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50-251 Turkey Point Plant, Unit 4, Florida Power and Light C 05000251
AUTH.NAME AUTHOR AFFILIATION
UHRIG,R.E. Florida Power & Light Co.
RECIP.NAME RECIPIENT AFFILIATION
VARGA,S.A. Operating Reactors Branch 1

SUBJECT: Forwards response to NRC 810409 ltr requesting addl info re adequacy of station electric distribution sys voltages. Calculated voltages were all less than measured voltages.

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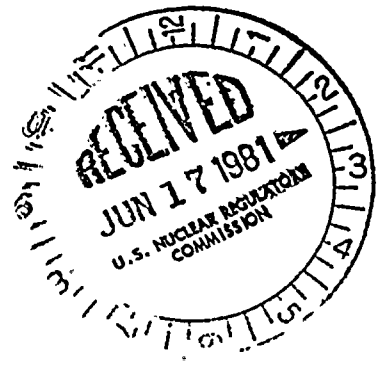
FLORIDA POWER & LIGHT COMPANY

June 10, 1981
L-81-243

Office of Nuclear Reactor Regulation
Attention: Mr. S. A. Varga, Chief
Operating Reactors Branch #1
Division of Operating Reactors
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555




Dear Mr. Varga:

Re: Turkey Point Units 3 & 4
Docket Nos. 50-250 & 50-251
Adequacy of Station Electric
Distribution System Voltages

Florida Power & Light has reviewed the NRC letter dated April 9, 1981 which requested additional information on the adequacy of station electric distribution system voltages at Turkey Point Units 3 and 4. The information requested is included in the attachment to this letter.

Very truly yours,

Robert E. Uhrig
Vice President
Advanced Systems & Technology

REU/PLP/ras

cc: Mr. J. P. O'Reilly, Region II
Harold F. Reis, Esquire

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ATTACHMENT

In response to NRC letter to FPL dated April 9, 1981
Re: Request for Additional Information, Turkey Point Units 3 & 4
Adequacy of Station Electric Distribution System Voltages
(dated February 3, 1981).

Reference: 1) NRC letter to FPL dated August 8, 1979
2) FPL letter to NRC dated November 9, 1979 (L-79-322)
3) FPL letter to NRC dated December 18, 1980 (L-80-411)

This response addresses the NRC Request for Additional Information enclosed in the NRC letter to FPL dated April 9, 1981. Each item of the subject letter is repeated below, followed by our response to that item.

NRC Request Item 1

Attachment C of Reference 1 provides the calculated bus voltages for the various running and starting load combinations. Clarify the following items:

a) Are the voltages submitted the transient voltages due to the starting loads, or steady state voltages after load starting?

b) Is the starting of the safety injection pump and RHR pump as stated in Attachment B, Reference 1 considered to be starting simultaneously with the various starting loads in cases 1 through 18 to establish worst case conditions?

To verify that the Class IE equipment can automatically start and operate within the Class IE equipment's voltage ratings both steady state and transients terminal voltages must be submitted. If the grid is at .979 per unit (235 KV) of nominal voltage, submit the corresponding steady state per unit value at the Class IE buses prior to the conditions analyzed.

Response to Item 1

The calculated bus voltages provided in Attachment C of Reference 3 are the lowest expected transient voltages due to the starting of all applicable safety loads simultaneously. The safety injection pump and the RHR pumps are assumed to start simultaneously in all cases analyzed.

The steady-state voltages on the Class IE buses prior to the conditions analyzed (i.e. starting of all safety loads simultaneously) are obviously greater than the voltages provided in Attachment C of Reference 3. Although the analyses whose results are provided in Attachment C of Reference 3 assumes some loads are automatically shed on a safety injection signal, the simultaneous start of all safety loads is equivalent to a greater load at a much lower power factor. Since the impedances in the distribution system are mostly reactive, the voltage drops across these impedances are greater and result in the worst case bus voltages as provided in Attachment C of Reference 3. Attachment D of Reference 3 provides the highest expected bus voltages because it assumes the highest expected switchyard voltage concurrent with minimum expected load in the plant. Therefore, because the voltages presented in attachments C and D of Reference 3 are considered acceptable, all voltages between these values should be considered acceptable.

NRC Request Item 2

Verify per Guideline 12, Reference 2 that when starting the steam generator feedwater pump (SGFP) after the Class IE buses are fully loaded (Attachment E, Reference 1) that the undervoltage protection relays will not drop out. Submit drawing showing location of proposed undervoltage relays. Also submit the steady state Class IE load terminal voltages after the SGFP starts and is running.

Response to Item 2

The existing undervoltage protection for Turkey Point was described in our November 9, 1979 response (Reference 2). As stated therein, the loss of voltage relays located on the 4160V buses respond at 40%-50% of 4160V, which is well below the worst case bus voltage of 83% of 4160V experienced on the start of a SGFP.

As stated in our previous responses (Reference 2 and 3) a design modification is in progress to add undervoltage protection to the 4160V buses and 480V load centers. Although this design has not been finalized, Attachment A provides the proposed location of these new undervoltage relays. The relays on the 4160V will be GE Type 1AV and will have setpoints chosen to protect equipment on the 4160V buses. The relays on the 480V load center will be ITE Type 27H and will have setpoints chosen to protect equipment on the Load Center and Motor Control Centers.

The steady state bus voltages after the SGFP is running, concurrent with safety loads running, are provided in attachment B. The two cases presented are the same ones presented in Attachment E of Reference 3.

NRC Request Item 3

From the electrical one-line diagram and description in the plant's FSAR, the preferred offsite source for each unit is the unit's startup transformer with the other unit's startup transformer as the alternate offsite source (GDC 17). Per GDC 5 and as required by Guideline 2, Reference 2 an analysis must be submitted for the worst case condition (i.e. loss of one startup transformer, concurrent with the minimum expected grid voltage, accident in one unit and the simultaneous shutdown of the other unit.

Response to Item 3

The voltage analyses presented in Reference 3 were performed in accordance with Guideline 2 and 3 (Reference 1) for the worst case conditions assuming all automatic actions of the electric power system occur as designed. Should a safety injection signal or unit trip occur coincident with the unavailability of the unit's start-up transformer, the automatic transfer from the unit auxiliary transformer to the start-up transformer would result in loss of voltage to the 4 KV busses. This condition would automatically initiate start of the emergency diesel diesel generators clearing of the buses and sequence loading of the safety equipment onto the energized buses. Any action other than described above must be accomplished manually with due consideration given to bus voltages and capacities.

As shown in Figure 8.2-3 (Electrical Single Line Diagram) of the FSAR, only the 3A and 4A buses have ties to the other units start-up transformer. The breakers on these ties are interlocked to prevent closing unless all other breakers on the bus are open. Therefore, by necessity, loads would be energized individually, with perhaps some shedding of load as required in the other unit. Furthermore, as stated in the FSAR, links in the iso-phase bus can be removed, thus isolating the main generator, and the 4KV buses energized via the main and auxiliary transformer.

Again, it should be emphasized that any manual action necessary due to extraordinary multiple failures in the power system would not result in simultaneous starting of all safety equipment and would be done with proper precautions.

NRC Request Item 4

Did the voltage analysis verification difference of less than 3% (Ref. 1) indicate the calculated voltages to be higher and/or lower than the measured values?

Response to Item 4

The calculated voltage were all less than the measured voltages.