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TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401

830 Power Building

DEC 17 1978

Director of Nuclear Reactor Regulation
Attention: Mr. Thomas A. Ippolito, Chief
Branch No. 3
Division of Operating Reactors
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Ippolito:

In a letter of December 28, 1977, to E. G. Case from J. E. Gilleland, TVA presented a description of modifications planned for the low pressure coolant injection (LPCI) valve power supplies in order to provide isolation from the swing-bus feature at Browns Ferry Nuclear Plant. By the above letter, TVA requested the NRC staff's concurrence with the planned design of the modification. However, in July of 1978, TVA discovered that the modifications could not be performed as originally planned because the vendor who was to supply the motor-generator sets (M-G sets), as an alternate power supply, had misinterpreted the TVA specifications and was prepared to provide M-G sets which would not provide the required transient voltage. Therefore, TVA immediately requested that your staff discontinue their review of the matter until a satisfactory solution could be obtained.

On August 17, 1978, TVA met with members of your staff to discuss the technical problems encountered and to propose a modification to the valve power supplies which would not utilize M-G sets. However, during the meeting, the NRC staff identified certain M-G set criteria that could be modified or eliminated without jeopardizing the LPCI system performance. Therefore, TVA's design organization has conducted a reevaluation of the design criteria and concluded that revisions could be made to the modification design in order to satisfactorily provide any transient voltage.

Enclosed are details of the modified M-G set characteristics with postulated M-G set operational modes. The enclosed details should sufficiently address the questions raised by members of your staff in the August meeting. The December 1977 submittal made to Mr. Case can be considered as applicable in its entirety to the planned modification. Therefore, TVA does not plan to issue any revisions to the above submittal.

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Mr. Thomas A. Ippolito

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The planned schedule for installation of these M-G sets has been delayed. Our original commitment was to modify power supplies to specified LPCI valves by the end of the second refueling outage of each of the Browns Ferry units. However, since a reevaluation of the M-G set criteria was necessary, the vendor had to reevaluate if the M-G sets could be fabricated to meet the revised criteria. Therefore, the vendor has agreed to material delivery dates which will facilitate installation of the M-G sets by the end of the second refueling outage of unit 3 and the third refueling outages of units 1 and 2.

Very truly yours,

J. E. Gilleland
Assistant Manager of Power

Enclosure

ENCLOSURE

MOTOR-GENERATOR SET MODIFICATIONS
FOR USE IN ELIMINATING
RELIANCE UPON SWING-BUS FOR
LPCI POWER SUPPLIES AT
BROWNS FERRY NUCLEAR PLANT

TVA representatives met with the NRC on August 17, 1978, to discuss design changes to TVA's original proposal (December 28, 1977, J. E. Gilleland to E. G. Case) for the LPCI modifications. During that meeting certain motor-generator set criteria were identified which could be modified or eliminated without jeopardizing the LPCI system performance. Those acceptable modifications were as follows:

1. Excitation power could be supplied from the drive-motor power source rather than from the alternator output.
2. A flywheel could be utilized to help supply power to the generator so that generator output does not drop below 75 percent volts per Hertz upon load application.
3. Provided that the speed of the drive motor does not drop below 90 percent during the dead bus time (time from loss of offsite power until the motor-generator sets are loaded onto the emergency diesel generators), the acceleration criteria given in the original specifications could be deleted.
4. The motor-generator set could be loaded in two steps if necessary.

Subsequent to that meeting the new parameters were passed onto the vendor with the request that they provide us with a technical proposal in compliance with all requirements.

As a result of the vendor's new proposal, the motor-generator sets will now have the following characteristics:

Drive Motor

1. 460V, 3 phase, 60 HZ
2. Maximum locked rotor current - 700A
3. 1800 rpm
4. No-load current - 29A at .11 power factor
5. Totally-enclosed fan cooled
6. Acceleration time - approximately 60 seconds

Generator

1. 480V, 3 phase, 60 HZ, 0.8 pf
2. 75 kW for 5 minutes, 50 kW continuous
3. Totally-enclosed fan cooled
4. 1800 rpm
5. Brushless Excitation

Exciter-Regulator

1. Excitation power will be taken from the drive motor power supply.
2. No field flashing unit is required since this function is automatically performed when the drive motor source is applied.

Flywheel Assembly

1. 4100 lb, forged steel flywheel
2. Two oil lubricated pillow blocks
3. Two mounting pedestals
4. Two shaft couplings

Unit Operation

The motor-generator set will run continuously in the unloaded condition. In the event of loss of offsite power the speed of the set will not drop below 90 percent of rated speed during the dead bus time. After restoration of power to the drive motor, the generator will be capable of starting all four valve motors as required. At the time of load application the generator output will drop to 75 percent volts per hertz. The three smallest valve motors will accelerate within one second allowing the voltage to recover to 90 percent of its rated value. At this time the 36 hp motor which has been drawing locked-rotor current will begin to accelerate and will be up to full speed within one second.

The loading chart of the LPCI valve motors (design values only) is given below for your information.

<u>HP</u>	<u>Full Load Current Amperes</u>	<u>Locked Rotor Current Amperes</u>	<u>Locked Rotor Power Factor</u>
2	4	24	.65
14	23	158	.65
0.33	1	6	.65
36	46.9	390	.65