JOSEPH M. FARLEY NUCLEAR PLANT-UNIT 2
ALABAMA POWER COMPANY
REPORT OF 10CFR50.55(e) DEFICIENCY

A design condition has been detected which can render Diesel Generator 1C and 1-2A inoperable when both Farley units are in operation and loss-of-offsite power (LOSP) on both units or LOSP on both units and LOCA on one unit occur.

Presently, as shown in Figure 1, Diesel Generator 1C has its auxiliaries powered from emergency Motor Control Center (MCC) 1N. MCC 1N gets its power supply from emergency 600V Load Center 1R. The 600V Load Center 1R is a shared load center capable of being energized from either unit. When it is energized from Unit 1 it is supplied from the 4KV Bus 1H through Station Service Transformer 1R. When it is energized from Unit 2 it is supplied from the Unit 2 4 KV Bus 2H through Station Service Transformer 2R. The two 600V incoming breakers of 600V Load Center 1R are key interlocked so that only one can be closed at any time. The alignment of Load Center 1R to Unit 1 or Unit 2 can be performed manually only, from the local control panel located in the diesel building.

As shown in Figure 1, Diesel Generator 1-2A has its auxiliaries powered from emergency MCC 1S. MCC 1S is a shared MCC capable of being energized from either unit. When it is energized from Unit 1 it is supplied from the Unit 1 600V Load Center 1D, which in turn is powered from Unit 1 4KV Bus 1F through Station Service Transformer 1D. When it is energized from Unit 2 it is supplied from the Unit 2 600V Load Center 2D, which in turn is powered from Unit 2 4 KV Bus 2F through Station Service Transformer 2D. The alignment of MCC 1S to Unit 1 or Unit 2 can be performed manually only from the MCC 1S located in the diesel building.

Under LOSP on both units or LOSP on both units and LOCA on Unit 1, Diesel 1C is a source of power for Unit 2 Train A hot shutdown loads, while Diesel 1-2A is a source of power for Unit 1 LOCA loads. If, at the accident occurrence, 600V Load Center 1R is aligned to Unit 1, it will be deenergized since 4 KV Bus 1H is deenergized, and Diesel Generator 1C loses its auxiliaries. At this time, MCC 1N

has to be connected to Station Service Transformer 2R by the manual operation of the key interlocked incoming breakers of 600V Load Center 1R. Diesel generator manufacturer has specified that diesel generator can run without its auxiliaries for one minute if the engine is at operating temperature, or for three minutes from cold start. If the manual changeover of power source to MCC 1R cannot be accomplished in the specified time, Diesel Generator 1C could be automatically tripped because of low lube oil pressure, or damaged because of loss of cooling water. The high cooling water temperature is alarmed, but does not trip the diesel generator automatically under accident conditions.

If Diesel Generator 1C is disabled, no source of power for Unit 2 Train A safeguard loads will be available, and a single failure on Unit 2 Train B can render Unit 2 incapable of being shutdown. (4 KV Bus 1H is deenergized under the postulated conditions since the tie breaker between 4 KV Bus 1F and 4 KV Bus 1H is open.)

If, under the above conditions MCC 1S is aligned to Unit 2, it will be deenergized and Diesel Generator 1-2A loses its auxiliaries. If Diesel Generator 1-2A is disabled, no source of power for Unit 1 Train A LOCA loads will be available. In this case, if we apply the single failure criterion to Unit 1 Train B instead of Unit 2 Train B, Unit 2 will meet the hot shutdown requirements, while Unit 1 cannot meet the LOCA requirements.

Under LOSP on both units and LOCA on Unit 2, Diesel Generator 1C is the source of power for Unit 1 Train A hot shutdown loads, while Diesel Generator 1-2A is the source of power for Unit 2 LOCA loads. If, at the accident occurrence 600V Load Center 1R is aligned to Unit 2, it will be deenergized since 4 KV Bus 2H is deenergized, and Diesel Generator 1C loses its auxiliaries. Diesel Generator 1C will be disabled, no source of power for Unit 1 Train A safeguard loads will be available, and a single failure on Unit 1 Train B can render Unit 1 incapable of being shutdown. (4 KV Bus 2H is deenergized under the postulated conditions since the tie breaker between 4KV Bus 2F and 4 KV Bus 2H is open.)

If, under the above conditions MCC 1S is aligned to Unit 1, it will be deenergized, Diesel Generator 1-2A disabled, and no source of power for Unit 2 Train A LOCA loads will be available. In this case, if we apply the single failure criterion to Unit 2 Train B instead of Unit 1 Train B, Unit 1 will meet the hot shutdown requirements, while Unit 2 cannot meet the LOCA requirements.

Thus, under the criteria of 10CFR50.55(e) the referenced problem constitutes a significant deficiency. Note that the referenced problem is only a safety problem when Unit 1 and Unit 2 are operated simultaneously.

A second problem identified concerning the diesel generator relates to the following. The Farley Nuclear Plant is intended to be designed to accommodate the Loss of Pond Dam along with Loss-of-Offsite Power and a single failure. Under this event, the river water systems will be automatically diverted to the wet pit which supplies suction to service water pumps.

For this event, for Unit 1 operation alone, a minimum of 2 river water pumps will be required. Therefore, to accommodate single failure, 4 river water pumps are powered from the diesel generator system.

For Unit 1 and Unit 2 operation, a minimum of 4 river water pumps are required and to accommodate single failure, 8 river water pumps are to be sequenced onto the diesel generator system.

With Unit 1 in operation alone two (2) emergency power sources (diesel generator 1C-Train A and diesel generator 2C-Train B) are dedicated to the River Water System. Four river water pumps with automatic starting capability are available so that in the event of single failure at least 2 river water pumps will start, meeting the minimum requirements for safe shutdown of the unit. Therefore, there is no deficiency for Unit 1 operation.

However, after two units go into operation, only one emergency power source (diesel generator 2C-Train B) is dedicated to the River Water System, hence only

4 river water pumps with automatic capability would be available. The failure of diesel generator 2C could leave the entire plant with no river water pumps available. This deviates from our commitment in the FSAR and does not meet the minimum River Water System availability requirements for safe shutdown of both Units. Redesign to provide a minimum of four river water pumps on Loss of Offsite Power is underway.

To correct the first problem the following corrective action will be taken (refer to Figure 2):

(1) The key interlock feature of breakers ER02 and ER05 on Load Center 1R will be removed and replaced by an electrical interlock, so that only one of the two breakers could be closed at any time.

The electrical circuitry of these breakers will be changed to accomplish the following: (a) automatically connect Load Center 1R to Bus 1H (ER02 closed and ER05 open) when Diesel Generator 1C is aligned to Unit 1 (DH07 on Bus 1H closed); (b) automatically connect Load Center 1R to Bus 2H (ER05 closed and ER02 open) when Diesel Generator 1C is aligned to Unit 2 (DH07 on Bus 2H closed).

(2) Manual transfer switch on MCC 1S will be removed and the incoming feeders from Load Centers 1D and 2D will be solidly connected to the MCC.

Breakers ED13 on Load Center 1D and ED13 on Load Center 2D will be electrically interlocked, so that only one of the two breakers could be closed at any time. The electrical circuitry of these breakers will be changed to accomplish the following: (a) automatically connect MCC 1S to Load Center 1D (ED13 on Load Center 1D closed and ED13 on Load Center 2D open) when Diesel Generator 1-2A is aligned to Unit 1 (DF08 on Bus 1F closed); (b) automatically connect MCC 1S to Load Center 2D (ED13 on Load Center 2D closed and ED13 on Load Center 1D open) when Diesel Generator 1-2A is aligned to Unit 2 (DF08 on Bus 2F closed).

In order to correct the second problem, the following changes to the logic, schematic, and wiring concerning the diesel generator are proposed (see Figures 1, 2 and 3):

(1) After the sequencer has added the LOSP loads to Bus 1F, the 4 KV Bus 1F will furnish power to the 4 KV Bus 1H. Three Unit 1 Train A river water pumps (Numbers 8, 9, and 10) will be started on Bus 1H in sequence.

(2) The LOSP sequencer on Bus 2F will be modified to eliminate containment cooler 2B from being added automatically. As in the past, containment cooler 2A will be automatically applied to Bus 2F. After LOSP sequencer has added LOSP loads to Bus 2F, the river water pumps sequencer on Bus 2H will be unblocked to enable one river water pump (Number 6) to automatically be applied to Bus 2H.

(3) Should diesel generator 2C fail, diesel generator 1B will furnish power to Bus 1J and diesel generator 2B will furnish power to Bus 2J after the sequencers on Buses 1G and 2G have had LOSP loads added. Two river water pumps (Numbers 4 and 5) will start on Bus 1J and two river water pumps (Numbers 1 and 2) will start on Bus 2J.

(4) The existing feature of the diesel generator 2C working like a backup for diesel generator 1B or 2B if either fails to furnish power to the hot shutdown load will be removed. This feature is not required to meet single failure criteria.

In the design event discussed, the river water system will be automatically diverted to the pond wet pit which supplies suction to the service water pumps. Additional stop logs will be added to the pond wet pit to ensure that adequate wet pit level is maintained.

The above changes will ensure that the plant has adequate river water supply with both units operating. Both problems will be corrected prior to the issuance of the Unit 2 Operating License.

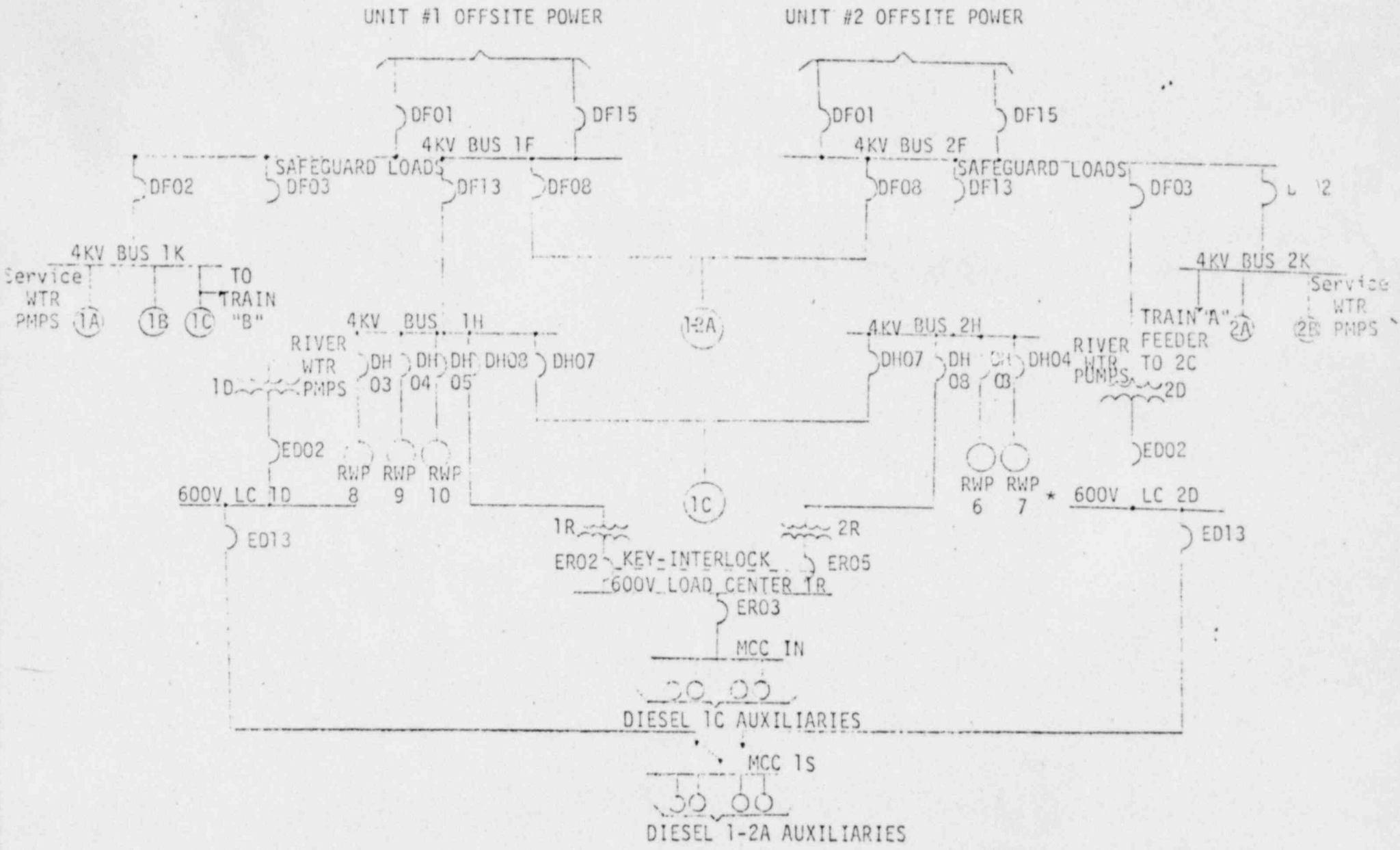
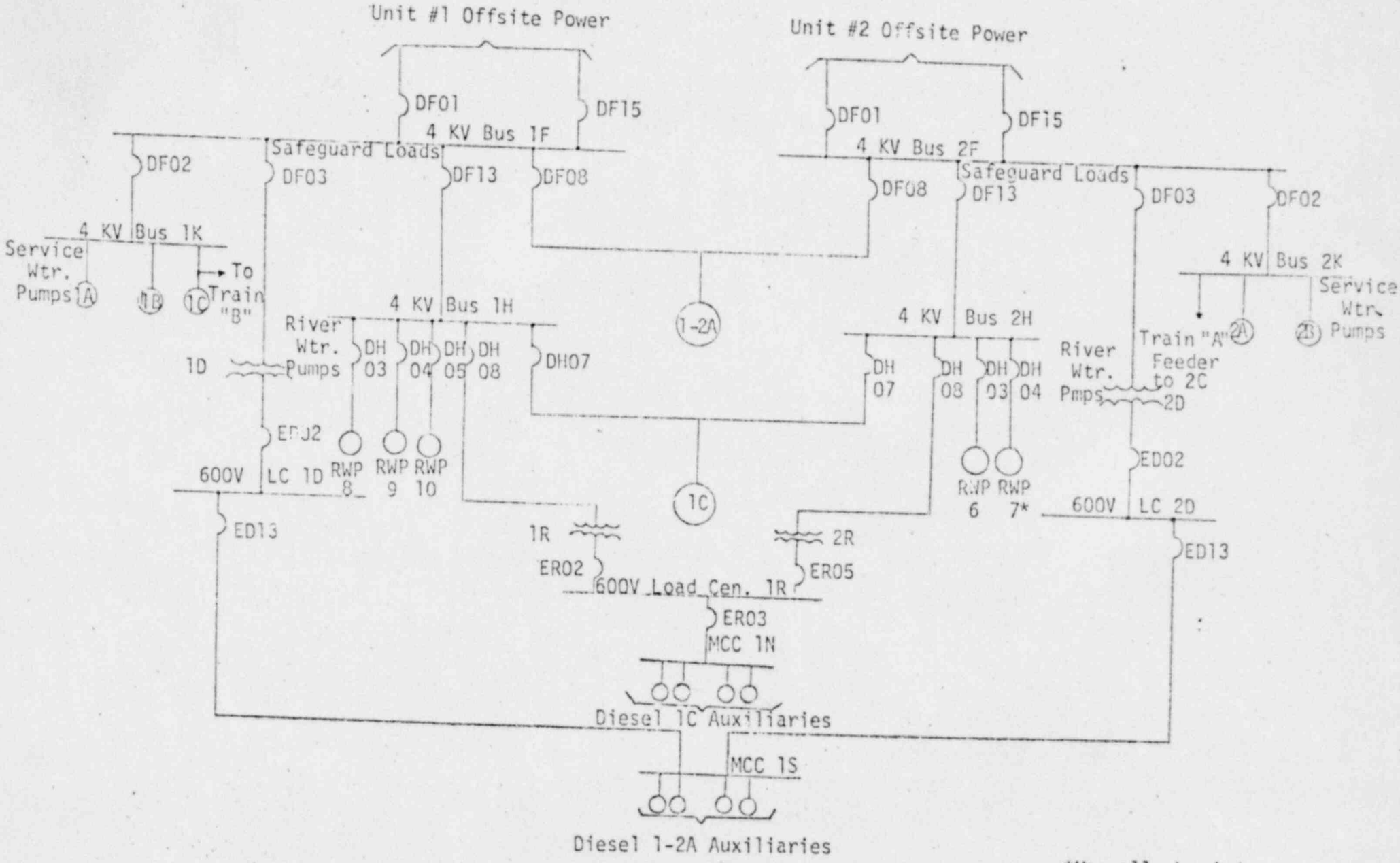


FIGURE 1 PRESENT CONFIGURATION-TRAIN A

* Manually Loaded



*Manually Loaded

FIGURE 2 CORRECTIVE ACTION-TRAIN A

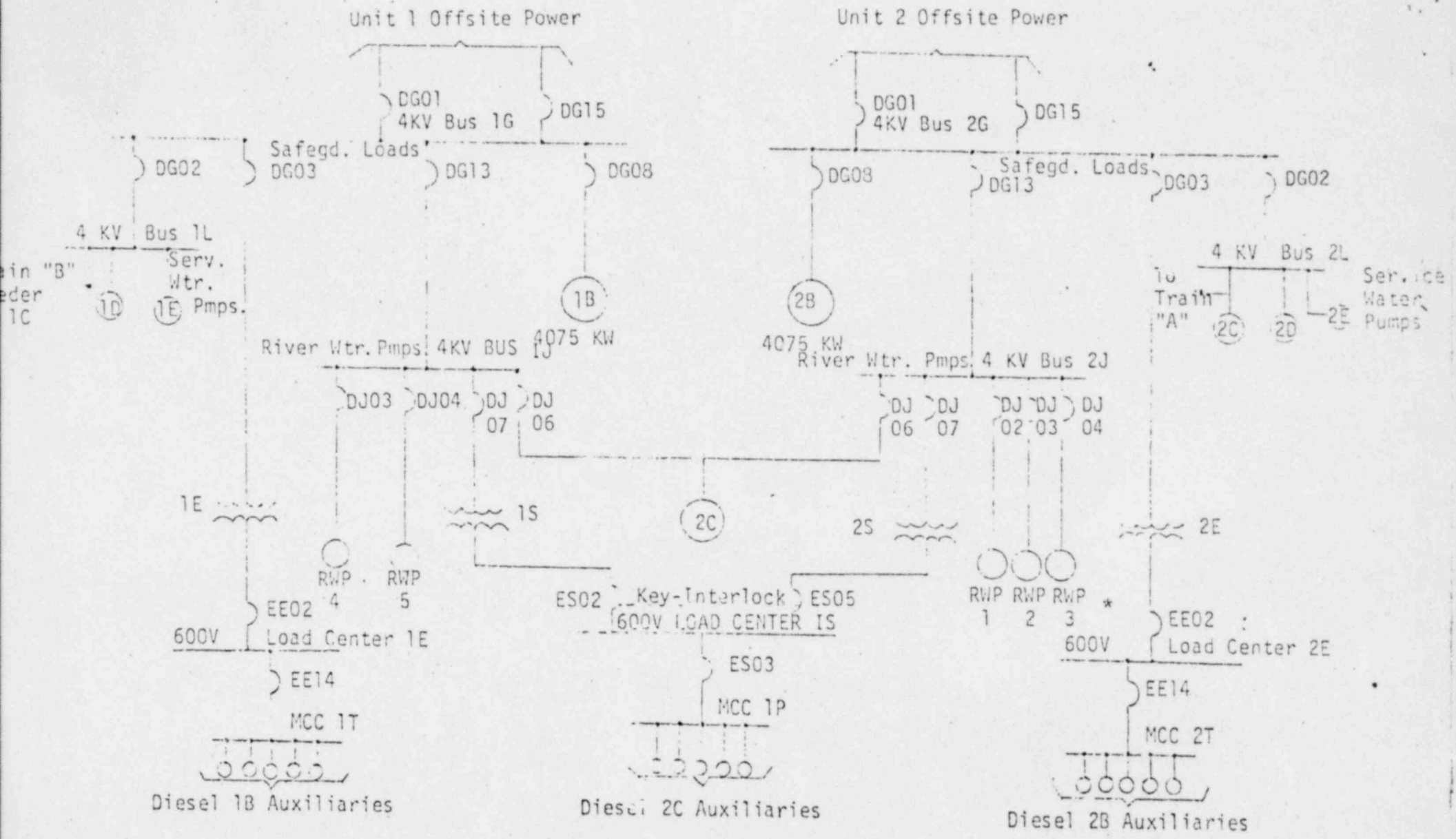


FIGURE 3 PRESENT CONFIGURATION -TRAIN B

(The corrective action necessitates no change to this figure.) * Manually Loaded