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ACCESSION NBR:8206010273 DOC.DATE: 82/05/24 NOTARIZED: NO DOCKET #
FACIL:50-335 St. Lucie Plant, Unit 1, Florida Power & Light Co. 05000335
AUTH.NAME AUTHOR AFFILIATION
UHRIG,R.E. Florida Power & Light Co.
RECIP.NAME RECIPIENT AFFILIATION
CLARK,R.A. Operating Reactors Branch 3

SUBJECT: Forwards response to 820419 request for addl info re operating time curves for undervoltage relays for 4,160-volt & 480-volt sys & Class IE equipment protection.

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FLORIDA POWER & LIGHT COMPANY

May 24, 1982
L-82-217

Office of Nuclear Reactor Regulation
Attention: Mr. Robert A. Clark, Chief
Operating Reactors Branch #3
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Clark:

Re: St. Lucie Unit 1
Docket No. 50-335
Degraded Grid Protection

Florida Power & Light has reviewed your letter dated April 19, 1982 which requested additional information on degraded grid protection for St. Lucie Unit 1. You asked us to submit operating time curves for the undervoltage relays for the 4160 volt and 480 volt systems, and to demonstrate that all Class 1E equipment will be protected for all voltage and time conditions on the curves. In order to respond to this question, we must compare the motor safe heating curves for all of the Class 1E equipment against the operating time curves for the relays. FPL does not have all of the information necessary to make a comparison at this time. We had contracted with our Architect - Engineer to provide the motor safe heating curves prior to receiving your letter, but we do not anticipate receiving this information until late September, 1982 at the earliest. This long period is due to the considerable effort involved in contacting individual vendors and sub-vendors to obtain the required curves. Then, following receipt of the curves, we will need sufficient time to perform the necessary design evaluations and to prepare our response to your questions.

Your second and third questions, which concern the relay setpoints, tolerances, and draft Technical Specifications, are closely tied to the first question, and cannot be answered until the operating time curve comparison is complete. We anticipate that it will take approximately two months after receiving the information to fully respond to these three questions. We have therefore, established November 30, 1982 as the earliest date for our submittal on these items. We regret that this date is beyond the goal you have established for completing this issue.

We have prepared responses to Questions 4, 5, 6, and 8 of your letter, and these responses are included in the attachment to this letter.

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Re: St. Lucie Unit 1
Docket No. 50-335
Degraded Grid Protection

Question 7 requested a verification that an overvoltage analysis presented in previous correspondence does represent the worst case overvoltage condition. We are still working on the response to this question. We are obtaining voltage and current readings for various motor control centers and switchgear at the plant. When we have completed gathering this information, we will conduct new voltage analyses. The results of these analyses are expected to be completed by July 30, 1982, at which time we will forward the results to you.

Very truly yours,

J A De Mastry
for

Robert E. Uhrig
Vice President
Advanced Systems & Technology

REU/JEM/mbd

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

ATTACHMENT

Re: St. Lucie Unit 1
Docket No. 50-335
Ultimate Heat Sink
Technical Specifications

References:

1) FP&L letter (R.E. Uhrig) to NRC (W. Gammill), dated November 9, 1979.

2) FP&L letter (R.E. Uhrig) to NRC (R. Clark), dated March 18, 1982.

3) NRC letter to FP&L, dated April 19, 1982.

4) NRC letter to FP&L, dated November 30, 1981.

5) NRC letter to FP&L, dated July 21, 1980.

Question 4:

Refs. 1 and 4 state that the undervoltage relays are bypassed .2 seconds after the diesel generator breaker closes and automatically reinstates upon opening of the diesel generator breaker. Does this bypassing/reinstatement include the relays at both the 4 kV and 480-volt levels? Position 3, Item C of Ref. 5 requires a test be included in the Technical Specifications to demonstrate that upon interruption of the diesel generators, the operability of the auto-reinstatement of the bypassed relays, load shedding and the subsequent reloading through the sequencer occurs as designated. Submit a Technical Specification change to meet this requirement.

Response to Question 4

Refs. 1 and 2 stated that the undervoltage relays are bypassed 0.2 seconds after the diesel generator breaker closes and automatically reinstates upon opening of the diesel generator breaker. This bypassing/reinstatment includes both the 4KV and 480-volt levels.

As stated in Ref. 2, a testing circuit has been engineered into the 4.16 KV and 480 volt undervoltage logic to provide the capability of functionally testing the undervoltage relays. Upon initiation of this relay test, a safeguard signal (480 V bus only) and a loss of voltage is simulated in the 4.16 KV and 480 volt busses. This action causes an indicating light to demonstrate that both the undervoltage relays, concurrent with a safeguard signal, will provide a signal to load shed, start the generator, and sequence the load. Simultaneously, a diesel generator breaker closing has been

simulated and an indicating light is utilized to demonstrate that the relays have been bypassed upon diesel generator breaker closing. Upon completion of this test, all simulated signals are removed and a normal condition exists, at which time the auto-reinstatement of the bypassed relays is demonstrated by assuring that the diesel generators do not start automatically. This test demonstrates that the relays are bypassed, the operability of the auto-reinstatement of the bypassed relays is achieved and the load shedding and the subsequent loading will occur as designed, if required. We will address the Technical Specification portion of this Question in conjunction with our response to Questions 1-3.

Question 5

The additional relays to be added to the 480-volt load center busses stated in Ref. 4 indicate that only one relay will be installed at each bus. If this is so, a spurious actuation or single failure of the relay will cause spurious load shedding, diesel generator starting and load sequencing. This does not meet the NRC position of requiring coincident logic. Provide a revised design to meet this requirement.

Response to Question 5:

As stated in Ref. 1, an undervoltage relay was added to each of the 480 volt busses during the last refueling outage (October 1981). A contact of the relay is series-connected with a safeguard signal. Therefore, a spurious actuation or single failure of the relay, as stated in Ref. 3, will not cause spurious load shedding, diesel generator starting, or load sequencing. This sequence of events will only be initiated when a sustained degraded voltage condition is concurrent with a safeguard signal actuation.

Question 6

Demonstrate that the 1 second time delay associated with the relay setpoint of 429 volts is adequate to preclude spurious trips during load starting of the 460-volt motors under worst case conditions submitted in Ref. 6, "Adequacy of Station Electric Distribution Systems Voltages". Analysis results showed voltage transients to 82% voltage at the motor terminals.

Response to Question 6:

As stated in Ref. 2, the 1-second time delay was chosen to preclude false actuation which may occur due to relay chattering. In addition, the setpoint of 429 volts was chosen to support the NRC request to assure that the MCC voltage will be above the manufacturer's guaranteed pick-up voltage (Reference 5). The setpoint adequately protects the equipment from being required to start below manufacturer's rating in case of a safeguard actuation concurrent

with an unlikely sustained degraded grid voltge condition. Should this condition exist, the load shedding will be initiated, the diesel generators will start, and load sequencing will follow.

Question 8:

Verify that all the design modifications will meet the requirements of IEEE 279-1971.

Response to Question 8:

All the design modifications comply with the requirements of IEEE 279-1971. To avoid spurious loss of all offsite power, protect equipment and to provide the required redundance, each safety related 4.16 K and 480 volt busses have individual undervoltage relays and logic circuits for diesel starting:

There is one undervoltage relay on each 4.16 KV safety-related bus. Furthermore, in order to preclude tripping of any safety-related bus from its offsite source due to spurious actuation or single failure of a CV-2 undervoltage relay in the 4.16 KV busses, a design modification in progress will add an additional undervoltage relay to each 4160 volt busses (Ref. 2), although not required by IEEE-279-1971. These relays will parallel the existing undervoltage relays with their normally closed contacts series connected as required per Ref. (4). Furthermore, as stated in tne response to Question 5, a spurious or single failure of an undervoltage relay in the 480 volt safety-related busses will not cause diesel generator starting.

In addition, there is no intertie between A and B undervoltage bus stripping/diesel generator starting logic in either the 4.16 KV or the 480 volt busses. Should relaying malfunction occur, it would affect the respective bus only. The other bus will remain connected to its source.

In view of the above and the fact that the relays are on separate busses, their cabling and associated logic are separated and they activate separate diesels, the redundancy, single failure and separation requirements of IEEE-279-1971 are met (Ref. 1).