June 30, 1994

Docket No. 50-352

Mr. George A. Hunger, Jr.
Director-Licensing, MC 52A-5
Philadelphia Electric Company
Nuclear Group Headquarters
Correspondence Control Desk
P.O. Box No. 195
Wayne, Pennsylvania 19087-0195

Dear Mr. Hunger:

SUBJECT: INTERIM INCREASE IN SPENT FUEL POOL, LIMERICK GENERATING STATION, UNIT 1 (TAC NO. M89431)

The Commission has issued the enclosed Amendment No. 72 to Facility Operating License No. NPF-39 for the Limerick Generating Station (LGS), Unit 1. This amendment consists of changes to the Technical Specifications (TSs) in response to your application dated May 6, 1994, as supplemented by letter dated June 3, 1994.

This amendment would revise TS Section 5.5.3, "Capacity," to facilitate an interim increase in the Unit 1 Spent Fuel Pool (SFP) from 2040 fuel assemblies to 2500 fuel assemblies. The revision is necessary to support implementation of a modification to install new high density spent fuel storage racks in each SFP at LGS.

A copy of our Safety Evaluation is also enclosed. Notice of Issuance will be included in the Commission's biweekly Federal Register notice.

Sincerely,
/S/

Frank Rinaldi, Project Manager
Project Directorate I-2
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Enclosures:
1. Amendment No. 72 to License No. NPF-39
2. Safety Evaluation

cc w/enclosures:
See next page

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CMiller	EWenzinger, RGN-I	CAnderson, RGN-I	

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OFC	:PDI-2/LA	:PDI-2/PE	:PDI-2/PM	:SPLB*	:SRXB	:
NAME	:MO'Brien	:TLiu:tlc	:FRinaldi	:CMcCracken	:TCollins	:
DATE	:6/17/94	:6/17/94	:6/17/94	:6/10/94	:6/17/94	:

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*Comments

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

June 30, 1994

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Office of Nuclear Reactor Regulation

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cc w/enclosures:
See next page

cc:

J. W. Durham, Sr., Esquire
Sr. V.P. & General Counsel
PECO Energy Company
2301 Market Street
Philadelphia, Pennsylvania 19101

Mr. Dave Helker, 52A-5
PECO Energy Company
955 Chesterbrook Boulevard
Wayne, Pennsylvania 19087-5691

Mr. David R. Helwig, Vice President
Limerick Generating Station
Post Office Box A
Sanatoga, Pennsylvania 19464

Mr. Robert Boyce
Plant Manager
Limerick Generating Station
P.O. Box A
Sanatoga, Pennsylvania 19464

Regional Administrator
U.S. Nuclear Regulatory Commission
Region I
475 Allendale Road
King of Prussia, PA 19406

Mr. Neil S. Perry
Senior Resident Inspector
US Nuclear Regulatory Commission
P. O. Box 596
Pottstown, Pennsylvania 19464

Mr. Craig L. Adams
Superintendent - Services
Limerick Generating Station
P.O. Box A
Sanatoga, Pennsylvania 19464

Mr. Rich R. Janati, Chief
Division of Nuclear Safety
PA Dept. of Environmental Resources
P. O. Box 8469
Harrisburg, Pennsylvania 17105-8469

Mr. James A. Muntz
Superintendent-Technical
Limerick Generating Station
P. O. Box A
Sanatoga, Pennsylvania 19464

Mr. James L. Kantner
Regulatory Engineer
Limerick Generating Station
P. O. Box A
Sanatoga, Pennsylvania 19464

Library
US Nuclear Regulatory Commission
Region I
475 Allendale Road
King of Prussia, PA 19406

Mr. Larry Hopkins
Superintendent-Operations
Limerick Generating Station
P. O. Box A
Sanatoga, Pennsylvania 19464

Mr. John Doering, Chairman
Nuclear Review Board
PECO Energy Company
955 Chesterbrook Boulevard
Mail Code 63C-5
Wayne, Pennsylvania 19087

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

PHILADELPHIA ELECTRIC COMPANY

DOCKET NO. 50-352

LIMERICK GENERATING STATION, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 72
License No. NPF-39

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Philadelphia Electric Company (the licensee) dated May 6, 1994, as supplemented by letter dated June 3, 1994, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. NPF-39 is hereby amended to read as follows:

Technical Specifications

The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 72 , are hereby incorporated into this license. Philadelphia Electric Company shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of June 30, 1994.

FOR THE NUCLEAR REGULATORY COMMISSION

Charles L. Miller

Charles L. Miller, Director
Project Directorate I-2
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Attachment: Changes to the
Technical Specifications

Date of Issuance: June 30, 1994

ATTACHMENT TO LICENSE AMENDMENT NO. 72

FACILITY OPERATING LICENSE NO. NPF-39

DOCKET NO. 50-352

Replace the following pages of the Appendix A Technical Specifications with the attached pages. The revised page is identified by Amendment number and contains vertical lines indicating the area of change. Overleaf page is provided to maintain document completeness.*

Remove	Insert
5-7	5-7*
5-8	5-8

SECONDARY CONTAINMENT

5.2.3 The secondary containment consists of three distinct isolatable zones. Zones I and II are the Unit 1 and Unit 2 reactor enclosures respectively. Zone III is the common refueling area. Each zone has an independent normal ventilation system which is capable of providing secondary containment zone isolation as required.

Each reactor enclosure (Zone I or II) completely encloses and provides secondary containment for its corresponding primary containment and reactor auxiliary or service equipment, and has a minimum free volume of 1,800,000 cubic feet.

The common refueling area (Zone III) completely encloses and provides secondary containment for the refueling servicing equipment and spent fuel storage facilities for Units 1 and 2, and has a minimum free volume of 2,200,000 cubic feet.

5.3 REACTOR CORE

FUEL ASSEMBLIES

5.3.1 The reactor core shall consist of not more than 764 fuel assemblies and shall be limited to those fuel assemblies which have been analyzed with NRC approved codes and methods and have been shown to comply with all Safety Design Bases in the Final Safety Analysis Report (FSAR).

CONTROL ROD ASSEMBLIES

5.3.2 The reactor core shall contain 185 cruciform-shaped control rod assemblies.

5.4 REACTOR COOLANT SYSTEM

DESIGN PRESSURE AND TEMPERATURE

5.4.1 The reactor coolant system is designed and shall be maintained:

a. In accordance with the code requirements specified in Section 5.2 of the FSAR, with allowance for normal degradation pursuant to the applicable Surveillance Requirements,

DESIGN PRESSURE AND TEMPERATURE (Continued)

b. For a pressure of:

1. 1250 psig on the suction side of the recirculation pump.

2. 1500 psig from the recirculation pump discharge to the outlet side of the discharge shutoff valve.

3. 1500 psig from the discharge shutoff valve to the jet pumps.

c. For a temperature of 575°F.

VOLUME

5.4.2 The total water and steam volume of the reactor vessel and recirculation system is approximately 22,400 cubic feet at a nominal steam dome saturation temperature of 547°F.

5.5 FUEL STORAGE

CRITICALITY

5.5.1.1 The spent fuel storage racks are designed and shall be maintained with:

a. A k_{eff} equivalent to less than or equal to 0.95 when flooded with unborated water, including all calculational uncertainties and biases as described in Section 9.1.2 of the FSAR.

b. A nominal 6.625 inch center-to-center distance between fuel assemblies placed in the storage racks.

5.5.1.2 The k_{eff} for new fuel for the first core loading stored dry in the spent fuel storage racks shall not exceed 0.98 when aqueous foam moderation is assumed.

DRAINAGE

5.5.2 The spent fuel storage pool is designed and shall be maintained to prevent inadvertent draining of the pool below elevation 346'0".

CAPACITY

5.5.3 The spent fuel storage pool is designed and shall be maintained with a storage capacity limited to no more than 2500 fuel assemblies.

5.6 COMPONENT CYCLIC OR TRANSIENT LIMIT

5.6.1 The components identified in Table 5.6.1-1 are designed and shall be maintained within the cyclic or transient limits of Table 5.6.1-1.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 72 TO FACILITY OPERATING LICENSE NO. NPF-57

PHILADELPHIA ELECTRIC COMPANY

LIMERICK GENERATING STATION, UNIT 1

DOCKET NO. 50-352

1.0 INTRODUCTION

By letter dated May 6, 1994, as supplemented by letter dated June 3, 1994, the Philadelphia Electric Company (PECo, or the licensee) submitted a request for changes to the Limerick Generating Station (LGS), Unit 1, Technical Specifications (TS). The requested changes would revise TS Section 5.5.3, "Capacity," to allow an interim increase in the Unit 1 Spent Fuel Pool (SFP) from 2040 fuel assemblies to 2500 fuel assemblies (including 560 low exposure fuel assemblies received from the Shoreham facility). PECo has indicated that the SFPs had been designed for a storage capacity of 2862 fuel assemblies (LGS Updated Final Safety Analysis Report (UFSAR), Section 9.1), and that the staff analysis (NUREG-0991, Section 9.1.3) supported a storage capacity of 2484 fuel assemblies. The revision is necessary to support another proposed TS amendment request, dated January 14, 1994, that would authorize the reracking of Units 1 and 2 SFPs at LGS. The supplemental letter provided clarifying information that did not change the initial proposed no significant hazards consideration determination.

2.0 EVALUATION

Currently, each unit at LGS has its own SFP, which provides storage for 2040 new and spent fuel assemblies. The two SFPs are located on a common refueling floor and are provided with interconnection for fuel transfer between the two pools.

The SFPs are seismic Category I reinforced concrete structures with post-tensioned girders and a 72-inch thick reinforced concrete slab (Section 3.2 of the LGS UFSAR). They are lined with stainless steel plates and are provided with a drainage system, and leakage detection and collection system (Section 9.1 of the LGS UFSAR). Loss of any nonseismic Category I components would not affect the ability to maintain spent fuel cooling or to maintain adequate submergence of the fuel. Also, accidental dropping of movable heavy objects into the SFP is precluded by administrative procedures, electrical interlocks, use of guardrails, curbs and reactor wells around the pool to prevent fuel handling and servicing equipment from falling into the pool. The licensee is committed to follow the guidance in NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants," which would preclude the likelihood of a heavy load drop.

The spent fuel storage racks are modular, freestanding, top entry racks designed to maintain the spent and new fuel in a space geometry whereby each fuel assembly has a neutron poisoning material between it and any adjoining

fuel assemblies. Currently, three sizes of rack modules are approved to use at LGS: 10 feet x 11 feet, 10 feet x 12 feet, and 11 feet x 12 feet. The 10 x 11 modules have 55 poison cans, the 10 x 12 modules have 60 poison cans, and the 11 x 12 modules have 66 poison cans. The poison cans consist of two concentric square aluminum tubes with four plates of Boral in the annular gaps. The outer concentric tube is folded into the inner tube at both ends and totally seal-welded. Each poison can is pressure and vacuum leak tested, plug-welded to isolate the Boral from the pool water, and then anodized. The storage racks are installed in such a manner so that there is a Boral plate between each adjoining fuel storage position. Each storage module is level with each other module at the top. There are 7.25 inches of clearance from the bottom of the module to the SFP floor. This clearance ensures each fuel assembly will stay cool with cooling water entering each fuel cell and by natural convection. The only point of contact between the spent fuel rack and the SFP structure is with the bottom liner plate. The design of the existing SFP storage racks is discussed in Section 9.1 of the LGS UFSAR.

The licensee has indicated that the rack materials have no significant degradation from the total radiation doses expected in the SFP over the design life. Furthermore, the racks are designed to withstand various loading conditions such as dead and live loads, loads experienced by a jammed fuel assembly or dropped fuel assembly, and loads experienced during seismic events.

The spent fuel storage racks maintain fresh and spent fuel with a nominal center-to-center spacing of 6.625 inches between fuel asemblies. The racks are designed with a boral plate between each adjoining fuel storage position. This separation distance, in conjunction with the high neutron absorbing boral material, ensures that the rack k_{eff} does not exceed the NRC acceptance criterion of 0.95 when completely flooded with unborated water, even for the proposed interim increase in the storage capacity. Therefore, the staff finds the criticality aspects of this interim change acceptable.

The LGS Unit 1 SFP has been designed by the licensee and evaluated by the staff for a storage capacity of up to 2862 spent fuel assemblies (UFSAR Section 9.1, and NUREG-0991 Section 9.1). Therefore, the staff finds the structural aspects of the proposed change to limit the spent fuel pool capacity up to 2500 fuel assemblies for the LGS Unit 1 spent fuel pool acceptable.

The Fuel Pool Cooling and Cleanup (FPCC) system is designed to remove the decay heat generated by the spent fuel assemblies in the SFP and to maintain the quality of pool water suitable for underwater operations and for personnel protection in the refueling area. The FPCC system is designed to maintain the bulk water temperature in the SFP at or below 140 degrees F under normal operating conditions with a normal decay heat load of 1.632×10^7 Btu/hr, two FPCC pumps, and two FPCC heat exchangers in operation. Two of the three installed SFP cooling pumps per each unit are powered from Class 1E power sources. Section 9.1 of the UFSAR contains the description for the normal heat load discharge history. The licensee's evaluation assuming the actual

discharge schedules for the proposed storage of the 2500 spent fuel assemblies in the Unit 1 SFP results in a decay heat load to be 1.05×10^7 Btu/hr which is below the currently analyzed condition. The RHR system is available as a backup SFP cooling system, following installation of an open spool piece, in the event of a loss of the spent fuel pool cooling system. Furthermore, the SFP is provided with redundant seismic Category 1 makeup capability from the ESW system, using valves located outside the control structure, to ensure an adequate supply of water under various conditions.

Based on NUREG-0991, "Safety Evaluation Report Related to the Operation of Limerick Generating Station, Units 1 and 2," Supplement 2, Section 9.1.3, "Spent Fuel Pool Cooling and Cleanup System", the heat removal capability of the FPCC system could support up to the storage of 2484 spent fuel assemblies. The licensee is requesting to increase the spent fuel storage capacity in the Unit 1 SFP from 2040 fuel assemblies to 2500 assemblies. They consist of 1940 spent fuel assemblies discharged from LGS, Units 1 and 2, including contingency, and 560 low exposure fuel assemblies shipped to LGS from the Shoreham Nuclear Power Station. In March 1994, the licensee completed an evaluation of the fuel recently discharged from LGS Unit 1 during the fifth refueling outage, and discovered that the present decay heat generation rate is approximately 6400 W/bundle. In comparison, the decay heat generation rate for Shoreham fuel is approximately 0.47 W/bundle. The heat load to the Unit 1 SFP from all the Shoreham fuel is considered negligible. The heat load for the Unit 1 SFP would still be well below the current TS limit for 2040 fuel assemblies, after the proposed increase in storage capacity to 2500 fuel assemblies. The staff finds the information on the spent fuel pool cooling and cleanup system acceptable.

The staff is currently evaluating certain specific potential loss of spent fuel pool cooling issues that were raised in a report filed pursuant to 10 CFR Part 21, on November 27, 1992. Should the staff determine that additional action regarding spent fuel cooling systems is warranted on a generic basis, the staff will take appropriate action.

The spent fuel transfer operation will involve the movement of 6 empty SFP racks from the Unit 2 SFP to the Unit 1 SFP. The removal and transfer of these racks will be performed using remote handling tools. Diving operations are not anticipated. However, if diving becomes necessary, the licensee has committed to follow existing plant procedures that incorporate the guidance stated in NRC Regulatory Guide 8.38, "Control Access of High and Very High Radiation Areas in Nuclear Power Plants," for the protection of the divers.

The empty SFP racks will be surveyed and rinsed with demineralized water prior to being transferred to the Unit 1 SFP. If the survey identifies any rack as having a radiation level higher than 1 R/hr, it will be hydrolazed under water to reduce the radiation level to less than 1 R/hr. The transfer will require that the racks be lifted out of the SFP. However, the time that the racks are out of the SFP is expected to be minimal (i.e., estimated as 5 minutes per rack), with minimal impact on airborne radioactivity levels. Further, the licensee has committed to ensure that the racks should not be allowed to dry out during the transfer.

The licensee is committed to maintain personnel exposure to as low as reasonably achievable and estimates that transfer of the 6 racks will result in less than one person-rem of occupational dose. In addition, PECO has committed to provide continuous health physics coverage along with continuous air sampling during this transfer operation. Further, as a result of the operational controls, no personnel respiratory protection devices are being considered for this operation. The staff finds the proposed radiation protection aspects of this SFP rack transfer from the Unit 2 SFP to the Unit 1 SFP acceptable.

Based on the above, the staff concludes that the proposed change to the Limerick Generating Station, Units 1 and 2, revising TS Section 5.5.3, "Capacity," to facilitate an interim increase in the Unit 1 SFP from 2040 fuel assemblies to 2500 fuel assemblies, is acceptable.

3.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Pennsylvania State official was notified of the proposed issuance of the amendment. The State official had no comments.

4.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (59 FR 27063). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

5.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributors: F. Rinaldi
T. Liu

Date: June 30, 1994