DCS MS-016

MAY 3 1983

DISTRIBUTION:

Docket File	OPA
NRC PDR	RDiggs
L PDR	PMKreutzer (3)
NSIC	RAClark
SECY	Gray File (+4)
ORB#3 Rdg	ASLAB
DEisenhut	DSells
OELD	ELJordan
LJHarmon	JMTaylor
TBarnhart (4)	ACRS-10
WJones	DBrinkman

Docket No. 50-335

Dr. Robert E. Uhrig
Vice President
Advanced Systems & Technology
Florida Power & Light Company
P. O. Box 529100
Juno Beach, Florida 33408

Dear Dr. Uhrig:

The Commission has issued the enclosed Amendment No. 58 to Facility Operating License No. DPR-67 for the St. Lucie Plant, Unit No. 1. The amendment consists of changes to the Technical Specifications in response to your application dated December 10, 1982.

The changes to the Technical Specifications were made to clarify and modify surveillance requirements and limiting conditions for operation for degraded grid voltage protection equipment and procedures.

Copies of the Safety Evaluation and the Notice of Issuance are also enclosed.

Sincerely,

Original signed by

Donald E. Sells, Project Manager
Operating Reactors Branch #3
Division of Licensing

Enclosures:
1. Amendment No. 58 to DPR-67
2. Safety Evaluation
3. Notice of Issuance

cc w/enclosures:
See next page

8305120146 830503
PDR ADOCK 05000335
P PDR

CMS 5/3/83

OFFICE	ORB#3:DL	ORB#3:DL	ORB#3:DL	AD:OR:DL	OELD		
SURNAME	PMKreutzer	DSells:sxn	RAClark	GCLainas	NA Wright		
DATE	4/28/83	4/28/83	4/28/83	4/28/83	5/2/83		

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

DISTRIBUTION:
Docket File
ORB#3 Rdg
PMKreutzer

Docket No. 50-335

Docketing and Service Section
Office of the Secretary of the Commission

SUBJECT: FLORIDA POWER & LIGHT COMPANY, St. Lucie Plant, Unit No. 1

Two signed originals of the Federal Register Notice identified below are enclosed for your transmittal to the Office of the Federal Register for publication. Additional conformed copies (12) of the Notice are enclosed for your use.

☐ Notice of Receipt of Application for Construction Permit(s) and Operating License(s).

☐ Notice of Receipt of Partial Application for Construction Permit(s) and Facility License(s): Time for Submission of Views on Antitrust Matters.

☐ Notice of Availability of Applicant's Environmental Report.

☐ Notice of Proposed Issuance of Amendment to Facility Operating License.

☐ Notice of Receipt of Application for Facility License(s); Notice of Availability of Applicant's Environmental Report; and Notice of Consideration of Issuance of Facility License(s) and Notice of Opportunity for Hearing.

☐ Notice of Availability of NRC Draft/Final Environmental Statement.

☐ Notice of Limited Work Authorization.

☐ Notice of Availability of Safety Evaluation Report.

☐ Notice of Issuance of Construction Permit(s).

☐ Notice of Issuance of Facility Operating License(s) or Amendment(s).

☒ Other: Amendment No. 58
Referenced documents have been provided PDR.

Division of Licensing
Office of Nuclear Reactor Regulation

Enclosure:
As Stated

OFFICE →	ORB#3:DL					
SURNAME →	PMKreutzer/pn					
DATE →	5/4/83					

NRC FORM 102 7—79

Florida Power & Light Company

cc:

Harold F. Reis, Esquire
Lowenstein, Newman, Reis & Alexrad
1025 Connecticut Avenue, N.W.
Washington, D. C. 20036

Norman A. Coll, Esquire
McCarthy, Steel, Hector & Davis
14th Floor, First National Bank Building
Miami Florida 33131

Mr. Jack Schreve
Office of the Public Counsel
Room 4, Holland Building
Tallahassee, Florida 32304

Resident Inspector
c/o U.S.N.R.C.
7900 S. A1A
Jensen Beach, Florida 33457

Administrator
Department of Environmental Regulation
Power Plant Siting Section
State of Florida
2600 Blair Stone Road
Tallahassee, Florida 32301

State Planning and Develpment Clearinghouse
Office of Planning and Budgeting
Executive Office of the Governor
The Capitol Building
Tallahassee, Florida 32301

Mr. Weldon B. Lewis
County Administrator
St. Lucie County
2300 Virginia Avenue, Room 104
Fort Pierce, Florida 33450

U.S. Environmental Protection Agency
Region IV Office
ATTN: Regional Radiation
Representative
345 Courtland Street, N.E.
Atlanta, Georgia 30308

Mr. Charles B. Brinkman
Manager - Washington Nuclear Operations
C-E Power Systems
Combustion Engineering, Inc.
7910 Woodmont Avenue
Bethesda, Maryland 20814

Regional Administrator
Nuclear Regulatory Commission, Region II
Office of Executive Director for Operations
101 Marietta Street, Suite 3100
Atlanta, Georgia 30303

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

FLORIDA POWER & LIGHT COMPANY

DOCKET NO. 50-335

ST. LUCIE PLANT UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 58
License No. DPR-67

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

   A. The application for amendment by Florida Power & Light Company, (the licensee) dated December 10, 1982, 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.

8305120153 830503
PDR ADOCK 05000335
P PDR

2. Accordingly, Facility Operating License No. DPR-67 is amended by changes to the Technical Specifications as indicated in the Attachment to this license amendment, and by amending paragraph 2.C(2) to read as follows:

   (2) Technical Specifications

   The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 58 , 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 its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

for Robert A. Clark, Chief
Operating Reactors Branch #3
Division of Licensing

Attachment:
Changes to the Technical
Specifications

Date of Issuance: May 3, 1983

ATTACHMENT TO LICENSE AMENDMENT NO. 58

TO FACILITY OPERATING LICENSE NO. DPR-67

DOCKET NO. 50-335

Replace the following pages of the Appendix "A" Technical Specifications with the enclosed pages. The revised pages are identified by amendment number and contain vertical lines indicating the area of change. The corresponding overleaf pages are also provided to maintain document completeness.

Pages

3/4 3-11
3/4 7-13
3/4 3-15
3/4 3-19

TABLE 3.3-3 (Continued)

ENGINEERED SAFETY FEATURE ACTUATION SYSTEM INSTRUMENTATION

FUNCTIONAL UNIT	TOTAL NO. OF CHANNELS	CHANNELS TO TRIP	MINIMUM CHANNELS OPERABLE	APPLICABLE MODES	ACTION
5. CONTAINMENT SUMP RECIRCULATION (RAS)					
a. Manual RAS (Trip Buttons)	2	1	2	1, 2, 3, 4	8
b. Refueling Water Tank - Low	4	2	3	1, 2, 3	9#
6. LOSS OF POWER					
a. 4.16 kv Emergency Bus Undervoltage (Loss of Voltage)*	2/Bus	2/Bus	1/Bus	1, 2, 3	12
b. 4.16 kv Emergency Bus Undervoltage (Degraded Voltage)					
(1) Undervoltage Device #1*	2/Bus	2/Bus	1/Bus	1, 2, 3	12
(2) Undervoltage Device #2*	2/Bus	2/Bus	1/Bus	1, 2, 3	12
c. 480 V Emergency Bus Undervoltage (Degraded Voltage)*	2/Bus	2/Bus	1/Bus	1, 2, 3	12
7. AUXILIARY FEEDWATER AUTOMATIC START Steam Generator (SG) Level Instruments	4/SG	2/SG 1/	2/SG	1, 2, 3	11

1/ 2/SG for either steam generator will start one train of AFW.

* This specification will be effective prior to Cycle 7 restart.

TABLE 3.3-3 (Continued)

TABLE NOTATION

(a) Trip function may be bypassed in this MODE when pressurizer pressure is < 1725 psia; bypass shall be automatically removed when pressurizer pressure is ≥ 1725 psia.

(b) An SIAS signal is first necessary to enable CSAS logic.

(c) Trip function may be bypassed in this MODE below 685 psig; bypass shall be automatically removed at or above 685 psig.

The provisions of Specification 3.0.4 are not applicable.

ACTION STATEMENTS

ACTION 8 - With the number of OPERABLE channels one less than the Total Number of Channels, restore the inoperable channel to OPERABLE status within 48 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

ACTION 9 - With the number of OPERABLE channels one less than the Total Number of Channels, operation may proceed provided the following conditions are satisfied:

a. The inoperable channel is placed in either the bypassed or tripped condition within 1 hour. For the purposes of testing and maintenance, the inoperable channel may be bypassed for up to 48 hours from time of initial loss of OPERABILITY; however, the inoperable channel shall then be either restored to OPERABLE status or placed in the tripped condition.

b. Within one hour, all functional units receiving an input from the inoperable channel are also placed in the same condition (either bypassed or tripped, as applicable) as that required by a. above for the inoperable channel.

c. The Minimum Channels OPERABLE requirement is met; however, one additional channel may be bypassed for up to 48 hours while performing tests and maintenance on that channel provided the other inoperable channel is placed in the tripped condition.

TABLE 3.3-3 (Continued)

TABLE NOTATION

ACTION 10 - With the number of OPERABLE channels one less than the Total Number of Channels, operation may proceed provided the inoperable channel is placed in the bypassed condition and the Minimum Channels OPERABLE requirement is demonstrated within 1 hour; one additional channel may be bypassed for up to 2 hours for surveillance testing per Sepcification 4.3.2.1.1.

ACTION 11 - Instrument operability requirements are contained in the Reactor Protection System requirements for Reactor Trip on Steam Generator Level. If an Automatic Start channel is inoperable, operation may continue provided that the affected pump is verified to be OPERABLE per Specification 4.7.1.2.a within 8 hours and at least once per 7 days thereafter; and the Automatic Start channel shall be restored to OPERABLE status within 30 days or the reactor shall be in at least HOT SHUTDOWN within the next 12 hours.

ACTION 12 - With the number of OPERABLE Channels one less than the Total Number of Channels operation may proceed until performance of the next required CHANNEL FUNCTIONAL TEST provided the inoperable channel is placed in the tripped condition within 1 hour.

TABLE 3.3-4

ENGINEERED SAFETY FEATURE ACTUATION SYSTEM INSTRUMENTATION TRIP VALUES

FUNCTIONAL UNIT	TRIP SETPOINT	ALLOWABLE VALUES
1. SAFETY INJECTION (SIAS)		
a. Manual (Trip Buttons)	Not Applicable	Not Applicable
b. Containment Pressure - High	≤ 5 psig	≤ 5 psig
c. Pressurizer Pressure - Low	≥ 1600 psia	≥ 1600 psia
2. CONTAINMENT SPRAY (CSAS)		
a. Manual (Trip Buttons)	Not Applicable	Not Applicable
b. Containment Pressure -- High-High	≤ 10 psig	≤ 10 psig
3. CONTAINMENT ISOLATION (CIS)		
a. Manual (Trip Buttons)	Not Applicable	Not Applicable
b. Containment Pressure - High	≤ 5 psig	≤ 5 psig
c. Containment Radiation - High	≤ 10 R/hr	≤ 10 R/hr
d. SIAS	----- (See FUNCTIONAL UNIT 1 above) ----	
4. MAIN STEAM LINE ISOLATION (MSIS)		
a. Manual (Trip Buttons)	Not Applicable	Not Applicable
b. Steam Generator Pressure - Low	≥ 585 psig	≥ 585 psig
5. CONTAINMENT SUMP RECIRCULATION (RAS)		
a. Manual RAS (Trip Buttons)	Not Applicable	Not Applicable
b. Refueling Water Tank - Low	48 inches above tank bottom	48 inches above tank bottom

TABLE 3.3-4 (Continued)

ENGINEERED SAFETY FEATURE ACTUATION SYSTEM INSTRUMENTATION TRIP VALUES

FUNCTIONAL UNIT	TRIP VALUE	ALLOWABLE VALUES
6. LOSS OF POWER		
a. (1) 4.16 kv Emergency Bus Undervoltage (Loss of Voltage)*	2900 ± 29 volts with a 1 ± .5 second time delay	2900 ± 29 volts with a 1 ± .5 second time delay
b. 4.16 kv Emergency Bus Undervoltage (Degraded Voltage)		
(1) Undervoltage Device #1*	3675 ± 36 volts with a 7 ± 1 minute time delay	3675 ± 36 volts with a 7 ± 1 minute time delay
(2) Undervoltage Device #2*	3592 ± 36 volts with a 18 ± 2 second time delay	3592 ± 36 volts with a 18 ± 2 second time delay
c. 480 volts Emergency Bus Undervoltage (Degraded Voltage)*	429 + 5-0 volts with a 7 ± 1 second time delay	429 + 5 -0 volts with a 7 ± 1 second time delay
7. AUXILIARY FEEDWATER	≥ 30% level	≥ 30% level

* This specification will be effective prior to Cycle 7 restart.

TABLE 3.3-5

ENGINEERED SAFETY FEATURES RESPONSE TIMES

INITIATING SIGNAL AND FUNCTION	RESPONSE TIME IN SECONDS
1. Manual	
a. SIAS	
Safety Injection (ECCS)	Not Applicable
Containment Fan Coolers	Not Applicable
Feedwater Isolation	Not Applicable
Containment Isolation	Not Applicable
b. CSAS	
Containment Spray	Not Applicable
c. CIS	
Containment Isolation	Not Applicable
Shield Building Ventilation System	Not Applicable
d. RAS	
Containment Sump Recirculation	Not Applicable
e. MSIS	
Main Steam Isolation	Not Applicable
Feedwater Isolation	Not Applicable
2. Pressurizer Pressure-Low	
a. Safety Injection (ECCS)	≤ 30.0*/19.5**
b. Containment Isolation ***	≤ 30.5*/20.5**
c. Containment Fan Coolers	≤ 30.0*/17.0**
d. Feedwater Isolation	≤ 60.0

TABLE 4.3-2 (Continued)

ENGINEERED SAFETY FEATURE ACTUATION SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS

FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL CALIBRATION	FUNCTIONAL TEST	MODES IN WHICH SURVEILLANCE REQUIRED
6. LOSS OF POWER				
a. 4.16 kv Emergency Bus Undervoltage (Loss of Voltage)*	S	R	M	1, 2, 3
b. 4.16 kv Emergency Bus Undervoltage (Degraded Voltage)				
(1) Undervoltage Device #1*	S	R	M	1, 2, 3
(2) Undervoltage Device #2*	S	R	M	1, 2, 3
b. 480 V Emergency Bus Undervoltage (Degraded Voltage)*	S	R	M	1, 2, 3
7. AUXILIARY FEEDWATER				
a. Auto Start	----------(See Surveillance 4.7.1.2.b)----------			
b. Steam Generator	----------(See RPS Table 4.3-1)----------			

* This specification will be effective prior to Cycle 7 restart.

TABLE 4.3-2 (Continued)

TABLE NOTATION

(1) The logic circuits shall be tested manually at least once per 31 days.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 58 TO FACILITY OPERATING LICENSE NO. DPR-67

FLORIDA POWER AND LIGHT COMPANY

ST. LUCIE UNIT 1

DOCKET NO. 50-335

Introduction and Summary

The criteria and staff positions pertaining to degraded grid voltage protection were transmitted to Florida Power and Light Company (FP&L) by NRC Generic Letter dated June 3, 1977. In response to this, by letters dated July 25, 1977, November 9, 1979, July 3, 1980, March 18, 1982 and May 24, 1982, the licensee proposed certain design modifications and changes to the Technical Specifications. A detailed review and technical evaluation of these proposed modifications and changes to the Technical Specifications was performed by Lawrence Livermore Laboratory (LLL), under contract to the NRC, and with general supervision by NRC staff. This work is reported by LLL in "Technical Evaluation Report on the Proposed Design Modifications and Technical Specification Changes on Grid Voltage Degradation for the St. Lucie Nuclear Power Plant, Unit 1" (attached). The staff reviewed this technical evaluation report and concurred in the conclusion that the licensee had not provided sufficient design details to complete an evaluation of the degraded grid voltage protection system. The licensee, in two additional submittals, both dated December 10, 1982, submitted revised design modifications to Technical Specifications associated with the degraded grid protection system. Further clarification was provided by letter dated March 11, 1983. After a review of these submittals, LLL submitted Revision 1 to their previous TER (attached). The staff has reviewed this additional information and concurs with LLL that the design of the degraded grid protection system meets the staff requirements and is therefore acceptable.

Evaluation Criteria

The criteria used by LLL 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 FP&L dated June 3, 1977.

Proposed Changes, Modifications and Discussion

The existing design at St. Lucie Unit 1 utilizes one CV-2 undervoltage relay on each of the 4160 volt Class 1E buses. These relays are induction disc, inverse time, with a setpoint of 88.34% of nominal. The 4160 volt nominal setpoint corresponds to 85% of nominal at the 480 volt MCC buses.

8305120160 830503
PDR ADOCK 05000335
P PDR

The 480 volt MCC buses contain undervoltage alarm relays. When actuated, the 4160 volt Class 1E bus relays will disconnect the degraded power source, initiate load shedding, start the emergency diesel generators and sequence the loads on the Class 1E buses when satisfactory diesel generator output voltage and frequency is achieved. These relays are automatically bypassed when the diesel generator output breaker is closed. If the diesel generator breaker should trip, the load shed and sequencing feature will be reinstated.

The licensee has proposed the following design changes:

1. Replacement of the above CV-2 with two definite-time delay relays on each 4160 volt Class 1E bus. This will provide a two-out-of-two coincident logic for loss-of-voltage detection per bus.

The voltage and time delay setpoints for this scheme will be 2900 ± 29 volts and 1 ± .5 seconds respectively. The function of these relays will be the same as the existing CV-2 relay (i.e., initiate offsite power source disconnection, load shedding, diesel generator starting, and load sequencing on the affected bus).

2. Addition of two sets of definite-time delay relays on each 4160-volt Class 1E bus with two-out-of-two coincident logic scheme. These relays will protect the Class 1E equipment from degraded voltage conditions. The first set of relays will be set at 3675 ± 36 volts (88.34% of 4160 volts) with a time delay of 7 ± 1 minutes. The second set of relays will be set at 3592 ± 36 volts (86.35% of 4160 volts) with a time delay of 18 ± 2 seconds.

3. Addition of second (ITE 27) undervoltage relay on each 480V Class 1E bus to provide a two-out-of-two coincident logic per bus. These relays will be interlocked with a safeguard signal to insure adequate starting voltage during accident conditions. The voltage and time delay setpoints for this scheme will be 429V +5V, -0.V (89.38% of 480V) and 7 ± 1 seconds.

In the December 10, 1982 submittals, FP&L provided the design details on the interaction of onsite power sources with load shed feature and necessary Technical Specifications which cover the setpoints with tolerances, surveillance requirements and limiting conditions for operation. Once the onsite power sources start supplying power to the Class 1E buses, load shed feature is bypassed for a period of 0.2 seconds (i.e., the diesel generator breakers are closed) and is automatically reinstated following breaker trip. This bypassing/reinstatement feature is accomplished by utilizing close/trip signal from the diesel generator output breaker.

The staff has reviewed FP&L's proposed undervoltage relay scheme and LLL's revised Technical Evaluation Report. The proposed design modification and Technical Specification changes, when implemented, will protect the Class 1E equipment from sustained degraded voltage under accident or non-accident conditions by initiating automatic disconnection of Class 1E equipment from

the offsite source, load shedding, diesel generator starting and load sequencing. The staff finds the proposed modifications to the degraded grid voltage system and changes to Technical Specifications acceptable.

Conclusions

The staff has reviewed the LLL Technical Evaluation Report dated July 30, 1982 and Revision 1 dated March 23, 1983 and concurs in the findings that sufficient information had been provided to complete the evaluation.

The FP&L submittals provided the design details of the proposed St. Lucie Plant, Unit 1 undervoltage relay scheme and changes to Technical Specifications. The staff has reviewed these submittals along with the LLL TERs and finds that the system as designed, including the revised Technical Specifications, meets the staff requirements for degraded grid protection at St. Lucie 1. The voltage and time delay trip settings will protect the Class 1E equipment from sustained degraded voltages from offsite power sources during accident and non-accident conditions. The staff, therefore, finds the degraded grid protection system and changes to technical specifications acceptable.

Environmental Consideration

We have 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, we have 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.

Conclusion

We have concluded, based on the considerations discussed above, that: (1) because the amendment does not involve a significant increase in the probability or consequences of an accident previously evaluated, does not create the possibility of an accident of a type different from any evaluated previously, and does not involve a significant reduction in a margin of safety, the amendment does not involve a significant hazards consideration, (2) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (3) 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.

Date: May 3, 1983

Attachments:
1. TER (UCID-19450), July 30, 1982
2. TER (UCID-19450, Rev. 1), March 23, 1983

Principal Contributor: J. Emami, DSI/PSB

UCID- 19450

TECHNICAL EVALUATION REPORT ON THE PROPOSED DESIGN MODIFICATIONS AND TECHNICAL SPECIFICATION CHANGES ON GRID VOLTAGE DEGRADATION FOR THE ST. LUCIE NUCLEAR POWER PLANT, UNIT 1

(Docket No. 50-335)

James C. Selan

July 30, 1982

Lawrence Livermore Laboratory

This is an informal report intended primarily for internal or limited external distribution. The opinions and conclusions stated are those of the author and may or may not be those of the Laboratory.

This work was supported by the United States Nuclear Regulatory Commission under a Memorandum of Understanding with the United States Department of Energy.

NRC FIN No. A-0250

A Copy Has Been Sent to PDR

XA

8209020602

ABSTRACT

This report documents the technical evaluation of the proposed design modification and Technical Specification changes for protection of Class 1E equipment from grid voltage degradation for the St. Lucie Nuclear Power Plant, Unit 1. The review criteria are based on several IEEE standards and the Code of Federal Regulations. The evaluation finds that the licensee has not provided sufficient information on the undervoltage protection system to allow a complete evaluation into the adequacy of protecting Class 1E equipment from sustained voltage degradation.

FOREWORD

This report is supplied as part of the Selected Electrical, Instrumentation, and Control Systems Issues Program 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 "Electrical, Instrumentation and Control System Support," B&R 20 19 04 031, FIN A-0250.

TABLE OF CONTENTS

		Page
1.	INTRODUCTION	1
2.	DESIGN BASIS CRITERIA	2
3.	EVALUATION	2
	3.1 Existing Undervoltage Protection	2
	3.2 Modifications	3
	3.3 Discussions	3
	3.3.1 NRC Staff Position 1: Second Level of Under-Voltage or Overvoltage Protection with a Time Delay	3
	3.3.2 NRC Staff Position 2: Interaction of Onsite Power Sources with Load Shed Feature	6
	3.3.3 NRC Staff Position 3: Onsite Power Source Testing	6
	3.4 Technical Specifications	6
4.	CONCLUSION	7
REFERENCES		8

TECHNICAL EVALUATION REPORT ON THE
PROPOSED DESIGN MODIFICATIONS AND TECHNICAL SPECIFICATION CHANGES
ON GRID VOLTAGE DEGRADATION
FOR THE
ST. LUCIE NUCLEAR POWER PLANT, UNIT 1
(Docket No. 50-335)

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 St. Lucie Nuclear Power Plant, Unit 1, 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. 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 25, 1977 [Ref. 2], November 9, 1979 [Ref. 3], July 3, 1980 [Ref. 4], March 18, 1982 [Ref. 5], and May 24, 1982 [Ref. 6], the licensee proposed certain design modifications to the undervoltage protection system. The design modifications include the installation of a degraded voltage protection system for the Class 1E equipment.

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.

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. 7].

(2) IEEE Standard 279-1971, "Criteria for Protection Systems for Nuclear Power Generating Stations" [Ref. 8].

(3) IEEE Standard 308-1974, "Class 1E Power Systems for Nuclear Power Generating Stations" [Ref. 9].

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

3. EVALUATION

3.1 EXISTING UNDERVOLTAGE PROTECTION

The present design at St. Lucie, Unit 1, utilizes one undervoltage relay on each of three 4160-volt Class 1E buses. The relay is an induction disc type (CV-2) which inversely relates time and voltage. That is, the lower the bus voltage, the faster the relay responds. The relay's voltage setpoint is 88.34% of 4160 volts (3675 volts) with a time dial setting of 1. This setting corresponds to relay actuation in 6 seconds at 79.5% of 4160 volts (3307 volts) or in 3 seconds at 70% of 4160 volts (2912 volts). The 88.34% voltage relay setpoint corresponds to 85% voltage (408 volts) at the 480-volt MCC buses where undervoltage is monitored by an annunciator/alarm system.

The function of the relay is to initiate source disconnection, load shedding, diesel generator starting, and load sequencing whenever the voltage and time delay setpoints are exceeded on its respective bus.

The relay is automatically bypassed approximately .2 seconds after the diesel generator breakers are closed. Should the diesel generator breakers trip open, the relay and load shedding logic is automatically reinstated.

3.2 MODIFICATIONS

The licensee is proposing a design change to the existing undervoltage protection system. This design change will add a second CV-2 relay to each 4160-volt Class 1E bus. This relay will be in parallel to the existing relay with their normally closed contacts series connected to produce a 2-out-of-2 coincident logic. The function of these relays will remain the same (i.e., source disconnection, load shedding, diesel generator starting, and load sequencing on the effected train).

A second design change, which is already implemented [Ref. 6] was the addition of an undervoltage relay on each 480-volt Class 1E load center bus. This relay has a voltage setpoint of 429 volts (89.4% of 480 volts) with a time delay of 1 second. This relay is interlocked with a safeguard signal. Therefore, for a sustained degraded voltage concurrent with a safeguard signal, automatic offsite source disconnection, load shedding, diesel generator starting, and load sequencing will occur. This system will also be bypassed 0.2 seconds after diesel generator breaker closing and auto-reinstated following breaker tripping.

Both of the above systems at each voltage level are train independent of each other. That is, there are no interties between the A and B load group buses load shedding and diesel generator starting. Only the effected bus will be disconnected with the remaining train still connected to its source.

3.3 DISCUSSION

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 is still analyzing the voltage requirements of the Class 1E equipment with the voltage operating time curves for the selected relays. This analysis is being done to verify that the setpoints selected are adequately protecting all Class 1E equipment at each voltage distribution level. The licensee is required to submit this verification of setpoint selection.

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

With the addition of a second CV-2 relay on each 4160-volt Class 1E bus, spurious trips will be precluded with the 2-out-of-2 logic. By interlocking the safeguard signal with the undervoltage relay on each 480-volt Class 1E load center bus, a failure of the relay will not cause a spurious disconnection from the offsite source. However, a spurious actuation of the single relay following a safeguard signal would cause a spurious separation from the offsite source with load shedding and subsequent reloading on the effected train. To preclude spurious separations from the offsite sources, the licensee is required to install a second relay on the 480-volt Class 1E load centers to produce a minimum acceptable coincident logic of 2-out-of-2.

(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 licensee has not provided the time delay with tolerances associated with the voltage setpoint of the CV-2 relays on the 4160-volt buses, nor the tolerances associated with the 1 second time delay of the 480-volt relays. Since the verification of the setpoint selection is still being analyzed by the licensee, an evaluation cannot be made until the final time delay and tolerances are provided. The licensee is required to verify that the selected time delays with tolerances do not exceed the maximum 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 inverse time characteristics of the CV-2 relay are designed such that the effects of short duration transients will be minimized. However, until the tolerances are submitted, an adequate determination cannot be made. The licensee is required to verify that the selected time delays with tolerances will minimize the effects of short duration transients.

(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 is still verifying the Class 1E equipment voltage requirements with the operating time curves for the relays. Therefore, an evaluation cannot be completed. The licensee is required to verify that the time delays with tolerances will protect all Class 1E equipment at all Class 1E voltage distribution levels.

(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 CV-2 relays 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. Should a degraded voltage occur concurrent with a safeguard signal, the relay located on the 480-volt Class 1E load center buses will initiate the auto-disconnection from the degraded offsite source.

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

The licensee states [Ref. 6] that all the design modifications comply with the requirements of IEEE 279-1971. However, the failure of the single relay on the 480-volt load center bus would allow for no available protection of the Class 1E equipment. Therefore, with no protection available, adequate voltages cannot be assured to meet the design voltage ratings of the Class 1E equipment. Also during testing, maintenance, or calibration of the relays during power operation, undervoltage protection is not available. To meet all requirements of IEEE 279-1971, (i.e. single failure criterion, testibility, Class 1E system protection, etc.), the licensee is required to install additional relays to produce a minimum acceptable coincident logic scheme of 2-out-of-2.

(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 has not submitted appropriate Technical Specification changes to reflect the design modfiications to the undervoltage protection system. The licensee is required to submit Technical Specification changes to include trip setpoints with tolerances, surveillance requirements, and LCO's for the undervoltage relaying system.

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 automatic 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 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 occurs 0.2 seconds after the diesel generator breakers close and is auto-reinstated following breaker tripping. The licensee is required to submit details on the circuitry modifications for accomplishing this 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 interaction between the onsite and offsite power sources.

Current Technical Specifications include tests which meet all the operational requirements of this position except for the auto-reinstatement of the load-shed feature and subsequent load sequencing following diesel generator breaker tripping. The licensee is required to include a test in the Technical Specifications to meet this requirement.

3.4 TECHNICAL SPECIFICATION

The licensee has not provided appropriate Technical Specification changes on the design modifications to the undervoltage protection system. The Technical Specification changes required by the licensee are to include:

(1) Trip setpoints of voltage and time with tolerances for the undervoltage relaying system.

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

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

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

(5) Test requirements to demonstrate the operability and independence of the onsite sources and the undervoltage relaying circuitry modifications.

CONCLUSIONS

Based on the information submitted by Florida Power and Light Company, it has been determined that insufficient information has been submitted on the design modifications to determine that all the requirements of NRC Staff Position 1 are met. The information still required from the licensee for evaluation is as follows:

(1) Completed verification analysis which demonstrates that the voltage/time curve selected for the undervoltage relays is protecting all Class 1E equipment at all distribution voltage levels and will minimize the effects of short duration transients.

(2) Time delay associated with the CV-2 relay voltage setpoint (88.34% of 4160 volts) with tolerances for both voltage and time.

(3) Voltage and time delay tolerances associated with 480-volt load center relay.

(4) Technical Specifications changes for the design modifications including the setpoints (voltage and time) with tolerances, surveillance requirements, and limiting conditions for operation (including action statements).

(5) Verification that the selected time delays with tolerances do not exceed the maximum time delay assumed in the FSAR accident analysis.

The design requirements of providing coincident logic and meeting IEEE 279-1971 are not met by the single relay installed on the 480-volt Class 1E load center buses. A spurious actuation of this relay following a safeguard signal would cause the spurious separation of the effected train from its preferred offsite source. The single relay does not meet the single failure criterion nor the testing/calibration/maintenance requirement of IEEE 279-1971. The failure of this single relay, or while being tested, maintained, or calibrated, would allow for no continued undervoltage protection of the Class 1E equipment. Therefore, to meet these requirements the

licensee must install additional relays to each 480-volt Class 1E load center bus. I recommend that additional relays be added to produce a minimum acceptable coincident logic scheme of 2-out-of-2. This logic scheme assures system reliability and meets IEEE 279-1971 requirements.

The licensee is bypassing the load-shed feature once the onsite sources are supplying the Class 1E equipment and will auto-reinstate the feature following breaker tripping. Therefore, NRC Staff Position 2 is met. The licensee is required to submit details of this circuitry modification for accomplishing this feature.

Existing Technical Specifications meet, in part, the requirements of NRC Staff Position 3. A test is required to be included in the Technical Specifications to demonstrate that following diesel generator breaker tripping, load-shedding, reconnection, and subsequent load sequencing occurs automatically. With this test included, all the requirements will be met.

REFERENCES

1. NRC letter to Florida Power and Light Company (FPL), dated June 3, 1977.
2. FPL letter (R. E. Uhrig) to NRC (Don K. Davis), dated July 25, 1977.
3. FPL letter (R. E. Uhrig) to NRC (W. G. Gammill), dated November 9, 1979.
4. FPL letter (R. E. Uhrig) to NRC (R. A. Clark), dated July 3, 1980.
5. FPL letter (R. E. Uhrig) to NRC (R. A. Clark), dated March 18, 1982.
6. FPL letter (R. E. Uhrig) to NRC (R. A. Clark), dated May 24, 1982.
7. 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."
8. IEEE Standard 279-1971, "Criteria for Protection Systems for Nuclear Power Generating Stations."
9. IEEE Standard 308-1974, "Criteria for Class 1E Power Systems for Nuclear Power Generating Stations."

UCID-19450 Revision 1

TECHNICAL EVALUATION REPORT (REVISION 1) ON THE PROPOSED DESIGN MODIFICATIONS AND TECHNICAL SPECIFICATION CHANGES ON GRID VOLTAGE DEGRADATION FOR THE ST. LUCIE NUCLEAR POWER PLANT, UNIT 1

(Docket No. 50-335)

James C. Selan

March 23, 1983

Lawrence Livermore Laboratory

This is an informal report intended primarily for internal or limited external distribution. The opinions and conclusions stated are those of the author and may or may not be those of the Laboratory.

This work was supported by the United States Nuclear Regulatory Commission under a Memorandum of Understanding with the United States Department of Energy.

NRC FIN No. A-0250

8304060471 XA

DISCLAIMER

This document was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, expressed or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

Available from: National Technical Information Service - U.S. Department of Commerce
5285 Port Royal Road - Springfield, VA 22161 - $7.00 per copy - (Microfiche $2.50)

ABSTRACT

This report is a revision of the technical evaluation documented in a separate report dated July 30, 1982 (UCID-19450) on the proposed design modifications and Technical Specification changes for the protection of the Class 1E equipment from grid voltage degradation for the St. Lucie Nuclear Power Plant, Unit 1. 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 proposed design modifications and Technical Specification changes will ensure that the Class 1E equipment will be protected from sustained voltage degradation during accident and non-accident conditions.

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.

TABLE OF CONTENTS

		Page
1.	INTRODUCTION	1
2.	DESIGN BASIS CRITERIA	2
3.	EVALUATION	2
	3.1 Existing Undervoltage Protection	2
	3.2 Modifications	3
	3.3 Discussions	3
	3.3.1 NRC Staff Position 1: Second Level of Under-Voltage or Overvoltage Protection with a Time Delay	3
	3.3.2 NRC Staff Position 2: Interaction of Onsite Power Sources with Load Shed Feature	5
	3.3.3 NRC Staff Position 3: Onsite Power Source Testing	5
	3.4 Technical Specifications	6
4.	CONCLUSION	6
	REFERENCES	7

TECHNICAL EVALUATION REPORT (REVISION 1) ON THE
PROPOSED DESIGN MODIFICATIONS AND TECHNICAL SPECIFICATION CHANGES
ON GRID VOLTAGE DEGRADATION
FOR THE
ST. LUCIE NUCLEAR POWER PLANT, UNIT 1
(Docket No. 50-335)

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 St. Lucie Nuclear Power Plant, Unit 1, 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. 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 25, 1977 [Ref. 2], November 9, 1979 [Ref. 3], July 3, 1980 [Ref. 4], March 18, 1982 [Ref. 5], May 24, 1982 [Ref. 6], December 10, 1982 [Ref. 7], December 10, 1982 [Ref. 8], and March 11, 1983 [Ref. 9], the licensee proposed certain design modifications, additions to the licensee's Technical Specifications, and limiting conditions for 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 July 30, 1982 (UCID-19450) based on new information submitted in References 7, 8, and 9.

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. 10].

(2) IEEE Standard 279-1971, "Criteria for Protection Systems for Nuclear Power Generating Stations" [Ref. 11].

(3) IEEE Standard 308-1974, "Class 1E Power Systems for Nuclear Power Generating Stations" [Ref. 12].

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

3. EVALUATION

3.1 EXISTING UNDERVOLTAGE PROTECTION

The present design at St. Lucie, Unit 1, utilizes one undervoltage relay on each of three 4160-volt Class 1E buses. The relay is an induction disc type (CV-2) which inversely relates time and voltage. That is, the lower the bus voltage, the faster the relay responds. The relay's voltage setpoint is 88.34% of 4160 volts (3675 volts) with a time dial setting of 1. This setting corresponds to relay actuation in 6 seconds at 79.5% of 4160 volts (3307 volts) or in 3 seconds at 70% of 4160 volts (2912 volts). The 88.34% voltage relay setpoint corresponds to 85% voltage (408 volts) at the 480-volt MCC buses where undervoltage is monitored by an annunciator/alarm system.

The function of the relay is to initiate source disconnection, load shedding, diesel generator starting, and load sequencing whenever the voltage and time delay setpoints are exceeded on its respective bus.

The relay is automatically bypassed approximately 0.2 seconds after the diesel generator breakers are closed. Should the diesel generator breakers trip open, the relay and load shedding logic is automatically reinstated.

3.2 MODIFICATIONS

The licensee is proposing a design change to the existing undervoltage protection system. This design change will replace the CV-2 relay (inverse time) with two definite-time delay relays in a 2-out-of-2 coincident logic [Ref. 13] to each 4160-volt Class 1E bus for loss-of-voltage detection. The setpoint for this scheme will be set at 2900 ± 29 volts (69.7% of 4160 volts) with a time delay of 1 ± 0.5 seconds. The function of these relays will remain the same (i.e., initiate source disconnection, load shedding, diesel generator starting, and load sequencing on the effected train).

The licensee is proposing a second design change which will add two sets of two definite-time delay relays on each 4160-volt Class 1E bus. The first set of relays, in a 2-out-of-2 coincident logic, will be set at 3675 ± 36 volts (88.34% of 4160 volts) with a time delay of 7 ± 1 minutes. The second set of relays, in a 2-out-of-2 coincident logic, will be set at 3592 ± 36 volts (86.35% of 4160 volts) with a time delay of 18 ± 2 seconds. These two separate sets of relays will define (to a greater degree of accuracy) two distinct points on the voltage/time curve required for equipment protection rather than utilizing inverse time relays [Ref. 13].

In addition to the above design changes, the licensee is also proposing to add a second relay on each 480-volt Class 1E load center bus to the already implemented design change [Ref. 6] to make up a 2-out-of-2 coincident logic scheme. These relays (ITE 27) will also be interlocked with a safeguard signal to insure adequate starting voltages during accident conditions. The relays will be set to actuate at 429 volts, +5 volts, -0.0 volts (89.38% of 480 volts) with a time delay of 7 ± 1 seconds. This setpoint is equivalent to 3927 volts (94.4% of 4160 volts) on the 4160-volt buses.

For sustained degraded voltages concurrent with or without a safeguard signal, all the above undervoltage schemes will initiate automatic disconnection from the offsite sources, load shedding, diesel generator starting and load sequencing. These systems will be bypassed 0.2 seconds after diesel generator breaker closing and automatically reinstated following breaker tripping.

3.3 DISCUSSION

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 shows that the setpoints of 3675 ± 36 volts (88.34% of 4160 volts) with a time delay of 7 ± 1 minutes and 3592 ± 36 volts (86.35% of 4160 volts) with a time delay of 18 ± 2 seconds for non-accident conditions, and 429 volts, +5.0 volts, -0.0 volts (89.38% of 480 volts) with a time delay of 7 ± 1 seconds for accident conditions, will protect the Class 1E equipment including relays, contactors, and other components whose functional performance would be inadequate because of undervoltage.

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

The proposed 2-out-of-2 coincident logic will preclude spurious tripping from the offsite power 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 time delay of 7 ± 1 seconds for the 480-volt protection schemes, interlocked with a safeguard signal, does not exceed the time delay assumed in the FSAR accident analysis of 30 seconds.

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

The time delays selected for both accident and non-accident conditions are long enough to override any short duration transients.

(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 analysis has shown that the time delays will not cause the failure or effect the operation of any equipment connected to and 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 2-out-of-2 coincident logic of the undervoltage protection schemes on the 4160-volt and 480-volt Class 1E buses will automatically initiate the disconnection from the degraded offsite sources for both accident and non-accident conditions.

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

The licensee states that the design modifications meet 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 a Technical Specification change request for the proposed design modifications which included trip setpoints with tolerances, surveillance requirements and limiting conditions for operation.

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 automatic 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 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 occurs 0.2 seconds after the diesel generator breakers close and is auto-reinstated following breaker tripping. This bypassing/reinstatement feature is accomplished by utilizing close/trip signals from the diesel generator output breaker.

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 interaction 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 in conjunction with a safety injection actuation signal. Conducting these tests will verify the functional operation of all the components used to initiate source disconnection, load-shedding, load-shed bypassing and auto-reinstatement, and to insure that there is no adverse interaction between the onsite and offsite sources.

3.4 TECHNICAL SPECIFICATION

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

(1) Voltage and time delay trip setpoints with tolerances of the undervoltage protection schemes (3675 ± 36 volts with a time delay of 7 ± 1 minutes and 3592 ± 36 volts with a time delay of 18 ± 2 seconds for non-accident conditions, and 429 volts, +5.0 volts, -0.0 volts with a time delay of 7 ± 1 seconds for accident conditions).

(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 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 during accident and non-accident conditions.

The licensee is bypassing the load-shed feature by using a close signal from the diesel generator breaker to prevent an adverse interaction when the onsite sources are supplying the Class 1E buses. The licensee is auto-reinstating the load-shed feature following diesel generator breaker tripping. Thus, 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 the NRC accept the proposed design modifications and Technical Specification changes for protecting the Class 1E equipment from sustained voltage degradation.

REFERENCES

1. NRC letter to Florida Power and Light Company (FPL), dated June 3, 1977.
2. FPL letter (R. E. Uhrig) to NRC (Don K. Davis), dated July 25, 1977.
3. FPL letter (R. E. Uhrig) to NRC (W. G. Gammill), dated November 9, 1979.
4. FPL letter (R. E. Uhrig) to NRC (R. A. Clark), dated July 3, 1980.
5. FPL letter (R. E. Uhrig) to NRC (R. A. Clark), dated March 18, 1982.
6. FPL letter (R. E. Uhrig) to NRC (R. A. Clark), dated May 24, 1982.
7. FPL letter (R. E. Uhrig) to NRC (R. A. Clark), dated December 10, 1982.
8. FPL letter (R. E. Uhrig) to NRC (D. G. Eisenhut), dated December 10, 1982.
9. FPL letter (R. E Uhrig) to NRC (R. A. Clark), dated March 11, 1983.
10. 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."
11. IEEE Standard 279-1971, "Criteria for Protection Systems for Nuclear Power Generating Stations."
12. IEEE Standard 308-1974, "Criteria for Class 1E Power Systems for Nuclear Power Generating Stations."
13. Telecon; D. Sells and H. Emami (NRC), P. Pace, R. Stephens, D. Smith and staff (FPL), J. Selan (LLNL), dated February 23, 1983.

Technical Information Department · Lawrence Livermore Laboratory
University of California · Livermore, California 94550

7590-01

UNITED STATES NUCLEAR REGULATORY COMMISSION

DOCKET NO. 50-335

FLORIDA POWER & LIGHT COMPANY

NOTICE OF ISSUANCE OF AMENDMENT TO FACILITY OPERATING LICENSE

The U. S. Nuclear Regulatory Commission (the Commission) has issued Amendment No. 58 to Facility Operating License No. DPR-67, issued to Florida Power & Light Company (the licensee), which revised Technical Specifications for operation of the St. Lucie Plant, Unit No. 1 (the facility), located in St. Lucie County, Florida. The amendment is effective as of the date of issuance.

The changes to the Technical Specifications were made to clarify and modify surveillance requirements and limiting conditions for operation for degraded grid voltage protection equipment and procedures.

The application for the amendment complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations. The Commission has made appropriate findings as required by the Act and the Commission's rules and regulations in 10 CFR Chapter I, which are set forth in the license amendment. Prior public notice of this amendment was not required since this amendment does not involve a significant hazards consideration.

8305120171 830503
PDR ADOCK 05000335
P PDR

The Commission has determined that the issuance of this amendment will not result in any significant environmental impact and that pursuant to 10 CFR §51.5(d)(4) an environmental impact statement or negative declaration and environmental impact appraisal need not be prepared in connection with issuance of this amendment.

For further details with respect to this action, see (1) the application for amendment dated December 10, 1982, (2) Amendment No. 58 to License No. DPR-67 and (3) the Commission's related Safety Evaluation. All of these items are available for public inspection at the Commission's Public Document Room, 1717 H Street, N.W., Washington, D.C. and at the Indian River Junior College Library, 3209 Virginia Avenue, Ft. Pierce, Florida. A copy of items (2) and (3) may be obtained upon request addressed to the U. S. Nuclear Regulatory Commission, Washington, D.C. 20555, Attention: Director, Division of Licensing.

Dated at Bethesda, Maryland, this 3rd day of May, 1983.

FOR THE NUCLEAR REGULATORY COMMISSION

Charles M. Trammell, Acting Chief
Operating Reactors Branch #3
Division of Licensing