

February 1995

Mr. George A. Hunger, Jr.
Director-Licensing, MC 62A-1
PECO Energy Company
Nuclear Group Headquarters
Correspondence Control Desk
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SUBJECT: ENVIRONMENTAL ASSESSMENT AND FINDING OF NO SIGNIFICANT IMPACT, POWER
UPRATE WITH INCREASED CORE FLOW, LIMERICK GENERATING STATION,
UNIT NOS. 1 AND 2 (TAC NOS. M88392 AND M88393)

Dear Mr. Hunger:

Enclosed is a copy of the Environmental Assessment and Finding of No Significant Impact related to your application for amendment dated December 9, 1993, as supplemented July 5, September 9, October 19, November 19, 1994, and January 6, and January 23, 1995. The proposed amendment would increase the licensed thermal power level of the reactor from the current limit of 3293 megawatts thermal (Mwt) to 3458 Mwt.

The assessment is being forwarded to the Office of the Federal Register for publication.

Sincerely,

/s/

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

Docket No. 50-352/353

Enclosure: Environmental Assessment

cc w/encl: See next page

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UNITED STATES
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

February 7, 1995

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A handwritten signature in cursive script, appearing to read "Frank Rinaldi".

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

Docket Nos. 50-352/353

Enclosure: Environmental Assessment

cc w/encl: See next page

Mr. George A. Hunger, Jr.
PECO Energy Company

Limerick Generating Station,
Units 1 & 2

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needed to Appendix B of the license (Environmental Protection Plan - Non-radiological).

The Need for the Proposed Action:

The proposed action is needed to permit an increase in the licensed core thermal power from 3293 Mwt to 3458 Mwt and provide the licensee with the flexibility to increase the potential electrical output of LGS, Units 1 and 2, providing additional electrical power to service domestic and commercial areas.

Environmental Impacts of the Proposed Action:

The "Final Environmental Statement (FES) Related to Operation of Limerick Generating Station, Units 1 and 2" was issued April 1984 (NUREG-0974). The licensee submitted GE Topical Report, NEDC-32225P, "Power Rerate Safety Analysis Report for Limerick Generating Station, Units 1 and 2," Class III, dated September 1993, as Attachment 3 to the December 9, 1993 submittal. NEDC-32225P contains the safety analysis prepared by GE to support this license change request and the implementation of power uprate at LGS, Units 1 and 2. The analyses and evaluations supporting these proposed changes were completed using the guidelines in GE Topical Report NEDC-31897P-A, "Generic Guidelines for General Electric Boiling Water Reactor Power Uprate," Class 3, dated May 1992, and NEDC-31948P, "Generic Evaluations of General Electric Boiling Water Reactor Power Uprate," Class III, dated July 1991. The NRC reviewed and approved GE Topical Reports NEDC-31897P-A and NEDC-31948P in a September 30, 1991, letter and in a letter from W. Russell, NRC, to P. Marriotte, GE, dated July 31, 1992.

The licensee provided information regarding the nonradiological and radiological environmental effects of the proposed action in the December 9, 1993 application and supplemental information in the January 6, and January 23, 1995 submittal. The staff has reviewed the potential radiological and non-radiological effects of the proposed action on the environment as described below.

Non-Radiological Environmental Assessment:

Power uprate will not change the method of generating electricity nor the method of handling any influents from nor effluents to the environment. Therefore, no new or different types of environmental impacts are expected.

The staff reviewed the nonradiological impact of operation at uprated power levels on influents from the Perkiomen Creek, Schuylkill and Delaware Rivers and effluents to the Schuylkill River. LGS, Units 1 and 2 each have a closed-loop circulating water system and cooling tower for dissipating heat from the main turbine condensers. The cooling towers are operated in accordance with the requirements of National Pollution Discharge Elimination System (NPDES) Permit No. PA0051926. The current permit was renewed on December 12, 1994 and is effective through December 31, 1999. The only increase in LGS water intake due to operation at power uprate conditions is due to increased evaporation in the hyperbolic natural draft cooling towers. In the January 6, 1995 letter, the licensee indicated that the existing consumptive flow will conservatively increase from 38,059,065 to 40,723,200 gallons per day (total for both units), depending on atmospheric conditions. The velocity of the intake water will increase less than 7 percent. Makeup is drawn from the Schuylkill River, Perkiomen Creek, or the Delaware River,

depending on flow and temperature. When makeup is drawn from the Delaware River through the Point Pleasant Pumping Station via the Bradshaw Station, 3 percent additional evaporative losses must be considered. The increased makeup flow (including evaporative losses), is within the existing water diversion consumptive use limit of 42,000,000 gallons per day specified in the original permitting evaluations.

Makeup water requirements for systems and components other than the cooling towers are not expected to change due to operation at uprated power levels. The licensee indicated that the only potential change is due to increased reactor operating pressure which could slightly increase leakage through valve packing. System leakage, however, is processed through the liquid radwaste system and returned to the condensate storage tank for reuse. Based on the above considerations, the staff concluded that the effect of makeup requirements at uprated power levels on the environment is not significant.

The licensee does not expect any increase in the cooling tower blowdown due to the physical limitation in the blowdown system. Likewise, the licensee does not expect any increase in the blowdown discharge velocity. However, the licensee indicated that the blowdown discharge temperature will increase less than 0.1°F. This temperature rise will have an insignificant effect on the thermal plume. This increase is within the NPDES permit limit.

An increase in cooling tower drift is not anticipated for operation at uprated conditions. Drift is a function of physical geometry, water flow, and wind conditions, none of which are changed by power uprate. Therefore, the licensee has indicated that the original evaluation of impacts to the terrestrial environment is not altered.

The only changes to the cooling tower water chemistry are due to increased evaporation from the towers. Concentrations of dissolved and suspended solids in the blowdown will increase approximately less than 7 percent, which is within NPDES permit limits. The licensee stated that the use of biocides and corrosion inhibitors in the circulating water system may change as a result of operation at uprated power levels. However, the licensee stated that change in chemical usage would not impact existing NPDES permit limitations.

Nonradiological effluent discharges from other systems were also considered. Nonradiological effluent limits for such systems as yard drains, sewage treatment plant, and laundry drains are established in the NPDES permit. Discharges from these systems are not expected to change significantly, if at all, because operation at uprated power levels is governed by the limits in the NPDES permit. Thus, the impact on the environment from these systems as a result of operation at uprated power levels is not significant.

Operation at uprated power levels will not result in increased noise generation from the majority of plant equipment. Some of this equipment, such as the main turbine and generator will operate at the same speed and thus will not contribute to increased offsite noise. Other major plant equipment is located within plant structures and will not lead to increased offsite noise levels. The main station transformers will operate at an increased kilovolt-ampere level which will cause an insignificant increase in the overall noise level. The makeup pumps, which are indoors, will operate at the same level, however, in some cases cycling on slightly more frequently. The pumps at the

Bradshaw Station are variable speed and, when used, will operate at a slightly higher speed. The pumps are indoors; therefore, the outside noise level increase will be insignificant.

The licensee has stated that there are no changes required to the LGS Environmental Protection Plan as a result of operation at uprated power levels. Specifically the licensee stated:

Other non-radiological environmental impacts of the proposed power rerate were reviewed based on the information submitted in the Environmental Report, Operating License Stage, the NRC Final Environmental Statement (FES), Operating License Appendix B (i.e., Environmental Protection Plan), the requirements of the applicable NPDES permits, which include the outfall limits, and the Delaware River Basin Commission Water Use permit. We have concluded the proposed power rerate will have insignificant impacts on the non-radiological elements of concern and the plant will be operated in an environmentally acceptable manner as established by the FES. Existing Federal, State and Local regulatory permits presently in effect will accommodate power rerate without modification.

The FES described the impact of plant operation on fogging in the vicinity of the facility. The FES discussed that the increase in fogging due to plant operation was expected to blend in with the natural fog and be indistinguishable. The staff expects that operation of the plant at uprated power levels will result in only a minimal increase in fogging over that discussed in the FES. Thus, the impact of plant operation on local fogging, including operation at uprated power, remains insignificant.

Radiological Environmental Assessment:

The licensee evaluated the impact of the proposed amendment to show that the applicable regulatory acceptance criteria continue to be satisfied for the uprated power conditions. In conducting this evaluation, the licensee considered the effect of the higher power level on source terms, onsite and offsite doses, and control room habitability during both normal operation and

accident conditions. The licensee provided information regarding the radiological environmental effects of the proposed action in NEDC-32225P and supplemental information in the January 6, 1995 submittal. In Sections 8.1 and 8.2 of NEDC-32225P, the licensee discussed the potential effect of power rerate on liquid and gaseous radioactive waste systems. Sections 8.3 and 8.4 discussed the potential effect of power uprate on radiation sources in the reactor core during operation and post-operation, and radiation sources in the reactor coolant resulted from coolant activation products, activated corrosion products and fission products. Section 8.5 of the Topical Report discussed the radiation levels during normal operation, normal post-operation, post-accident, and offsite doses during normal operation. Finally, Section 9.2 of NEDC-32225P presented the results of calculated whole body and thyroid doses at the uprated power and current authorized power conditions at the exclusion area boundary and the low population zone that might result from the postulated design basis radiological accidents [i.e., loss-of-coolant-accident (LOCA), main steam line break accident (MSLBA) outside containment, fuel handling accident (FHA) and control rod drop accident (CRDA)].

In Section 8.1 of NEDC-32225P, the licensee stated that there will be only a slight increase in the liquid radwaste collection as a result of operation at higher power levels. The liquid waste system collects, monitors, processes, stores, and returns processed radioactive waste to the plant for reuse or for discharge. The largest contributor to the liquid waste results from the backwash of the condensate demineralizers and deepbeds. The rate of loading on the demineralizers increases, resulting in the average time between backwash precoat being reduced slightly; this reduction does not affect plant

safety. Similarly, the reactor water cleanup (RWCU) filter/demineralizers will require slightly more frequent backwashes due to slightly higher levels of activation and fission products. The power uprate will increase the flow rate through the condensate demineralizers, with a subsequent reduction in the average time between backwashing. Additionally, neither the floor drain collector subsystem nor the waste collector subsystem is expected to experience a significant increase in the total volume of liquid waste due to operation at the uprated level.

The licensee stated that while the activated corrosion products in liquid wastes are expected to increase proportionally to the square of the power increase, the total volume of processed waste is not expected to increase appreciably. Based on its analyses of the liquid radwaste system, the licensee has concluded the requirements of 10 CFR Part 20 and 10 CFR Part 50, Appendix I, will be met. Based on the above considerations, the staff concluded that the power uprate will have no significant adverse effects on liquid effluents.

The gaseous waste management systems collect, control, process, store and dispose of gaseous radioactive waste generated during normal operation and abnormal operational occurrences. These systems include the standby gas treatment system (SGTS), off-gas recombiner system, the ambient temperature charcoal treatment system, and various building ventilation systems. Various devices and processes, such as radiation monitors, filters, isolation dampers, and fans, are used to control airborne radioactive gases. The licensee states that the activity of airborne effluents released through building vents is not

expected to increase significantly with power uprate and the systems are designed to meet the requirements of 10 CFR Part 20 and 10 CFR Part 50, Appendix I.

In its power uprate submittal, the licensee has stated that the greatest contributor of radioactive gases is the noncondensable radioactive gases from the main condenser, including activation gases (principally N-16, O-19, and N-13) and radioactive noble gas parents. The increase in production of these gases is expected to be approximately proportional to the core power increase. These noncondensable radioactive gases, along with nonradioactive air due to inleakage to the condenser, are continuously removed from the main condensers by the steam jet air ejectors (SJAE). The SJAEs discharge into the offgas system. The flow of these gases into the offgas system is included with the flow of H₂ and O₂ to the recombiner, which will also increase linearly with core power. Radioactive gases and H₂ and O₂ pass from the recombiner through a holdup pipe, cooler condenser, adsorber bed, and high-efficiency particulate air (HEPA) filters and exit the facility through the north stack. Gaseous activity effluent release rates are monitored down stream of the adsorber bed and alarms are provided in the control room. The licensee has stated that the operational increases in hydrogen, oxygen, and noble gases due to uprate are not significant when compared to the current total system flow which also includes air from condenser inleakage and steam flows from the air ejector.

The design basis for the offgas system is for activity release rates of 100,000 microcuries per second based on a mixture of activation and fission

product gases and fuel leakage and a 30-minute holdup time. The system is designed to meet the requirements of 10 CFR Part 20 and 10 CFR Part 50, Appendix I. Performance of the system at uprated power levels is expected to remain within the system design basis and, thus, to continue to meet the requirements of 10 CFR Part 20 and 10 CFR Part 50, Appendix I.

The contribution of gases to the gaseous waste management system from building ventilation system is not expected to increase significantly with power uprate because 1) the amount of fission products released into the reactor coolant depends on the number and nature of the fuel rod defects and is not dependent on reactor power, and 2) the concentration of coolant activation products is expected to remain unchanged since the linear increase in the production of these products will be offset by the linear increase in steaming rate.

Based on its review of the gaseous waste management system, the staff concluded that there will not be a significant adverse effect on airborne effluents as a result of the power uprate.

The licensee has evaluated the effects of the power uprate on in-plant radiation levels in the LGS facility during normal and abnormal operation as well as from postulated accident conditions. The licensee has concluded that radiation levels from both normal and accident conditions may increase slightly. However, because many areas of the plant were designed for higher than expected radiation sources, the small increase in radiation levels expected due to power uprate will not affect radiation zoning or shielding in the plant.

During periods of normal and post-operation conditions, individual worker exposures will be maintained within acceptable limits by the existing, as low as is reasonably achievable (ALARA) program, which controls access to radiation areas. Procedure controls compensate for slightly increased radiation levels.

The offsite doses associated with normal operation are not significantly affected by operation at the uprated power level, and are expected to remain below the limits of 10 CFR Part 20 and 10 CFR Part 50, Appendix I.

The main control room (MCR) habitability was evaluated. Post-accident MCR and technical support center doses were confirmed by the licensee to be within the limits of General Design Criterion (GDC) 19 or 10 CFR Part 50, Appendix A.

The increase in LOCA radiological consequences due to power uprate was analyzed by the licensee. The resultant offsite doses were found to be within guidelines of 10 CFR Part 100. The events evaluated for uprate were the LOCA, the MSLBA, the FHA, and the CRDA. The whole body and thyroid doses were calculated for the exclusion area boundary (EAB), low population zone (LPZ), and the control room. The plant-specific results for power uprate remain well below established regulatory limits. The doses resulting from the accidents analyzed are compared below with the applicable dose limits.

LOCATION	LOCA Radiological Consequences		
	UFSAR DOSE (rem)	DOSE (rem)	LIMIT
	@ 3458 Mwt	@ 3527 Mwt*	
Exclusion Area:			
Whole Body Dose	0.67	0.68	25
Thyroid Dose	0.15	0.15	300
Low Population Zone:			
Whole Body Dose	1.7	1.7	25
Thyroid Dose	0.04	0.04	300
Main Control Room:			
Whole Body Dose	4.6	4.7	5
Thyroid Dose	14.0	14.3	30
Beta	7.6	7.8	30

FHA Radiological Consequences			
Exclusion Area			
Whole Body Dose	0.7	0.7	6
Thyroid Dose	0.95	0.98	75
Low Population Zone			
Whole Body Dose	0.099	0.102	6
Thyroid Dose	0.13	0.135	75

CRDA Radiological Consequences			
Exclusion Area			
Whole Body Dose	0.04	0.042	6
Thyroid Dose	0.32	0.3	75
Low Population Zone			
Whole Body	0.014	0.0148	6
Thyroid Dose	0.62	0.63	75

*This number represents 102% of the power uprate level. Doses based on 102% are consistent with Regulatory Guide 1.49, Revision 1 guidance and are provided to allow for possible instrument errors in determining the power level.

Based on a review of the licensee's major assumptions and methodology used in their reconstituted dose calculations and the staff's original safety evaluation, the staff concluded that the offsite radiological consequences and control room operator doses at uprated power levels still remain below 10 CFR Part 100 dose reference values and GDC 19 dose limits. Therefore, the staff concludes that no significant adverse effect on radiation levels will result onsite or offsite from the planned power uprate.

It is expected that the increased energy requirements associated with operation at uprated power will require an increase in the reload fuel enrichment and will result in increased burnup. The NRC previously evaluated the environmental impacts associated with burnup values of up to 60,000 Mwd/MT with fuel enrichments up to 5 percent ²³⁵U (published in the Federal Register, 53 FR 6040 dated February 29, 1988). The staff concluded that the environmental impacts associated with Table S-3 of 10 CFR 51.51, Uranium Fuel Cycle Environmental Data, and Table S-4 of 10 CFR 51.52, Environmental Impact of Transportation of Fuel and Waste, are conservative and bound the corresponding impacts for burnup levels of up to 60,000 Mwd/MtU and ²³⁵U enrichments up to 5 percent by weight. In the January 23, 1995 submittal, the licensee indicated that while fuel burnup and enrichment levels may increase as a result of operation at uprated power, the burnup and enrichment will remain within the 5 percent enrichment and 60,000 Mwd/MT value previously evaluated by the staff. Based on the above cited environmental assessment and the licensee's statements regarding expected burnup and enrichment values, the staff concludes that the environmental effects of increased fuel cycle and transportation activity as a result of operation at uprated power levels are not significant.

The Commission has completed its evaluation of the proposed action and concludes that the NRC's FES is valid for operation at the proposed uprated power conditions for LGS, Units 1 and 2. The staff also concluded that the plant operating parameters impacted by the proposed uprate would remain within the bounding conditions on which the conclusions of the FES are based.

The change will not increase the probability or consequences of accidents, no changes are being made in the types of any effluents that may be released offsite, and there is no significant increase in the allowable individual or cumulative occupational radiation exposure.

The NRC staff finds the radiological and nonradiological environmental impacts associated with the proposed small increase in power are very small and do not change the conclusion in the FES that the operation of LGS, Units 1 and 2, would cause no significant adverse impact upon the quality of the human environment.

Accordingly, the Commission concludes that there are no significant radiological environmental impacts associated with the proposed action.

Alternatives to the Proposed Action:

Since the Commission has concluded there is no measurable environmental impact associated with the proposed action, any alternatives with equal or greater environmental impact need not be evaluated.

The principal alternative to the action would be to deny the request. Such action would not significantly reduce the environmental impact of plant operation but would restrict operation of LGS, Units 1 and 2 to the currently licensed power level and prevent the facility from generating approximately 60 MWe (165 MW) additional that is obtainable from the existing plant design.

Alternative Use of Resources:

This action does not involve the use of any resources not previously considered in the "Final Environmental Statement related to the operation of Limerick Generating Station, Units 1 and 2," dated April 1984.

Agencies and Persons Consulted:

In accordance with its stated policy, the staff consulted with the Bureau of Radiation Protection, Pennsylvania Department of Environmental Resources, regarding the environmental impact of the proposed action. The State official had no comments.

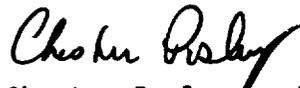
FINDING OF NO SIGNIFICANT IMPACT

Based upon the environmental assessment, the Commission concludes that the proposed action will not have a significant effect on the quality of the human environment. Accordingly, the Commission has determined not to prepare an environmental impact statement for the proposed action.

For further details with respect to the proposed action, see the licensee's letter dated December 9, 1993, as supplemented by letters dated July 5, September 9, October 19, and November 19, 1994, and January 6, and January 23, 1995, which are available for public inspection at the Commission's Public Document Room, The Gelman Building, 2120 L Street, NW., Washington, DC, and at the local public document room located at the Pottstown Public Library, 500 High Street, Pottstown, PA 19464.

Dated at Rockville, Maryland, this 7th day of February 1995.

FOR THE NUCLEAR REGULATORY COMMISSION



Chester Poslusny, Acting Director
Project Directorate I-2
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation