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Memorandum

TO : C. G. Long, Chief
Reactor Projects Branch #3, DRL

DATE: MAY 2 5 1967

FROM : THRU: V. A. Moore, Chief, Instrumentation and Power Technology Branch, DRL
D. F. Sullivan
Instrumentation and Power Technology Branch, DRL

SUBJECT: DOCKET NO. 50-269/270: OCONEE (DUKE) NUCLEAR STATION, ON-SITE EMERGENCY POWER, UNITS #1 AND #2

I&PTB:DRL:DFS RT-20

POOR ORIGINAL

On May 8, 1967, R. L. Ferguson, H. Denton, and I met with representatives of the Duke Power Company and Babcock and Wilcox to discuss the safety aspects of off-site and on-site emergency power at the proposed Oconee station, Units 1 and 2. This memo deals only with the on-site power.

Up-to-date full size drawings of "Electrical Power Systems - Single Line Diagram" (Fig. 8-1, PSAR), and "125/250 VDC System and 120 VAC Vital Power System" (Fig. 8-3, PSAR) were made available to us. In addition, we also received a draft copy of revised answers to several staff questions pertaining to the emergency electrical systems.

Units #1 and #2 will share four 125 VDC batteries and six battery chargers. One pair of batteries will feed one three-wire bus (250/125/0), and the other pair will feed a second three-wire bus. In general, control and instrumentation loads will be supplied at 125 volts dc, with the heavier loads such as motors supplied at 250 volts dc. The dc system is ungrounded.

Six separate 125 volt dc control power panelboards will be provided. Each panelboard will be supplied by redundant feeders from different 125/250 volt dc bus sections through diodes to isolate any faults which might occur on one of the feeders. Mr. C. Wylie, of Duke Power, assured us that a method will be devised for testing the diodes during reactor operation.

A detailed failure analysis of the three-wire dc system has been presented in Supplement 2 of the PSAR, and is presently being reviewed.

All of the ac power sources will supply power through transformers to the redundant 4160 volt main feeder busses and tie circuit breakers which supply power to the redundant 4160 volt switchgear bus sections that serve the engineered safeguard auxiliaries and reactor protection systems. The engineered safeguard auxiliaries and reactor protection systems will be arranged so that a failure of any single bus section will not prevent the respective systems from fulfilling their protection functions. The emergency power sources will be automatically switched onto the 4160 volt main feeder buses of a unit in the preferential sequence as follows:

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a) the startup transformer bus

b) the other unit's auxiliary electrical system

c) the 100 Kv transmission line

d) the Keowee Hydro station

The control schemes will be designed to prevent the paralleling of two sources during the above switching operations.

We expressed concern over the possibility of failure of this switching system. There were no circuit diagrams available to us, and no fault analysis of the system has been submitted. We were assured that the system will be designed to meet the single failure criterion.

Shedding of nonessential loads will be accomplished via circuit breakers with duplicate trip coils energized from different dc buses. Presumably, those feeder breakers whose closing is essential to plant safety under accident conditions are arranged to meet the single failure criterion, whether the failure is electrical or mechanical. This is being evaluated by us at present.

Four redundant 120 volt ac vital instrument power buses will be provided to supply power to essential instrumentation and control loads under all operating conditions. Each bus will be supplied separately from a static inverter connected to one of the six 125 dc control power panelboards.

In addition, sources of 120 volts ac (regulated) and 120 y 208 volt ac (unregulated) will be available.

Mr. Wylie agreed to provide in-service testing capability to determine if a battery (or batteries) has become disconnected.

cc: S. Levine, Asst. Dir., DRL
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