REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

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FACIL:50-261 H. B. Robinson Plant, Unit 2, Carolina Power and Ligh 05000261
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UTLEY,E.E. Carolina Power & Light Co.
RECIP.NAME RECIPIENT AFFILIATION
VARGA,S.A. Operating Reactors Branch 1

SUBJECT: Forwards addl info re adequacy of station electric distribution sys voltages,in response to 800602 ltr. Describes undervoltage relay trip setting for Class IE 480 volt buses,spare startup transformer & offsite sources.

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July 23, 1980

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Office of Nuclear Reactor Regulation
Attention: Mr. Steven A. Varga, Chief
Operating Reactors Branch No. 1
United States Nuclear Regulatory Commission
Washington, D. C. 20555

H. B. ROBINSON STEAM ELECTRIC PLANT UNIT NO. 2
DOCKET NO. 50-261
LICENSE NO. DPR-23
ADDITIONAL INFORMATION CONCERNING ADEQUACY OF
STATION ELECTRIC DISTRIBUTION SYSTEM VOLTAGES

Dear Mr. Varga:

In your letter of June 2, 1980, you requested additional information to continue your review of the adequacy of station electric distribution system voltage at H. B. Robinson Unit No. 2. Responses to the items presented in Enclosure 1 of that letter are provided in the enclosed attachment.

We trust this information satisfies your concerns and is suitable for your use. If you have any questions on this subject, please contact our staff.

Yours very truly,

E. E. Utley
Executive Vice President
Power Supply and
Engineering & Construction

JHE/RLM/jc (1676)
Enclosure

cc: Mr. J. D. Neighbors (NRC)

A015
S. 1/1

411 Fayetteville Street • P. O. Box 1551 • Raleigh, N. C. 27602

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REQUEST FOR ADDITIONAL INFORMATION
H. B. ROBINSON #2
ADEQUACY OF STATION ELECTRIC DISTRIBUTION SYSTEM VOLTAGES

Ref. 1: NRC letter (William Gammill) to CP&L (E. E. Utley), dated August 8, 1979

Ref. 2: CP&L letter (E. E. Utley) to NRC (A. Schwencer), dated October 5, 1979

Ref. 3: CP&L letter (E. E. Utley) to NRC (A. Schwencer), dated October 3, 1979

1. The undervoltage relay trip setting for the Class 1E 480 volt buses is 328 volts as stated in Ref. 2, Section 2.0, paragraph 2. This trip setting contradicts the setting of 394 volts $\pm$ 1 volt proposed in the changes in the Technical Specifications (Ref. 3, page 3.5-7A, Table 3.5-1). State the undervoltage relay trip setting with tolerances used to satisfy the analysis of the adequacy of station electric distribution system voltages (Ref. 1, enclosure 2, guideline 8 and 12), and undervoltage protection of the Class 1E equipment.

Response

The undervoltage relay trip setpoint for the Emergency 480 volt buses as well as the normal 480 volt buses is 328 volts as stated in Reference 2. The trip setting of 394 volts included in the proposed Technical Specifications addition is incorrect. 328 $\pm$ 1 volts is the setpoint used during the life of the plant. This undervoltage setpoint (328 $\pm$ 1 volts) with a delay of 0.75 $\pm$ 0.25 seconds satisfies the requirements of Reference 1 and is in agreement with the description of undervoltage monitors designed to function on a complete loss of offsite power in the Safety Evaluation and Statement of Staff Positions Relative to the Emergency Power Systems for Operating Reactors which was an enclosure of the June 3, 1977 letter from Mr. R. W. Reid of the NRC to Mr. J. A. Jones of Carolina Power & Light Company.

2. Ref. 2, page 2, paragraph 2, refers to an installed spare startup transformer #2 that can be jumpered into service should the startup transformer fail. Also mentioned is the use of the unit auxiliary transformer as an alternative source of off-site power when the spare transformer is out of service. Provide the times required to jumper the spare startup transformer into service and to enable backfeeding through the unit auxiliary transformer. The time should be in conformity with the core uncovering time from the accident analysis and the discharge time of Class 1E battery.

Response

The spare Startup Transformer for Unit 2 is not an installed spare. It is a spare unit stored on site and has no wiring connections other than a cabinet heater to prevent accumulation of condensate in the control panel. A minimum of twenty-four (24) hours is the estimated time required to temporarily connect the spare transformer for service. The type of failure of the normal startup transformer (i.e., fire, loss of duct bank, etc.) could cause this time to be greater. A minimum time of four (4) hours is estimated to disconnect the generator straps to enable backfeeding through the unit auxiliary transformer.

The reference to the core uncovering time and the discharge time of the batteries in this item is not considered relevant because no source of off-site power is assumed necessary during these events. Either of the two emergency diesel generators which are considered in the accident analyses, is adequate for a safe shutdown.

3. The submitted analysis data in Ref. 2 assumed the plant was still online at 100% power and all loads required to support power operations were being supplied from startup transformer #2. The intent of the analysis in Ref. 1 is to determine that the onsite distribution system and offsite power system is of sufficient capacity and capability to automatically start and operate all safety loads within their required voltage ratings immediately following a

unit trip or LOCA (whichever has the largest load demand). Submit a separate analysis of all offsite sources to meet the above requirements. Note: If the specifications of the spare startup transformer are identical to the main startup transformer no analysis is required through it.

Response

The spare startup transformer, the normal startup transformer, and the unit auxiliary transformer have the same capacity rating. Therefore, no analysis is required.

4. In the analysis to satisfy undervoltage protection and to preclude spurious trips as outlined in the June 3, 1977 letter, the following motor specifications were used: nameplate rating of 460 volts, ± 10% continuous voltage of 414 volts and 506 volts, respectively, and minimum running voltage of 322 volts. The analysis as presented in Ref. 2 refers to 480 volt motors, ± continuous voltages of 414 volts and 514 volts, respectively, and minimum running voltage of 312 volts. Explain this contradiction of motor values and the effect these values have in the analysis presented in Ref. 2.

Response

The voltage ratings associated with a nominal 460 volts as presented in this item are confusing because they could not be located in the referenced June 3, 1977 letter. However, to clarify this concern, it should be noted that the voltage values of 460 and 480 as listed by reference 2 are used synonymously in the electrical industry. Depending on the preference of the author, a range of 440 to 480 volts is used synonymously when discussing power supplies. The voltages as listed in reference 2 are the values recommended by the Architect Engineering firm which conducted the degraded grid analysis for the Robinson Plant. This firm was also the A/E firm during construction of the unit and therefore is very familiar with the Robinson Plant electrical system.

The difference between the high level voltages of 506 and 514 is not significant to this undervoltage study. However, 514 is the voltage presented in the A/E analysis. We have not been able to determine the origin of the 322 volts referenced in the NRC item. It does not appear in any of the referenced information. The minimum running voltage from the A/E analysis is 312 volts which has been previously presented. The present undervoltage protection setpoint is calibrated to 328 $\pm$ 1 volts as stated in the response to item 1 above and is greater than either referenced setpoint.

5. Ref. 1, page 2, paragraph 3, requests that a review of the plant's electric power system be made to determine if there are any events or conditions which could cause the loss of both required circuits from the offsite network to the onsite distribution systems. Submit a response which meets this request.

Response

The two offsite sources (Startup Transformer and Unit Auxiliary Transformer) are totally independent of and electrically isolated from each other from their source to the 4KV buses. Therefore, no event or condition should cause the loss of both circuits. However, the delays described in the response to item 2 could be present.

6. Ref. 1, page 2, paragraph 3 states that the analysis of the adequacy of the onsite distribution system and offsite power system to operate all required safety loads within their voltage ratings be verified by test. Submit a description of the test method and compare the test results with the analysis results.

Response

As described in reference 2, page 2, paragraph 1, an actual event is more meaningful than a preplanned test. The successful completion of an instantaneous unplanned Safety Injection initiation from 100% power, including the starting of all ESF loads and the shift of

offsite source from the Unit Auxiliary to the Startup Transformer was demonstrated by the referenced event and a test under such conditions would not demonstrate this capability more accurately.

7. Supply the calculated voltages for all low voltage AC (less than 480 V) Class 1E buses for each analyzed case. Do these systems supply any instruments and control circuits as required by GDC 13? If so, is all equipment capable of sustaining the analyzed voltages (blowing fuses, overheating, etc.)? Is the connected equipment qualified by the manufacturers to withstand the expected voltages without affecting their ability to perform the required function?

Response

All voltages below 480 volts which would be affected are fed from 480 volt sources through transformers and would be affected by the same percentage as the source. Therefore, they would be able to perform their functions the same as the 480 volt systems and would be protected by the undervoltage systems of the 480 volt buses. These lower voltage buses do supply instruments and control circuits and are listed below:

MCC 9 - 120/208 volts - transformer from MCC 6
MCC 10 - 120/208 volts - transformer from MCC 5
Instrument Bus 1 & 6 - 120 volts - transformer from MCC 5
Instrument Bus 4 & 9 - 120 volts - transformer from MCC 6
MCC 5 is fed from E1 and MCC 6 from E2 buses

The remaining low voltage instrument buses are fed from Inverters and would not be affected. The instrument buses which supply safety-related instruments and controls from AC sources (MCC 5 and MCC 6) are powered through a constant voltage type transformer which maintains output constant with a variable input of 380 to 520 volts. Therefore, the output voltage will not be affected since the degraded voltage of concern is within these limits.

MCC 9 and MCC 10 would be affected by the same proportional degradation as the 480 volt sources E1 and E2. There are safety-related motor operated valves (MOV) on these buses. Normal engineering tolerances should assure that the small amount of degradation (14%) and the short time interval (10 seconds) will not result in an operability problem. However, the manufacturer of these MOVs will be contacted to verify this and if any discrepancies are found, a revision to this response will be filed.