PECO ENERGY

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

September 9, 1994

Docket No. 50-277

License No. DPR-44

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

Subject: Peach Bottom Atomic Power Station, Unit 2
Submittal of Inspection Plan In Response to
Generic Letter 94-03, "Intergranular Stress Corrosion
Cracking of Core Shrouds in Boiling Water Reactors"

Dear Sir:

On August 24, 1994, PECO Energy Company responded to Generic Letter (GL) 94-03, dated July 25, 1994. Reporting Requirement 2 of the GL requested that an inspection plan of the core shroud be submitted to the U. S. Nuclear Regulatory Commission (USNRC) no later than 3 months prior to performing the inspections except for those plants whose inspections would occur less than three months from the receipt of the GL. As discussed in a call between M. C. Kray (PECO Energy Company) and S. Dembek (USNRC), on August 12, 1994, Peach Bottom Atomic Power Station, Unit 2 is scheduled to begin its refueling outage in September 1994, and, will submit its core shroud inspection plan by September 9, 1994.

Accordingly, attached is the inspection plan for PBAPS, Unit 2.

Please note that the core shroud inspections are currently scheduled to begin September 23, 1994. If a shroud repair is determined to be necessary, the currently scheduled date to begin the repair is October 5, 1994. The outage is currently scheduled to conclude on October 28, 1994.

If you have any questions, please contact us.

Very truly yours,

M. C. Kray for

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

Attachments

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

A018
1/1

COMMONWEALTH OF PENNSYLVANIA :

: ss.

COUNTY OF CHESTER :

D. M. Smith, being first duly sworn, deposes and says:

That he is Senior Vice President and Chief Nuclear Officer of PECO Energy Company; that he has read the enclosed additional response to Generic Letter 94-03, dated July 25, 1994, for Peach Bottom Facility Operating License DPR-44, and knows the contents thereof; and that the statements and matters set forth therein are true and correct to the best of his knowledge, information and belief.

Senior Vice President
Chief Nuclear Officer

Subscribed and sworn to
before me this 9th day
of September 1994.

Notary Public

Notarial Seal
Erica A. Santori, Notary Public
Tredyffrin Twp., Chester County
My Commission Expires July 10, 1995

PECO ENERGY COMPANY
SECOND RESPONSE TO NRC GENERIC LETTER 94-03

CORE SHROUD INSPECTION PLAN
PEACH BOTTOM ATOMIC POWER STATION
UNIT 2
DOCKET NUMBER 50-277

In accordance with Reporting Requirement Number 2 of NRC Generic Letter (GL) 94-03, dated 7/25/94, the following inspection plan, for Peach Bottom Atomic Power Station (PBAPS), Unit 2, is provided. This plan has been developed for implementation during the next refueling outage of PBAPS 2 (2R10), which is scheduled to begin on September 17, 1994.

The inspection methods, scope, and flaw evaluation criteria of this inspection plan satisfy the recommendations of the Boiling Water Reactor Vessel and Internals Project (VIP), as specified in the "BWR Core Shroud Inspection And Flaw Evaluation Guidelines" - GENE-523-113-0894, Rev. 0, dated September 1994 (Reference 2), and submitted to the NRC on September 2, 1994.

This inspection plan has been developed in response to "Requested Licensee Actions", Number 3, of the GL. It has been developed using the ongoing guidance provided by the VIP, the recommendations of General Electric Co. Service Information Letter (SIL) 572, Rev. 1, and site specific experience gained through previous shroud inspections at PBAPS, Unit 3. The key factors considered in the development of the plan include: hot operating years, materials, water chemistry history, fabrication processes, neutron fluence, available inspection techniques, accessibility, equipment, logistics of data evaluation, outage schedules, and stress corrosion cracking history at PBAPS, Unit 2.

The PBAPS, Unit 2 shroud is considered to be highly susceptible to Intergranular Stress Corrosion Cracking (IGSCC); due primarily to material, age, and water chemistry history. However, the PBAPS, Unit 2 shroud was fabricated using seamless, roll-forged rings, which have consistently shown an immunity to severe stress corrosion cracking in the weld heat affected zone (HAZ) in these applications (e.g. no plant which has inspected has found extensive cracking in forged rings). This mitigating factor has been acknowledged by the VIP, as documented in Section 2.1 of Reference 2.

Since the PBAPS, Unit 2 core shroud has experienced more than 6 hot operating years, and is fabricated primarily with higher carbon content stainless steel, it has been identified by Reference 2 as an Inspection Category C facility. For Inspection Category C, Reference 2 recommends a comprehensive inspection of shroud welds. This comprehensive inspection includes inspection of all circumferential shroud welds (i.e. H-1 through H-7).

PECO ENERGY COMPANY
SECOND RESPONSE TO NRC GENERIC LETTER 94-03

CORE SHROUD INSPECTION PLAN
PEACH BOTTOM ATOMIC POWER STATION
UNIT 2
DOCKET NUMBER 50-277

SCOPE OF INSPECTION:

The PBAPS, Unit 2 shroud welds can be divided into four groups:

1. Shroud attachment welds (e.g. shroud head bolt lugs)
2. Shroud vertical welds
3. Shroud support structure welds
4. Shroud circumferential welds

The safety consequences of degradation of the shroud attachment welds are considerably less significant than those associated with the circumferential welds; therefore, the shroud attachment welds have not been included in the initial inspection plan. Likewise, the vertical shroud welds have been shown to have a lower safety significance than the circumferential welds, and are not included in the initial inspection plan. The basis for elimination of these welds from the initial inspection plan is addressed in Section 3.11 and Appendix A of Reference 2.

The shroud support structure welds have not been included in the initial inspection plan. These welds are considered to be less susceptible to cracking than the shroud welds. Since the shroud support structure is fabricated from Alloy 600 material, its susceptibility to IGSCC is expected to be lower than the Type 304 stainless steel shroud material. Additionally, since the shroud support structure is welded in a non-creviced configuration, susceptibility to IGSCC is further reduced. Finally, in this region of the vessel, the applied stresses are relatively low, the reactor coolant is expected to be less oxidizing, and the fluence levels are significantly lower.

Therefore, the scope of welds included in the initial shroud inspection plan for PBAPS, Unit 2 include shroud circumferential welds H-1 through H-7.

PECO ENERGY COMPANY
SECOND RESPONSE TO NRC GENERIC LETTER 94-03

CORE SHROUD INSPECTION PLAN
PEACH BOTTOM ATOMIC POWER STATION
UNIT 2
DOCKET NUMBER 50-277

EXTENT OF INSPECTION:

The extent of inspection of each of these seven welds is based on factors such as accessibility, susceptibility, inspection technique, inspection equipment, neutron exposure (fluence), evaluation methods and outage schedules. The initial extent of planned inspections exceeds the minimum sound ligarnent approach, described in Section 3.0 of Reference 2. The extent of inspections has been developed considering inspection logistics and outage impact, while quantifiably demonstrating the structural integrity of the shroud welds H-1 through H-5. The extent of inspections may be expanded, depending on the results of the initial inspections.

Since accessibility for UT inspection of welds H-6 and H-7 is inherently limited, the extent of these inspections is intended to qualitatively demonstrate the structural integrity of welds H-6 and H-7, as discussed in Section 3.2 of Reference 2.

The inspection technique planned for the initial inspections is Ultrasonic Testing (UT). This technique is intended to interrogate the volume of the subject welds and associated heat affected zones for cracking initiating on the inside surface (ID) and portions of the outside surface (OD). Eddy Current Testing (ET) is also being considered, for interrogation of the outside surface (OD) of the subject welds, in order to compliment the UT technique and comprehensively inspect both surfaces of the shroud. The decision for use of the ET technique will be made near the time of implementation, based on factors such as: equipment availability, qualification, and experience. The evaluation of inspection results will be suitable for the technique or combination of techniques which is used. The equipment planned for use during these inspections includes the GE OD Tracker, and the GE Suction Cup Scanner. This combination of equipment will maximize the ability to access the shroud welds.

The extent of inspection of each circumferential weld will vary, depending on the specific weld characteristics (i.e. accessibility, inspection technique, safety significance, fluence, loads, evaluation methodology, and inspection results). The initial extent of inspections planned, using a combination of UT and ET, is as follows:

Weld Number	*Extent Of Inspection
H-1	Accessible length in a 180° segment
H-2	Accessible length in a 180° segment
H-3	Accessible length in a 360° segment
H-4	Accessible length in a 360° segment
H-5	Accessible length in a 180° segment
H-6	Accessible length in the area of the two access hole covers
H-7	Accessible length in the area of the two access hole covers

* Changes to extent of inspections occur, depending on technique (e.g. UT only) or combination of techniques used.

PECO ENERGY COMPANY
SECOND RESPONSE TO NRC GENERIC LETTER 94-03

CORE SHROUD INSPECTION PLAN
PEACH BOTTOM ATOMIC POWER STATION
UNIT 2
DOCKET NUMBER 50-277

EVALUATION:

The evaluation of the results of the inspections will include a combination of fracture mechanics methodologies. As recommended in Reference 2, for welds which have a projected neutron exposure (fluence) level greater than $3X10^{20}$ N/CM^2 through the next two operating cycles, the analysis will include both the Limit Load and Linear Elastic Fracture Mechanics (LEFM) methodologies. For welds with an exposure level below this threshold, the Limit Load technique will be used exclusively. The planned application of fracture mechanics analysis is as follows:

WELD NUMBER	METHODOLOGIES
H-1	Limit Load only
H-2	Limit Load only
H-3	Limit Load and LEFM
H-4	Limit Load and LEFM
H-5	Limit Load only
H-6	Limit Load only
H-7	Limit Load only

The initial evaluations will consider all identified indications and uninspected ligaments to be through-wall cracks. Two cycles of crack growth (CG) and an NDE uncertainty factor (U) will be included in the evaluation. Detailed evaluations, including flaw depth sizing, in accordance with Reference 2, may be conducted, based on inspection results.

If the UT inspection technique is used exclusively, the evaluations will be adjusted to address any limitations which this technique may have regarding detection on the near surface.

REPAIR:

If the results of the shroud inspections do not satisfactorily demonstrate structural integrity of the shroud, a contingency repair option has been planned. This option includes a complete shroud repair (Modification P-00435), consisting of tie rods and horizontal stabilizers. The complete repair is being designed by General Electric Co. to fully replace the H-1 through H-7 welds, using the VIP Core Shroud Repair Design Criteria (Reference 3).

REFERENCES:

1. PECO Energy Response to Generic Letter 94-03, dated August 24, 1994.
2. BWR Core Shroud Inspection and Flaw Evaluation Guidelines, GENE-523-113-0894, Rev. 0, dated September 1994.
3. BWR Core Shroud Repair Design Criteria, Revision 0, dated August 10, 1994.