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

August 14, 1984

Docket Nos. 50-250
and 50-251

Posted
Amdt 98
to DPR-41
See correction
Letter of 1-25-85

Mr. J. W. Williams, Jr., Vice President
Nuclear Energy Department
Florida Power and Light Company
Post Office Box 14000
Juno Beach, Florida 33408

Dear Mr. Williams:

The Commission has issued the enclosed Amendment No. 104 to Facility Operating License No. DPR-31 and Amendment No. 98 to Facility Operating License No. DPR-41 for the Turkey Point Plant Units Nos. 3 and 4, respectively. The amendments consist of changes to the Technical Specifications in response to your application transmitted by letter dated August 6, 1982, as modified on September 1, 1982, January 3, 1983, April 25, 1983, January 31, 1984 and April 23, 1984.

These amendments provide requirements in the Technical Specifications for protection of safety-related equipment subjected to sustained degraded voltage conditions at the offsite power source and interaction between the offsite and onsite source.

A copy of the related Safety Evaluation is enclosed. A Notice of Issuance will be included in the Commission's next regular monthly Federal Register notice.

Sincerely,

Daniel G. McDonald, Jr.

Daniel G. McDonald, Jr., Project Manager
Operating Reactors Branch #1
Division of Licensing

Enclosures:
1. Amendment No. 104 to DPR-31
2. Amendment No. 98 to DPR-41
3. Safety Evaluation

cc: w/enclosures
See next page

J. W. Williams, Jr.
Florida Power and Light Company

Turkey Point Plants
Units 3 and 4

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

FLORIDA POWER AND LIGHT COMPANY

DOCKET NO. 50-250

TURKEY POINT PLANT UNIT NO. 3

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No.104
License No. DPR-31

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

   A. The application for amendment by Florida Power and Light Company (the licensee) dated August 6, 1982, as modified on September 1, 1982, January 3, 1983, April 25, 1983, January 31, 1984 and April 23, 1984, 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-31 is hereby amended to read as follows:

(B) Technical Specifications

The Technical Specifications contained in Appendix A and B, as revised through Amendment No. 104, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of issuance and shall be implemented within 60 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Steven A. Varga, Chief
Operating Reactors Branch #1
Division of Licensing

Attachment:
Changes to the Technical
Specifications

Date of Issuance: August 14, 1984

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

FLORIDA POWER AND LIGHT COMPANY

DOCKET NO. 50-251

TURKEY POINT PLANT UNIT NO. 4

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 98
License No. DPR-41

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

   A. The application for amendment by Florida Power and Light Company (the licensee) dated August 6, 1982, as modified on September 1, 1982, January 3, 1983, April 25, 1983, January 31, 1984 and April 23, 1984, 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-41 is hereby amended to read as follows:

(B) Technical Specifications

The Technical Specifications contained in Appendix A and B, as revised through Amendment No. 98 , are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective immediately and shall be implemented within 60 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Steven A. Varga, Chief
Operating Reactors Branch #1
Division of Licensing

Attachment:
Changes to the Technical
Specifications

Date of Issuance: August 14, 1984

ATTACHMENT TO LICENSE AMENDMENT

AMENDMENT NO. 104 FACILITY OPERATING LICENSE NO. DPR-31

AMENDMENT NO. 98 FACILITY OPERATING LICENSE NO. DPR-41

DOCKET NO. 50-250 AND 50-251

Revise Appendix A as follows:

Remove Pages	Insert Pages
Table 3.5-2	Table 3.5-2
	Table 3.5-2 (cont'd)
Table 3.5-4	Table 3.5-4 Sheets 1 and 2
Table 4.1-1 Sheet 3	Table 4.1-1 Sheet 3

TABLE 3.5-2

ENGINEERED SAFETY FEATURES ACTUATION

NO.	FUNCTIONAL UNIT	1 MIN. OPERABLE CHANNELS	2 MIN. DEGREE OF REDUN-DANCY	3 OPERATOR ACTION IF CONDITIONS OF COLUMN 1 OR 2 CANNOT BE MET
1.	SAFETY INJECTION			
1.1	Manual	1	0	Cold Shutdown
1.2	High Containment Pressure	2	1	Cold Shutdown
1.3	High Differential Pressure between any Steam Line and the Steam Line Header*	2	1	Cold Shutdown
1.4	Pressurizer Low Pressure*	2	1	Cold Shutdown
1.5	High Steam Flow in 2/3 Steam Lines with Low T_{avg} or Low Steam Line Pressure**	1/line in each of 2 lines	1	Cold Shutdown
2.	CONTAINMENT SPRAY			
2.1	High Containment Pressure and High-High Containment Pressure (coincident)	2 per set	1/set	Cold Shutdown
3.	AUXILIARY FEEDWATER			
3.1	Low-Low Steam Generator Level	2	1	Hot Shutdown
3.2	Loss of Power			
	a. 4.16kV Emergency Bus undervoltage (Loss of Voltage)	2	0	Cold Shutdown
	b. 480V Load Centers (2 instantaneous relays per load center)***	1****	0	Cold Shutdown
	c. 480V Load Centers (2 inverse time relays per load center)***	1****	0	Cold Shutdown

Amendments 104 and 98
correction letter of 1-25-85

TABLE 3.5-2

ENGINEERED SAFETY FEATURES ACTUATION

NO.	FUNCTIONAL UNIT	1 MIN. OPERABLE CHANNELS	2 MIN. DEGREE OF REDUN-DANCY	3 OPERATOR ACTION IF CONDITIONS OF COLUMN 1 OR 2 CANNOT BE MET
1.	SAFETY INJECTION			
1.1	Manual	1	0	Cold Shutdown
1.2	High Containment Pressure	2	1	Cold Shutdown
1.3	High Differential Pressure between any Steam Line and the Steam Line Header	2	1	Cold Shutdown
1.4	Pressurizer Low Pressure*	2	1	Cold Shutdown
1.5	High Steam Flow in 2/3 Steam Lines with Low T_{avg} or Low Steam Line Pressure	1/line in each of 2 lines	1	Cold Shutdown
2.	CONTAINMENT SPRAY			
2.1	High Containment Pressure and High-High Containment Pressure (coincident)	2 per set	1/set	Cold Shutdown
3.	AUXILIARY FEEDWATER			
3.1	Low-Low Steam Generator Level	2	1	Hot Shutdown
3.2	Loss of Power			
	a. 4.16kV Emergency Bus undervoltage (Loss of Voltage)	2	0	Cold Shutdown
	b. 480V Load Centers (2 instantaneous relays per load center)**	1***	0	Cold Shutdown
	c. 480V Load Centers (2 inverse time relays per load center)**	1***	0	Cold Shutdown

Superseded by correction letter 1-25-85

TABLE 3.5-2 (Cont'd.)

ENGINEERED SAFETY FEATURES ACTUATION

NO.	FUNCTIONAL UNIT	1 MIN. OPERABLE CHANNELS	2 MIN. DEGREE OF REDUN-DANCY	3 OPERATOR ACTION IF CONDITIONS OF COLUMN 1 OR 2 CANNOT BE MET
3.3	Safety Injection	(---See 1 above---)		
3.4	Trip of both Main Feedwater Pump Breakers	2	0	Cold Shutdown

* This signal may be manually bypassed, when the reactor is shutdown and pressure is below 2000 psig.

** This signal may be manually bypassed, when cooling down the reactor and T_{AVG} is below 543°F.

*** These items do not apply on Unit 3 until after implementation of PC/M 79-116 and on Unit 4 until after implementation of PC/M 80-44.

**** Operation or start-up may continue with only one channel operable only if the inoperable channel is placed in the trip condition.

TABLE 3.5-2 (Cont'd.)

ENGINEERED SAFETY FEATURES ACTUATION

NO.	FUNCTIONAL UNIT	1 MIN. OPERABLE CHANNELS	2 MIN. DEGREE OF REDUN-DANCY	3 OPERATOR ACTION IF CONDITIONS OF COLUMN 1 OR 2 CANNOT BE MET
3.3	Safety Injection	(—See 1 above—)		
3.4	Trip of both Main Feedwater Pump Breakers	2	0	Cold Shutdown

* This signal may be manually bypassed, when the reactor is shutdown and pressure is below 2000 psig.

** These items do not apply on Unit 3 until after implementation of PC/M 79-116 and on Unit 4 until after implementation of PC/M 80-44.

*** Operation or start-up may continue with only one channel operable only if the inoperable channel is placed in the trip condition.

Superseded by correction letter dated 1-25-85

TABLE 3.5-4 (Sheet 1)

ENGINEERED SAFETY FEATURE SETPOINTS

No.	FUNCTIONAL UNIT	CHANNEL ACTION	SET POINT
1.	High Containment Pressure	Safety Injection Containment Spray* Steam Line Isolation* Containment Isolation*	≤ 6 psig
2.	High-High Containment Pressure	See No. 1	≤ 30 psig
3.	Pressurizer Low Pressure	Safety Injection	≥ 1715 psig
4.	High Steam Line Differential Pressure (2/3 between any header and any line)	Safety Injection	≤ 150 psi
5.	High Steam Line Flow (2/3 lines)	Safety Injection Steam Line Isolation	d/p for 3.84×10^6 lb/hr, 770 psig, 100% RP d/p for 0.64×10^6 lb/hr, 1005 psig, 0% RP d/p linear with 1st stg. press., 0-100% RP
	Coincident with:		
	Low Steam Line Pressure, or Low T_{avg}		≥ 600 psig ≥ 531 F
6.	Low-Low Steam Generator Level	Auxiliary Feedwater	≥ 15% narrow range
7a.	Loss of Voltage (either 4 KV bus)	Auxiliary Feedwater	N.A.

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* High and High-High coincident

TABLE 3.5-4 (Sheet 2)

ENGINEERED SAFETY FEATURE SETPOINTS

NO.	FUNCTIONAL UNIT	CHANNEL ACTION	SETPOINT
7b.	Degraded Voltage ** (480 Volt Load Center)	Auxiliary Feedwater	All with tolerance of ±5 volts.
	Load Center	Instantaneous Setpoint	Delay Setpoint
	3A**	436V (10 sec. delay)#	419V (60 sec ±30 sec. delay)
	3B**	416V (10 sec. delay)#	426V (60 sec ±30 sec. delay)
	3C**	417V (10 sec. delay)#	427V (60 sec ±30 sec. delay)
	3D**	428V (10 sec. delay)#	436V (60 sec ±30 sec. delay)
	4A**	415V (10 sec. delay)#	427V (60 sec ±30 sec. delay)
	4B**	414V (10 sec. delay)#	424V (60 sec ±30 sec. delay)
	4C**	401V (10 sec. delay)#	413V (60 sec ±30 sec. delay)
	4D**	403V (10 sec. delay)#	412V (60 sec ±30 sec. delay)
8.	Safety Injection	Auxiliary Feedwater	All SI setpoints
9.	Trip of both Main Feedwater Pump Breakers	Auxiliary Feedwater	N.A.

** These items do not apply on Unit 3 until after implementation of PC/M 79-116 and on Unit 4 until after implementation of PC/M 80-44.

Channel action is subject to condition being concurrent with Safety Injection signal.

TABLE 4.1-1 SHEET 3

	Channel Description	Check	Calibrate	Test	Remarks
23.	Environmental Radiological Monitors	N.A.	A(1)	M(1)	(1) Flow
24.	Logic Channels	N.A.	N.A.	M†	
25.	Emer. Portable Survey Instruments	N.A.	A	M	
26.	Seismograph	N.A.	N.A.	Q	Make trace. Test battery (change semi-annually)
27.	Auxiliary Feedwater Flow Rate	M†	R	N.A.	
28.	RCS Subcooling Margin Monitor	M†	R	N.A.	
29.	PORV Position Indicator (Primary Detector)	M†	N.A.	R	Check consists of monitoring
30.	PORV Block Valve Position Indicator	M†	N.A.	R	indicated position and verifying
31.	Safety Valve Position Indicator	M†	R	N.A.	by observation of related parameters.
32.	a. Loss of Voltage (both 4kv bussess)	N.A.	N.A.	R	For AFW actuation at power only
	b. Undervoltage (both 4KV busses and 480 volt Load Centers)**	S†	R	M†	
33.	Trip of both Main Feedwater Pump Breakers	N.A.	N.A.	R	For AFW actuation at power only

** This item does not apply on Unit 3 until after implementation of PC/M 79-116 and on Unit 4 until after implementation of PC/M 80-44.

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 104 TO FACILITY OPERATING LICENSE NO. DPR-31

AND AMENDMENT NO. 98 TO FACILITY OPERATING LICENSE NO. DPR-41

FLORIDA POWER AND LIGHT COMPANY

TURKEY POINT PLANT, UNIT NOS. 3 AND 4

DOCKET NOS. 50-250 AND 50-251

INTRODUCTION AND SUMMARY

The criteria and staff positions pertaining to degraded grid voltage protection were transmitted to Florida Power and Light Company (FPL) by NRC Generic Letter dated June 3, 1977. In response to this, by letters dated July 21, 1977, November 9, 1979, January 14, 1981 and May 10, 1982, the licensee proposed certain design modifications and changes to the Technical Specifications. The staff and our consultant, Lawrence Livermore National Laboratory (LLNL), reviewed the submittals and provided the results and a request for additional information in a letter dated October 28, 1982. By letters dated August 6, 1982, September 1, 1982, January 3, 1983, April 25, 1983, January 31, 1984 and April 23, 1984, FPL submitted additional design changes, information and Technical Specifications. A detailed review and technical evaluation of these proposed modifications and changes to the Technical Specifications was performed by LLNL. This work is reported by LLNL in "Degraded Grid Protection for Class 1E Power Systems Turkey Point Nuclear Generating Plant Units 3 and 4".

We have reviewed the submittals and concur with LLNL that the design of the degraded grid protection system for Turkey Point Plant Units 3 and 4 meet the staff requirements and is therefore acceptable.

EVALUATION CRITERIA

The criteria used by LLNL in its technical evaluation of the proposed changes include GDC-17 ("Electric Power Systems") of Appendix A to 10 CFR 50; IEEE Standard 279-1971 ("Criteria for Protection Systems for Nuclear Power Generating Stations"); IEEE Standard 308-1974 ("Class 1E Power Systems for Nuclear Power Generating Stations"); and staff positions defined in NRC Generic Letter to FPL dated June 3, 1977.

PROPOSED CHANGES, MODIFICATIONS AND DISCUSSION

The existing undervoltage protection at Turkey Point consists of:

Two instantaneous loss of voltage relays on each 4160 volt Class 1E buses with a setpoint of 40 to 50% of nominal. The two-out-of-two logic is such that actuation of one of the two relays on train "A" in conjunction with one of the two relays on train "B" will disconnect the offsite power source, initiate load shedding of the Class 1E buses, start the emergency diesel and initiate load sequencing. The load shedding feature is bypassed when the Class 1E buses are being supplied by the diesel generators.

The following electrical system design modifications have been proposed by the licensee:

1. Modify the existing loss of voltage relays so that the relays of buses A and B are independent. With these modifications actuation of both relays on bus A or bus B will initiate offsite source disconnection, load shedding, diesel generator starting and load sequencing only for the bus on which the undervoltage condition occurs.

2. Installation of two inverse time undervoltage relays on each 480 volt Class 1E load center. These relays will be connected in a two-out-of-two logic per bus and will provide protection against sustained degraded voltages under non-accident conditions. These relays will be bypassed when the diesel generator is supplying the Class 1E buses.

3. Installation of two instantaneous relays on each 480 volt Class 1E load center. These relays will be connected in a two-out-of-two logic and interlocked with a safety injection (SI) signal. When actuated concurrent with an SI, these relays will initiate power source disconnection, diesel generator starting, load shedding and subsequent load sequencing.

etter dated October 28, 1982, we requested the licensee provide the following additional information:

1. Details including relay curves which show that the 4160V and 480V degraded voltage relays with time delays of 30 ± 10 minutes will protect Class IE equipment from the effects of degraded grid voltage.
2. In addition to the proposed Technical Specification changes, provide provisions which include:
   a. Surveillance requirements for the loss of voltage relays consistent with our June 3, 1977 letter.
   b. Diesel generator test requirements which demonstrate the reinstatement of load shedding and load sequencing subsequent to a D/G breaker trip.

The licensee has provided the technical specifications for the relay setpoints with tolerances, time delays, surveillance requirements and limiting conditions for operation. In addition, details were provided on how bypassing is accomplished by interlocking between the load-shed relays and the contact of the diesel breaker; a einstatement of the load-shed feature when the diesel generator breaker trips. The proposal of two inverse time undervoltate relays on each 4160 volt Class IE bus

was deleted and the 4160 volt CLass 1E protection was modified with relays on the 480 volt Class 1E load center.

The licensee's submittals dated August 6, 1982 September 1, 1982, January 3, 1983, April 25, 1983, provided the necessary additional design details including the revised Technical Specifications. We have reviewed the submittals and find that the degraded grid protection system as designed for Turkey Point 3 and 4 meet staff requirements and the voltage and time delay trip settings will protect the Class 1E equipment from sustained degraded voltages under accident and non-accident conditi

However, the licensee in letters dated January 31, 1984 and April 23, 1984 informed us that the proposed specification (two minimum operable channels) in the technical specification could severely restrict operation in that it would not allow maintenance of the aforementioned relays during operation. Furthermore, the action statement requires a cold shutdown of the plant if one of the two channels become inoperable. The licensee feels that it is contrary to the original intent of the specification. Consequently, the licensee proposed a revised Table 3.5-2 of the technical specifications with a footnote which states that operation or start-up may continue with only one channel operable subject to placing the inoperable channel in the trip condition.

In view of the fact that staff position requires performance of a regular channel test (monthly) and calibration (every refueling), this amendment accommodates such provisions without disrupting plant operation by placing the inoperable channel in the trip mode. The degraded voltage protection channel maintains 1-out-of-1 logic on the affected bus while one channel is in the trip mode.

In addition, the licensee has proposed to increase the instantaneous setpoint by five volts on Table 3.5-4 to correct previously transmitted values. The licensee determined that the new values more closely represent the designated tolerance of the relays. These values are more conservative than those originally approved.

We therefore find the degraded grip protection system and changes to Technical Specifications acceptable based on the details included in this Safety Evaluation and attached Technical Evaluation Report.

ENVIRONMENTAL CONSIDERATION

These amendments involve a change in the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The staff has determined that these amendments involve 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 commulative occupational radiation exposure. The Commission has previously issued a proposed finding that these amendments involve no significant hazards consideration and there has been no public comment on such finding. Accordingly, these amendments meet the eligibility criteria for categorical exclusion set forth in 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 these amendments.

CONCLUSION

We have 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 the amendments will not be inimical to the common defense and security or to the health and safety of the public:

Date: August 14, 1984

Attachments:
As stated

Principal Contributors:

P. Kang

D. McDonald

UCID- 19149 Revision 1

TECHNICAL EVALUATION REPORT (REVISION 1) ON THE PROPOSED DESIGN MODIFICATIONS AND TECHNICAL SPECIFICATION CHANGES ON GRID VOLTAGE DEGRADATION FOR THE TURKEY POINT NUCLEAR GENERATING PLANT UNITS 3 AND 4

(Docket Nos. 50-250, 50-251)

James C. Selan

April 8, 1983

Lawrence Livermore Laboratory

is work was supported by the United States Nuclear Regulatory Commission under
lemorandum of Understanding with the United States Department of Energy.
RC FIN NO. A-0250

ABSTRACT

This report is a revision of the technical evaluation documented in a separate report dated August 4, 1982 (UCID-19149) on the proposed design modification and Technical Specification changes for protection of the Class 1E equipment from grid voltage degradation for the Turkey Point Nuclear Generating Plant, Units 3 and 4. The review criteria are based on several IEEE standards and the Code of Federal Regulations. The evaluation compares the submittals made by the plant with the NRC staff positions and the review criteria. The evaluation finds that the design modifications and the changes to the Technical Specifications will ensure that the Class 1E equipment will be protected from sustained voltage degradation.

FOREWORD

This report is supplied as part of the Selected Operating Reactor Issues Program II being conducted for the U. S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Division of Licensing, by Lawrence Livermore National Laboratory.

The U. S. Nuclear Regulatory Commission funded the work under the authorization entitled "Selected Operating Reactor Issues Program II," B&R 20 19 10 11 1, FIN No. A-0250.

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ILLUSTRATION

TECHNICAL EVALUATION REPORT (REVISION 1) ON THE PROPOSED DESIGN MODIFICATIONS AND TECHNICAL SPECIFICATION CHANGES ON GRID VOLTAGE DEGRADATION FOR THE TURKEY POINT NUCLEAR GENERATING PLANT, UNITS 3 AND 4 (Docket Nos. 50-250, 50-251)

James C. Selan
Lawrence Livermore National Laboratory

1. INTRODUCTION

By letter dated June 3, 1977 [Ref. 1], the U. S. Nuclear Regulatory Commission (NRC) requested Florida Power and Light Company (FPL), the licensee, to assess the susceptibility of the Class 1E electrical equipment to sustained degraded voltage conditions at the offsite power sources and to the interaction between the offsite and onsite emergency power systems at the Turkey Point Nuclear Generating Plant, Units 3 and 4. In addition, the NRC requested that the licensee compare the current design of the emergency power systems at the plant facilities with the NRC staff positions as stated in the June 3, 1977 letter [Ref. 1], and that the licensee propose plant modifications, as necessary, to meet the NRC staff positions, or provide a detailed analysis which shows that the facility design has equivalent capabilities and protective features. Further, the NRC required certain Technical Specifications be incorporated into the facility's operating license.

By letters dated July 21, 1977 [Ref. 2], November 9, 1979 [Ref. 3], January 14, 1981 [Ref. 4], May 10, 1982 [Ref. 5], August 6, 1982 [Ref. 6], September 1, 1982 [Ref. 7], and January 3, 1983 [Ref. 8], the licensee proposed certain design modifications, additions to the licensee's Technical Specifications, and limiting conditions of operation (LCO's). The design modifications include the installation of a degraded voltage protection system for the Class 1E equipment. The proposed additions to the Technical Specifications and LCO's are in regard to calibrations, surveillance requirements, test requirements, and "action" statements associated with the proposed voltage protection system.

The purpose of this report is to evaluate the licensee's proposed design modifications, Technical Specification changes, and proposed LCO's to determine that they meet the criteria established by the NRC for the protection of Class 1E equipment from grid voltage degradation.

This report is a revision of the technical evaluation documented in a separate report dated August 4, 1982 (UCID-19149) based on new information submitted in References 6, 7, and 8.

2. DESIGN BASIS CRITERIA

The design basis criteria that were applied in determining the acceptability of the system modification to protect the Class 1E equipment from degradation of grid voltages are as follows:

(1) General Design Criterion 17 (GDC 17), "Electric Power Systems," of Appendix A, "General Design Criteria for Nuclear Power Plants," Code of Federal Regulations, Title 10, Part 50 (10 CFR 50) [Ref. 9].

(2) IEEE Standard 279-1971, "Criteria for Protection Systems for Nuclear Power Generating Stations" [Ref. 10].

(3) IEEE Standard 308-1974, "Class 1E Power Systems for Nuclear Power Generating Stations" [Ref. 11].

(4) NRC staff positions as stated in a letter dated June 3, 1977 [Ref. 1].

3. EVALUATION

3.1 EXISTING UNDERVOLTAGE PROTECTION

The present undervoltage protection design utilizes two undervoltage relays on each of the 4160-volt Class 1E buses (Buses A and B of Figure 1). The relays are instantaneous type HGA which respond at 40% - 50% of 4160 volts. These relays are used as loss-of-voltage protection.

The relay logic (2-out-of-2) is such that actuation of one relay (A1 or A2) on "A" bus in conjunction with the actuation of its interconnected relay (B1 or B2) on "B" bus will initiate the offsite source disconnection, load shedding, diesel generator starting and subsequent load sequencing on both buses. For example, the starting of diesel generator 3 and the disconnection of startup transformer 3 is initiated by the actuation of relay A1 on bus 3A and relay B2 on bus 3B or the actuation of relay A1 and the starting sequence of diesel generator 4. This logic scheme results in two separate and redundant circuits.

The load shedding feature is not bypassed when the Class 1E buses are being supplied by the diesel generators.

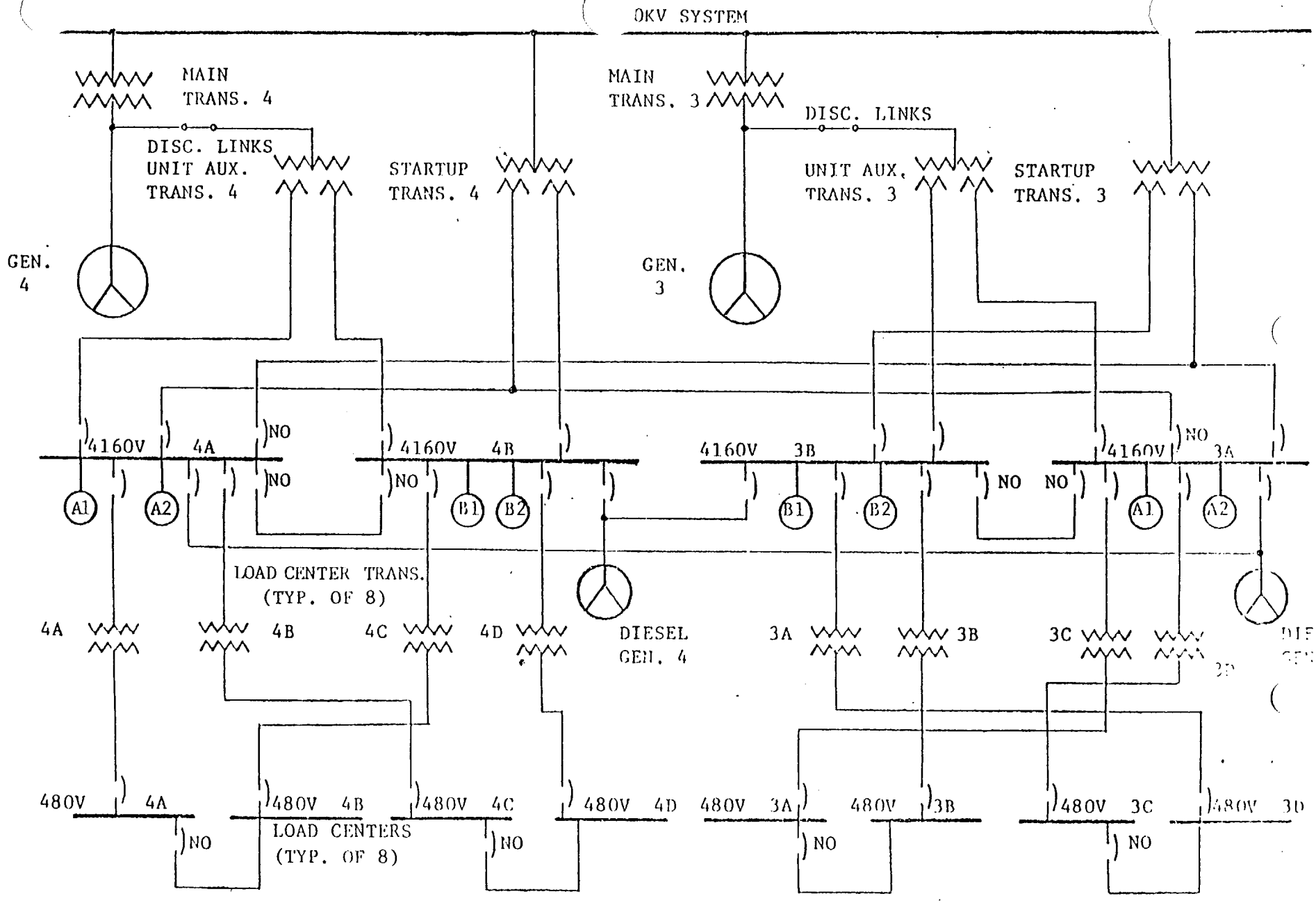

FIGURE 1 TURKEY POINT UNITS 3 AND 4 ELECTRICAL ONE-LINE DIAGRAM

3.2 MODIFICATIONS

The licensee is proposing design changes to the existing undervoltage protection system and are as follows:

(1) The logic of the existing relays will be reconnected such that the offsite source disconnection, load shedding, diesel generator starting, and load sequencing will occur only for that bus on which the loss of voltage occurs. The logic will remain 2-out-of-2 but the scheme on bus A will now be independent of that on bus B.

(2) The installation of two additional instantaneous relays (type ITE27H) with a definite-time delay and two inverse-time relays (type IAV) with a definite-time delay on each 480-volt Class 1E load center. Both sets of relays will be in a 2-out-of-2 coincident logic scheme. The instantaneous relays will protect the Class 1E equipment at both the 4 kV and 480-volt levels from sustained degraded voltages under accident conditions. The inverse-time relays will also protect the Class 1E equipment at both voltage levels under non-accident conditions. Actuation of either set of relays will initiate the tripping of the incoming 4 kV feeder breakers, diesel generator starting, load shedding, and subsequent load sequencing. Both sets of the relays (instantaneous and inverse time) are also interlocked with the 'b' contact of diesel generator breaker to disable the load-shedding feature when the diesel generators are on line and to reinstate the feature following breaker tripping.

(3) The proposed setpoints for the instantaneous relays and the inverse-time relays, respectively, on each load center bus for the above undervoltage protection design changes are as follows:

480-volt Class 1E Load Centers	Setpoint
3A	*431 volts
	**419 volts
3B	411 volts
	426 volts
3C	412 volts
	427 volts
3D	423 volts
	436 volts
4A	410 volts
	427 volts

4B	409 volts 424 volts
4C	396 volts 413 volts
4D	398 volts 412 volts

* All the instantaneous relays have a voltage setpoint tolerance of ± 5 volts with a definite-time delay of 10 seconds.

** All the inverse-time relays have a voltage setpoint tolerance of ± 5 volts with a time delay of 60 seconds ± 30 seconds.

3.3 DISCUSSIONS

This section presents a statement on the NRC staff position from their June 3, 1977 letter [Ref. 1] followed by an evaluation of the licensee's design.

3.3.1 NRC Staff Position 1: Second Level of Undervoltage or Overvoltage Protection with a Time Delay

This position is to be met by the licensee meeting certain criteria. Each criterion has been evaluated against the licensee's proposal and is addressed below.

(1) "The selection of voltage and time setpoints shall be determined from an analysis of the voltage requirements of the safety-related loads at all onsite system distribution levels."

The licensee's analysis demonstrated that the proposed undervoltage protection setpoints as defined in Section 3.2, with their associated time delays of 10 seconds and 60 seconds ± 30 seconds, will protect the Class 1E equipment from sustained degraded voltages under accident and non-accident conditions.

(2) "The voltage protection shall include coincidence logic to preclude spurious trips of the offsite power sources."

The proposed coincident logic of 2-out-of-2 will preclude spurious trips from the offsite sources.

(3) "The time delay selected shall be based on the following conditions."

(a) "The allowable time delay, including margin, shall not exceed the maximum time delay that is assumed in the FSAR accident analysis."

The proposed 10-second time delay in addition to the 18 seconds for diesel generator loading under accident conditions does not exceed the 50-second time delay assumed in the FSAR accident analysis.

(b) "The time delay shall minimize the effect of short duration disturbances from reducing the availability of the offsite power sources."

The proposed time delays of 10 seconds and 60 seconds $\pm$ 30 seconds for both accident and non-accident conditions respectively, were selected to minimize the effects of short duration transients from reducing the availability of the offsite power sources.

(c) "The allowable time duration of a degraded voltage condition at all distribution system levels shall not result in failure of safety systems or components."

The licensee's voltage analysis has shown that the proposed time delays (10 seconds and 60 seconds $\pm$ 30 seconds) will not cause any failure of any equipment connected to or associated with the Class 1E power system.

(4) "The undervoltage monitors shall automatically initiate the disconnection of offsite power sources whenever the voltage setpoint and time delay limits have been exceeded."

The operation of the IAV relays on the 480-volt Class 1E load centers, in a 2-out-of-2 coincident logic, will automatically initiate the disconnection from the offsite source whenever the voltage and time delay setpoints are exceeded. The operating time of the IAV relay is such that as the rate of voltage degradation increases, the associated time delay becomes shorter. Should a degraded voltage occur concurrent with a safety injection signal, the relays (ITE 27H) located on the 480-volt Class 1E load center buses, in a 2-out-of-2 coincident logic, will initiate the auto-disconnection from the degraded offsite source after a definite-time delay (10 seconds).

(5) "The voltage monitors shall be designed to satisfy the requirements of IEEE Standard 279-1971."

The proposed design modifications to the undervoltage protection scheme meet all the requirements of IEEE 279-1971.

(6) "The Technical Specifications shall include limiting conditions for operation, surveillance requirements, trip setpoints with minimum and maximum limits, and allowable values for the second-level voltage protection monitors."

The licensee submitted proposed Technical Specifications changes for the design modifications which included limiting conditions for operation, surveillance requirements, and the trip setpoints.

3.3.2 NRC Staff Position 2: Interaction of Onsite Power Sources with Load Shed Feature

The second position requires the system be designed to prevent matic load shedding of the emergency buses once the onsite sources are supplying power to all sequenced loads. If an adequate basis can be provided for retaining the load-shed feature, the licensee must assign maximum and minimum values to the setpoint of the load-shed feature. These setpoints must be be documented in the Technical Specifications. The load-shedding feature must also be reinstated if the onsite source supply breakers are tripped.

The licensee is bypassing the load-shed feature once the onsite sources are supplying the Class 1E buses. This bypassing is accomplished by the interlocking of the load-shed relays with the "b" contact of the diesel generator breaker. Tripping of the breaker will automatically reinstate the load-shed feature.

3.3.3 NRC Staff Position 3: Onsite Power Source Testing

The third position requires that certain test requirements be included in the Technical Specifications. These tests are to "...demonstrate the full functional operability and independence of the onsite power sources at least once per 18 months during shutdown." The tests are to simulate loss of offsite power in conjunction with a safety-injection actuation signal and to simulate interruption and subsequent reconnection of onsite power sources. These tests will verify the proper operation of the load-shed system, the load-shed bypass circuitry, and that there is no adverse interon between the onsite and offsite power sources.

Existing Technical Specifications include tests which demonstrate the full functional operability and independence of the onsite power sources by simulating a loss-of-offsite power to verify diesel generator starting and loading. Then a safety injection signal is simulated to verify that the Class 1E loads are sequenced on. Conducting this test will test all the components used to verify the proper operation of the load-shed feature, load-shed bypassing, and auto-reinstatement and insure that there is no adverse interaction between the onsite and offsite sources.

3.4 TECHNICAL SPECIFICATIONS

The licensee has provided appropriate Technical Specification changes on the design modifications to the undervoltage protection system. Specifically, the proposed changes included:

(1) Voltage and time delay trip setpoints with tolerances of the undervoltage relaying system (see Section 3.2).

(2) The required coincident logic (minimum 2-out-of-2).

(3) Surveillance requirements for a channel check at least once per 12 hours, a channel functional test at least once per 31 days and a channel calibration at least once per 18 months (refueling).

(4) Limiting conditions for operation including action statements when the number of required channels is less than the minimum number required.

4. CONCLUSIONS

Based on the information submitted by Florida Power and Light Company, it has been determined that the proposed design modifications comply with NRC Staff Position 1. All of the staff's requirements and design basis criteria have been met. The voltage and time delay trip settings will protect the Class 1E equipment from sustained degraded voltages from the offsite sources.

The licensee is bypassing the load-shed feature by using the 'b' of the diesel generator breaker to prevent an adverse interaction when the onsite sources are supplying the Class 1E buses. The licensee is proposing to auto-reinstate the load-shed feature following diesel generator breaker tripping. This NRC Staff Position 2 is met.

The existing Technical Specifications include tests which have been reviewed and found to meet the requirements of NRC Staff Position 3.

Accordingly, I recommend that the NRC accept the proposed design modifications and Technical Specification changes to protect the Class 1E equipment from sustained degraded voltages.

REFERENCES

1. NRC letter to Florida Power and Light Company (FPL), dated June 2, 1977.

2. FPL letter (R. E. Uhrig) to NRC (George Lear), dated July 21, 1977.

3. FPL letter (R. E. Uhrig) to NRC (W. G. Gammill), dated November 9, 1979.

4. FPL letter (R. E. Uhrig) to NRC (T. M. Novak), dated January 14, 1981.

5. FPL letter (R. E. Uhrig) to NRC (T. M. Novak), dated May 10, 1982.

6. FPL letter (R. E. Uhrig) to NRC (D. G. Eisenhut), dated August 6, 1982.

7. FPL letter (R. E. Uhrig) to NRC (S. A. Varga), dated September 1, 1982.

8. FPL letter (R. E. Uhrig) to NRC (S. A. Varga), dated January 3, 1983.

9. Code of Federal Regulations, Title 10, Part 50 (10 CFR 50), General Design Criterion 17 (GDC 17), "Electric Power Systems" of Appendix A "General Design Criteria for Nuclear Power Plants."

10. IEEE Standard 279-1971, "Criteria for Protection Systems for Nuclear Power Generating Stations."

11. IEEE Standard 308-1974, "Criteria for Class 1E Power Systems for Nuclear Power Generating Stations."

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