PECO ENERGY

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

September 18, 1995

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. 95-01-0

Gentlemen:

PECO Energy Company is submitting Technical Specifications (TS) Change Request No. 95-01-0, in accordance with 10CFR 50.90, requesting an amendment to the TS (Appendix A) of Operating License Nos. NPF-39 and NPF-85 for Limerick Generating Station (LGS), Units 1 and 2, respectively. This proposed change will revise TS Table 4.3.1.1-1, "Reactor Protection System Instrumentation Surveillance Requirements" to reflect the change in the calibration frequency for the Local Power Range Monitor (LPRM) signal from every 1000 Effective Full Power Hours (EFPH) to every 2000 Megawatt Days per Standard Ton (MWD/ST). Information supporting this Change Request is contained in Attachment 1 to this letter, and the marked up pages showing the proposed change to the LGS Units 1 and 2 TS are contained in Attachment 2. This information is being submitted under affirmation, and the required affidavit is enclosed.

We request that, if approved, the amendment to the LGS Unit 1 TS be issued by April 1, 1996, and become effective within 30 days of issuance. For LGS Unit 2 TS, the amendment should be issued after 3D-MONICORE is implemented which is currently scheduled for May 1996.

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

Enclosure, Attachments

cc: T. T. Martin, Administrator, Region I, USNRC (w/enclosure, attachments)
N. S. Perry, USNRC Senior Resident Inspector, LGS (w/enclosure, attachments)
R. R. Janati, PA Bureau of Radiological Protection (w/enclosure, attachments)

A001

COMMONWEALTH OF PENNSYLVANIA :

: ss.

COUNTY OF CHESTER :

W. H. Smith, III, being first duly sworn, deposes and says:

That he is Vice President of PECO Energy Company, the Applicant herein; that he has read the foregoing Application for Amendment of Facility Operating License Nos. NPF-39 and NPF-85 (Technical Specifications Change Request No. 95-01-0), to change the calibration frequency for the Local Power Range Monitor (LPRM) signal from every 1000 Effective Full Power Hours (EFPH) to every 2000 Megawatt Days per Standard Ton (MWD/ST), at Limerick Generating Station, Units 1 and 2, 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 18th day
of September 1995.

Notary Public

Notarial Seal
Mary Lou Skrocki, Notary Public
Tredyffrin Twp., Chester County
My Commission Expires May 17, 1999
Member, Pennsylvania Association of Notaries

ATTACHMENT 1

LIMERICK GENERATING STATION

UNITS 1 AND 2

DOCKET NOS. 50-352
50-353

LICENSE NOS. NPF-39
NPF-85

TECHNICAL SPECIFICATIONS CHANGE REQUEST

NO. 95-01-0

"CHANGE IN THE CALIBRATION FREQUENCY FOR THE LOCAL POWER RANGE MONITOR (LPRM) SIGNAL FROM EVERY 1000 EFPH TO EVERY 2000 MWD/ST"

Supporting Information for Changes - 6 Pages

Docket Nos. 50-352
50-353
License Nos. NPF-39
NPF-85

PECO Energy Company, licensee under Facility Operating License Nos. NPF-39 and NPF-85 for Limerick Generating Station (LGS), Units 1 and 2, respectively, requests that the Technical Specifications (TS) contained in Appendix A to the Operating License be amended as proposed herein, to reflect the change in the calibration frequency for the Local Power Range Monitor (LPRM) signal from every 1000 Effective Full Power Hours (EFPH) to every 2000 Megawatt Days per Standard Ton (MWD/ST), thereby revising TS Table 4.3.1.1-1 and TS Bases 3/4.3.1. The proposed change to the TS is indicated by mark-ups on TS page 3/4 3-8 and TS Bases page B 3/4 3-1. The TS page and TS Bases page showing the proposed change are contained in Attachment 2.

We request that, if approved, the LGS Unit 1 TS change proposed herein be issued by April 1, 1996, and become effective within 30 days of issuance of the amendment. For LGS Unit 2 TS, the amendment should be issued after 3D-MONICORE is implemented which is currently scheduled for May, 1996.

This TS Change Request provides a discussion and description of the proposed TS change, a safety assessment of the proposed TS change, information supporting a finding of No Significant Hazards Consideration and information supporting an Environmental Assessment.

Discussion and Description of the Proposed Change

The proposed change to the Limerick Generating Station (LGS) Units 1 and 2 Technical Specifications (TS) Table 4.3.1.1-1, "Reactor Protection System Instrumentation Surveillance Requirements," and TS Bases 3/4.3.1 will reflect the change in the calibration frequency for the Local Power Range Monitor (LPRM) signal from every 1000 Effective Full Power Hours (EFPH) to every 2000 Megawatt Days per Standard Ton (MWD/ST). This proposed TS change is currently applicable to LGS Unit 1 and will be valid for LGS Unit 2 when 3D-MONICORE is implemented as the core monitoring program.

BWR power operation relies upon readings from fixed in-core neutron detectors (i.e., Local Power Range Monitors (LPRMs)). LPRMs are small fission chambers with an approximately linear response to the local neutron flux, and thus local thermal power. The calibration of the LPRMs every 1000 EFPH employs a second set of moveable detectors (i.e., Traversing In-Core Probe (TIP) system.) The required LPRM calibration relates the power distribution, measured by the TIP system, to the LPRM readings existing at the time. When the LPRMs are normalized to one another, to the TIP readings, and to a plant heat balance calculation, the LPRMs allow determination of the local power in the core for each node (approximately 6 inches) of the fuel.

Outputs from the calibrated LPRMs are used in the Reactor Protection System (i.e., Average Power Range Monitor (APRM)), and the Rod Block Monitor (RBM), as well as daily surveillance of the Power Distribution Limits (reactor thermal limits monitoring). Accuracy requirements on the power distribution are defined by GESTAR-II (NEDE-24011-P-A-10, Section 4.3.1.1.1) and GE Fuel Bundle Designs (NEDE-31152P), which are part of the LGS licensing basis. In particular, Table 3-3 of NEDE-31152P requires calculated nodal powers to have a root mean square (rms) uncertainty of no more than 8.7% for reload cores. This uncertainty includes uncertainties contributed by the LPRM system.

Advances in process computer monitoring include the development of new mathematical techniques and algorithms combining reactor physics theory with on-line core data, (e.g., LPRM readings). One such methodology is 3D-MONICORE which is currently in use at LGS Unit 1. The 3D-MONICORE employs an adaptive learning algorithm using on-line as well as historical core data inputs to improve power

calculations within the reactor physics model by effectively modifying the neutron leakage terms (adaptive coefficients) to force the calculated power distribution to match the measured power distribution as determined by the TIP system. Corrections made within the monitoring process account for decay of LPRM sensitivity due to depletion of the fissile coating within each LPRM. The 1000 EFPH calibration interval at LGS was based upon older monitoring methodology and older LPRM designs in use at the time.

Part of the study discussed below investigated the sensitivity decay characteristics of the present generation of LPRM detectors. Calibration current and exposure data demonstrate an increase in the predictability of LPRM sensitivity as a function of exposure. This, combined with improved monitoring methods, allows lengthening of the LPRM calibration interval as discussed below.

3D-MONICORE reactor physics methodology was used off-line to model four continuous months of rated operation at Plant Hatch during a recent cycle to study the effect of lengthening the LPRM calibration interval. This period included a control rod pattern sequence exchange. Actual plant LPRM readings were modified using TIP set (OD1) calibration currents to factor out the effects of the LPRM calibrations. The operational periods of interest were then re-depleted using the modified LPRM readings (i.e., without calibrations). Comparisons of 2D bundle and 3D nodal power distributions (with calibrations versus without) were made and percent rms deviations were calculated for each exposure point of interest. Results of this analysis show that the licensing basis nodal power uncertainty of 8.7% was satisfied for up to approximately 3000 EFPH between LPRM calibrations. Therefore, a change in the frequency for LPRM calibrations from 1000 EFPH to 2000 EFPH is acceptable.

The following calculations were used to convert 2000 EFPH to 2000 MWD/ST. These units are, for this application, effectively interchangeable based on the combination of two facts:

1) Straight Conversion: Using current core weights and rated powers, converting 2000 EFPH to units of MWD/ST results in:

$$\text{LGS 1 Cycle 6:}\quad \left[\frac{2000\ EFPH}{24\ Hrs/Day}\right] x \left[\frac{3293\ MW}{145.991\ ST}\right] = 1879.7\ MWD/ST$$

and,

$$\text{LGS 2 Cycle 4:}\quad \left[\frac{2000\ EFPH}{24\ Hrs/Day}\right] x \left[\frac{3458\ MW}{145.086\ ST}\right] = 1986.2\ MWD/ST$$

Using projected core weights and re-rated power (as LGS Unit 2 is currently re-rated and LGS Unit 1 will be re-rated in Cycle 7), a range of future MWD/ST values can be obtained. The projected core weights range from an equilibrium full core of GE-13 at 144.4 ST; to a core of GE-12 with Shoreham bundles included, which would be 152.1 ST. Therefore, the 2000 EFPH equivalences in MWD/ST are:

GE-13 Equilibrium Full Core: $\left[\frac{2000\ EFPH}{24\ Hrs/Day}\right] x \left[\frac{3458\ MW}{144.4\ ST}\right] = 1995.6\ MWD/ST$

and,

GE-12 with Shoreham Bundles: $\left[\frac{2000\ EFPH}{24\ Hrs/Day}\right] x \left[\frac{3458\ MW}{152.1\ ST}\right] = 1894.6\ MWD/ST$

Thus, for the 2000 EFPH equivalence, the expected range is between 1879.7 MWD/ST and 1995.6 MWD/ST. Values become larger as cores become lighter and re-rate power is implemented. This entire range is equivalent to only approximately 116 EFPH, or less than 6% of the original 2000 EFPH.

2) Nodal Power Uncertainty Sensitivity to EFPH: The Hatch Study indicates that the nodal power uncertainty is relatively insensitive to the number of EFPH since the last calibration. In fact, between approximately 2000 and 3000 EFPH, the nodal power uncertainty increases by less than 0.1% which is within the 8.7% rms uncertainty limit specified in NEDE-31152P.

Thus, while it is recognized that the actual MWD/ST value corresponding to 2000 EFPH is a function of core weight and rated core power (and is therefore cycle dependent), the selection of an even 2000 MWD/ST interval for LPRM signal calibration is reasonable and results in a nodal power uncertainty which is less than the 8.7% uncertainty limit. The proposed change in units from EFPH to MWD/ST is consistent with NUREG-1433, Standard Technical Specifications, General Electric Plants, BWR/4," Revision 1, dated April 1995.

Therefore, we propose that TS Table 4.3.1.1-1 and TS Bases 3/4.3.1 be revised to reflect the change in the calibration frequency for the LPRM signal, from every 1000 EFPH to every 2000 MWD/ST.

Safety Assessment

The proposed change in the calibration frequency for the Local Power Range Monitor (LPRM) signal from every 1000 EFPH to 2000 MWD/ST does not involve a physical change in the configuration, setpoints, or operation of any safety-related instrumentation. The proposed TS change does not make any physical change to the fuel or the manner in which the fuel responds to a transient or accident.

The LPRMs are utilized as input to the Average Power Range Monitor (APRM) and Rod Block Monitor (RBM) systems. The primary safety function of the APRM system is to initiate a scram during core-wide neutron flux transients before the actual core-wide neutron flux level exceeds the safety analysis design basis. This prevents fuel damage from single operator errors or equipment malfunctions. The APRMs are calibrated at least once per week to the plant heat balance, utilize a radially and axially diverse group of LPRMs as input and are utilized to detect changes in average, not local, power changes. Therefore, the effects of changing the LPRM calibration frequency to 2000 MWD/ST on the APRM system responses will be minimal due to any individual LPRM drift being practically canceled out (due to diversity of input) and/or due to the frequent recalibration of the APRMs to an independent power calculation (the heat balance). Thus, changing the LPRM calibration frequency as proposed will not impact the capability of the APRM system to perform the scram function, and there is no impact on transient delta-CPRs.

The RBM system is utilized in the mitigation of a Rod Withdrawal Error (RWE) event. The RBM system is designed to prevent the operator from increasing the local power significantly when withdrawing a control rod. Under Average Power Range Monitor - Rod Block Monitor Technical Specifications/Maximum Extended Load Line Limit Analysis (ARTS/MELLLA) on each selection of a control rod, the average of the assigned, unbypassed LPRMs is adjusted to equal a 100% reference signal for each of the two RBM channels. Each RBM channel automatically limits the local thermal margin changes by limiting the allowable change in local average neutron flux to the RBM setpoint. If the local average neutron flux change is greater than that allowed by the RBM setpoint, within either RBM channel, the rod withdrawal permissive is removed preventing further rod movement. Since the change in local neutron flux is calculated from the change in the average of the LPRM readings, and calibrated, on every rod selection to the reference signal, offsets in individual LPRM readings due to calibration differences are effectively eliminated for a given RBM setpoint. Therefore, the constraints on the withdrawal of any given rod are unchanged, and there will not be any increase in RWE delta-CPR.

The GE Thermal Analysis Basis (GETAB) determination of the Minimum Critical Power Ratio (MCPR) Safety Limit allows a maximum total nodal uncertainty of the Traversing In-Core Probe (TIP) readings (of which the LPRM updated uncertainty is a part) of 8.7%. The change in LPRM calibration frequency results in an LPRM Update uncertainty which, when combined with the other uncertainties which comprise the total TIP readings uncertainty, yields a total TIP readings nodal power uncertainty of less than the allowed 8.7%. Thus the proposed change in LPRM calibration frequency will not affect the existing MCPR Safety Limit.

The proposed TS change does not affect existing accident analyses or design assumptions, nor does it impact any safety limits of the plant.

Information Supporting a Finding of No Significant Hazards Consideration

We have concluded that the proposed change to the Limerick Generation Station (LGS), Units 1 and 2 Technical Specifications (TS), which will revise TS Table 4.3.1.1-1, "Reactor Protection System Instrumentation Surveillance Requirements" to reflect the change in the calibration frequency for the Local Power Range Monitor (LPRM) signal, from every 1000 Effective Full Power Hours (EFPH) to every 2000 Megawatt Days per Standard Ton (MWD/ST), does not involve a Significant Hazards Consideration. In support of this determination, an evaluation of each of the three (3) standards set forth in 10 CFR 50.92 is provided below.

1. The proposed Technical Specifications (TS) change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

   The change in the calibration frequency of the Local Power Range Monitor (LPRM) signal does not make any physical change to the fuel or the manner in which the fuel responds to a transient or accident. The proposed TS change does not affect the fundamental method by which the LPRMs are calibrated. Also, the LPRM calibration frequency is not considered an initiator of any events analyzed in the SAR. Therefore, calibrating the LPRMs on a different frequency will not increase the probability of occurrence of an accident previously evaluated in the SAR.

The resulting nodal power uncertainty does not exceed the nodal power uncertainty accounted for in the existing Minimum Critical Power Ratio (MCPR) Safety Limit; thus, the MCPR Safety Limit is not affected by this TS Change, and, therefore, the initial conditions of any accident are unchanged. Since the calibration frequency change will not affect the course of any evaluated accident, the consequences of an accident previously evaluated in the SAR will not be increased.

Therefore, the proposed TS change does not involve an increase in the probability or consequences of an accident previously evaluated.

2. The proposed TS change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

The change in the calibration frequency of the Local Power Range Monitor (LPRM) signal does not make any physical change to the plant or the manner in which the equipment responds to a transient or accident. The proposed TS change does not introduce a new mode of plant operation and does not involve the installation of any new equipment or instrumentation. The fuel will continue to be operated to the same safety limits since the Minimum Critical Power Ratio (MCPR) Safety Limit remains unchanged due to this TS change.

Therefore, the proposed TS change does not create the possibility of a new or different kind of accident, from any accident previously evaluated.

3. The proposed TS change does not involve a significant reduction in a margin of safety.

The following TS Bases were reviewed for potential reduction in the margin of safety:

2.0	Safety Limits and Limiting Safety System Settings;
3/4.1	Reactivity Control Systems;
3/4.2.1	Average Planar Linear Heat Generation Rate;
3/4.2.3	Minimum Critical Power Ratio:
3/4.2.4	Linear Heat Generation Rate;
3/4.3.1	Reactor Protection System Instrumentation;
3/4.3.6	Control Rod Block Instrumentation;
3/4.3.7.7	Traversing In-Core Probe System;

The GE Thermal Analysis Basis (GETAB) determination of the Minimum Critical Power Ratio (MCPR) Safety Limit allows a maximum total nodal uncertainty of the Traversing In-Core Probe (TIP) readings of which the Local Power Range Monitor (LPRM) Update uncertainty is a part. The change in LPRM calibration frequency results in an LPRM Update uncertainty which, when combined with the other uncertainties which comprise the total TIP readings uncertainty, yields a total TIP readings nodal power uncertainty of less than the allowed GETAB uncertainty. Thus the change in LPRM calibration frequency will not affect the MCPR Safety Limit.

The LPRMs are utilized as input to the Average Power Range Monitor (APRM) and Rod Block Monitor (RBM) systems. The primary safety function of the APRM system is to initiate a scram during core-wide neutron flux transients before the actual core-wide neutron flux level exceeds the safety analysis design

basis. This prevents fuel damage from single operator errors or equipment malfunctions. The APRMs are calibrated at least once per week to the plant heat balance, utilize a radially and axially diverse group of LPRMs as input and are utilized to detect changes in average, not local, power changes. Therefore, the effects of changing the LPRM calibration frequency on the APRM system responses will be minimal due to any individual LPRM drift being practically canceled out (due to diversity of input) and/or due to the frequent recalibration of the APRMs to an independent power calculation (the heat balance). Thus, changing the LPRM calibration frequency will not impact the capability of the APRM system to perform the scram function, and there is no impact on transient delta-CPRs.

The RBM system is utilized in the mitigation of a Rod Withdrawal Error (RWE) event. The RBM system is designed to prevent the operator from increasing the local power significantly when withdrawing a control rod. Under Average Power Range Monitor - Rod Block Monitor Technical Specifications/Maximum Extended Load Line Limit Analysis (ARTS/MELLLA) on each selection of a control rod, the average of the assigned, unbypassed LPRMs is adjusted to equal a 100% reference signal for each of the two RBM channels. Each RBM channel automatically limits the local thermal margin changes by limiting the allowable change in local average neutron flux to the RBM setpoint. If the local average neutron flux change is greater than that allowed by the RBM setpoint, within either RBM channel, the rod withdrawal permissive is removed preventing further rod movement. Since the change in local neutron flux is calculated from the change in the average of the LPRM readings, and calibrated on every rod selection to the reference signal, offsets in individual LPRM readings due to calibration differences are effectively eliminated for a given RBM setpoint. Therefore, the constraints on the withdrawal of any given rod are unchanged, and there will not be any increase in RWE delta-CPR.

Since the MCPR Safety Limit is unaffected and the delta-CPR values are unchanged, the cycle CPR Operating limits are unchanged due to this TS change. Therefore, the proposed change in the frequency of LPRM signal calibration does not result in a reduction in a margin of safety.

Information Supporting an Environmental Assessment

An environmental assessment is not required for the change proposed by this TS Change Request because the requested change to the Limerick Generating Station (LGS), Units 1 and 2, TS conforms to the criteria for "actions eligible for categorical exclusion" as specified in 10 CFR51.22(c)(9). The requested change will have no impact on the environment. The proposed change does not involve a significant hazards consideration as discussed in the preceding section. The proposed change does not involve a significant change in the types or significant increase in the amounts of any effluents that may be released offsite. In addition, the proposed change does not involve a significant increase in individual or cumulative occupational radiation exposure.

Conclusion

The Plant Operations Review Committee and the Nuclear Review Board have reviewed this proposed change to the Limerick Generating Station (LGS), Units 1 and 2, TS and have concluded that it does not involve an unreviewed safety question, and will not endanger the health and safety of the public.