

PHILADELPHIA ELECTRIC COMPANY

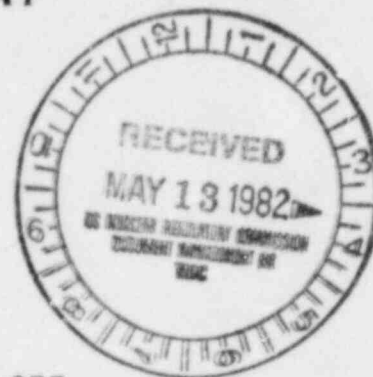
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JOSEPH W. GALLAGHER
MANAGER
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May 11, 1982

Docket Nos. 50-277

Mr. John F. Stolz
Operating Reactor Branch #4
Division of Licensing
US Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Stolz:

IE Bulletin 80-13 "Cracking in Core Spray Spargers", required, in part, that in the event cracks are identified an evaluation shall be provided to the NRR for review and approval prior to return to operation.

The attached discussion provides a summary of the analysis performed to support restart and continued operation of Peach Bottom Unit 2.

Please note that although the evaluation concludes that no modifications are required in order to assure safe operation, Philadelphia Electric nevertheless, will install a clamp at the crack location to provide further assurance of core spray sparger operability and safe reactor operation. This clamp was designed and fabricated by General Electric. The installation has been reviewed by the Operation and Safety Review Committee.

The present refueling/maintenance outage is currently scheduled for completion on June 4, 1982, therefore prompt consideration of these matters would be appreciated.

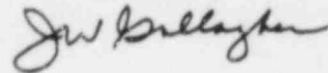
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This crack was reported to the NRC on Licensee Event Reports 2-82-09/1P, 2-82-09/1X, and by letter (S. L. Daltroff to R. C. Haynes, dated April 29, 1982).

If we can provide any additional information, please contact us.

Very truly yours,

A handwritten signature in cursive script, appearing to read "J. W. Briley".

Attachment

cc: R. C. Haynes, Administrator, NRC
C. J. Cowgill, Site Inspector

ATTACHMENT

DISCUSSION PEACH BOTTOM ATOMIC POWER STATION UNIT 2 - DOCKET No. 50-277 CORE SPRAY SPARGER CRACKING Spring, 1982

During the current refueling and maintenance outage, in vessel inservice inspection located a 180 degree crack in the header to junction box weld heat affected zone of the 'B' core spray sparger at Peach Bottom Unit 2.

General Electric has provided information regarding the safety significance of this crack as a result of analysis they have performed. Philadelphia Electric Company anticipate receipt of these formal analyses no later than May 17, 1982, however, a summary of the preliminary results is provided as follows:

A. Area of discussion

1. Analysis has been directed toward three areas of significance.
 - a. Emergency core cooling system performance limits
 - b. Structural integrity
 - c. Loose parts
2. A comparison to the Pilgrim Station, which due to similar indications, had previously been reviewed by the NRC, was conducted.

B. Summary Results

1.a. Emergency Core Cooling.

It is General Electric's conclusion that there is no change in the Maximum Average Planar Heat Generation Rate (MAPLHGR) limit of the upcoming Cycle 6.

The bounding effect of the sparger crack on ECCS performance was evaluated by reanalyzing the limiting Design Basic Accident (DBA) LOCA event, assuming complete severance of the cracked sparger at the crack location. The resultant localized coolant distribution reduces the core spray heat transfer effectiveness and potentially increases the maximum calculated peak cladding temperature (PCT). The limiting break size of the ECCS analysis does not change with this assumption.

The reanalysis did not take credit for the effects of localized spray distribution on core reflooding. Localized injection would cause earlier subcooling and counter current flow limiting (CCFL) breakdown which results in a faster core reflood.

The original limiting LOCA event analysis for Reload 5, Cycle 6, resulted in a maximum PCT of 1965 degrees F. The present analysis results in a maximum PCT of 2075 degrees F. The maximum predicted bundle average exposure for 8x8R fuel at the end of Cycle 6 is predicted to be approximately 30 GWD/ST. The current accepted licensing basis for ECCS performance limits which accounts for increased fission gas release at higher exposures (Ref. letter R. E. Engle, GECo, to T. A. Ippolito, NRC, May 28, 1981) requires approximately 70 degrees F margin to the 10 CFR 50 part 46 limit for 2200 degrees F. Since reanalysis indicates a margin of 125 degrees F, no reduction is required in the Cycle 6 MAPLHGR limits.

1b. Structural Integrity

The core spray sparger cracking at Peach Bottom Unit 2 is thought to be caused by the influence of weld sensitization or prior sensitization of the arm material and subsequent cold work of the arms during forming and installation. Sources of stress for possible Intergranular Stress Corrosion Cracking (IGSCC) are dependent on residual stresses from arm bending and deflection during installation.

All identified stresses during normal operation were found to be negligible. The loading considered include impingement load, seismic loading, pressure, weight and thermally induced loads. It is concluded that these normal operating loads do not result in stresses which

are sufficient to explain the cracks observed in the sparger.

Stresses incurred during core spray injection are the design stresses for the sparger. Design loadings include those listed above plus those resulting from system activation. It is concluded that the structural integrity of the sparger will be maintained during core spray injection.

In the evaluation of crack arrest, the stresses due to bracket restraint and the fabrication residual stresses were significant and were evaluated in detail. Because the applied loading is predominantly displacement controlled, the stresses relax as the cracks grow. Crack arrest is therefore expected.

In summary, the potential sources of stresses in the spargers resulting from fabrication, installation, normal operation, and operation during postulated Loss of Coolant Accidents were reviewed. Potential causes of cracking and the likelihood of crack propagation were evaluated. It is concluded that the structural integrity of the sparger will be maintained for all conditions of operation.

1c. Loose Parts Analysis

Although it is anticipated that the sparger will not break, an evaluation of the possible consequences of a potential loose piece was performed. The evaluation addressed the following safety concerns: 1) Potential for corrosion or other chemical action to reactor materials; 2) Potential for flow blockage to a fuel bundle and subsequent fuel damage and; 3) Potential for interference with control rod operation.

The probability for unacceptable corrosion or other chemical action is zero. The sparger material was selected for the reactor vessel environment.

It is not possible to uniquely describe a loose part since one has not occurred. Therefore, three different types of loose pieces were postulated. They are: a section of sparger pipe; an outlet nozzle and; a small piece of the sparger. The potential for these postulated pieces to cause blockage or interference was evaluated by considering appropriate hydrodynamic

principles and available flow paths. The possible effects of these concerns on safe reactor operation was also addressed. It is concluded that the potential for unacceptable flow blockage of a fuel assembly or for control rod interference is essentially zero.

2. Comparison of Peach Bottom and Pilgrim events

At Pilgrim, indications were found in both the upper and lower sparger headers, while at Peach Bottom 2 an indication was found only in the lower sparger. The entire analysis for both Pilgrim and Peach Bottom 2 (including the structural and loose parts analyses) were performed following the same documented procedures and using approved Appendix K LOCA models.

The ECCS portion of this procedure involves applying a spray heat transfer penalty in the approved model inputs. This procedure is very conservative and yields a bounding result and it is within the framework of the standard reload analysis procedure. It does not depend on the number or size of the cracks in a sparger but rather assumes no spray heat transfer from the spargers containing the indications. Applying this procedure to Pilgrim resulted in an assumed loss of spray cooling from both spargers whereas at Peach Bottom only the loss of spray cooling from the lower sparger is assumed.

The ECCS analysis results in a higher maximum PCT which can, depending upon PCT margin, result in merely a reduction of margin, as in the case of Peach Bottom, or a lowering of the MAPLHGR limit as at Pilgrim.

In summary, the same ECCS analysis procedures and models were applied to both Peach Bottom and Pilgrim. However, in the Peach Bottom analysis only one sparger was assumed to lose spray cooling effectiveness. The procedures and conclusions of the structural and loose parts analysis were identical for both Peach Bottom and Pilgrim. Therefore, it is reasonable to compare the situations at both Units recognizing the difference heretofore noted.