Tennessee Valley Authority, Post Office Box 2000, Decatur, Alabama 35609

APR 30 1992

O. J. "Ike" Zeringue
Vice President, Browns Ferry Operations

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Gentlemen:

In the Matter of	)	Docket Nos. 50-259
Tennessee Valley Authority	)	50-260
		50-296

BROWNS FERRY NUCLEAR PLANT (BFN) - UNITS 1, 2, AND 3 - GENERIC LETTER (GL) 91-11, RESOLUTION OF GENERIC ISSUES (GIs) 48, "LCOs FOR CLASS 1E VITAL INSTRUMENT BUSES," AND 49, "INTERLOCKS AND LCOs FOR CLASS 1E TIE BREAKERS"

References: 1. TVA to NRC letter dated January 29, 1992, same subject.

This letter provides NRC with BFN's response, pursuant to 10 CFR 50.54(f), to Generic Letter 91-11, "Resolution of Generic Issues 48, 'LCOs For Class 1E Vital Instrument Buses,' and 49, 'Interlocks And LCOs For Class 1E Tie Breakers," dated July 18, 1991. GL 91-11 directed licensees to evaluate the applicability of GIs 48 and 49 to their plant and to implement procedural controls (or to provide justification that such controls are not necessary) to fulfill the following requirements:

1. Limit the time that a plant is in possible violation of the single-failure criterion with regard to the Class 1E vital instrument buses and tie-breakers,

2. Require surveillances of these components, and

3. Ensure that, except for the times covered in Item (1), the plant is operating in an electrical configuration consistent with the regulations and its design bases.

BFN has completed its evaluation and has concluded that the administrative controls in place satisfy the recommendations of the GL. The bases for this conclusion are provided in the Enclosure.

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U.S. Nuclear Regulatory Commission
April 30, 1992

If you have any questi·s, please contact Raul R. Baron at (205) 729-7566.

Sincerely,

J. R. Rupert
Engineering and Modifications Manager

In the absence of O. J. Zeringue
Vice President, Browns Ferry Operations

Enclosure
cc (Enclosure):
NRC Resident Inspector
Browns Ferry Nuclear Plant
Route 12, Box 637
Athens, Alabama 35611

Mr. Thierry M. Ross, Project Manager
U.S. Nuclear Regulatory Commission
One White Flint, North
11555 Rockville Pike
Rockville, Maryland 20852

Mr. B. W. Wilson, Project Chief
U.S. Nuclear Regulatory Commission
Region II
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30323

Subscribed and sworn to before me
on this 30th day of April 1992.

Barbara A. Blanton
Notary Public

My Commission Expires 10-30-94

ENCLOSURE

The following is the proposed resolution of Generic Issues (GIs) 48 and 49 for BFN Units 1, 2, and 3 utilizing the guidance provided in Enclosure 1 of Generic Letter (GL) 91-11.

The GL recommended that each licensee "ensure that your plant has procedures that include time limitations and surveillance requirements for

1. Vital instrument buses (typically 120VAC buses),

2. Inverters or other onsite power sources to the vital instrument buses, and

3. Tie breakers that can connect redundant Class 1E buses (AC or DC) at one unit or that can connect Class 1E buses between units at the same site."

Response To GI-48, "LCOs for Class 1E Vital Instrument Buses"

Two BFN electrical systems satisfy the definition of a "vital instrument bus" (VIB) provided in GL 91-11. These are 1) the 208/120VAC Instrument and Control Power System, and 2) the 120VAC Reactor Protection (RPS) System Power Supply. A brief description of each system along with TVA's response to the GI for each system is provided below.

1. 208\120VAC Instrument and Control (I & C) Power System

   One pair of I & C buses is provided for each unit. Each bus in the pair is energized by an independent Class 1E 480V shutdown board source via a 480-208\120VAC transformer in series with a 208\120-208\120VAC regulating transformer, and is ultimately backed by the shutdown board's associated diesel generator (DG). To increase the reliability of the system, the alternate supplies are from the same division of another unit. The following table summarizes the normal and alternate power supply arrangements for each bus:

BUS	NORMAL	ALTERNATE	DIVISION
I&C Bus A (U1)	480V Shutdown Bd 1A	480V Shutdown Bd 2A	I
I&C Bus B (U1)	480V Shutdown Bd 1B	480V Shutdown Bd 3B	II
I&C Bus A (U2)	480V Shutdown Bd 2A	480V Shutdown Bd 3A	I
I&C Bus B (U2)	480V Shutdown Bd 2B	480V Shutdown Bd 1B	II
I&C Bus A (U3)	480V Shutdown Bd 3A	480V Shutdown Bd 1A	I
I&C Bus B (U3)	480V Shutdown Bd 3B	480V Shutdown Bd 2B	II

   An auto-transfer switch is provided on each unit to transfer to the alternate supply after a three second time delay when the normal supply voltage decreases to 70% of nominal bus voltage. Auto transfer back to the normal supply will occur when the normal supply voltage increases to 90% of its nominal value. The I&C bus transfer scheme is shown pictorially on Figure 1.

The I&C transformer capabilities are adequate to supply normal loads plus the additional I&C bus load from another unit. Transfer to the alternate supply (same division from another unit) maintains the divisional integrity of the I&C buses and does not expose the I & C buses to the potential for a violation of the single failure criterion. Therefore, no time limitations or additional controls are necessary to ensure the reliability and availability of the 208\120VAC I & C Power System.

2. Description of the 120VAC RPS Power Supply

Two redundant and electrically separated RPS channels, A and B, including power supplies, are provided on each unit. Each RPS power supply consists of a motor-generator (MG) set and two series circuit protectors. Each unit's RPS Channel A MG set is powered from that unit's 480V RMOV board A. Each unit's Channel B MG set is powered from the corresponding 480V RMOV board B. The MG sets have no alternate power supplies. For Unit 2, the Unit Preferred Regulating transformer provides the capability for a common alternate power supply to both RPS channels' distribution buses from the Standby Auxiliary Power System. The Unit Preferred Transformer is a 480-240\120VAC stepdown transformer fed from the Unit 2 480V RMOV Board 2B. For Units 1 and 3 the RPS alternate supply capability for each bus is provided by each unit's RPS regulating transformer. The RPS Regulating Transformers are supplied from the Standby Auxiliary Power System via 480V Shutdown Board 1B for Unit 1 and 480V RMOV Board 3B for Unit 3. A switch is provided on each unit battery board to align a RPS channel to its alternate supply. The RPS bus transfer scheme is shown on Figure 2. Interlocks are provided to prevent the alternate supply from supplying both channels simultaneously, and to prevent closing both the normal supply breaker and the alternate supply breaker to any one channel simultaneously. The design of the RPS is such that on a loss of normal or alternate power, components go to their fail-safe condition and a reactor scram occurs. The RPS bus must be manually re-energized following a loss of power. Therefore, no single-failure exposure exists for the RPS power supply.

As described above, the concerns presented in the GL are not applicable to the 208/120V AC I&C Power System and the RPS Power Supply due to inherent design features. Therefore, we have concluded that GI-48 is resolved for the BFN VIBs.

FIGURE 1
BFN I & C BUS TRANSFER SCHEME

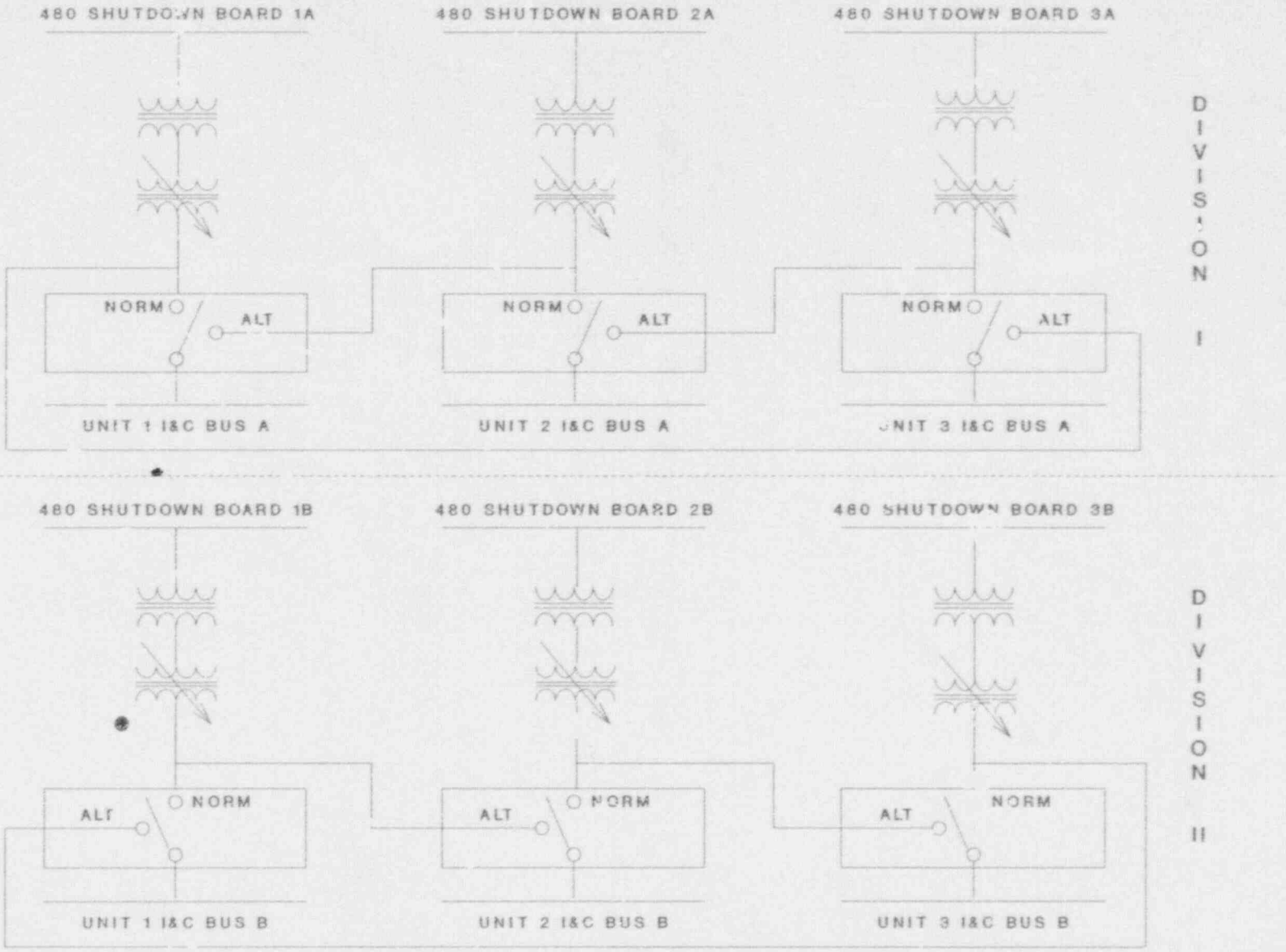
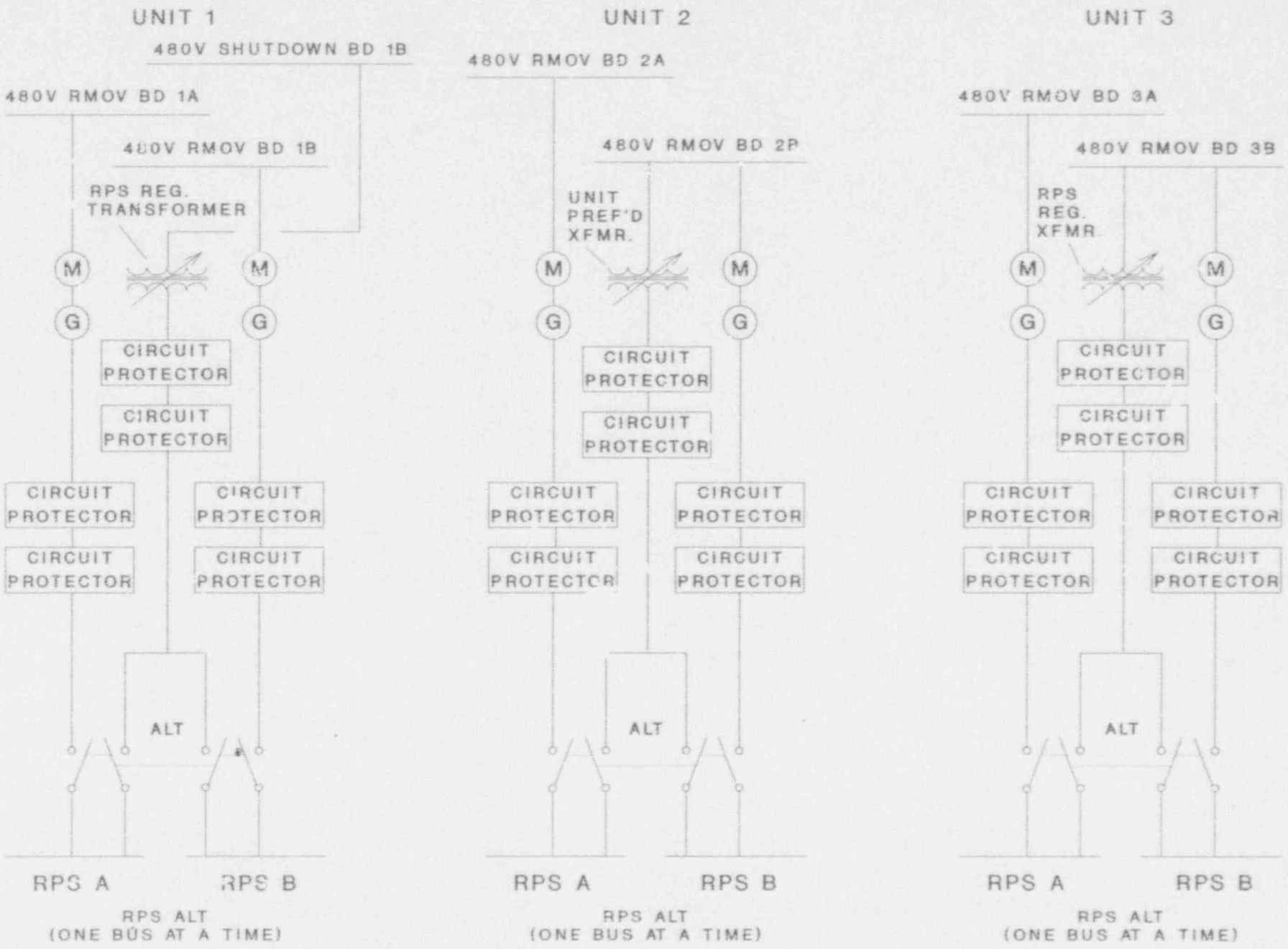


FIGURE 2
RPS BUS TRANSFER SCHEME



Response to GI-49, "Interlocks and LCOs for Class 1E Tie Breakers"

1. Standby Auxiliary Power System

The Class 1E standby AC electrical supply and distribution system for Units 1 and 2 consists of four DGs, four 4KV Shutdown Boards (Boards A, B, C, and D), four 480V Shutdown Boards, ten 480V Reactor Motor-operated Valve (RMOV) Boards [i.e. Unit 1(2) 480V RMOV boards 1(2)A, 1(2)B, 1(2)C, 1(2)D, and 1(2)E], eight MG sets, two DG 480V Auxiliary Boards, and one 480V Control Bay Ventilation Board. The Class 1E standby AC supply and distribution system for Unit 3 is separate from that of Units 1 and 2. It consists of four DGs, four 4KV Shutdown Boards (Boards 3EA, 3EB, 3EC, and 3ED), two 480V Shutdown Boards, five 480V RMOV Boards (3A, 3B, 3C, 3D, and 3E), four MG sets, two DG 480V Auxiliary Boards, one 480V Standby Gas Treatment System Board, and one 480V Control Bay Ventilation Board.

Each 480V RMOV board has a normal and an alternate power supply. The alternate power supply is the other divisional 480V Shutdown Board in each unit. Electrical interlocks are provided to prevent the paralleling of the normal and alternate supplies. Each unit's 480V RMOV Boards A, B, and C must be manually transferred to their alternate source. 480V RMOV Boards D and E are automatically transferred to their respective alternate source on a loss of voltage. 480V RMOV Boards D and E supply those valves necessary for Low Pressure Coolant Injection. These boards are connected to both the normal and alternate sources via MG sets to prevent fault propagation following an automatic transfer. Prior to the transfer of 480V RMOV boards 1A, 1B, 1C, 2A, 2B, 3A, 3B, and 3C to the alternate feeders, the following criteria must be adhered to:

A. While a unit is operating at power, transfer of the associated 480V RMOV Board to the alternate feeder is only permissible when there is a failure of normal supply. Return to the normal supply shall be within twelve hours or the reactor shall be in cold shutdown within the next twenty four hours. Indefinite operation on the alternate feeder is permitted only during the shutdown condition.

B. The loading limitations shown on the 480V Shutdown and 480V RMOV Board single line drawings shall not be exceeded.

C. Preventive maintenance on the normal feeder breakers for the 480V RMOV Boards or their feeders is permitted only during the shutdown condition.

D. When a 480V Shutdown Board is being fed from its emergency transformer the alternate feeder breaker to a RMOV Board fed from the Shutdown Board cannot be closed.

These restrictions are also applicable to the Unit 3 DG 480V Auxiliary Boards when Unit 3 is in operation.

When a 480V Shutdown Board or Unit 1 or 2 DG 480V Auxiliary Board is placed on its alternate source, the board may be considered operable as long as the technical specification limiting condition for operation associated with the normal source 4KV Shutdown Board is adhered to.

These restrictions have been incorporated into Operating Instruction 0-OI-57B, 480V/240V AC Electrical System. The alignment of the 480V RMOV and Shutdown Boards for system operability is performed in accordance with 0-OI-57B and is independently verified. Board alignment is then monitored by the BFN System Status Control Program.

2. 4KV Shutdown Board Tie-breakers

Each of the 4KV Shutdown Boards on Units 1 and 2 (Boards A, B, C, and D) may be connected to its respective (same division) Unit 3 4KV Shutdown Board (Boards 3EA, 3EB, 3EC, and 3ED, respectively) via cross-tie breakers. This design feature enables a Unit 1 or a Unit 2 Diesel Generator (DG) to be operated in parallel with its respective Unit 3 DG. For example, DG A can be paralleled only with DG 3A.These interconnections are through manually controlled circuit breakers which are electrically interlocked to prevent the tie-breaker from being closed when the normal supply breaker is closed. Additional interlocks are provided to ensure that the DGs are properly synchronized prior to interconnection. The alignment of the 4KV Shutdown Boards is monitored in accordance with the System Status Control Program.

Parallel operation of two DGs is administratively limited to a condition where an accident signal is present in any unit and offsite power is not available and 10 minutes have elapsed since the accident began. Parallel DG operation is controlled by Abnormal Operating Instruction 0-AOI-57-1A, Loss of Offsite Power.

3. Maintenance Tie-Breakers for the 480V RMOV Boards D and E

As described above, the normal/alternate power supplies to each unit's 480V RMOV Boards D (Division I) and E (Division II) are MG sets. A third power source, a maintenance feeder, from 480V RMOV board C (non-Divisional) is also available for supplying 480V RMOV boards D and E. Use of this feeder allows maintenance to be performed on the MG sets.

The use of the maintenance feeders from each unit's 480V RMOV board C to 480V RMOV boards D and E is administratively controlled by BFN Operating Instruction 0-OI-57B, 480V/240VAC Electrical System, and may be used only during periods of reactor shutdown. During reactor operation, the maintenance feeder breakers are controlled by the System Status Control Program.

4. 250V DC Power System Tie-Breakers

The 250V DC Power System is consists of two subsystems:

A. The 250V plant DC system, which consists of four 120-cell lead-acid batteries (one Class 1E unit battery and battery charger per unit, one non-Class 1E station battery and battery charger, and one Class 1E spare charger). 250V plant DC system power is distributed to its safety-related loads via three 250V DC battery boards and nine (three per unit) divisionalized DC RMOV boards. An alternate power supply for each DC RMOV Board is provided by another unit's 250V DC battery.

B. The 250V DC Control power system (250V DC control power supplies A, B, C, D, and 3EB for 4KV Shutdown Boards A, B, C, D, and 3EB, and 480V Shutdown Boards 1A, 2A, 1B and 2B, respectively), which consists of five lead-acid batteries (one battery and battery charger for each shutdown board, and one spare battery charger). Alternate power sources are provided by the 250V plant DC system. Electrical interlocks prevent paralleling the normal and alternate power supplies.

The use of alternate supplies for the 4KV Shutdown Boards, 480V Shutdown Boards, and the DC RMOV Boards are administratively controlled by 0-OI-57D, DC Electrical System Operating Instruction and BFN Technical Specifications, Section 3.9, Auxiliary Electrical Systems. During the use of alternate control power sources for the 4KV Shutdown Boards and the 480V Shutdown Boards, continued reactor operation is permissible during the succeeding five days. During the use of the

alternate feeders to the DC RMOV Boards continued power operation is permissible during the succeeding seven days. The alignment of the 250V DC Power System is controlled by 0-OI-57D, DC Electrical System Operating Instruction and is monitored by the System Status Control Program.

BFN has evaluated the use of Class 1E tie-breakers against the NRC staff's recommendations contained in the GL and has determined that the existing controls are sufficient to resolve the GI-49 concern.