Station Support Department

PECO NUCLEAR
A Unit of PECO Energy

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

November 4, 1996

Docket Nos. 50-352
50-353

License Nos. NPF-39
NPF-85

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

Subject: Limerick Generating Station, Units 1 and 2
Technical Specifications Change Request No. 95-14-0
Response to Request for Additional Information

Gentlemen:

By letter dated June 28, 1996, PECO Energy Company submitted Limerick Generating Station (LGS), Unit 1 and Unit 2, Technical Specifications (TS) Change Request No. 95-14-0 that proposed adopting 10CFR 50, Appendix J, Option B, performance based testing. By letter dated October 10, 1996, the NRC requested additional information involving TS Change Request No. 95-14-0, which is provided in Attachment 1 to this letter.

This additional information is being submitted under affirmation and the associated affidavit is enclosed.

If you have any questions, please do not hesitate to contact us.

Very truly yours,

G. A. Hunger, Jr.

G. A. Hunger, Jr.
Director - Licensing

A017

Attachment
Enclosure

cc: H. J. Miller, Administrator, Region I, USNRC (w/enclosure attachment)
N. S. Perry, USNRC Senior Resident Inspector, LGS (w/enclosure attachment)
R. R. Janati, PA Bureau of Radiation Protection (w/enclosure attachment)

COMMONWEALTH OF PENNSYLVANIA :

: SS

COUNTY OF CHESTER :

D. B. Fetters, being first duly sworn, deposes and says: that he is Vice President of PECO Energy Company, the Applicant herein; that he has read the enclosed additional information supporting Technical Specifications Change Request No. 95-14-0 "Adoption of Performance Based 10 CFR 50, Appendix J, Option B Testing," for Limerick Generating Station, Unit 1 and Unit 2, Facility Operating License Nos. NPF-39 and NPF-85, 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.

Subscribed and sworn to

before me this 1ST day

of November 1996.

Mary Lou Skrocki

Notary Public

Notarial Seal
Mary Lou Skrocki, Notary Public
Tredyffrin Twp., Chester County
My Commission Expires May 17, 1999

Attachment 1

Limerick Generating Station

Unit 1 and Unit 2

Docket Nos.
50-352
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License Nos.
NPF-39
NPF-85

Technical Specifications Change Request

No. 95-14-0

"Adoption of Performance Based 10CFR50, Appendix J, Option B Testing"

Additional Information

8 pages

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NRC RAI #1

Provide a discussion of the potential increase in risk due to extending the drywell-to-suppression pool bypass test interval to 10 years. Address such issues as:

(1) increase in risk of overpressurizing containment due to bypass leakage following a severe accident,

(2) increase in source terms for various events due to bypass of the suppression pool followed by containment failure, and

(3) the possibility of bypass leakage of large amounts of hydrogen to the suppression pool.

PECO Response #1

1) Extending the drywell-to-suppression pool bypass test interval to 10 years in order to coincide with the Type A, Integrated Leak Rate Test (ILRT) will not result in an increase in the calculated Containment Overpressure Failure (COPF) frequency. As shown in the table below, COPF is dominated by loss of decay heat removal (DHR), not loss of vapor suppression. The small fraction of COPF resulting from loss of vapor suppression is a result of vacuum breaker failure, not wetwell airspace bypass. Technical Specification 4.6.2.1.f requires that a separate leakage test be conducted on the vacuum breakers during each refueling outage for which the drywell bypass leakage test is not conducted. This test ensures that the vacuum breaker leakage area remains significantly below the Technical Specifications bypass leakage area. The vacuum breaker test frequency (TS 4.6.2.1.f) is unaffected by the proposed change in test frequency (TS 4.6.2.1.e) for the drywell-to-suppression chamber bypass test which is conducted during ILRT testing. Therefore, the most probable source of bypass leakage, the vacuum breakers, will continue to be tested at the current frequency of 24 months, independent of the bypass test frequency. Thus, the proposed change to adopt Option 'B' testing which allows a 10 year ILRT test interval, does not have an adverse affect on the capability to detect vacuum breaker leakage, and as such will not impact the COPF frequency resulting from a failure of the DHR equipment or the vacuum breakers.

COPF Frequencies

Event Class	Loss of DHR	Loss of Vapor Suppression	Total COPF
Transients	62.6%	0.10%	62.7%
ATWS	32.8%	0.09%	32.9%
Small LOCA	0.11%	0.07%	0.17%
Medium LOCA	0.37%	1.00%	1.37%
Large LOCA	0.92%	1.98%	2.90%
Total	96.8%	3.20%	100%

One may postulate that COPF may occur as a result of suppression pool bypass, due to failure modes other than vacuum breakers failing open. However, a review of the containment response, as described in the subsequent paragraphs, demonstrates that in the absence of gross diaphragm failures, that is, failures that are in excess of design basis leakage, suppression pool bypass can only result in COPF when coupled with a loss of decay heat removal. Since the drywell-to-suppression pool bypass test does not test the functionality of the decay heat removal equipment, extending the test interval to 10 years will not impact the COPF frequency.

Pressure suppression containments rely on steam condensation in the suppression pool for pressure suppression. Steam that bypasses the suppression pool will not be condensed and will contribute to containment pressurization. Pool bypass can occur as a result of the following containment failure modes:

- rupture of an Safety Relief Valve (SRV) tail pipe in the wetwell air space,
- failure of a pair of vacuum breakers open,
- leakage through the drywell floor, downcomers, or vent pipe assemblies into the wetwell air space.

Since the first two items are unrelated to the performance of the drywell-to-suppression pool bypass leakage tests, the only issue associated with this Technical Specification change is with the last item from this list.

Concerns associated with drywell-to-suppression pool bypass leakage are primarily with LOCAs. In transients and ATWS events, reactor coolant is not released to the drywell, but is transported directly to the suppression pool via the SRV tail pipes. In LOCAs, the release of reactor coolant is directly to the drywell. In this situation, drywell-to-suppression pool bypass leakage can contribute to containment pressurization since a significant amount of steam may flow directly into the suppression pool air space instead of the suppression pool. However, the plant design and operating procedures are intended to prevent COPF from drywell-to-suppression pool bypass leakage.

Primary coolant discharge into the drywell will cause the drywell to pressurize. Steam will begin to flow to the suppression pool once the pressure difference between the drywell and wetwell is sufficient to clear the downcomers at approximately 5 psid. If a leak path exists which allows the suppression pool to be bypassed, the wetwell will begin pressurizing before the vacuum breakers clear. If the bypass leakage is substantial enough, the pressure difference between the drywell and wetwell may never exceed 5 psid. In this case, vapor suppression capabilities via the suppression pool would be lost.

The plant design and Emergency Operating Procedures (EOPs) are intended to prevent the potential containment challenges from drywell-to-suppression pool bypass leakage. Primary coolant discharge into the drywell will cause the drywell to pressurize. Once the drywell pressure exceeds 1.68 psig, the primary containment control procedure EOP, T-102, instructs the operator to initiate suppression pool sprays before the containment pressure reaches 10 psig. Suppression pool spray operation will cause the vapor bypassing the suppression pool to condense. If the containment pressure continues to rise, for whatever reason including a large bypass of the suppression pool, the operator will initiate the drywell spray system once the containment pressure exceeds 10 psig. Operation of the drywell sprays is sufficient to terminate any pressure rise associated with drywell-to-suppression pool bypass leakage.

In the unlikely event that suppression pool sprays and drywell sprays are not functional and the containment pressure continues to rise, then the operator will be instructed to depressurize the Reactor Pressure Vessel (RPV). Once the RPV pressure drop is adequate, the operator will be able to initiate shutdown cooling or provide alternate shutdown cooling. Success of either of these methods would be sufficient to terminate the primary containment pressure rise. COPF from drywell-to-suppression pool bypass leakage can only occur if decay heat removal is unavailable. Containment failure from loss of decay heat removal is already captured as identified in the above table and is not sensitive to this test. Therefore, COPF frequency is unaffected by extending the drywell-to-suppression pool bypass test to 10 years.

2) Increasing the drywell-to-suppression pool bypass test interval to 10 years will not increase the radioactive source term should the containment fail on overpressure. As described in the initial response to the first part of this

question, the most probable source of drywell-to-suppression pool bypass leakage is from the vacuum breakers. The vacuum breaker test, which will continue to occur at the frequency specified in Technical Specification 4.6.2.1.f, ensures that the leakage area remains significantly below the allowable Technical Specification bypass leakage area. Additionally, there is a substantial margin (a factor of 10) in the Technical Specification allowable leakage compared to the design leakage area. The severe accident source term would still be dominated by DHR equipment or vacuum breaker failures and, therefore, is unaffected by the interval chosen for the drywell-to-suppression pool bypass leakage test.

3) Increasing the drywell-to-suppression pool bypass test interval to 10 years will not create the possibility of bypass leakage of large amounts of hydrogen to the suppression pool. Due to its low solubility, any hydrogen that is generated will accumulate in the suppression pool air space as it passes through the suppression pool water. Once the wetwell air space pressure exceeds the drywell pressure, all gases in the wetwell air space will begin to flow into the drywell. The existence of a bypass leakage would only allow this mixing process to occur more readily. The hydrogen concentration in the wetwell air space is largely unaffected by the bypass area and, as such, is insensitive to the interval chosen for the drywell-to-suppression pool bypass leakage test.

<u>NRC RAI #2</u>

Are there areas which could affect the drywell bypass leakage which will be inaccessible and therefore not readily inspected visually or not inspected at all?

PECO Response #2

All areas of the liner plate over the diaphragm slab are accessible except for areas under support base plates that are installed over anchor bolts. The three and a half feet thick concrete diaphragm slab and the liner plate provide additional leak tightness capability between the drywell and the suppression pool.

In the drywell, the inside of the vent pipe assemblies are not accessible. In the suppression chamber, permanently installed platforms provide access to the outside of vent pipe and SRV tailpipes. Alternate access can be provided by scaffold or boat in the suppression pool to permit visual inspection when required.

NRC RAI #3

What controls are there over modifications to the drywell/suppression pool interface that could affect leakage?

PECO Response #3

PECO maintains the following modifications controls relative to containment:

(1) Technical Specification 3/4.6.2 (3.6.2.1b) identifies the acceptable drywell-to-suppression chamber bypass leakage. Since this is a Technical Specification requirement, and PECO Administrative Procedures MOD-C-3 (Modifications and Minor Physical Change Process) and NE-C-205 (Design Input Document Control) require a Technical Specifications review by the lead modification engineer, this issue is considered to be within the "modification program." Any proposed modification affecting containment would require a review of all applicable Technical Specifications.

(2) PECO Administrative Procedures MOD-C-3 (Modifications and Minor Physical Change Process) and NE-C-205 (Design Input Document Control) require a complete review of the Updated Final Safety Analysis Report (UFSAR) with regard to any modification. Since this issue is discussed in the UFSAR, it would be evaluated.

(3) PECO Administrative Procedures MOD-C-3 (Modifications and Minor Physical Change Process) and NE-C-205 (Design Input Document Control) require a review of the Safety Analysis Report which includes the Design Assessment Report (DAR). The DAR includes the response of containment (drywell & suppression pool) during design basis events. Again, for a modification in which this interface may be impacted, this design consideration would apply.

If a repair or modification to the diaphragm slab, or other component, which could impact drywell-to-suppression pool bypass leakage is planned, appropriate post maintenance/modification testing will be performed to ensure the continued leak integrity of the barrier. PECO maintains programs to define the proper post maintenance/modification testing depending on the type of repair or modification planned. In the case of the diaphragm slab, the guidance provided in Regulatory Guide 1.163 "Performance-Based Containment Leak-Test Program" via Nuclear Energy Institute (NEI) document 94-01 discusses repair and modifications that affect containment leakage integrity. Consistent with PECO's approach to apply the risk and performance based aspects of Regulatory Guide 1.163 to the diaphragm slab, the Regulatory Guide would be an appropriate input in determining the post maintenance/modification testing for the diaphragm slab if work on the slab is performed.

NRC RAI #4

Is there a backup to containment spray? If there are procedures governing the use of spray backup, describe them.

PECO Response #4

Containment spray, either wetwell or drywell, would not be utilized until drywell pressure rises above the spray initiation pressure as established in the Emergency Procedure Guideline calculations and provided in plant emergency procedures. LGS utilizes a defense-in-depth methodology to maintain primary containment integrity by use of the following methods to control rising containment pressure (in order of preference):

A) non-safety related drywell coolers, if available,
B) suppression pool cooling mode of residual heat removal (RHR) system,
C) wetwell air-space spray mode of RHR,
D) drywell spray mode of RHR,
E) containment vent.

Control methods B, C, and D each include two 100 percent diverse loops for single failure proof control of rising containment pressure.

NRC RAI #5

List all lines or penetrations between the drywell and the suppression pool which are not subject to Appendix J leak testing requirements. What assurance is there that these are not potential leak paths?

PECO Response #5

The list of cross-connected piping is provided below and was provided in our November 30, 1993, Technical Specifications Change submittal supporting performance of the bypass test during Appendix J, Type A Testing. The cross-connected piping includes only those systems that are potential air leakage pathways between the drywell and suppression chamber airspace. All lines and penetrations between the drywell and the suppression pool are subject to Appendix J leak testing in the form of Type A, B, or C tests as noted in LGS Technical Specifications and in the proposed LGS Primary Containment Leakage Rate Testing Program (PCLRTP).

The systems with piping external to the containment that are a potential source of drywell-to-suppression chamber leakage and are subject to Appendix J leak testing are:

1) Containment vent and purge lines (20" and 24" diameter lines with two flow paths from the drywell to the suppression chamber).

2) Drywell and suppression chamber spray lines (18" and 6" diameter lines with two flow paths from the drywell to the suppression chamber).

3) Containment Integrated Leak Rate Test data acquisition system line (3/4" diameter lines with one flow path from the drywell to the suppression chamber).

4) Containment atmosphere sampling lines (1" and 2" diameter lines with two flow paths from the drywell to the suppression chamber).

5) Containment instrument gas lines (1" diameter lines with two flow paths from the drywell to the suppression chamber).

NRC RAI #6

The Final Safety Analysis Report demonstrates that the wetwell sprays will maintain the pressure below the containment design pressure for the design basis bypass leakage. How much larger could the leakage be before the containment sprays become ineffective?

PECO Response #6

The effectiveness of wetwell spray for maintaining containment pressure below design pressure is dependent on the subcooling of the spray and the spray pattern. The design basis for bypass leakage is a small break LOCA as discussed in LGS UFSAR Section 6.2.1.1.5. For this event, the suppression pool water temperature is not expected to increase quickly and should remain subcooled below wetwell airspace temperature with steam bypass. In addition, both independent loops of wetwell spray include the RHR heat exchangers which can be used for additional subcooling to ensure adequate spray subcooling such that wetwell spray will always be effective in maintaining containment pressure below design pressure.

Wetwell sprays require operator action to initiate, and the bypass leakage is limited such that response time to initiate sprays is realistic and reasonable. As discussed in

LGS UFSAR Section 6.2.1.1.5, the design basis leakage for LGS is a bypass leakage of $A/\sqrt{k}=0.20$ sq. ft. (0.05 sq. ft. for each of four sets of vacuum breakers). The analysis assumes the operator is unaware of the bypass leakage until the drywell pressure reaches 30 psig. With bypass leakage of $A/\sqrt{k}=0.20$ sq. ft., the operator will have at least 30 minutes after drywell pressure reaches 30 psig to initiate wetwell spray to mitigate the rising containment pressure.

The design allowable bypass leakage for the wetwell-to-drywell vacuum breakers is $A/\sqrt{k}=0.05$ sq. ft. cumulative, consistent with NUREG 0800 Standard Review Plan 6.2.1.1.C. Likewise, the acceptance criteria for bypass leakage test is 10% of this, or $A/\sqrt{k}=0.005$ sq. ft. cumulative. Thus the design basis analysis for the bypass leakage assumes four (4) times the wetwell-to-drywell breaker design basis closed indication limit switch setting, and forty (40) times the allowable measured bypass leakage.

NRC RAI #7

Describe the frequency and type of any non-destructive testing of the liner plate over the diaphragm slab at the penetrations and at the circumference where the diaphragm slab intersects the containment wall.

PECO Response #7

Non-destructive testing consisting of visual VT-3 inspection to verify structural integrity is performed each refueling outage per PECO Nuclear's 10CFR50 Appendix J program.

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