Docket No. 50-261

March 4, 1991

Mr. Lynn W. Eury
Executive Vice President
Power Supply
Carolina Power & Light Company
Post Office Box 1551
Raleigh, North Carolina 27602

Dear Mr. Eury:

SUBJECT: ISSUANCE OF AMENDMENT NO. 133 TO FACILITY OPERATING LICENSE NO. DPR-23 REGARDING TURBINE REDUNDANT OVERSPEED TRIP SYSTEM - H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2, (TAC NO. 77091)

The Nuclear Regulatory Commission has issued the enclosed Amendment No. 133 to Facility Operating License No. DPR-23 for the H. B. Robinson Steam Electric Plant, Unit No. 2. This amendment consists of changes to the Technical Specifications (TS) in response to your request dated June 29, 1990.

The amendment revises the TS by removing the surveillance requirements related to the turbine overspeed trip system.

A copy of the related Safety Evaluation is enclosed. Notice of Issuance will be included in the Commission's bi-weekly Federal Register notice.

Sincerely,

Orignal signed by:

Ronnie H. Lo, Senior Project Manager
Project Directorate II-1
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Enclosures:
1. Amendment No. 133 to DPR-23
2. Safety Evaluation

cc w/enclosures:
See next page

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NAME	: PAnderson	: RLo:pk	: EAdensam	:	:	:	:
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Mr. L. W. Eury
Carolina Power & Light Company

H. B. Robinson Steam Electric
Plant, Unit No. 2

cc:
Mr. R. E. Jones, General Counsel
Carolina Power & Light Company
P. O. Box 1551
Raleigh, North Carolina 27602

Mr. H. A. Cole
Special Deputy Attorney General
State of North Carolina
P. O. Box 629
Raleigh, North Carolina 27602

U.S. Nuclear Regulatory Commission
Resident Inspector's Office
H. B. Robinson Steam Electric Plant
Route 5, Box 413
Hartsville, South Carolina 29550

Regional Administrator, Region II
U.S. Nuclear Regulatory Commission
101 Marietta Street
Suite 2900
Atlanta, Georgia 30323

Mr. R. Morgan
General Manager
H. B. Robinson Steam Electric Plant
P. O. Box 790
Hartsville, South Carolina 29550

Mr. Dayne H. Brown, Director
Department of Environmental,
Health and Natural Resources
Division of Radiation Protection
P. O. Box 27687
Raleigh, North Carolina 27611-7687

Mr. Robert P. Gruber
Executive Director
Public Staff - NCUC
P. O. Box 29520
Raleigh, North Carolina 27626-0520

Mr. C. R. Dietz
Manager, Robinson Nuclear Project
Department
H. B. Robinson Steam Electric Plant
P. O. Box 790
Hartsville, South Carolina 29550

Mr. Heyward G. Shealy, Chief
Bureau of Radiological Health
South Carolina Department of Health
and Environmental Control
2600 Bull Street
Columbia, South Carolina 29201

AMENDMENT NO.133 TO FACILITY OPERATING LICENSE NO. DPR-23 - ROBINSON, UNIT NO. 2

[redacted]

NRC PDR
Local PDR
PDII-1 Reading
S. Varga (14E4)
G. Lainas
E. Adensam
P. Anderson
R. Lo
OGC
D. Hagan (MNBB 3302)
E. Jordan (MNBB 3302)
G. Hill (4) (P1-137)
Wanda Jones (P-130A)
J. Calvo (11D3)
C. McCracken
N. Wagner
ACRS (10)
GPA/PA
OC/LFMB

cc: Robinson Service List

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

CAROLINA POWER & LIGHT COMPANY

DOCKET NO. 50-261

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 133
License No. DPR-23

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

   A. The application for amendment by Carolina Power & Light Company (the licensee), dated January 12, 1987, as supplemented October 3, 1988, and April 4, 1989, 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 3.B. of Facility Operating License No. DPR-23 is hereby amended to read as follows:

B. Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 133 , are hereby incorporated in the license. Carolina Power & Light Company 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

Orignal signed by:

Ronnie H. Lo, Acting Director
Project Directorate II-1
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: March 4, 1991

OFC	:LA:PD21:DRPE	:PM:PD21:DRPE	: OGC	:D:PD21:DRPE	:	:	:
NAME	:PAnderson	:RLo:pk	:	:EAdensam	:	:	:
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ATTACHMENT TO LICENSE AMENDMENT NO. 133

FACILITY OPERATING LICENSE NO. DPR-23

DOCKET NO. 50-261

Replace the following pages of the Appendix A Technical Specifications with the enclosed pages. The revised areas are indicated by marginal lines.

Remove Pages	Insert Pages
4.1-7	4.1-7

TABLE 4.1-1 (Continued)

Channel Description	Check	Calibrate	Test	Remarks
21. Containment Sump Level	N.A.	R	N.A.	
22. Turbine Trip Logic**	N.A.	N.A.	R	
23. Accumulator Level and Pressure	S	R	N.A.	
24. Steam Generator Pressure	S	R	M	
25. Turbine First Stage Pressure	S	R	M	
26. DELETED				
27. Logic Channel Testing	N.A.	N.A.	M(1) S/U(2)	(1) During hot shutdown and power operations. When periods of reactor cold shutdown and refueling extend this interval beyond one month, this test shall be performed prior to startup. (2) Logic channel testing for nuclear source range channels shall only be required prior to each reactor startup, if not performed within the previous seven (7) days.
28. DELETED				
29. 4 Kv Frequency	N.A.	R	R	

** Stop valve closure or low EH fluid pressure.

Amendment No. 83, 106, 122, 127, 133

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATING TO AMENDMENT NO. 133 TO FACILITY OPERATING LICENSE NO. DPR-23

CAROLINA POWER & LIGHT COMPANY

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

DOCKET NO. 50-261

1.0 INTRODUCTION

Carolina Power & Light Company (CP&L), the licensee for the H.B. Robinson Steam Electric Plant, Unit No. 2 (HBR), proposed removing the turbine redundant overspeed trip system (TROTS) in a submittal dated June 29, 1990. This would be accomplished by removing the turbine overspeed protection trip channel surveillance requirements from Table 4.1-1 in the HBR Technical Specifications (TS), after which the licensee would remove the TROTS from the instrumentation used to control the speed of the turbine/generator.

In order to operate the turbine-generator (TG), high pressure steam is introduced into the high pressure (HP) turbine by means of two stop valves and four governing control valves. Each stop valve is upstream of two governing control valves which are operated in parallel. After passing through the high pressure turbine, the exhaust steam passes through a reheater and then into the low pressure (LP) turbine through a reheat stop valve and reheat intercept valve in series. There are two LP turbines; each LP turbine has two separate reheaters associated with that turbine. The steam to the HP and LP turbines provides the energy to move the TG. Once the steam to the turbines is shut off, the TG set slows down and stops.

Four separate systems control the speed of the turbine generator: the TROTS system, the mechanical overspeed trip valve, the electrical solenoid trip valve, and an overspeed protection controller. TG speed control is maintained by closing the valves that admit steam into the HP and LP turbines when conditions warrant such action.

The TROTS, mechanical overspeed trip valve, and electrical solenoid trip valve systems cause the fourteen steam admitting valves, i.e., two turbine stop, four turbine governing, four reheat stop and four reheat intercept, to close by dumping the high pressure oil from under the actuator that opens these valves and keeps them open against spring action which acts to close them.

The TROTS system operates by means of three speed detectors which are at the generator end of the TG set. Each sends a signal to a separate

conditioning and logic circuit. These conditioned signals are then sent to overspeed detection relays, as long as the TG speed is less than 111% of normal operating speeds. Speeds above 111% cause the signals to cease, allowing the relays to open. The relays, in turn, send signals to open to two parallel dump valves, each on a separate electrical system, allowing the 14 valves in the steam-admitting system to close. Only one of the two dump valves needs to open in order to have the turbine valve close. Once the steam admitting valves close, there is no energy imparted to the turbine portion of the TG set and it coasts to a halt. System actuation results when at least two of the three speed detection signals are absent. The TROTS is not relied upon for mitigation in the analysis of accidents.

There are three other systems that use similar means to control the speed of the TG set. Two of these are the mechanical overspeed trip valve and the 20/AST electrical solenoid trip valve. The mechanical overspeed trip operates by means of an eccentric weight mounted in the governor end of the turbine shaft. At speeds equal to or greater than 110% of normal, the eccentric weight strikes a trigger which opens a cup-valve to allow the autostop oil to drain. This, in turn, causes the high pressure fluid to drain from all of the turbine valves, allowing the turbine valves to close.

The 20/AST electrical solenoid trip valve opens on a generator trip signal that results from loss of load signal or signal on opening of the generator breaker. The solenoid actuates a plunger-valve which drains the autostop oil in a separate way from that of the overspeed trip valve, causing the high pressure oil to drain from under the valve actuators. This causes the steam valves to close by spring action.

There is one other system that is used to control the speed of the TG set and which operates when the TG speed exceeds 103% of normal operating speed -- the overspeed protection controller. This system uses two solenoid operated valves that dump the governing valve emergency trip fluid at turbine speeds of 103% and greater. This system controls only the eight governing and intercept valves and continues to operate as long as the overspeed condition exists. This system has a separate speed detector at the governor end of the turbine.

2.0 EVALUATION

2.1 TG Trip System Reliability

2.1.1 Probability of Overspeed with TROTS

The licensee reported that a probabilistic risk assessment (PRA) had been conducted for the probability of design overspeed, i.e., greater than 118% of normal, using only the TROTS for control. This analysis indicated that the probability of turbine overspeed in excess of 118% was 9.6×10^{-8} per

year. This value does not include either the probability of missile ejection or the probability of damaged to a target resulting in unacceptable releases.

2.1.2 Probability of Overspeed with Turbine Missile Ejection (with TROTS removed)

The licensee cited a new PRA that was conducted by Westinghouse, assuming the TROTS system had been removed. The reported results of this analysis showed that the probability of turbine missile ejection as a result of overspeed of the fully integrated rotor is estimated to be 7.5×10^{-8} per year.

The estimated probability has been calculated by the use of PRA, combined with the equation shown below.

$$P(1) = P(A) \times P(M/A) + P(B) \times P(M/B) + P(C)$$

P(1) = Annual probability of turbine missile ejection
P(A) = Annual probability of design overspeed of turbine (less than 120%)
P(B) = Annual probability of intermediate overspeed of turbine (less than 130%)
P(C) = Annual probability of destructive overspeed of turbine (greater than or equal to 180%)

P(M/A) = Conditional probability of missile ejection given that design overspeed occurs

P(M/B) = Conditional probability of missile ejection given that intermediate overspeed occurs

P(A), P(B), and P(C) are mean probabilities calculated through fault tree analysis of the turbine valve and related control and trip systems.

P(M/A) and P(M/B) are determined specifically for the LP fully-integral rotor.

No conditional probability of failure of the turbine rotor at destructive overspeed is shown since that probability is 1.

The fault tree prepared by Westinghouse was modified to conform with the HBR overspeed protection system. Testing of the speed control systems and faults of those systems as affected by testing were included in the analyses. Note that the value P(1) does not include the probability of an ejected missile striking an object so as to result in unacceptable releases (see section 2.1.3, below).

2.1.3 Standard Review Plan Guidelines

Section 3.5.1.3, "Turbine Missiles," of the Standard Review Plan (SRP)

specifies the use of criteria for unfavorably situated TG's in causing damage resulting in releases in excess of 10 CFR Part 100 guidelines to be in the probability range equal to or less than 10^{-7} per year. Note that the licensee's calculated estimate of 7.5×10^{-8} per year with TROTS removed does not include the probability of missile impingement upon a system that would result in excess releases. Such inclusion would reduce the value of 7.5×10^{-8} per year to a probability less than 7.5×10^{-8}, thus meeting the SRP guidelines.

2.1.4 TROTS Failures

The licensee reported that, at present, monthly testing of the TROTS system is required. This testing is done by failing one channel at a time. The licensee noted that a plant trip had been initiated during a during a TROTS channel failure during testing of another channel. Further, TROTS has been documented as the cause of four turbine/reactor trips that were not the result of actual TG overspeeding.

3.0 SUMMARY

It is the conclusion of the staff that the TROTS may be removed from use as a TG control system without increasing the probability of an accident resulting from TG overspeed in excess of applicable requirements (10^{-7} per year). The conclusion that the TROTS may be removed is based upon three considerations:

(1) With TROTS removed there are still three systems left to protect the plant against TG overspeed.

(2) With TROTS removed, the acceptance criteria related to SRP 3.5.1.3, "Turbine Missiles," are met.

(3) TROTS has been the cause of spurious plant trips.

4.0 ENVIRONMENTAL CONSIDERATION

This amendment changes requirements with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes the surveillance requirements. The 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 off site; and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that this amendment involves no significant hazards consideration, and there has been no public comment on such finding. Accordingly, this 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 this amendment.

5.0 CONCLUSION

The Commission made a proposed determination that this amendment involves no significant hazards consideration, which was published in the FEDERAL REGISTER (55 FR 30293) on July 25, 1990, and consulted with the State of South Carolina. No public comments or requests for hearing were received, and the State of South Carolina did not have any comments.

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, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

Dated: March 4, 1991

Principal Contributors: N. Wagner
R. Lo