Station Support Department

10CFR50.90

PECO ENERGY

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

September 9, 1994

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
Response to Request for Additional Information
Regarding Power Rerate Program dated
August 11, 1994 (RAI-2)

Gentlemen:

Attached is our response to your Request for Additional Information (RAI), discussed in our telephone conversation on August 11, 1994, regarding the planned implementation of the Power Rerate Program at Limerick Generating Station (LGS), Units 1 and 2. The Power Rerate Program is the subject of Operating License Change Request No. 93-24-0 which was forwarded to you by letter dated December 9, 1993.

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

Attachment

cc: T. T. Martin, Administrator, Region I, USNRC - w/ attachment
N. S. Perry, USNRC Senior Resident Inspector, LGS - w/attachment
R. R. Janati, Director, PA Bureau of Radiological Protection - w/attachment

190061

A001
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, the Applicant herein; that he has read the enclosed response to the NRC Request for Additional Information involving Power Rerate discussed on August 11, 1994, concerning Operating License Change Request (No. 93-24-0) for Limerick Generating Station 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.

Senior Vice President and
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

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

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION (RAI-2)
LIMERICK GENERATING STATION, UNITS 1 AND 2
(Per Telecon dated August 11, 1994)

Question 1:

Define ICA Region stability exclusion region in Figure 2-1, "Power/Flow Operating Map for Power Rerate," of NEDC-32225P. State that the ICA region and the stability exclusion region are the same thing.

Response 1:

The potential for BWR Core Thermal-Hydraulic Instability is documented in GE Service Information Letter (SIL) 380, Revision 1. The SIL's recommendations have been included in the LGS 1 and 2 Operating procedures. In addition, GE and the BWROG have developed interim corrective actions (ICA's) to further address core stability concerns. NRC Bulletin No. 88-07, Supplement 1, "Power Oscillations in Boiling Water Reactors (BWR's)", has endorsed these ICA's which have been implemented at LGS 1 and 2. The ICA's included "Operating Exclusion Regions" on the LGS Power/Flow Map, thus the ICA region and the stability exclusion region are the same thing. Inadvertent entry into these regions requires immediate action for exiting the region. The exclusion regions are bounded by the natural circulation line, the minimum recirculation pump speed line and the 45% of rated core flow line. These flow boundaries are essentially unaffected by power rerate since only the power axis of the power/flow map is rescaled by power rerate and rated core flow is not changed. The exclusion regions are also bounded by the 80% rod line, the 100% rod line and the maximum flow control rod line. The maximum flow control rod line is unaffected by power rerate; however, the 80% and 100% rod lines are affected. To ensure that the ICA's provide the same level of protection at power rerate conditions as they do currently, the 80% and 100% rod lines have been redefined such that the absolute power (MWT) values of these boundaries are unchanged (i.e., 80% becomes 76.2% (80/1.05) and 100% becomes 95.2% (100/1.05). Thus, the power rerate ICA exclusion region boundaries provide the same level of protection against potential stability events as the current boundaries.

Question 2:

Section 2.5.1, "Control Rod Drive Hydraulic System", of NEDC-32225P.

CRD pump modifications - What are they?

Please state what the mods are.

Response 2:

Mod. P00195 replaces the existing CRD pumps, motors, and gear boxes with new, higher-capacity, direct-drive (i.e., pump and motor, no gear box) pumps. This is the only modification being performed on the CRD system involving Power Rerate.

This modification is being performed because, the evaluation for power rerate determined that the existing pumps do not have sufficient capacity under rerate conditions during normal CRD positioning operations. This is due to high line losses from the discharge of the pump to the CRD flow control station. Maintaining the required differential pressure of 250 psid between the CRD system and reactor pressure would result in cooling water flows of approximately 35 gpm, which may result in the increase of the number of drives running hot. After discussion with the existing pump manufacturer and review of the pump operating history, a determination was made that the pumps be replaced. This replacement includes pumps and motors and the removal of the existing pumps, motors, and gear boxes.

Question 3:

Section 3.4, "Reactor Recirculation System" (RRS), of NEDC-32225P. Vibration Evaluation - Does it exist? Provide information on vibration analysis. What is the LGS plan to test for it? Commit to a Vibration test.

Response 3:

A detailed vibration analysis was performed for the reactor recirculation system piping for rerate conditions. The impact of rerate resulted in a negligible effect.

A qualitative assessment of the rerate vibration conditions for the recirculation pump shaft was performed. The increased speed of the recirculation pump due to rerate (less than 1%) will not lead to significant increases in shaft mechanical stresses.

A qualitative analysis of the impact of rerate conditions on the recirculation pump and pump motor vibration was performed by General Electric. It was concluded that rerate conditions would not impact pump or pump motor vibration levels.

The recirculation pump, pump motor, and piping were determined to remain within ASME code allowable values for stresses.

Recently, a phenomenon described as "Containment Noise" has occurred at another U.S. BWR. This phenomenon has been related to operation at increased core flow (ICF) above 100% rated flow. The increased recirculation pump speed associated with ICF is theorized to be a contributing factor to this phenomenon. This phenomenon is not believed to be related to power rerate since only a very small increase in recirculation pump speed is required to maintain a given core flow at rerate conditions. An investigation at this other U.S. BWR to determine the source of this phenomenon is underway. PECO Energy is following this investigation closely.

LGS Units 1 and 2 have operated with ICF up to 105% rated flow for many cycles. No incidents of the "Containment Noise" phenomenon have been reported at LGS. Analyses have been performed for LGS justifying ICF operation up to 110% rated flow including rerate conditions. PECO Energy plans to implement 110% ICF near the end of the LGS Unit 2 Cycle 3 Operating Cycle (September 1994), prior to the implementation of power rerate the following cycle.

PECO Energy is developing a monitoring program for the implementation of 110% ICF. This program is likely to include baseline measurements and trending of noise and vibration levels in key areas of the reactor building and monitoring the vibration instrumentation currently installed on the recirculation pump motors and shafts. Implementation of 110% ICF will consist of a gradual progression from 105% core flow up to 110% core flow over a period of approximately one week. This approach will allow PECO Energy to closely monitor the effects of the increasing recirculation pump speed and respond appropriately if the "Containment Noise" phenomenon is encountered.

Question 4:

Section 4.2.1, "High Pressure Coolant Injection" (HPCI). GE SIL 480 (Overspeed) should be implemented for HPCI pump. Has it been implemented? If not, does LGS plan to implement it?

Response 4:

GE SIL 480 has been incorporated into the LGS HPCI system.

Question 5:

Section 9.3.1, "Anticipated Transients Without Scram" (ATWS), of NEDC-32225P. How will ATWS acceptance criteria be met? What was "previous analysis"? GE Generic Analysis shows 20 psi, LGS is 40 psi. Need clarification.

Response 5:

All the plant parameter changes for LGS Power Rerate are within the generic criteria, except for the ATWS high pressure setpoint, as stated in Section 9.3.1. The setpoint was increased 40 psi rather than the 20 psi covered by the generic power uprate ATWS evaluation. A series of test cases were run for a similar BWR/4 to evaluate the effects of certain inputs on the peak pressure for the limiting ATWS event, namely MSIV closure. A reduction of the ATWS high pressure setpoint by 30 psi produced only an 8 psi drop in the peak pressure in a sensitivity test case. Although the 20 psi additional increase was expected to increase the peak vessel pressure by less than 10 psi, plant-specific ATWS analysis was performed for LGS Power Rerate.

The LGS-plant specific ATWS analysis was performed at 3458 MWt power level. The analysis assumed 28% boron enrichment and a 40 psi increase in the high pressure setpoint. ATWS acceptance criteria are met in the results of this plant-specific analysis. Peak vessel pressure is 1371 psig, which is within the 1375 psig LGS criterion. Peak cladding temperature is 1501° F, which is less than the 2200° F criterion. Peak suppression pool temperature is 188.8° F, which is within the 190° F generic criterion.

Question 6:

Page 5-5 of SAFER/GESTR LOCA Report, NEDC-32170P, Rev. 1 "Jet pump uncovery" - Is it the same as 2/3 core coverage? State what it is.

Response 6:

Both terms refer to the same elevation, but at different times in the event. "Jet pump uncovery" is a term used to describe when the water level in the downcomer drops below 2/3 core height during the short-term blowdown phase for a large recirculation line break (analyzed using LAMB code) in a LOCA event. The term "2/3 core coverage" is generally used to describe the long-term response in which jet pumps enable flooding of the core up to the level of the jet-pump nozzles after a large break.

Question 7:

Section 5.3.2 of SAFER/GESTR LOCA report, NEDC-32170P, Rev. 1 (Section on MELLLA calculation) What are PCT MELLLA values? I.E., 20° F delta between 2 PCT's (What are these PCT's?)

Response 7:

The PCT impact from MELLLA is conservatively stated in section 5.3.2 as less than 20° F. SAFER calculations were performed at 75% initial core flow with BP/P8x8R and GE11 fuel using Appendix K assumptions. The results are tabulated below:

Fuel Type	PCT (° F) at Rated Core Flow	PCT (° F) at 75% Core Flow
BP/P8x8R	1619	1604
GE11	1577	1582