Docket Nos. 50-250
and 50-251

August 20, 1992

D RIBUTION
See attached sheet

Mr. J. H. Goldberg
President-Nuclear Division
Florida Power and Light Company
P.O. Box 14000
Juno Beach, Florida 33408-0420

Dear Mr. Goldberg:

SUBJECT: TURKEY POINT UNITS 3 AND 4 - ISSUANCE OF AMENDMENTS RE: DEGRADED VOLTAGE PROTECTION SCHEME (TAC NOS. M83248 AND M83249)

The Commission has issued the enclosed Amendment No. 152 to Facility Operating License No. DPR-31 and Amendment No. 147 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 April 21, 1992, as supplemented May 19, June 2 and July 29, 1992.

These amendments permit the addition of one definite time delay relay per channel in the existing non-safety injection degraded voltage protection scheme for safety-related load centers, and eliminate the reference in the Technical Specifications to a specific type of relay used in the degraded voltage protection scheme.

A copy of the Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's biweekly Federal Register notice.

Sincerely,
(Original Signed By J. Norris for)
L. Raghavan, Acting Project Manager
Project Directorate II-2
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Enclosures:
1. Amendment No.152 to DPR-31
2. Amendment No.147 to DPR-41
3. Safety Evaluation

cc w/enclosures:
See next page

Document Name - TP83248.AMD

OFC	:LA:PDII-2	:PM:PDII-2	:D:PDII-2	:OGC	:	:
NAME	:DMiller	:LRaghavan	:H. Berkow	: CBarth	:	:
DATE	: 8/14/92	: 8/14/92	: 8/14/92	: 8/18/92	:	:

concurred on shallow notice

Mr. J. H. Goldberg
Florida Power and Light Company

Turkey Point Plant

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DATED: August 20, 1992

AMENDMENT NO. 152 TO FACILITY OPERATING LICENSE NO. DPR-31-TURKEY POINT UNIT 3
AMENDMENT NO. 147 TO FACILITY OPERATING LICENSE NO. DPR-41-TURKEY POINT UNIT 4

Docket File
NRC & Local PDRs
PDII-2 Reading
S. Varga, 14/E/4
G. Lainas, 14/H/3
H. Berkow
D. Miller
L. Raghavan
OGC
D. Hagan, 3302 MNBB
G. Hill (8), P-137
Wanda Jones, MNBB-7103
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ACRS (10)
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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. 152
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 April 21, 1992, as supplemented May 19, June 2 and July 29, 1992, 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 and Environmental Protection Plan

   The Technical Specifications contained in Appendix A, as revised through Amendment No. 152, are hereby incorporated in the license. The Environmental Protection Plan contained in Appendix B is hereby incorporated into the license. The licensee shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

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

FOR THE NUCLEAR REGULATORY COMMISSION

Herbert N. Berkow

Herbert N. Berkow, Director
Project Directorate II-2
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: August 20, 1992

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. 147
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 April 21, 1992, as supplemented May 19, June 2 and July 29, 1992, 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 and Environmental Protection Plan

   The Technical Specifications contained in Appendix A, as revised through Amendment No. 147, are hereby incorporated in the license. The Environmental Protection Plan contained in Appendix B is hereby incorporated into the license. The licensee shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

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

FOR THE NUCLEAR REGULATORY COMMISSION

Herbert N. Berkow

Herbert N. Berkow, Director
Project Directorate II-2
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
  Specifications

Date of Issuance: August 20, 1992

ATTACHMENT TO LICENSE AMENDMENT

AMENDMENT NO. 152 FACILITY OPERATING LICENSE NO. DPR-31

AMENDMENT NO. 147 FACILITY OPERATING LICENSE NO. DPR-41

DOCKET NOS. 50-250 AND 50-251

Revise Appendix A as follows:

Remove pages	Insert pages
3/4 3-19	3/4 3-19
3/4 3-20	3/4 3-20
3/4 3-28	3/4 3-28
3/4 3-29	3/4 3-29
3/4 3-33a	3/4 3-33a

TABLE 3.3-2 (Continued)

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION

FUNCTIONAL UNIT	TOTAL NO. OF CHANNELS	CHANNELS TO TRIP	MINIMUM CHANNELS OPERABLE	APPLICABLE MODES	ACTION
6. Auxiliary Feedwater### (Continued)					
b. Stm. Gen. Water Level--Low-Low	3/steam generator	2/steam generator in any steam generator	2/steam generator	1, 2, 3	15
c. Safety Injection	See Item 1. above for all Safety Injection initiating functions and requirements.				
d. Bus Stripping	1/bus	1/bus	1/bus	1, 2, 3	23
e. Trip of All Main Feed-water Pumps Breakers	1/breaker	(1/breaker) /operating pump	(1/breaker) /operating pump	1, 2	23
7. Loss of Power					
a. 4.16 kV Busses A and B (Loss of Voltage)	2/bus	2/bus	2/bus	1, 2, 3, 4	18
b. 480 V Load Centers 3A, 3B, 3C, 3D and 4A, 4B, 4C, 4D Degraded Voltage	2 per load center	2 on any load center	2 per load center	1, 2, 3, 4	18
Coincident with: Safety Injection	See Item 1. above for all Safety Injection initiating functions and requirements				

TABLE 3.3-2 (Continued)

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION

FUNCTIONAL UNIT	TOTAL NO. OF CHANNELS	CHANNELS TO TRIP	MINIMUM CHANNELS OPERABLE	APPLICABLE MODES	ACTION
7. Loss of Power (Continued)					
c. 480 V Load Centers 3A, 3B, 3C, 3D and 4A, 4B, 4C 4D Degraded Voltage	2 per load center	2 on any load center	2 per load center	1, 2, 3, 4	18
8. Engineered Safety Features Actuation System Interlocks					
a. Pressurizer Pressure	3	2	2	1, 2, 3	19
b. T_{avg} - Low	3	2	2	1, 2, 3	19
9. Control Room Ventilation Isolation					
a. Automatic Actuation Logic and Actuation Relays	2	1	2	1, 2, 3, 4,6**	16
b. Safety Injection	See Item 1. above for all Safety Injection initiating functions and requirements.				
c. Containment Radio-activity--High	2	1	1	1, 2, 3, 4,6**	16
d. Containment Isolation Manual Phase A or Manual Phase B	2	1	2	1, 2, 3, 4	17
e. Control Room Air Intake Radiation Level	2	1	2	All	24

TABLE 3.3-3 (Continued)

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION TRIP SETPOINTS

FUNCTIONAL UNIT	ALLOWANCE (TA)	Z	S	TRIP SETPOINT	ALLOWABLE VALUE#
7. Loss of Power (Continued)					
b. 480V Load Centers Degraded Voltage					
Load Center					
3A	[ ]	[ ]	[ ]	430V±5V (10 sec ± 1 sec delay)	[ ]
3B	[ ]	[ ]	[ ]	438V±5V (10 sec ± 1 sec delay)	[ ]
3C	[ ]	[ ]	[ ]	434V±5V (10 sec ± 1 sec delay)	[ ]
3D	[ ]	[ ]	[ ]	434V±5V (10 sec ± 1 sec delay)	[ ]
4A	[ ]	[ ]	[ ]	435V±5V (10 sec ± 1 sec delay)	[ ]
4B	[ ]	[ ]	[ ]	434V±5V (10 sec ± 1 sec delay)	[ ]
4C	[ ]	[ ]	[ ]	434V±5V (10 sec ± 1 sec delay)	[ ]
4D	[ ]	[ ]	[ ]	430V±5V (10 sec ± 1 sec delay)	[ ]
Coincident with: Safety Injection and	see item 1			See Item 1. above for all Safety Injection Trip Setpoints and Allowable Values.	
Diesel Generator Breaker Open				N.A.	N.A.

TABLE 3.3-3 (Continued)

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM
INSTRUMENTATION TRIP SETPOINTS

FUNCTIONAL UNIT	ALLOWANCE (TA)	Z	S	TRIP SETPOINT	ALLOWABLE VALUE#
7. Loss of Power (Continued)					
c. 480V Load Centers Degraded Voltage					
Load Center					
3A	[ ]	[ ]	[ ]	424V±5V(60 sec ±30 sec delay)	[ ]
3B	[ ]	[ ]	[ ]	427V±5V(60 sec ±30 sec delay)	[ ]
3C	[ ]	[ ]	[ ]	437V±5V(60 sec ±30 sec delay)	[ ]
3D	[ ]	[ ]	[ ]	435V±5V(60 sec ±30 sec delay)	[ ]
4A	[ ]	[ ]	[ ]	430V±5V(60 sec ±30 sec delay)	[ ]
4B	[ ]	[ ]	[ ]	436V±5V(60 sec ±30 sec delay)	[ ]
4C	[ ]	[ ]	[ ]	434V±5V(60 sec ±30 sec delay)	[ ]
4D	[ ]	[ ]	[ ]	434V±5V(60 sec ±30 sec delay)	[ ]
Coincident with: Diesel Generator Breaker Open	N.A.	N.A.	N.A	N.A.	N.A.

TABLE 4.3-2 (Continued)

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION
SURVEILLANCE REQUIREMENTS

CHANNEL FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL CALIBRATION	ANALOG CHANNEL OPERATIONAL TEST	TRIP ACTUATING DEVICE OPERATIONAL TEST	ACTUATION LOGIC TEST#	MODES FOR WHICH SURVEILLANCE IS REQUIRED
6. Auxiliary Feedwater (Continued)						
c. Safety Injection	See Item 1. above for all Safety Injection Surveillance Requirements.					
d. Bus Stripping	N.A.	R	N.A.	R	N.A.	1, 2, 3
e. Trip of All Main Feedwater Pump Breakers.	N.A.	N.A.	N.A.	R	N.A.	1, 2
7. Loss of Power						
a. 4.16 kV Busses A and B (Loss of Voltage)	N.A.	R	N.A.	R	N.A.	1, 2, 3, 4
b. 480V Load Centers 3A,3B,3C,3D and 4A,4B,4C,4D Degraded Voltage	S	R	N.A.	M(1)	N.A.	1, 2, 3, 4
Coincident with: Safety Injection	See Item 1. above for all Safety Injection Surveillance Requirements.					
c. 480V Load Centers 3A,3B,3C,3D and 4A,4B,4C,4D Degraded Voltage	S	R	N.A.	M(1)	N.A.	1, 2, 3, 4

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 152 TO FACILITY OPERATING LICENSE NO. DPR-31

AND AMENDMENT NO. 147 TO FACILITY OPERATING LICENSE NO. DPR-41

FLORIDA POWER AND LIGHT COMPANY

TURKEY POINT UNIT NOS. 3 AND 4

DOCKET NO. 50-250 AND 50-251

1.0 INTRODUCTION

By application dated April 21, 1992, as supplemented May 19, June 2 and July 29, 1992, Florida Power and Light Company (the licensee) requested revisions to the Technical Specifications (TS) for Turkey Point Units 3 and 4. The proposed changes involve design modifications to the engineered safety features actuation system (ESFAS) instrumentation for detecting degraded voltage at the class 1E 480 V load centers (LCs). Presently, the 480 V LC has two degraded voltage protection schemes. One scheme is utilized when the safety injection (SI) actuation signal is present, and the other scheme is used during normal station operation (described in the licensee's letter as "non-safety injection degraded voltage protection scheme"). The licensee proposes to modify the degraded voltage protection scheme which is used during normal station operation. No design modification is proposed for the scheme that detects degraded voltages while the SI signal is present.

The protection scheme used during normal power operation includes GE-IAV type inverse time voltage relays. Based on its operational experience, the licensee indicates that the settings of these relays may drift in a non-conservative direction such that on low voltages, the relays either would trip after an additional time delay or would not trip at all. To improve repeatability and to reduce potential harmful effects due to setpoint drifts of existing voltage relays on the degraded voltage detection and protection circuit, the licensee proposes to install additional voltage relays of definite time delay type and bypass switches to the existing voltage relays. The bypass switches would allow these circuits to be placed in the trip mode during tests and calibration. The licensee plans to implement the proposed modifications for Unit 3 during its Cycle 13 refueling outage and for Unit 4 during its Cycle 14 refueling outage.

On July 9 and July 15, 1992, the staff held telephone conversations with the licensee to discuss the proposed changes and requested additional information. By letters dated June 2 and July 29, 1992, the licensee provided additional information. These letters provided supplemental information that did not change the initial no significant hazards consideration determination.

2.0 BACKGROUND

Induction motors run as a constant Kilo Volt Amperes (KVA) device. This means the motor current increases with a decrease in motor terminal voltage. This is valid until the terminal voltage is reduced to a "stall voltage," when the motor can no longer develop sufficient torque to drive the attached load and the motor begins to stall. When operating below the stall voltage, the motor will act as a constant impedance device and will draw current consistent with its terminal voltage. Operation of the motors at a lower voltage and a consequent increase in motor current and heat generation at the motor windings could cause winding short circuits, insulation damage, ground faults, etc. and subsequently could lead to motor damage. The extent of motor damage will depend on the duration of its operation at reduced voltage, and on the magnitude of motor current. To prevent motor damage while operating at sustained low voltages, the Turkey Point Units 3 and 4 design includes a degraded voltage sensing and protection scheme.

Each unit has four class 1E 480 V LC buses A, B, C, and D. Buses A and C are assigned to the train A power division, and buses B and D are assigned to the train B power division. Each bus is provided with two separate protection schemes to protect the motors of connected loads against sustained degraded voltage condition. This protection scheme detects a degraded voltage condition on any of the 480 V class 1E LC buses and, in response to a significant degraded voltage condition, trips and initiates a division level signal to transfer source of power from the offsite source to an onsite source. One scheme is utilized during presence of the SI actuation signal, and the other scheme is used during normal station operation. The licensee proposes to modify the degraded voltage protection scheme which is used during normal station operation. No design modification has been proposed for the protection scheme that detects degraded voltages while the SI signal is present. Therefore, the discussion in this Safety Evaluation (SE) is limited to the degraded voltage protection scheme which is used during normal station operation.

Each of the 480 V class 1E LC buses 3A, 3B, 3C and 3D degraded voltage protection scheme, which is used during normal station operation, include two trip-logic channels. The protection logic will generate a trip-and-transfer signal only if both channels of any LC concurrently sense a degraded voltage condition (two-out-of-two logic). The protection circuit of each channel of each LC bus consists of a set of one General Electric (GE) IAV-55C type inverse time voltage relay connected across a potential transformer of the LC, and one auxiliary relay connected to the IAV relay. Upon detecting a degraded voltage condition, contacts from the IAV-55C undervoltage relay close to energize its auxiliary relay. A circuit containing the set of contacts from each of these two auxiliary relays wired in series (two-out-of-two logic) would initiate the trip-and-transfer signal. Therefore, to initiate the trip-and-transfer signal for any of the four LCs, the associated channel 1 and channel 2 IAV-55C relays with their respective auxiliary relays for that LC must change state.

The existing IAV relays tend to drift from the required undervoltage settings specified in the TS. Furthermore, the existing logic does not detect a failed coil in any auxiliary relays, and does not allow the circuit to be placed in the trip mode without an external shorting bar. Because of these problems, the licensee plans to implement design modifications. The proposed design modifications for Unit 3 would be implemented during its Cycle 13 refueling outage and for Unit 4 during its Cycle 14 refueling outage.

3.0 PROPOSED DESIGN MODIFICATIONS

The proposed modifications to the existing degraded voltage scheme would:

1. add two ITE-27N definite time delay type undervoltage relays (one in each logic channel) to the existing two IAV-55C (one in each logic channel) undervoltage relays;

2. delete the auxiliary relays from trip circuit;

3. interconnect contacts from two existing IAV relays and two new ITE relays for each LC in a "one-out-of-two-taken twice" logic. This logic will generate a trip signal if degraded voltage is detected by either the IAV-55C or ITE-27N (one-out-of-two) relays in the logic channel 1, concurrently with detection of degraded voltage by either IAV-55C or (one-out-of-two) ITE-27N relays in the logic channel 2. Therefore, both channels of any LC must generate a trip signal concurrently for a transfer to occur.

4. add a bypass switch which would be used to place one undervoltage relay channel in the trip mode when one or both of the relays of that channel are removed from the logic circuitry for testing or calibration. With the addition of the bypass switch, the IAV relay's shorting bar, which at present is used to place the relay channel in a trip mode, would be disconnected.

5. add two new GE HGA111 type auxiliary relays to the protection scheme. These relays would be normally de-energized, and would be used only to actuate the control room annunciator window. They would not control the trip circuit logic.

6. replace the existing three-position test switch by a five-position test switch to enable the operator to test either the IAV or the ITE relay of either channel. The test switch would include two indicating lights (white and amber). The white light would be used to indicate normal operation while the amber light would indicate a successful relay test.

7. install the new ITE-27N relays, GE-HGA auxiliary relays, bypass switch, test switch, and indicating lights in a new class 1E, seismically qualified subpanel which will be located across from each of the 480V LCs.

8. modify the engraving on the existing annunciator window F35, which at present reads "UNDER VOLTAGE SCHEME TEST", to read "UNDER VOLTAGE TEST/BYPASS".

4.0 EVALUATION

The staff reviewed and evaluated the licensee's proposed design modification to verify that: (1) the modification would not defeat the original design objective of the protection circuit, (2) the modified circuit would trip and separate the distribution system from offsite power before equipment either is damaged from the effects of sustained low voltage or rendered inoperable by the operation of other protective devices, and (3) would not degrade safety systems, compromise the safety of the plant, or introduce any new failure modes that were not previously analyzed and have not been compensated for.

The licensee's proposal does not include any design modification to the protection scheme that detects degraded voltages while the SI signal is present. However, for consistency with the proposed TS wording change to the protection scheme during normal operation, the licensee proposes to revise the TS Table 3.3-2 item 7b to delete the phrase "2 instantaneous relays per load center" and TS Tables 3.3-3 and 4.3.2, item 7b to delete the phrase "Instantaneous Relays". These changes are administrative in nature and are acceptable.

The licensee proposes to modify the degraded voltage protection scheme which is used during normal station operation. The proposed modifications involve new ITE relays which would protect the 480 V alternating current (AC) system from the adverse effects of a sustained degraded voltage condition while the existing IAV relays would protect from the adverse effects of a brief large voltage transient. Adding another undervoltage relay enhances the existing degraded voltage protection scheme by addressing the repeatability concerns since the new ITE-27N undervoltage relays have greater repeatability in the undervoltage range where the existing IAV-55C relays tend to drift. In addition, by removing the auxiliary relays from the trip circuit, the potential of rendering the trip circuit inoperable due to failure of an auxiliary relay is eliminated. Also, the modified test circuit enables testing for failures of trip-actuating relays.

4.1 Engineering Calculation for Degraded Voltage Relay Setpoints

The licensee performed engineering calculation 21701-523-E-01 to determine setpoints for the new ITE relays and for existing IAV relays. The calculation was based on low voltage settings described in TS Table 3.3-3 Section 7.c for the existing inverse time relays for 480 V LC. The TS table settings were assigned to the new ITE relays, because these relays have a greater repeatability in the undervoltage range where the existing IAV-55C relays tend to drift. The IAV relays have been assigned settings lower than that for the ITE relays. The calculations verified that the settings agreed with the voltage values for steady-state and transient conditions as described in report FLO 53-20.5004, "Emergency Power System Enhancement Project, Relay Coordination Study," Revision 11.

The staff noted the following in the calculations:

(1) The settings are within the TS described ranges. The TS settings are: 106 V ± 1.25 V (60 ± 30 seconds delay) for LC 3A, 106.75 V ± 1.25 V (60 ± 30 seconds delay) for LC 3B, 109.25 V ± 1.25 V (60 ± 30 seconds delay) for LC 3C, and 108.75 V ± 1.25 V (60 ± 30 seconds delay) for LC 3D, respectively.

(2) The IAV relay settings are lower than the ITE relay settings. Therefore, the IAV relays should not operate before the ITE relays. Therefore, at the TS trip voltages, only the new ITE relays are involved. During a voltage transient lower than the setting of the ITE relay, the ITE relay will operate but its contacts will not close until after at least 53.5 seconds (60 ± seconds setting minus 6.5 seconds uncertainty).

(3) The calculations also verified that the relays would not operate at the steady-state voltage at the bus. The actual steady-state and transient voltages were determined by engineering calculation EC-145, "PSB-1 Voltage Analysis for Electrical Auxiliary System," Revision 5. The minimum value of steady-state voltage on the bus has been used to calculate minimum motor terminal voltage of the class 1E loads.

(4) The calculations were performed using measuring and test equipment (M&TE) accuracy provided by the plant maintenance staff. Therefore, results of this setpoint calculation apply only if the M&TE accuracy is controlled to the values used in the calculation. At present, the licensee does not have any procedure to track and control the M&TE accuracy per the above requirement, but the licensee has committed to implement such a procedure before the modification is declared operational.

(5) The calculations use cable resistance at 55 degrees C. Contact resistance was accounted for by increasing the cable lengths by 10%. The staff finds this reasonable. Except for the setting tolerance, all components of uncertainty were added using the "square root of the sum of the squares" method to obtain the value of the total uncertainty. The allowance for the setting tolerance was added algebraically.

(6) The setpoint calculation indicates that the steady-state and transient voltages include a margin of -1.00 volt to account for drifting of the IAV relays. The setting calculation did not use this value to arrive at the minimum steady-state and transient voltages. The calculation does not indicate the time duration for this drift and source of this data. The calculation for the ITE relay setting also does not address the allowance for the relay drift.

During a July 9, 1992 telephone conversation, the licensee indicated that the -1.00 volt referenced in its calculation was not used as a design input to the calculation but is used to provide an arbitrary margin for field verification of voltages to check relay curves, and relay trip settings. The licensee further stated that the drift values for the IAV and ITE relays were not available from vendors. The licensee could not use historical data for the existing IAV relays because with new settings, these relays would be operating at different curves. Therefore, the licensee acquired historical drift data for both the IAV and ITE relays from operational experience of other nuclear utilities.

Based on the above data, the licensee concluded that the worst-case drift is insignificant compared to the available margin between the relay settings and allowable values, and therefore, could be neglected. The licensee has committed to revise the calculation to indicate the above basis for neglecting the allowances for relay drift.

4.2 Calculation for Coordination Between Undervoltage and Overcurrent Protection

The licensee performed calculation 21701-523-E-02 to demonstrate that the settings of the ITE and IAV undervoltage relays as determined by calculation 21701-523-E-01 were adequate to ensure the operability of the safety-related equipment connected to the 4.16 KV vital switchgear, 480 V LCs and 480 V motor control centers (MCCs). The calculation also demonstrated that, during a condition of sustained low voltage, the relays will trip and isolate the onsite distribution system from the offsite source before the equipment either is damaged from the effects of the reduced voltages or is rendered inoperable because other protective devices misoperated and isolated the equipment from the system. The calculation verified that:

(1) During the sustained low-voltage condition, the minimum voltage on the motor terminals, considering all voltage drops, will be higher than the stall voltage of the motor. This would ensure that the motor will not stall before the degraded voltage protection scheme generates a trip.

(2) During the sustained low-voltage condition, the minimum voltage on the contactors, considering all voltage drops, is more than the

contactor dropout voltage. This would ensure that the MCC contactors would not drop before a trip signal is generated by the degraded voltage protection scheme.

(3) During the sustained low-voltage condition, the highest motor current caused by the lowest terminal voltage will always be below the thermal damage curve of the ESF load motors. This high current will not damage the motors during the time the undervoltage relay trips, which could be a maximum of 90 seconds (considering a 30 second margin allowed by the TS over and above the fixed delay of 60 seconds).

(4) During a sustained low-voltage condition, the highest motor current caused by the low voltage would not be enough to cause the feeder overcurrent (O/C) protection device to trip. This would ensure that the motor would not be rendered inoperable by an inadvertent trip of the feeder protection device before the degraded voltage protection scheme generates a trip.

The calculation did not evaluate the effects of low-voltage operation for the motor-operated valves (MOVs) and dampers, battery chargers and resistive loads on the basis that their short duration of operation would not cause damage or tripping by over current devices. This is acceptable for the reasons described below.

The MOVs and dampers, being intermittent loads, will probably not be operating during the degraded voltage transient. In addition, the design, application and O/C protection for MOVs allow for the extended overload or for the stalled conditions. The licensee verified this through the vendor-supplied data for motors, O/C protection devices and the calculations for establishing the values and duration of transient voltages. Battery chargers and resistive loads would become inoperable during a transient if the low voltage during the transient is less than the rated voltage of these devices. These loads will not overheat and will not draw the current needed to actuate the O/C devices. Resistive loads draw currents proportional to their terminal voltage, and therefore, the current through these devices will be low. The licensee verified these facts through the vendor-supplied data for these loads, settings of its O/C protection devices and the calculation for establishing the values and duration of transient voltages.

The licensee performed these calculations using the following assumptions:

(1) If the values for the stall torque of a specific motor was not available, the licensee used equivalent values from NEMA standard MG-1 Section MG-1-12-39.

(2) If the licensee did not have thermal damage curves for a specific motor, it assumed that the existing setting curves of the feeder protection devices would be adequate to protect motors from thermal damage. The licensee obtained damage curves from vendors for all

large class 1E motors. For low horsepower motors, the licensee verified the existing settings of the feeder protection devices for these small motors using multiple values of the motor full load currents and then compared the voltage relay setting to verify that the relay trips before the feeder protection device.

(3) The licensee evaluated each motor for the effects of undervoltage-induced higher currents until the motor terminal voltage reached its stall value. The staff finds this acceptable since when operating below the stall voltage, the motor will not act as a constant KVA load but will act as a constant impedance load. Therefore, after the voltage drops below the stall voltage, the motor current will be reduced in proportion to the reduction in the terminal voltage of the motor.

(4) To determine if the voltage relays adequately protect the safety-related motors, the licensee took the following actions:

(a) Determined motor currents corresponding to various voltages on the voltage relay characteristic curves.

(b) Plotted the resulting motor currents, which were correlated to voltage and operating times of the voltage relays, along with the response time curves for the O/C protection device for the motor and feeder, and thermal damage curves of the motors where available. The calculation accounted for voltage drops across the bus and across the individual feeder circuits.

(c) Examined composite plots, plotted as described in item (b) above, to verify that on sustained low voltage operation, the voltage relay would trip before the motor either was damaged by overcurrents or was isolated by the O/C trip device.

(d) If the motor damage curves were not available, the licensee evaluated the composite plots to verify that during sustained low voltage conditions, the relay trip signal will occur before the motor and feeder O/C device trips.

These calculations indicate that during operation at the sustained low voltages, ESFAS load motors are adequately protected against thermal damage and their feeder O/C protection devices properly coordinated. However, the emergency containment cooler, emergency containment filter fans and containment spray pump motors, and the feeder O/C device settings failed to coordinate. The licensee had used proper guidelines when it had previously performed calculations for the selection and setting of feeder O/C devices for these motors. The licensee's discussion with the motor vendors indicate that the thermal damage curves are based on the time and currents which would cause the motor to reach 215° C, and this temperature level may be an indication of accelerated thermal aging rather than a catastrophic failure. Furthermore, the vendor prepared these curves assuming no heat transfer from the motor and no cooling effects of the vane-axial fan of the motor. The licensee informed the staff that the motor protective device would trip the motor before the temperature rises to 215° C, and based on conservatism used by the vendor in their thermal damage calculation, the licensee concluded that these motors would not lose any part of their qualified life during operation at sustained low-voltage condition before the voltage relay actuates a transfer of power. The staff finds this acceptable.

However, the coordination calculation indicated that the breakers of the above three motors were not coordinated. In response to the staff's question regarding coordination calculation for other breakers in the plant, the licensee reviewed all coordination calculations and verified that these three breakers are an isolated case and that this problem does not exist throughout the plant.

4.3 Failure Modes

(1) The existing degraded voltage protection scheme utilizes voltage sensing relays and auxiliary relays to actuate the sequencer trip circuit. The modification includes only voltage-sensing relays, and therefore, eliminates the possibility that a failed auxiliary relay could prevent the degraded voltage trip circuit from functioning. The auxiliary relays added by this modification in another circuit are used only for annunciation, and are normally de-energized. Therefore, this modification adds no new failure modes.

(2) A bypass switch is added by this modification which will enable one of the two voltage-sensing logic channels to be placed in the bypass mode while one or both relays in one channel are removed for test or for calibration. The existing design includes a shorting bar instead of a bypass switch to place the relay in the trip mode. Installing a bypass switch removes the chance of operator errors in using the shorting bar. The switch is key locked with the key removable in all positions.

(3) The modification maintains the "two-out-of-two" relay actuation logic to initiate the trip and transfer action. Therefore, no new failures modes are added in this area. The ability to place the channel in the bypass mode during relay testing and calibration reduces the potential for any single component failure to cause inadvertent actuation of the sequencer trip logic. Therefore, implementing the modification will not increase the probability of spurious sequencer actuation and inadvertent transfer to the onsite emergency power source.

By implementing these modifications, no new failure modes are created that could impact safety. The modification will not increase the probability of occurrence and consequences of previously analyzed failures.

The staff has reviewed the data provided by the licensee, the licensee's calculations and methodologies. The staff also reviewed the licensee's conclusion. Based upon our review, we conclude that the licensee's data, methodologies, and conclusions are correct and that the amendments will not endanger the health and safety of the public.

4.4 Environmental Qualification

Equipment associated with this modification has been qualified for a mild environment since it is located in the Unit 3 480 V LC rooms and the control room, which are designated mild environment areas. The licensee procured all components to safety-related, quality level 1 requirements. The components are qualified for their intended application and have been seismically qualified by the equipment vendor. This modification removes one test switch, two indicator lights and three auxiliary relays from each of the LCs 3A, 3B, 3C, and 3D. The total mass to be removed is insignificant (approximately 0.6%) when compared to the total mass of each LC and thus will not affect the structural adequacy and seismic qualification of these LCs.

4.5 Modification Design Implementation

The staff reviewed the licensee's design package for the modification and verified that the licensee completed the following:

(1) Verified that all supports are seismically qualified.

(2) Considered and corrected all seismic category II over I situations.

(3) Included alarms or other means to detect possible failures.

(4) Analyzed possible single failures and or common mode failures and incorporated protection against failures.

(5) Established procedures to revise all controlled copies of the control room reference documents to show the modified configuration, before the modification is declared operational.

(6) Verified the adequacy of class 1E batteries using the battery sizing calculations.

(7) Revised the heating, ventilation and air conditioning (HVAC) calculations for all areas to contain additional heat loading due to the design modification.

(8) Evaluated the effect of this modification on the fire protection system. In designing and implementing the modification, the licensee has analyzed the existing fire protection requirements and ensured that all equipment and cables added by this modification would be installed inside the same fire area where the connected LCs are located. The licensee previously has analyzed these fire areas

for safe shutdown capability, and the modification does not effect the existing analysis. Therefore, implementing this modification will not adversely affect the station fire protection program and fire fighting strategies.

(9) Trained the station operators for the following aspects of the modification: operation, surveillance, testing, maintenance, EOP, and any operating limitations imposed by the design on existing systems and components. Implementing this modification alters the operation of annunciator window F35 in the control room and requires the operator to take new actions during off-normal or emergency condition. The modification does not alter any equipment on the alternate shutdown panel.

(10) Reviewed all new installations for relays, cables, switches and related wiring to ensure that the new installations do not in any way adversely affect the ability of other nearby safety systems and components.

(11) Included proper isolation for signal and power connections between class 1E and nonclass 1E circuits and between redundant class 1E circuits and components.

(12) Verified that the modification does not affect the radioactive waste treatment or radioactive monitoring systems, and does not create any new sources of radioactive contamination or radiation.

(13) Verified that the emergency diesel generators have sufficient capacity to supply the additional 2 volt ampere (VA) loading resulting from this modification.

(14) Analyzed the short circuit rating of the fuses of relay circuits and found that the fuse rating was adequate.

5.0 <u>SUMMARY</u>

Based on the above evaluation, the staff finds the instrumentation and control design modification of the degraded voltage protection system at the Turkey Point Station Units 3 and 4 acceptable.

6.0 <u>STATE CONSULTATION</u>

Based upon the written notice of the proposed amendments, the Florida State official had no comments.

7.0 <u>ENVIRONMENTAL CONSIDERATION</u>

These amendments change a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the 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 cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration and there has been no public comment on such finding (57 FR 24669). Accordingly, these amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of these amendments.

8.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

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