January 30, 1984

(See correction letter of March 5, 1984)

Docket No. 50-219
LS05-84-01-048

Mr. P. B. Fiedler
Vice President and Director
Oyster Creek Nuclear Generating Station
Post Office Box 388
Forked River, New Jersey 08731

Dear Mr. Fiedler:

SUBJECT: INTERMEDIATE RANGE MONITORS (IRM) - NEUTRON MONITORING SYSTEM

Re: Oyster Creek Nuclear Generating Station

The Commission has issued the enclosed Amendment No. 71 to Provisional Operating License No. DPR-16 for the Oyster Creek Nuclear Generating Station. This amendment consists of changes to the Technical Specifications in response to your application dated September 2, 1983, as supplemented December 2, 1983.

The amendment authorizes changes to the Appendix A Technical Specifications for the Neutron Monitoring System by adding a tenth range to the intermediate range monitors.

A Notice of Consideration of Issuance of Amendment to License and Proposed No Significant Hazards Consideration Determination and Opportunity for Hearing related to the requested action was published in the Federal Register on November 22, 1983 (48 FR 52814). No request for hearing and no comments were received.

The supplemental information submitted by letter dated December 2, 1983 merely clarifies the meaning of the Technical Specification change. It provides rewording which explicitly states that the minimum recirculation flow of 39.65×10^6 lb/hr. intended for operation in IRM range 10 only, and not for all operation in the Startup Mode as originally submitted. This was the actual intent of the original submittal, as seen from the analysis of the significant hazards consideration contained in the original application. Thus, the supplemental information did not change the scope of the staff's notice for opportunity for hearing.

A copy of our related Safety Evaluation is also enclosed. This action will appear in the Commission's Monthly Notice publication in the Federal Register.

Sincerely,

Original signed by

Dennis M. Crutchfield, Chief
Operating Reactors Branch #5
Division of Licensing

Enclosures:
1. Amendment No. 71 to
   License No. DPR-16
2. Safety Evaluation

cc w/enclosures:
See next page

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

GPU NUCLEAR CORPORATION

AND

JERSEY CENTRAL POWER & LIGHT COMPANY

OYSTER CREEK NUCLEAR GENERATING STATION

AMENDMENT TO THE AMENDED PROVISIONAL OPERATING LICENSE

Amendment No. 71
License No. DPR-16

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

   A. The application for amendment by GPU Nuclear Corporation and Jersey Central Power and Light Company (the licensees) dated September 2, 1983, as supplemented December 2, 1983, 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 Provisional Operating License No. DPR-16 is hereby amended to read as follows:

   (2) Technical Specifications

   The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 71, are hereby incorporated in the license. GPU Nuclear Corporation shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Dennis M. Crutchfield

Dennis M. Crutchfield, Chief
Operating Reactors Branch #5
Division of Licensing

Attachment:
Changes to the Technical
Specifications

Date of Issuance: January 30, 1984

ATTACHMENT TO LICENSE AMENDMENT NO. 71

PROVISIONAL OPERATING LICENSE NO. DPR-16

DOCKET NO. 50-219

Replace the following pages of the Appendix A Technical Specifications with the enclosed pages. The revised pages are identified by the captioned amendment number and contain vertical lines indicating the area of change.

PAGES

2.3-1

2.3-3

2.3-5

2.3-6

3.1-8

3.1-14

3.3-2a

4.1-4

4.1-6

2.3 LIMITING SAFETY SYSTEM SETTINGS

Applicability: Applies to trip settings on automatic protective devices related to variables on which safety limits have been placed.

Objective: To provide automatic corrective action to prevent the safety limits from being exceeded.

Specification: Limiting safety system settings shall be as follows:

FUNCTION	LIMITING SAFETY SYSTEM SETTINGS
1) Neutron Flux, Scram	
a) APRM	For recirculation flow, $W \leq 61 \times 10^6$ lb/hr: $\leq ([1.34 \times 10^{-6}] W + 34.0)$ percent of rated neutron flux when total peaking factors in all fuel types are less than or equal to those in Specification 2.1.A.1, or The lowest value of: $\leq ([1.34 \times 10^{-6}] W + 34.0) \left[\frac{PF_o}{PF}\right]$ percent of rated neutron flux from among those calculations for each fuel type with total peaking factors, $PF > PF_o$, where PF_o = peaking factor in Specification 2.1.A.1. For recirculation flow, $W > 61 \times 10^6$ lb/hr: $\leq$ 115.7 percent of rated neutron flux when total peaking factors in all fuel types are less than or equal to those in Specification 2.1.A.1, or The lowest value of $\leq 115.7 \left[\frac{PF_o}{PF}\right]$ percent of rated neutron flux from among those calculations for each fuel type with total peaking factors $PF > PF_o$, where PF_o = peaking factor in Specification 2.1.A.1.
b) IRM	$\leq$ 38.4 percent of rated neutron flux.

FUNCTION	LIMITING SAFETY SYSTEM SETTINGS
7) Low Pressure Main St[illegible]a Line, MSIV Closure	≥ 5 psig (initiated in IRM range 10)
8) Main Steam Line Isolation Valve Closure, Scram	≤ 10% Valve Closure from full open
9) Reactor Low Water Level, Scram	≥ 11',5" above the top of the active fuel as indicated under normal operating conditions
10) Reactor Low-Low Water Level, Main Steam Line Isolation Valve Closure.	≥ 7',2" above the top of the active fuel as indicated under normal operating conditions.
11) Reactor Low-Low Water Level, Core Spray Initiation	≥ 7'2" above the top of the active fuel.
12) Reactor Low-Low Water Level, Isolation Condenser Initiation	≥ 7'2" above the top of the active fuel with time delay ≤ 3 seconds.
13) Turbine Trip Scram	10 percent turbine stop valve(s) closure from full open.
14) Generator Load Rejection Scram	Initiate upon loss of oil pressure from turbine acceleration relay.

BASES: Safety limits have been established in Specifications 2.1 and 2.2 to protect the integrity of the fuel cladding and reactor coolant system barriers. Automatic protective devices have been provided in the plant design to take corrective action to prevent the safety limits from being exceeded in normal operation or operational transients caused by reasonable expected single operator error or equipment malfunction. This Specification establishes the trip settings for these automatic protection devices.

The Average Power Range Monitor, APRM[1], trip setting has been established to assure never reaching the fuel cladding integrity safety limit. The APRM system responds to changes in neutron flux. However, near rated thermal power the APRM is calibrated, using a plant heat balance, so that the neutron flux that is sensed is read out as percent of rated thermal power. For slow maneuvers, those where core thermal power, surface heat flux, and the power transferred to the water follow the neutron flux, the APRM will read reactor thermal power. For fast transients, the neutron flux will lead the power transferred from the cladding to the water due to the effect of the fuel time constant. Therefore, when the neutron flux increases to the scram setting, the percent increase in heat flux and power transferred to the water will be less than the percent increase in neutron flux.

The APRM trip setting will be varied automatically with recirculation flow with the trip setting at rated flow 61.0×10^6 lb/hr or greater being 115.7% of rated neutron flux. Based on a complete

For operation in the Startup mode while the reactor is at low pressure, the IRM range 9 High Flux scram setting of 12% of the rated power provides adequate thermal margin between the maximum power and the safety limit of 18.3% of rated power to accommodate anticipated maneuvers associated with power plant startup. There are a few possible sources of rapid reactivity input to the system in the low power/low flow condition. Effects of increasing pressure at zero or low void content are minor, because cold water from sources available during the startup is not much colder than that already in the system, temperature coefficients are small, and control rod sequences are constrained by operating procedures backed up by the rod worth minimizer. Worth of individual rods is very low in a constrained rod pattern. In a sequenced rod withdrawal approach to the scram level, the rate of power rise is no more than five percent of the rated per minute, and the IRM system would be more than adequate to assure a scram before the power could exceed the safety limit.

To continue operation beyond 12% of rated power, the IRMs must be transferred into range 10. The Reactor Protection System is designed such that reactor pressure must be above 825 psig to successfully transfer the IRMs into range 10, thus assuring protection for the fuel cladding safety limit. The IRM scram remains active until the mode switch is placed in the RUN position at which time the trip becomes a coincident IRM upscale, APRM downscale scram.

The adequacy of the IRM scram was determined by comparing the scram level on the IRM range 10 to the scram level on the APRMs at 30% of rated flow. The IRM scram is at 38.4% of rated power while the APRM scram is at 52.7% of rated power. The minimum flow for Oyster Creek is at 30% of rated power and this would be the lowest APRM scram point. The increased recirculation flow to 65% of flow will provide additional margin to CPR limits. The APRM scram at 65% of rate flow is 87.1% of rated power, while the IRM range 10 scram remains at 38.4% of rated power. Therefore, transients requiring a scram based on flux excursion will be terminated sooner with a IRM range 10 scram then with an APRM scram. The transients requring a scram by nuclear instrumentation are the loss of feedwater heating and the improper startup of an idle recirc loop. The loss of feedwater heating transient is not affected by the range 10 IRM since the feedwater heaters will not be put into service until after the LPRM downscales have cleared, thus insuring the operability of the APRM system. This will be administratively controlled. The improper startup of an idle recirc loop becomes less severe at lower power level and the IRM scram would be adequate to terminate the flux excursion.

The Rod Worth Minimizer is not required beyond 10% of rated power. The ability of the IRMs to terminate a rod withdrawal transient is limited due to the number and location of IRM detectors. An evaluation was performed that showed by maintaining a minimum recirculation flow of 39.65×10^6 lb/hr in range 10 a complete rod withdrawal initiated at 35% of rated power or less would not result in violating the fuel cladding safety limit. Therefore, a rod block on the IRMs at less than 35% of rated power would be adequate protection against a rod withdrawal transient.

The reactor coolant system safety valves offer yet another protective feature for the reactor coolant system pressure safety limit since these valves are sized assuming no credit for other pressure relieving devices. In compliance with Section I of the ASME Boiler and Pressure Vessel Code, the safety valves must be set to open at a pressure no higher than 103% of design pressure, and they must limit the reactor pressure to no more than 110% of design pressure. The safety valves are sized according to the code for a condition of turbine stop valve closure while operating at 1930 MW(t), followed by (1) a delay of all scrams, (2) failure of the turbine bypass valves to open, and (3) failure of the isolation condensers and relief valves to operate. Under these conditions, a total of 16 safety valves are required to turn the pressure transient. For analysis purposes, the void reactivity coefficient was also pessimistically increased by 50%, i.e., a void coefficient 1.5 times normal. With the safety valves set as specified herein the maximum vessel pressure (at the bottom of the pressure vessel) would be about 1301 psig (9); maximum pressure at the lowest point in the recirculation loop is approximately 1315 psig which is 60 psi below the safety limit. The ASME B&PV Code allows a ±1% of working pressure (1250 psig) variation in the pop point of the valves. This variation is recognized in Specification 4.3.

The low pressure isolation of the main steam lines at 825 psig was provided to give protection against fast reactor depressurization and the resulting rapid cool-down of the vessel. Advantage was taken of the scram feature which occurs when the main steam line isolation valves are closed, to provide for reactor shutdown so that high power operation at low reactor pressure does not occur, thus providing protection for the fuel cladding integrity safety limit. Operation of the reactor at pressures lower than 825 psig requires that the reactor mode switch be in the startup position and the IRMs be in the range 9, or lower, where protection of the fuel cladding integrity safety limit is provided by the IRM high neutron flux scram. Thus, the combination of the main steam line low pressure isolation and isolation valve closure scram assures the availability of neutron flux scram protection over the entire range of applicability of the fuel cladding integrity safety limit. In addition the isolation valve closure scram anticipates the pressure and flux transients which occur during normal or inadvertent isolation valve closure.

With the scrams set at 10% valve closure, there is no increase in neutron flux and the peak pressure is limited to 1110 psig (9).

TABLE 3.1.1 PROTECTIVE INSTRUMENTATION REQUIREMENTS (CONTD)

Function	Trip Setting	Reactor Modes in Which Function Must Be Operable: Shutdown	Refuel	Startup	Run	Min. No. of Operable or Operating (Tripped) Trip Systems	Min. No. of Operable Instrument Channels Per Operable Trip Systems	Action Required*
B. Reactor Isolation								
1. Low-Low Reactor Water Level	**	X	X	X	X	2	2	Close main steam isolation valves and close isolation condenser vent valves, or place in cold shutdown condition
2. High Flow in Main Steam-line A	≤ 120% rated	X(s)	X(s)	X	X	2	2	
3. High Flow in Main Steam-line B	≤ 120% rated	X(s)	X(s)	X	X	2	2	
4. High Temperature in Main Steamline Tunnel	≤ Ambient at Power + 50°F	X(s)	X(s)	X	X	2	2	
5. Low Pressure in Main Steam-line	**		X		X	2	2	
6. High Radiation in Main Steam Tunnel	≤ 10X Normal Background	X(s)	X(s)	X	X	2	2	
C. Isolation Condenser								
1. High Reactor Pressure	**	X(s)	X(s)	X	X	2	2	Place plant in cold shutdown condition
2. Low-Low Reactor Water	≥ 7'2" above top of active fuel	X(s)	X(s)	X	X	2	2	

TABLE 3.1.1 (Cont'd)

v. Those functions not required to be operable when the ADS is not required to be operable.

w. These functions must be operable only when irradiated fuel is in the fuel pool or reactor vessel and secondary containment integrity is required per specification 3.5.B.

y. The number of operable channels may be reduced to 2 per Specification 3.9.E and F.

z. The bypass function to permit scram reset in the shutdown or refuel mode with control rod block must be operable in this mode.

aa. Pump circuit breakers will be tripped in 10 seconds ± 15% during a LOCA by relays SK7A and SK8A.

bb. Pump circuit breakers will trip instantaneously during a LOCA.

cc. Only applicable during STARTUP Mode while operating in IRM Range 10.

G. Primary Coolant System Pressure Isolation Valves

Applicability:

Operational Conditions - Startup and Run Modes; applies to the operational status of the primary coolant system pressure isolation valves.

Objective:

To increase the reliability of primary coolant system pressure isolation valves thereby reducing the potential of an intersystem loss of coolant accident.

Specification:

1. During reactor power operating conditions, the integrity of all pressure isolation valves listed in Table 3.3.1 shall be demonstrated. Valve leakage shall not exceed the amounts indicated.

2. If Specification 1 cannot be met, an orderly shutdown shall be initiated and the reactor shall be in the cold shutdown condition within 24 hours.

H. Required Minimum Recirculation Flow Rate for Operation in IRM Range 10

1. During STARTUP mode operation, a minimum recirculation flow rate is required before operating in IRM range 10 to insure that technical specification transient MCPR limits for operation are not exceeded. This minimum flow rate is no longer required once the reactor is in the RUN mode.

2. 39.65×10^6 lb/hr is the minimum recirculation flow rate necessary for operation in IRM range 10 at this time. This flow rate leaves sufficient margin between the minimum flow required by the RWE analysis performed and the minimum flow used while operating in IRM range 10.

The logic of the instrument safety systems in Table 4.1.1 is such that testing the instrument channels also trips the trip system, verifying that it is operable. However, certain systems require coincident instrument channel trips to completely test their trip systems. Therefore, Table 4.1.2 specifies the minimum trip system test frequency for these tripped systems. This assures that all trip systems for protective instrumentation are adequately tested, from sensors through the trip system.

Every element of electrical circuitry for the reactor protection system is to be verified operable prior to plant startup by functional testing. Parallel elements of circuits which do not permit functional verification of freedom from shorts by routine channel trips are to be verified functional during refueling shutdown.

IRM calibration is to be performed during reactor startup. The calibration of the IRMs during startup will be significant since the IRMs will be relied on for neutron monitoring and reactor protection up to 38.4% of rated power during a reactor startup.

References: (1) "Reliability of Engineered Safety Features as a Function of Testing Frequency," I. M. Jacobs, Nuclear Safety, Volume 9, No. 4, July-August, 1968.

(2) "Reactor Protection System, A Reliability Analysis," I. M. Jacobs, APED-5179, Eng. A-16, June, 1966.

	Instrument Channel	Check	Calibrate	Test	Remarks (applies to Test & Calibration)
14.	High Radiation in Reactor Building				
	Operating Floor	1/s	1/3 mo	1/wk	Using gamma source for calibration
	Ventilation Exhaust	1/s	1/3 mo	1/wk	Using gamma source for calibration
15.	High Radiation on Air Ejector Off-Gas	1/s	1/3 mo	1/wk	Using built-in calibration equipment
16.	IRM Level	N A	each startup	N A	
	IRM Scram	*	*	*	Using built-in calibration equipment
17.	IRM Blocks	N A	Prior to startup and shutdown	Prior to startup & shutdown	Upscale and downscale
18.	Condenser Low Vacuum	N A	Each refueling outage	Each refueling outage	

*Calibrate prior to startup and normal shutdown and thereafter check 1/s and test 1/wk until no longer required.

Legend:
NA = Not applicable; 1/s = Once per shift; 1/d = Once per day; 1/3d = Once per 3 days; 1/wk = Once per week; 1/3 mo = Once every 3 months.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 71 TO PROVISIONAL OPERATING LICENSE NO. DPR-16

GPU NUCLEAR CORPORATION AND

JERSEY CENTRAL POWER & LIGHT COMPANY

OYSTER CREEK NUCLEAR GENERATING STATION

DOCKET NO. 50-219

1.0 INTRODUCTION

By letter dated September 2, 1983 as supplemented December 2, 1983, GPU Nuclear Corporation (GPU) requested an amendment to Provisional Operating License No. DPR-16 for the Oyster Creek Nuclear Generating Station. This amendment would authorize changes to the Neutron Monitoring System by adding a tenth range to the intermediate range monitors.

A Notice of Consideration of Issuance of Amendment and Proposed No Significant Hazards Consideration Determination and Opportunity for Hearing related to the requested action was published in the Federal Register on November 22, 1983 (48 FR 52814). A request for hearing and public comments were not received.

The supplemental information submitted by letter dated December 2, 1983 merely clarifies the meaning of the Technical Specification change. It provides rewording which explicitly states that the minimum recirculation flow of 39.65×10^6 lb/hr. intended for operation in IRM range 10 only, and not for all operation in the Startup Mode as originally submitted. This was the actual intent of the original submittal, as seen from the analysis of the significant hazards consideration contained in the original application. Thus, the supplemental information did not change the scope of the staff's notice for opportunity for hearing.

2.0 DISCUSSION AND EVALUATION

The proposed Technical Specification change would add a tenth range to the Intermediate Range Montior (IRM) to permit monitoring of core power up to approximately 40 percent of full power. A reactor scram trip would be provided at 38.4% of full power with a rod block at 35 percent of full power. With the present IRM setpoint of 12 percent full power the switch from STARTUP to RUN mode occurs at 10 percent of full power and a significant fraction of the LPRM channel responses are below the downscale setpoints.

Frequently the conditions for operability of the APRM rod block circuitry cannot be met for certain rods and considerable ingenuity is required to continue the power increase. Increasing the power at which the switch from STARTUP to RUN occurs would eliminate this problem.

In order to support the increase in power for the switchover it is necessary to reanalyze the low power rod withdrawal event. The APRM rod block is not in operation in the STARTUP mode and it is necessary to show that core thermal limits are not violated in its absence. GPU has performed the analysis under the assumption that the IRM rod block and scram do not function and that a rod withdrawal error results in the complete removal of the rod from the core. Each rod in the pattern was withdrawn and the core flow required to prevent violation of fuel thermal limits was determined. For Cycle 9 the maximum required value was found to be 23% of rated flow. In order to bound future cycles this value would be increased to 65 percent to require this flow rate prior to entering, and while operating in Range 10 on the IRM.

Core-wide transients which are affected by this change include the loss of feedwater heating and the improper startup of an idle recirculation loop. However, the IRM scram at 38.4 percent of full power is lower than the APRM scram at minimum flow (52.7% of rated power at 30 percent flow). Thus, the core would be adequately protected. In addition, under administrative control, the feedwater heaters will not be turned on until the LPRM downscales have been cleared and the APRM trip is operable. The staff concludes that fuel thermal limits will not be violated during operation and, therefore, the proposed change is acceptable.

3.0 ENVIRONMENTAL CONSIDERATION

The staff has determined that the amendment does not authorize a change in effluent types or total amounts nor an increase in power level and will not result in any significant environmental impact. Having made this determination, the staff has further concluded that the amendment involves an action which is insignificant from the standpoint of environmental impact, and pursuant to 10 CFR §51.5(d)(4), that an environmental impact statement or negative declaration and environmental impact appraisal need not be prepared in connection with the issuance of this amendment.

4.0 CONCLUSION

The staff 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; and (2) such activities will be conducted in compliance with the Commission's regulations and the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

5.0 ACKNOWLEDGEMENT

This evaluation was prepared by W. Brooks.

Dated: January 30, 1984