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June 30, 1980

Mr. T. A. Ippolito, Chief
Operating Reactors - Branch 2
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Subject: Dresden Station Units 1, 2, and 3
Quad Cities Station Units 1 and 2
Adequacy of Station Electric
Distribution System Voltages
NRC Docket Nos. 50-10/237/249 and
50-254/265

References (a): T. A. Ippolito letter to D. L. Peoples dated May 15, 1980

(b): R. F. Janecek letter to W. Gammill dated June 11, 1980

Dear Mr. Ippolito:

Reference (a) requested additional information concerning the adequacy of station electric distribution system voltages.

Our responses to the NRC Staff questions contained in the enclosure to the above referenced letter are as follows:

1. Question

The CECo. summary attachment[a] (last paragraph) concludes that the computer program results need not be compared to test results for Dresden 1. While the Zion program and input parameters were verified by test, it is not known that the input parameters for Dresden 1 (or other units) can be verified by test. CECo. should verify the program, input variables, and constants used for the Dresden and Quad Cities analyses per the requirements of reference b, page 2, paragraph 3.

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Response

Verification of the voltage analysis program used to determine the voltages for Dresden Units 1, 2, and 3 and Quad Cities Units 1 and 2 was submitted in Reference (b). Information entered into this program for each station such as transformer taps, transformer impedances, etc. were verified in the field to be

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the correct values.

2. Question

Were the grid voltage values, 34.8 to 36.3 kV (item II, page 1)[c], 132 to 142 kV (item II, page 1)[e], 333 to 354 kV (item II, page 1)[f], and 343 to 354 kV (item II, page 1)[g] determined per NRC guideline 6? If not, describe how they were obtained.

Response

The minimum expected grid voltages were determined per NRC guideline 6. For Dresden 1, the minimum expected voltage of 34.8 is based on minimum experienced voltage plus contingency plans for 34.5 kV system line outages. The minimum expected grid voltages for Dresden 2 and 3 and Quad Cities 1 and 2 were determined by load flow studies. For Dresden Unit 2, the minimum voltage of 132 kV is expected if two large local units on the 138 kV system are out of service at the time of system peak load.

For Dresden Unit 3, minimum grid voltage is expected if Dresden Units 2 and 3 are out of service at the time of peak load. At Quad Cities, minimum grid voltage will occur if both Quad Cities generators are out during peak load.

3. Question

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

Engineering is currently in progress to replace the existing 120 V AC essential service motor-generator sets with inverters equipped with voltage regulators. The new inverters with their voltage regulators will provide a power supply which is well within the voltage ratings of the instrumentation and control circuits being supplied.

4. Question

Figure 3c,e,f,g shows the lowest bus voltage when starting the largest non-class 1E load for respective plants. Did this motor

start when all the other loads were running? Give the effect of starting this load on all class 1E buses and loads per NRC guideline 3b. What are the bus and load voltages when starting the largest 480 V class 1E load when all other class 1E loads are running?

Response

The lowest bus voltage when starting the largest non-class 1E load was calculated when all other loads were running. The motor would start under these conditions.

Attachments 1 and 2 are applicable for Dresden Unit 1 when the auxiliary loads are supplied from reserve auxiliary transformers 12 and 13, respectively.

Attachments 3 and 4 show the bus and load voltages for Dresden Units 2 and 3, respectively.

Attachment 5 shows the bus and load voltages for Quad Cities Units 1 and 2.

The above Attachments also indicate the bus and load voltages when the largest load on the 480 V class 1E is started with all other class 1E loads running.

5. Question

Define how the acronyms SAT and RAT are used. It appears, from references e, f, and g, that they might be used interchangeably. The summary refers to SAT, while the detail review and figures refer to RAT on all units except Dresden 1.

Response

The acronym SAT (System Auxiliary Transformer) and RAT (Reserve Auxiliary Transformer) may be used interchangeably. The transformers connected directly to the transmission system and supply power for the station auxiliaries had formerly been called Reserve Auxiliary Transformers. These transformers now are used to supply power during normal operation, so they are now referred to as System Auxiliary Transformers.

6. Question

Is it possible that the units's UAT can supply the class 1B load group while the main generator is disconnected? If nothing prohibits such a connection to the offsite grid, this analysis should be performed per NRC guideline b.

Response

The unit auxiliary transformer (UAT) is directly connected to the generator bus. In the event of a unit trip, the UAT is not available to supply power to the station. Only if the generator bus connection is unbolted and physically removed is it possible to disconnect the generator and energize the unit auxiliary transformer from the grid system to supply unit auxiliary power.

7. Question

Each SAT is capable of supplying its own unit's auxiliary load and the emergency load of the other unit (see the summary [e,f,g]). NRC guideline 2 requires the voltage study for the largest load demand including when one unit is in LOCA and the other unit is in safe shutdown. The intertie between buses 24-1 and 34-1 (Dresden)[e], 14-1 and 24-1 (Quad Cities)[f], and a similar arrangement for Zion (bus numbers are unreadable in report)[g] demand this voltage analysis.

Response

NRC guideline 2 required that an analysis be performed for (1) an accident in the unit being analyzed and simultaneous shutdown of all other units at the station or (2) an anticipated transient in the unit being analyzed (e.g., unit trip) and simultaneous shutdown of all other units at that station, whichever presents the largest load demand situation. This guideline was followed in making the voltage analysis.

Our understanding of Question #7 is that, additional voltage calculations are now required for minimum and maximum expected grid voltages for Limiting Conditions of Operations when one SAT is out of service. An analysis will be performed for the SAT of one unit out of service and one of its safety-related buses being supplied from the other unit SAT while also furnishing normal shutdown power (e.g. unit trip). We expect to complete this analysis by July 10, 1980.

Please address any questions concerning this matter to this office.

One (1) signed original and fifty-nine (59) copies of this transmittal are provided for your use.

Very truly yours,

Robert F. Janecek

Robert F. Janecek
Nuclear Licensing Administrator
Boiling Water Reactors

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