

**PECO NUCLEAR**

A Unit of PECO Energy

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

January 12, 1999

Docket No. 50-353
License No. NPF-85U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555Subject: Limerick Generating 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/Madam:

On July 25, 1994, the NRC issued Generic Letter (GL) 94-03, "Intergranular Stress Corrosion Cracking of Core Shrouds in Boiling Water Reactors." This GL requested in part, that Boiling Water Reactor (BWR) licensees perform core shroud inspections at their plants. This GL also included several reporting specific requirements.

By letter dated August 24, 1994, PECO Energy responded to GL 94-03 for Limerick Generating Station (LGS), Units 1 and 2. Subsequently, in a letter dated March 13, 1995, the NRC issued a Safety Evaluation Report (SER) for LGS, Unit 2, indicating that PECO Energy had provided the necessary information in order for the NRC to complete its review of GL 94-03.

By letter dated October 28, 1996, PECO Energy submitted schedule information indicating that the core shroud inspections for LGS, Unit 2, would be performed during the fifth refueling outage (2R05) planned for 1999. This refueling outage is currently scheduled to begin on April 16, 1999. Reporting Requirement 2 of GL 94-03 stipulates that licensees must submit a written response containing information pertaining to inspection plan information no later than three (3) months prior to performing the core shroud inspections. Accordingly, the attachment to this letter contains the core shroud inspection plan for LGS, Unit 2. This letter is being submitted under affirmation, and the required affidavit is enclosed.

If you have any questions or require additional information, please do not hesitate to contact us.

Very truly yours,

G. D. Edwards
Director- Licensing

A018 1/1

Attachment
Enclosurecc: H. J. Miller, Administrator, Region I, USNRC (w/ attachment, enclosure)
A. L. Burritt, USNRC Senior Resident Inspector, LGS (w/ attachment, enclosure)9901210369 990112
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bcc:	G. R. Rainey - 63C-3	w/o attachment, enclosure
	J. D. von Suskil - LGS, SMB1-1	"
	J. J. Hagan - 62C-3	"
	C. P. Lewis - 63C-2	"
	M. P. Gallagher - LGS, GML5-1	"
	J. P. Grimes - LGS, SSB3-1	"
	C. T. Bell - LGS, SSB2-3	w/ attachment, enclosure
	T. A. Moore - LGS, SSB2-4	"
	B. S. Oliver - LGS, JSK4-1	"
	D. P. Helker - 62A-1	"
	V. M. Nilekani - 63B-5	"
	R. J. McCall - 63B-3	"
	R. E. Ciemiewicz - 63B-3	"
	D. L. Schmidt - LGS, SSB2-3	"
	PA DEP BRP Inspector - LGS, SSB2-4	"
	Commitment Coordinator - 62A-1	"
	Correspondence Control Desk - 61B-5	"
	DAC - 61B-5	"

**LIMERICK GENERATING STATION, UNIT 2
RESPONSE TO GENERIC LETTER 94-03
REPORTING REQUIREMENT 2**

CORE SHROUD INSPECTION PLAN

BACKGROUND

On July 25, 1994, the NRC issued Generic Letter (GL) 94-03, "Intergranular Stress Corrosion Cracking of Core Shrouds in Boiling Water Reactors." PECO Energy responded to GL 94-03 for Limerick Generating Station (LGS), Units 1 and 2, by letter dated August 24, 1994. The NRC issued a Safety Evaluation Report (SER) for LGS, Unit 2, regarding GL 94-03 on March 13, 1995. By letter dated October 28, 1996, PECO Energy submitted core shroud inspection schedule information for LGS, Unit 2.

In accordance with Reporting Requirement 2 of Generic Letter (GL) 94-03, and in response to the NRC's Safety Evaluation Report (SER) issued by letter dated March 13, 1995, the following core shroud inspection plan for Limerick Generating Station (LGS) Unit 2, is provided. This plan has been developed for implementation during the next refueling outage for LGS, Unit 2 (2R05), which is scheduled to begin on April 16, 1999.

The examination methods, scope, and flaw evaluation criteria of this inspection plan satisfy the recommendations of the Boiling Water Reactor Vessel and Internals Project (BWRVIP), as specified in BWRVIP-01, "BWR Core Shroud Inspection and Flaw Evaluation Guideline," Revision 2, EPRI Report TR-107079, dated October 1996.

This inspection plan has been developed in response to Requested Licensee Action 3, of the GL. The plan has been developed using ongoing guidance provided by the BWRVIP and site specific experience gained through previous core shroud inspections at LGS, Unit 1, and Peach Bottom Atomic Power Station (PBAPS), Units 2 and 3. The key factors considered in the development of this plan include: hot operating years, materials of fabrication, water chemistry history, and current industry experience.

The LGS, Unit 2, core shroud is considered to be moderately susceptible to Intergranular Stress Corrosion Cracking (IGSCC); due primarily to age, materials of fabrication, and water chemistry history.

Since the LGS, Unit 2, core shroud has experienced more than eight (8) hot operating years, and is fabricated with low carbon content stainless steel, and has had a conductivity less than or equal to 0.30 microS/cm for the first five (5) fuel cycles, it has been identified in BWRVIP-01 as an Inspection Category B plant. For Inspection Category B plants, BWRVIP-01 recommends a limited inspection of specific core shroud welds. This limited inspection includes a sufficient length of the core shroud circumferential welds to enable determination of the structural integrity of the weld, considering crack growth and NDE uncertainties. The inspection scope includes core shroud circumferential welds H-3, H-4, H-5, and H-7.

SCOPE OF INSPECTION

The LGS Unit 2 core 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 attachment welds, vertical welds, and support structure welds have been excluded from this initial inspection plan. PECO Energy is aware of the ongoing dialogue between the BRWVIP and the NRC regarding vertical shroud weld inspections. However, since vertical weld inspection guidance has not been finalized, and considering the moderate IGSCC susceptibility of the LGS, Unit 2, core shroud, vertical weld inspections are not included in the scope of this initial inspection plan. In addition, Section 3.1 and Appendix A of BWRVIP-01 provides a basis for excluding these welds from the initial inspection plan. Therefore, the scope of welds included in this core shroud baseline inspection plan for LGS, Unit 2, include core shroud circumferential welds H-3, H-4, H-5, and H-7.

EXTENT OF INSPECTION

The extent of inspection of each of these four welds is based on accessibility for state-of-the-art examination equipment.

The examination technique planned for this baseline inspection 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 the outside surface (OD) of the core shroud. The equipment, procedures and personnel shall meet the Standards for Ultrasonic Examination of BWR Vessel Internal Components as established in BWRVIP-03, "Reactor Pressure Vessel and Internals Examination Guidelines," Draft Revision 1, dated October 1998. The equipment to be used is intended to maximize access to and thereby coverage of the core shroud weld and required volumes. The evaluation of examination results will be suitable for the examination technique and delivery system used.

Additional Nondestructive Examination (NDE) methods, including Eddy Current Testing (ET) and Visual Testing (EVT-1) as identified in Table 3-2 of BWRVIP-01, may be used as necessary to achieve the targeted baseline examination coverage and/or disposition recorded UT indications. The equipment, procedures and personnel for these additional NDE methods shall also have been successfully demonstrated for the BWRVIP following the protocol established per BWRVIP-03.

The extent of inspection of each core shroud circumferential weld may vary, depending on the specific weld characteristics (i.e., accessibility to in-vessel components, unexpected interferences). The initial extent of inspections planned, using the inspection system described above, is as follows:

<u>Weld Number</u>	<u>Extent of Inspection Planned</u>
H-3, H-4, H-5, and H-7	100% examination of the accessible length in a 360° segment

If the cumulative length of flaw indication found in any weld is greater than or equal to 10% of the examined weld length, the scope of the inspections will be extended to include welds H-1, H-2 and H-6.

EVALUATION

The evaluation of the examination results will include a combination of fracture mechanics methodologies. As recommended in BWRVIP-01, for welds which have a projected neutron exposure (fluence) level greater than 3×10^{20} n/cm² through the next two (2) 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:

<u>Weld Number</u>	<u>Methodologies</u>
H-3	Limit Load and LEFM
H-4	Limit Load and LEFM
H-5	Limit Load
H-7	Limit Load

The initial evaluations will consider all identified crack indications to have through-wall depth. Unexamined (inaccessible) weld lengths will also be considered as through-wall indications. A minimum of two (2) cycles of crack growth and an NDE uncertainty factor will be included in the evaluation. Detailed evaluations, including flaw depth sizing, in accordance with BWRVIP-01, may be conducted, based on examination results. Assumptions for the uninspected regions shall be re-evaluated, but still conservative, to base flaw depths on flaws detected in the inspected region of a given weld and the distribution, including length, on flaws detected in the inspected region of that weld. If no flaw indications are identified at a given weld, no formal evaluation is considered necessary for that weld.

REPAIR

Because of the moderate susceptibility of the LGS, Unit 2, core shroud to the degradation phenomenon, and the results of inspection of more susceptible core shrouds, the need for shroud repair is not expected at this time. However, should a repair of the core shroud be necessary, the repair design shall follow the guidance of BWRVIP-02, "Core Shroud Repair Design Criteria," Revision 1, EPRI Report TR-106337, dated September 1994, and shall be submitted to the NRC in accordance with BWRVIP-04, "Guide for Format and Content of Core Shroud Repair Design Submittals," EPRI Report TR-105692, dated October 1995, prior to implementation during a future outage. The scope of this inspection will be extended to include those examinations necessary to ensure the structural integrity of components relied on by the repair design.

REPORTS

PECO Energy will provide the results of the LGS, Unit 2, core shroud inspections conducted during 2R05 within 30 days of completion of the inspections as required by Reporting Requirement 3 of GL 94-03.

COMMONWEALTH OF PENNSYLVANIA

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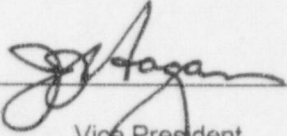
SS.

COUNTY OF CHESTER

:

J. J. Hagan, being first duly sworn, deposes and says:

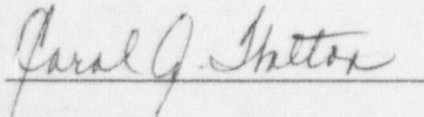
That he is Vice President of PECO Energy Company; that he has read the foregoing supplemental response to Generic Letter 94-03 for Limerick Generating Station, Unit 2, concerning core shroud inspection plans, and knows the contents thereof; and that the statements and matters set forth therein are true and correct to the best of his knowledge, information, and belief.


Vice President

Subscribed and sworn to

before me this *12th* day

of *January* 1999.



Notary Public

