Station Support Department

PECO NUCLEAR
A Unit of PECO Energy

IEB 80-13

PECO Energy Company
965 Chesterbrook Boulevard
Wayne, PA 19087-5691

September 26, 1996

Docket No. 50-277

License No. DPR-44

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

Subject: Peach Bottom Atomic Power Station, Unit 2
Core Spray In-Vessel Piping

Dear Sir:

The purpose of this letter is to provide additional information regarding crack indications identified in the Peach Bottom Atomic Power Station, Unit 2 Core Spray (CS) System. Attachment A discusses the generic implications of the crack indications, and supplements information telecopied (3:52 P.M.) to the U. S. Nuclear Regulatory Commission (USNRC) earlier today. This evaluation was approved by the Plant Operations Review Committee on September 26, 1996.

If you have any questions, please contact us.

Very truly yours,

G. A. Hunger, Jr.

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

Attachment

cc: H. J. Miller, Administrator, Region I, USNRC
W. L. Schmidt, USNRC Senior Resident Inspector, PBAPS

a:cs3

Attachment A

PEACH BOTTOM ATOMIC POWER STATION - UNIT 2
CORE SPRAY SPARGER TEE-BOX

EXECUTIVE SUMMARY

Engineering evaluated the Core Spray sparger Tee-box for generic implications as a result of indications found on the header Tee-box cover plate assembly. Engineering concluded that generic implications are not applicable based on a review of the weld geometry, fabrication, and Tee-box applied loads.

The Core Spray Sparger cover to Tee-box weld (Figure 1) is a full penetration weld and therefore non-creviced, eliminating a significant contributor to IGSCC initiation. Additionally, the Tee-box and sparger were installed and welded in the shop, which provides better control of design and fabrication tolerances, and reduces or eliminates induced loads due to fit up. Finally, sparger Tee-box operational loads due to flow and pressure are approximately one third of those at the header Tee-box resulting in lower stresses in the cover plate than that of the header Tee-box cover plate.

In addition to design and operational evaluations, sparger Tee-box inspections have been performed since 1980 in accordance with USNRC IEB 80-13. One sparger pipe to Tee-box weld ("B" sparger) cracked as a result of excessive cold working during pre-construction repairs. A repair clamp was installed in 1982 (Figure 3) and inspections are performed on this repair clamp each refueling outage. No other indications have been identified to date. The clamp and accessible areas of the cover plate weld were inspected during 2R11 with no indications identified.

A comparison of sparger Tee-box to header Tee-box is provided below.

CORE SPRAY T-BOX COMPARISON	
Sparger T-box	Header T-box
1. Shop fabricated.	1. Field fabricated.
2. Full penetration weld design yields non-crevice weld.	2. Partial penetration weld has potential to yield a small crevice weld.
3. Estimated loading on T-box cover plate from Core Spray injection is 3235 lbf. (4000 gpm @ 85 psid). Minimum ligament = 2 ligaments @ 17 deg. each considering 2.77 SF.	3. Estimated loading on T-box cover plate from Core Spray injection is 9,170 lbf. (7825 gpm @ 133 psid). Minimum ligament = 2 ligaments @ 61 deg each considering 2.77 SF

CONSTRUCTION AND FABRICATION

The sparger Tee-box configuration is different than the header Tee-box. The header Tee-box is a .437" thick forging with a .25" cover plate attached utilizing a partial penetration groove weld (Figure 2). The sparger Tee-box is a .28" thick forging with a .25" cover plate attached utilizing a **full** penetration groove weld (Figure 1) which is a non-creviced weld, therefore eliminating a significant contributor to IGSCC initiation. Additionally, sparger Tee-box fabrication was done in the shop rather than in the field and the potential for fabrication induced stresses is expected to be lower.

LOADS

Operational loads were determined based on component design and system flow and pressure. The loads are approximately one third less in the sparger Tee-box than those associated with the header Tee-box due to system design. Estimated loading on the sparger Tee-box cover from Core Spray injection is 3235 lbf. (4000 GPM @ 85 psid); vs. 9,170 lbf. (7,825 GPM @ 133 psid) for the header Tee-box.

INSPECTIONS AND FREQUENCY

Core Spray Spargers, Tee-boxes, Nozzles, and Brackets have been examined each refueling outage since 1980 in response to USNRC I.E. Bulletin 80-13. The inspection technique utilized the Visual Testing VT-1 method, with 1 mil resolution. The last examinations were performed in 1994, during 2R10. No indications, IGSCC or others, have been identified to date. However, one sparger pipe to Tee-box weld ("B" sparger) cracked as a result of excessive cold working during pre-construction repairs. A repair clamp was installed in 1982 (Figure 3). Inspections are performed on this repair clamp each refueling outage. The repair clamp captures the Tee-box cover plate as well as the sparger to Tee-box welds. The inspections performed during 2R11 provided visual access to a 30 degree radius of the Tee-box weld and no indications were identified. A summary of the inspections are provided below.

CORE SPRAY SPRARGER INSPECTIONS PERFORMED PER 80-13				
OUTAGE	A SPARGER 240 AZ	B SPARGER 120 AZ	C SPARGER 240 AZ	D SPARGER 120 AZ
2R04	SAT	SAT	SAT	SAT
2R05	SAT	SAT	SAT	SAT
2R06	SAT	REPAIR	SAT	SAT
2R07	SAT	SAT	SAT	SAT
2R08	SAT	SAT	SAT	SAT
2R09	SAT	SAT	SAT	SAT
2R10	SAT	SAT	SAT	SAT

Re-examination will be performed every other refueling outage per VIP-18 recommendations. The next inspection is scheduled to be performed during 2R12.

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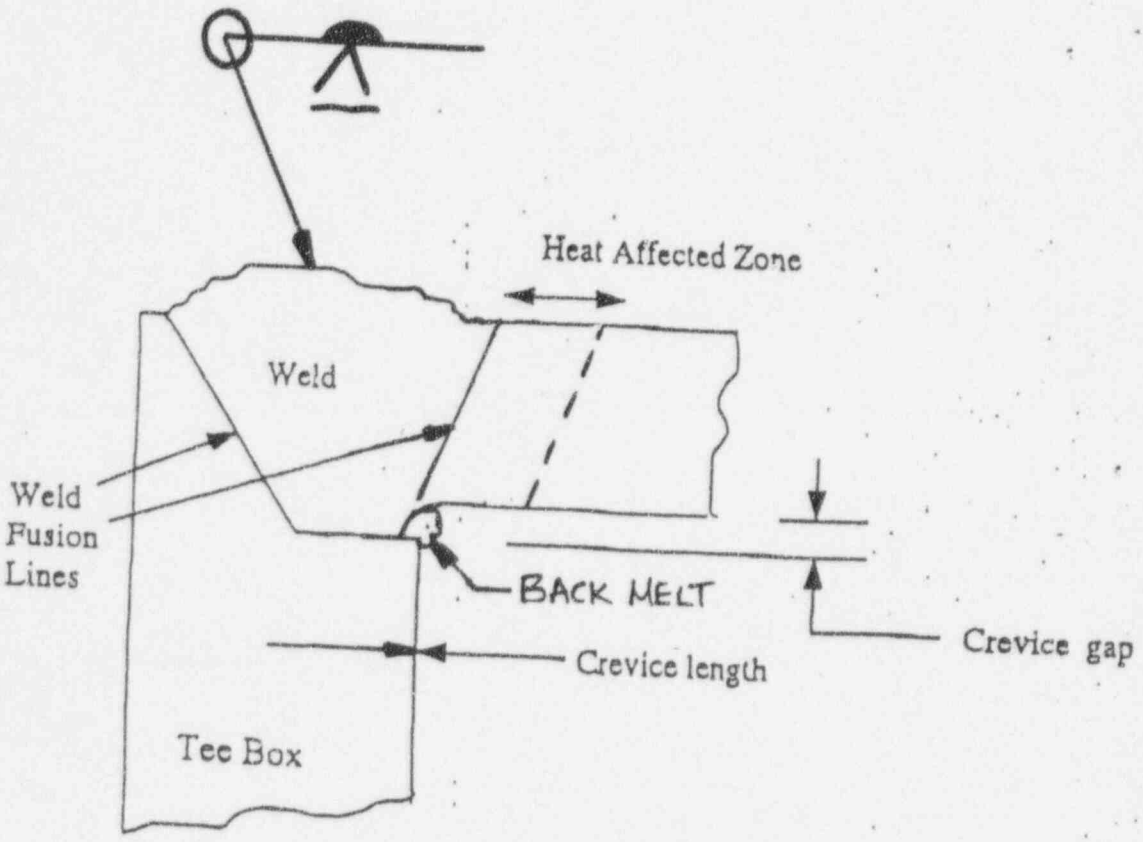
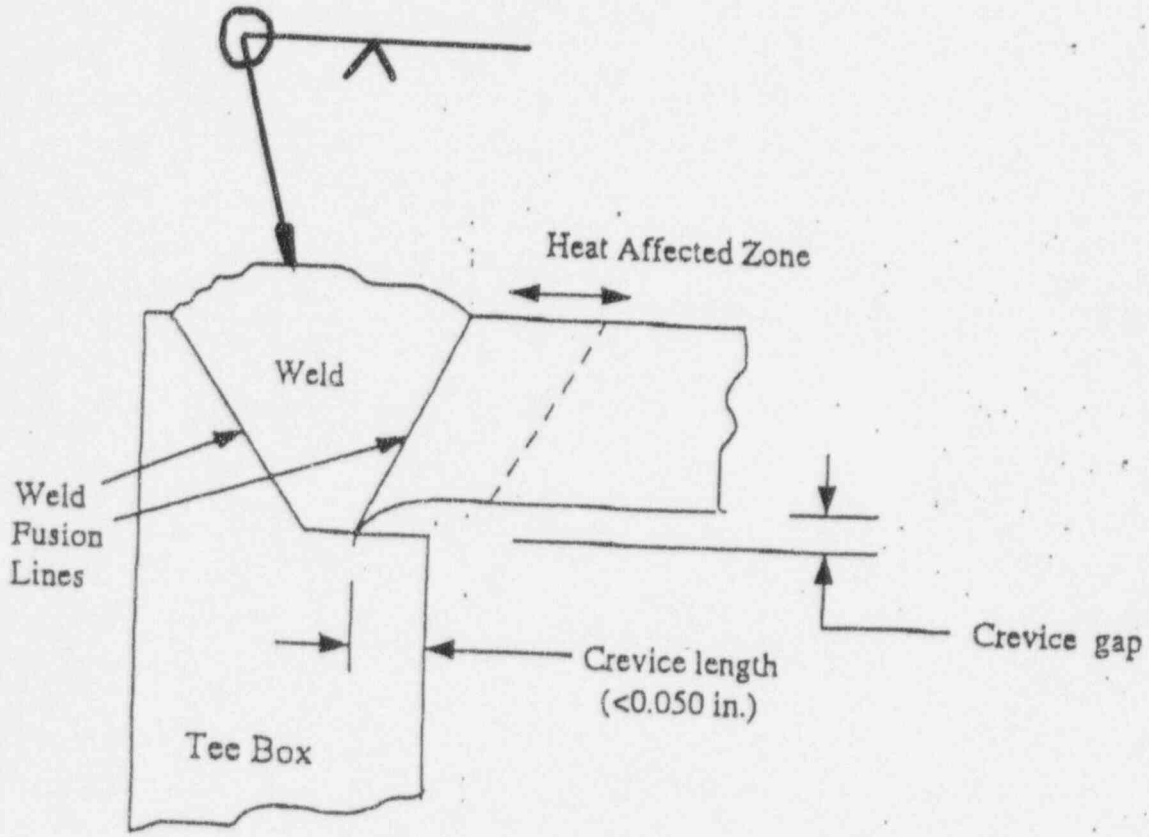


SPARGER

FIGURE 1



HEADER

FIGURE 2

'B' SPARGER TEE-BOX CLAMP REPAIR

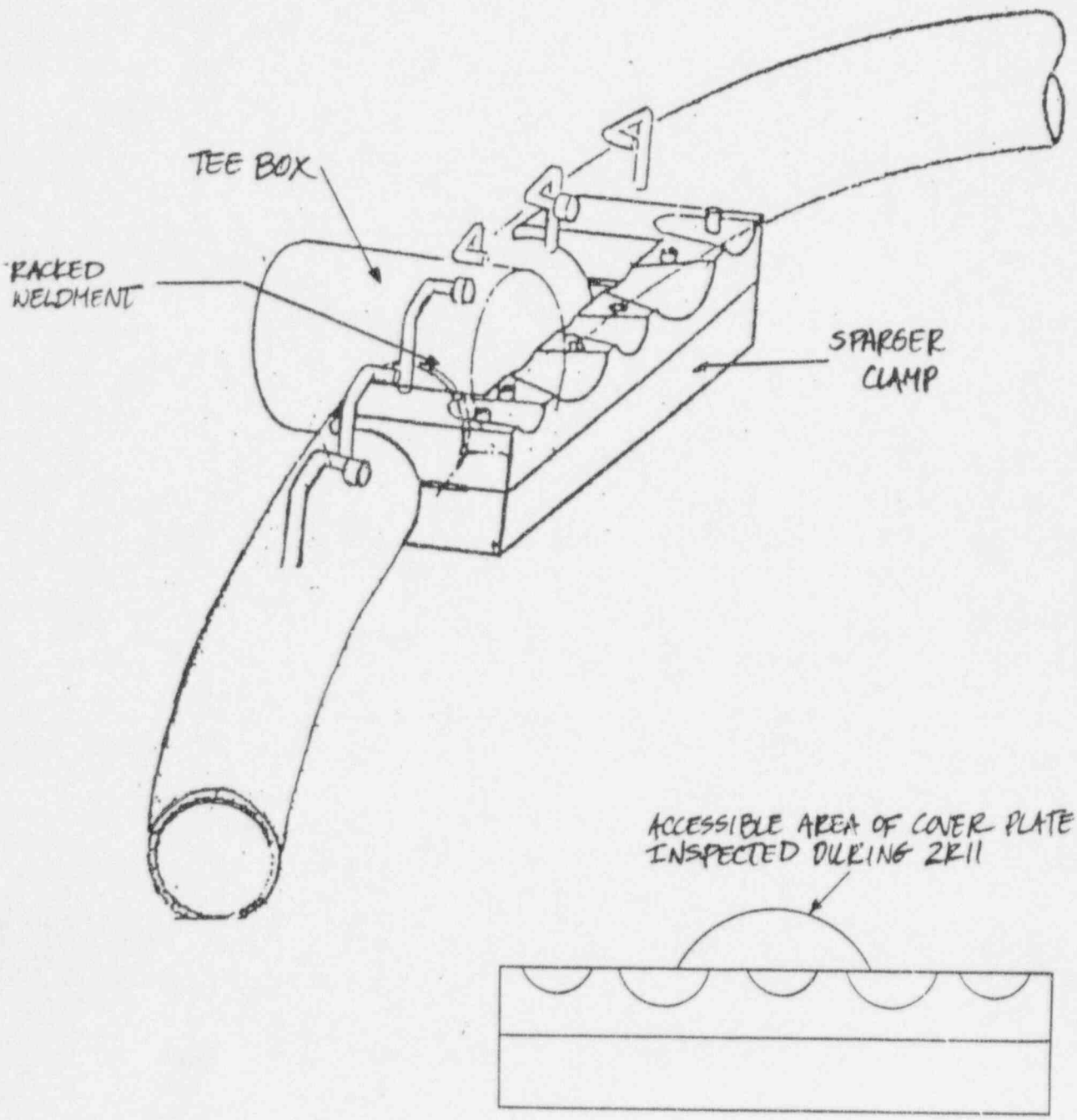


FIGURE 3

GE Nuclear Energy

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

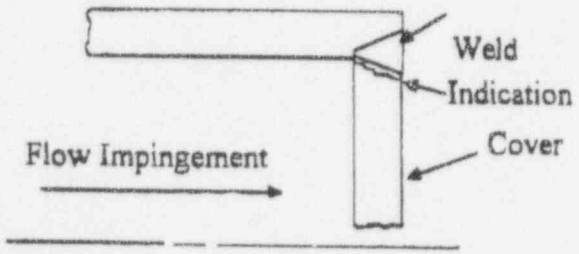
September 26, 1996

Vijay Nilekani
PECo Energy

Subject: Peach Bottom Unit 2 Core Spray Loop B Sparger Tee-Box Allowable Flaw Evaluation

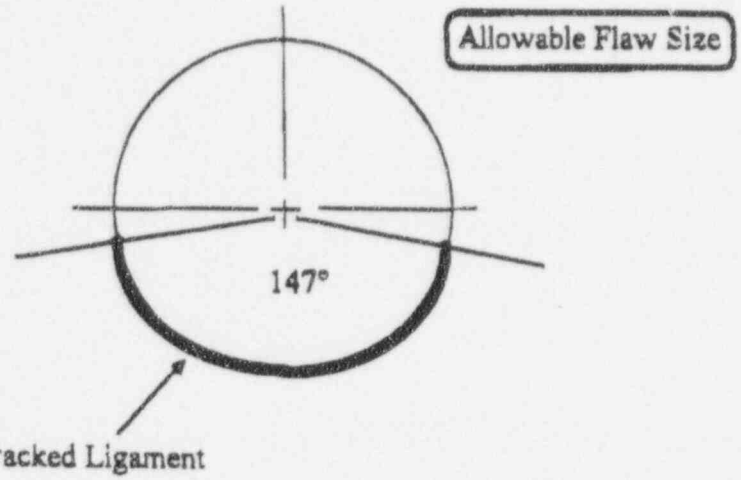
An evaluation of was performed to determine the allowable through-wall flaw length in the Peach Bottom Unit 2 Core Spray Loop B sparger tee box. Also, an evaluation was performed to determine the length of two uncracked ligaments, located opposite to each other. The applied loads at this condition are the pressure drop across the Tee box wall and the flow impingement loads due to core spray injection. A pressure drop of 85 psi and flow of 4000 gpm was used in the evaluation. The applied forces on the cover plate are 2456 lbs due to the pressure difference and 770.3 lbs due to the flow impingement.

The failure mode for this situation was ductile shear.

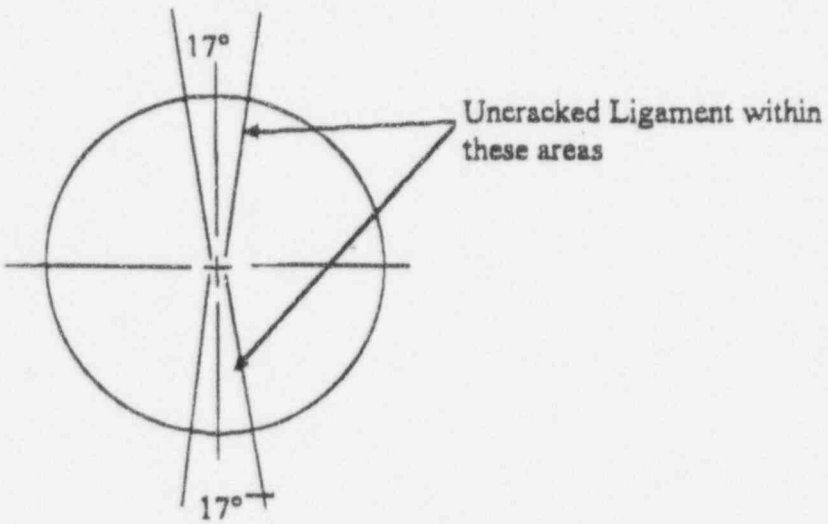


The approach used for these calculations was consistent to those in the BWRVIP Core Spray I&E Guidelines. A safety factor of 2.77 was used for this condition which corresponds to upset conditions. It is recognized that the core spray injection occurs only during a faulted event (higher allowable stress and lower required safety factors (1.39)), however, the higher upset factor of 2.77 was used to include conservatism in the evaluation. A correction factor for the welding process also was used which is consistent with the BWRVIP I&E Guideline.

Based on these assumptions and methodology, calculations were performed to determine the allowable through-wall crack in the cover plate. Results of this calculation demonstrate that the allowable through-wall flaw can be 213° of the circumference of the cover plate. This is shown in the following schematic.



The results of the calculation also determined that two equally spaced uncracked ligaments of length equivalent to 17° of the cover plate circumference are required at end-of-cycle to assure structural integrity. This is demonstrated in the following figure.



Please contact me if you have any questions.

Regards,

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