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REPLY TO:
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July 31, 1981
FVY 81-109

United States Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Mr. Darrell G. Eisenhut, Director
Division of Licensing

References: (a) License No. DPR-28 (Docket No. 50-271).
(b) USNRC Letter to VYNPC dated February 20, 1981 (Generic Letter 81-12).
(c) VYNPC Letter to USNRC dated February 13, 1981, FVY 81-27, Request for Exemption.

Dear Sir:

Subject: Additional Information on Alternative Safe Shutdown System Proposal

Attachments I, II and III have been prepared to provide the information needed to allow the staff to complete their review of Vermont Yankee's proposed alternate shutdown system. As you are well aware, the schedule for design and installation of this equipment allowed by Section 10CFR50.48, is extremely tight. We, therefore, wish to point out the need for a timely review and approval by the staff to enable Vermont Yankee to begin the engineering work necessary to support the equipment procurement schedule required by 10CFR50.48.

To aid the staff in effecting this timely review, we suggest that as soon as an NRC group is chosen to review this submittal, we meet with them to discuss salient points of the submittal, as well as to answer any questions which might arise. This should expedite review and approval.

We trust this information and approach will be satisfactory. If you have any questions or comments, please contact us.

Very truly yours,

VERMONT YANKEE NUCLEAR POWER CORPORATION

L. D. Marsolais

L. D. Marsolais
Project Manager

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ATTACHMENT I

Response to Generic Letter 81-12, dated February 20, 1981.

SECTION 8: Information Required for Staff Review

(a) NRC Request

Description of the systems or portions thereof used to provide the shutdown capability and modifications required to achieve the alternate shutdown capability if required.

Response

There are three plant areas identified by Vermont Yankee and by the NRC staff as those areas where one train of systems necessary to achieve and maintain hot shutdown conditions from either the control room or emergency control stations is not free from damage due to a fire in its redundant counterpart; and where systems necessary to achieve and maintain cold shutdown from either the control room or emergency control stations may not be capable of repair within 72 hours. These areas are:

1. the switchgear room,

2. the cable spreading room, and

3. the control room.

In these three areas, the NRC has determined that the potential for the loss of normal hot and cold shutdown methods due to a single fire is high enough to require Vermont Yankee to develop an alternate safe shutdown method which does not require the use of equipment in the rooms and cabling running through the rooms. In response to the staff determinations, we have investigated the three areas and have developed alternate safe shutdown methods in case of a fire in those areas.

With a major fire, which destroys any of these three areas, the systems that would be used in this unlikely event to provide shutdown capabilities are:

1. the RCIC system, which maintains vessel inventory and controls cooldown,

2. the RHR system in the torus and shutdown cooling modes,

3. the Service Water System to remove heat from the torus,

4. a diesel generator to provide power for the systems in Items 2 and 3,

5. the CRD system.

The modifications necessary to achieve this shutdown capability are listed below:

Switchgear Room Fire

1. A one-hour fire wall will be installed in the switchgear room to separate 4160 V Bus 3 and 480 V Bus 8 from 4160 V Bus 4 and 480 V Bus 9.

2. The present switchgear room CO_2 fire protection system will be converted into two systems to cover the separate areas.

3. A local RCIC control panel will be provided in the RCIC room with the necessary controls and instrumentation to allow prompt operation of the system with the available operating crew. A separate dc supply independent of the fire areas will be provided for the RCIC system. The RCIC panel and any circuit which could be affected by the fire will be isolated from the cable spreading room, control room and switchgear room.

4. A one-hour fire barrier will be installed around the feed cables to MCC 9B as they pass through the fire area containing 4160 V Buses 1 and 3.

5. Affected control cables for the reactor feed pumps will be protected with a one-hour fire barrier.

Cable Spreading Room Fire

1. Installation of a local RCIC control panel and dc power supply as described above.

2. Modifications to the RCIC governor to allow control from the local RCIC control panel and to isolate the governor from the control room, cable spreading room and switchgear room.

3. A dc power supply independent of the fire area to provide field flashing and control for the designated diesel generator and 4160 V and 480 V buses.

4. Installation of a panel with suitable isolation devices for all electrical cables which have the potential for causing undesirable "hot short" equipment response.

5. Installation of a one-hour barrier around affected control cables for the reactor feed pumps and a one-hour barrier around the power cables to MCC 9B.

Control Room Fire

Same as for cable spreading room fire.

(b) NRC Request

System design by drawings which show normal and alternate shutdown control and power circuits, location of components, and that wiring which is in the area and the wiring which is out of the area that required the alternate system.

Response

Drawings showing location of components and power circuits for the alternate shutdown system are included as Attachment III. As described in (d) below, transfer switches and isolation devices will be used for circuits of all equipment necessary to operate the alternate shutdown system which could be affected by fire. Therefore, it is not necessary to submit the balance of the information requested in this section.

(c) NRC Request

Demonstrate that changes to safety systems will not degrade safety systems (e.g., new isolation switches and control switches should meet design criteria and standards in FSAR for electrical equipment in the system that the switch is to be installed; cabinets that the switches are to be mounted in should also meet the same criteria (FSAR) as other safety related cabinets and panels; to avoid inadvertent isolation from the control room, the isolation switches should be keylocked, or alarmed in the control room if in the "local" or "isolated" position; periodic checks should be made to verify switch is in the proper position for normal operation; and a single transfer switch or other new device should not be a source for a single failure to cause loss of redundant safety systems).

Response

All of the new electrical components that interface with existing Safety Class components will be designed and specified to equal or better criteria than those existing components.

The features planned to avoid inadvertent isolation of the control room from the operation of this equipment will include either controlling and restricting access, keylocking transfer switches, or periodic checks of transfer switch areas, or alarming in the control room where feasible.

(d) NRC Request

Demonstrate that wiring, including power sources for the control circuit and equipment operation for the alternate shutdown method, is independent of equipment wiring in the area to be avoided.

Response

The design philosophy used will be to use transfer and isolation switches and controls which disconnect all equipment and wiring for operation of the alternate shutdown method in the affected fire area, so their damage by fire will not affect the operation of necessary equipment. The power source for the RCIC system is steam from the reactor itself. The control power source for the new RCIC control panel and associated equipment will be from a battery far removed from the fire area. The power source for the RHR, RHR service water and service water systems will be the emergency diesel generators. The switchgear powered by the diesels will be in separate rooms, divided by a one-hour fire barrier and protected by fire detection and suppression systems.

(e) NRC Request

Demonstrate that alternate shutdown power sources, including all breakers, have isolation devices on control circuits that are routed through the area to be avoided, even if the breaker is to be operated manually.

Response

See response to (d) above.

(f) NRC Request

Demonstrate that licensee procedure(s) have been developed which describe the tasks to be performed to effect the shutdown method. A summary of these procedures should be submitted.

Response

Procedures will be prepared following the completion of the engineering design when all aspects of the design have been formalized and approved.

At this phase of the design, it is difficult to predict exactly what operator actions will be necessary. However, a summary of probable actions follows here.

For a fire in the switchgear room, with its new fire barrier, only one train will be lost to the fire. The redundant train will be immediately available. The plant will scram, and all systems will be operated from the control room or reactor building as necessary.

The RCIC system will control vessel level and cooldown. One RHR train will be available for torus cooldown and eventual plant cooldown.

For a fire either in the cable spreading room or the control room, the same operator actions will be taken. The plant will be scrammed and two operators will be dispatched as follows. One will proceed to the RCIC control panel, operate any necessary transfer or isolation switches, start the RCIC system, and begin reactor cooldown. The second operator will proceed to the diesel generator room and start the diesel. He will then proceed to the reactor building and line up the RHR system to provide torus cooling. He will start RHR train from the switchgear room.

After more operators are available, the plant can be brought to cold shutdown.

(g) NRC Request

Demonstrate that spare fuses are available for control circuits where these fuses may be required in supplying power to control circuits used for the shutdown method, and may be blown by the effects of a cable spreading room fire. The spare fuses should be located convenient to the existing fuses. The shutdown procedure should inform the operator to check these fuses.

Response

The insistance that spare fuses should be made available is considered inappropriate at this stage of the design process. Vermont Yankee intends to consider all contingencies including the need for spare fuses. Procedures will alert the operators to the possibility of the occurrence of any of these contingencies.

(h) NRC Request

Demonstrate that the manpower required to perform the shutdown functions using the procedures of (f), as well as to provide fire brigade members to fight the fire, is available as required by the Fire Brigade Technical Specifications.

Response

Based upon present fire brigade requirements, there are three people available to perform the shutdown operations.

(i) NRC Request

Demonstrate that adequate acceptance tests are performed. These should verify that: equipment operates from the local control station when the transfer or isolation switch is placed in the "local" position and that the equipment cannot be operated from the control room; and

that equipment operates from the control room, but cannot be operated at the local control station when the transfer or isolation switch is in the "remote" position.

Response

Test procedures will be prepared and performed in accordance with our existing QA program.

(j) NRC Request

Technical Specifications of the surveillance requirements and limiting conditions for operation for that equipment not already covered by existing Technical Specifications. For example, if new isolation and control switches are added to a service water system, the existing Technical Specifications surveillance requirements on the service water system should add a statement similar to the following:

"Every third pump test should also verify that the pump starts from the alternate shutdown station after moving all service water system isolation switches to the local control position."

Response

Technical Specification revisions will be submitted where appropriate for operation for that equipment not already covered by existing Technical Specifications as a part of the proposed change when the system design is completed and prior to implementation.

(k) NRC Request

Demonstrate that the systems available are adequate to perform the necessary shutdown functions. The functions required should be based on previous analyses, if possible (e.g., in the FSAR), such as a loss of normal ac power or shutdown on a Group I isolation (BWR). The equipment required for the alternate capability should be the same or equivalent to that relied on in the above analysis.

Response

The performance goals for the shutdown functions are:

1. "The reactivity control function shall be capable of achieving and maintaining cold shutdown reactivity conditions."

   The CRD system as it exists, meets this requirement. In the event of a fire, the reactor would be manually scrammed from the control room, if the fire had not already caused the scram. No further action is needed to insure cold shutdown reactivty conditions. Details of CRD system capability are described in the FSAR, Section 3.6.

2. "The reactor coolant makeup function shall be capable of maintaining the reactor coolant level above the top of the core for BWRs".

   In the previously submitted Fire Hazard Analysis, loss of off-site power is assumed. Vermont Yankee was designed for a loss of off-site power. The RCIC system was provided to maintain core inventory, and aid in removing decay heat until pressure is reduced to the point where the RHR system can take over decay heat removal.

3. "The reactor heat removal function shall be capable of achieving and maintaining decay heat removal."

   The train of safety relief valves, RCIC and RHR systems meet this requirement.

4. "The process monitoring function shall be capable of providing direct readings of the process variables necessary to perform and control the above functions."

   The instruments identified in Table 1 of Attachment II will provide the direct readings of the process variables necessary to perform and control the above functions.

5. "The supporting functions shall be capable of providing the process cooling, lubrication, etc., necessary to permit the operation of the equipment used for safe shutdown functions."

   The supporting functions will be capable of providing the process cooling, lubrication, etc., necessary to permit the operation of the equipment used for safe shutdown functions.

(1) NRC Request

Demonstrate that repair procedures for cold shutdown systems are developed and material for repairs is maintained on-site.

Response

The methods of alternate safe shutdown developed by Vermont Yankee do not require repair procedures to be developed. A method of reaching cold shutdown will always be available as a part of the systems used.

ATTACHMENT II

Response to Generic Letter 81-12 dated February 20, 1981, Request for Additional Information.

1.A. Provide a table that lists all equipment including instrumentation and support system equipment that are required by the alternative or dedicated method of achieving and maintaining hot shutdown.

Response

Table 1 lists all of the equipment, instrumentation and support system equipment required by the alternative method of achieving and maintaining hot shutdown.

1.B. For each alternative shutdown equipment listed in 1.A above, provide a table that lists the essential cables (instrumentation, control and power) that are located in the fire area.

Response

As discussed in Attachment 1, the basic design philosophy of the alternate safe shutdown methods shall utilize isolation devices, transfer switches, a new control panel, and power supplies that allow separation from all control cables, power cables, and instrumentation cables within the fire areas.

1.C. Provide a table that lists safety related and non-safety related cables associated with the equipment and cables constituting the alternative or dedicated method of shutdown that are located in the fire area.

Response

This table is not required since all the cabling for the alternate safe shutdown methods will be isolated from the fire area by transfer switches or other isolation devices. When designs of the modifications are complete it will be shown that the equipment required for shutdown will be unaffected by fires in the areas of concern.

1.D. Show that fire-induced failures of the cables listed in 1.B and 1.C above will not prevent operation or cause maloperation of the alternative or dedicated shutdown method.

Response

See response to 1.C above.

1.E. For each cable listed in 1.B above, provide detailed electrical schematic drawings that show how each cable is isolated from the fire area.

Response

As discussed in 1.B, any necessary cables will be isolated from the fire area.

2. The residual heat removal system is generally a low pressure system that interfaces with the high pressure primary coolant system. To preclude a LOCA through this interface, we require compliance with the recommendations of Branch Technical Position RSB 5-1. Thus, this interface most likely consists of two redundant and independent motor operated valves. These two motor operated valves and their associated cable may be subject to a single fire hazard. It is our concern that this single fire could cause the two valves to open resulting in a fire-initiated LOCA through the subject high-low pressure system interface. To assure that this interface and other high-low pressure interfaces are adequately protected from the effects of a single fire, we require the following information:

A. Identify each high-low pressure interface that uses redundant electrically controlled devices (such as two-series motor operated valves) to isolate or preclude rupture of any primary coolant boundary.

Response

Table 2 lists each high-low pressure interface that uses redundant electrically controlled devices to isolate or preclude rupture of any primary coolant boundary.

B. Identify the device's essential cabling (power and control) and describe the cable routing (by fire area) from source to termination.

Response

See (D) below.

C. Identify each location where the identified cables are separated by less than a wall having a three-hour fire rating from cables for the redundant device.

Response

See (D) below.

D. For the areas identified in Item 2.C above (if any), provide the bases and justification as to the acceptability of the existing design or any proposed modifications.

Response

Circuits of devices listed in Table 2 have been examined and isolation will be evaluated and provided as necessary outside the fire area to preclude a fire initiated LOCA caused by inadvertent equipment operation. For this reason there is no need to respond to (B) and (C) above.

ATTACHMENT III

TABLE I

Equipment, Support Systems and Instrumentation
Required to Achieve and Maintain Hot Shutdown
Using the Alternative Shutdown Method

- RCIC System
- RCIC Valves
- Instrumentation
  - RV Level Indication
  - Reactor Pressure
  - CST Level
  - Torus Level
  - Torus Temperature
  - RCIC System Flow
  - RCIC Pump Discharge Pressure
  - RCIC Turbine Speed
- RHR Pumps
- RHR Motors
- RHR Motor Breakers
- RHR System Valves
- RHR Service Water Pumps
- RHR Service Water Motors
- RHR Service Water Motor Breakers
- Service Water Pumps
- Service Water Motors
- Service Water Motor Breakers
- RRUs as Required

Diesel Generator

Diesel Generator Breaker

Diesel Room Fan

Fuel Oil Transfer Pump

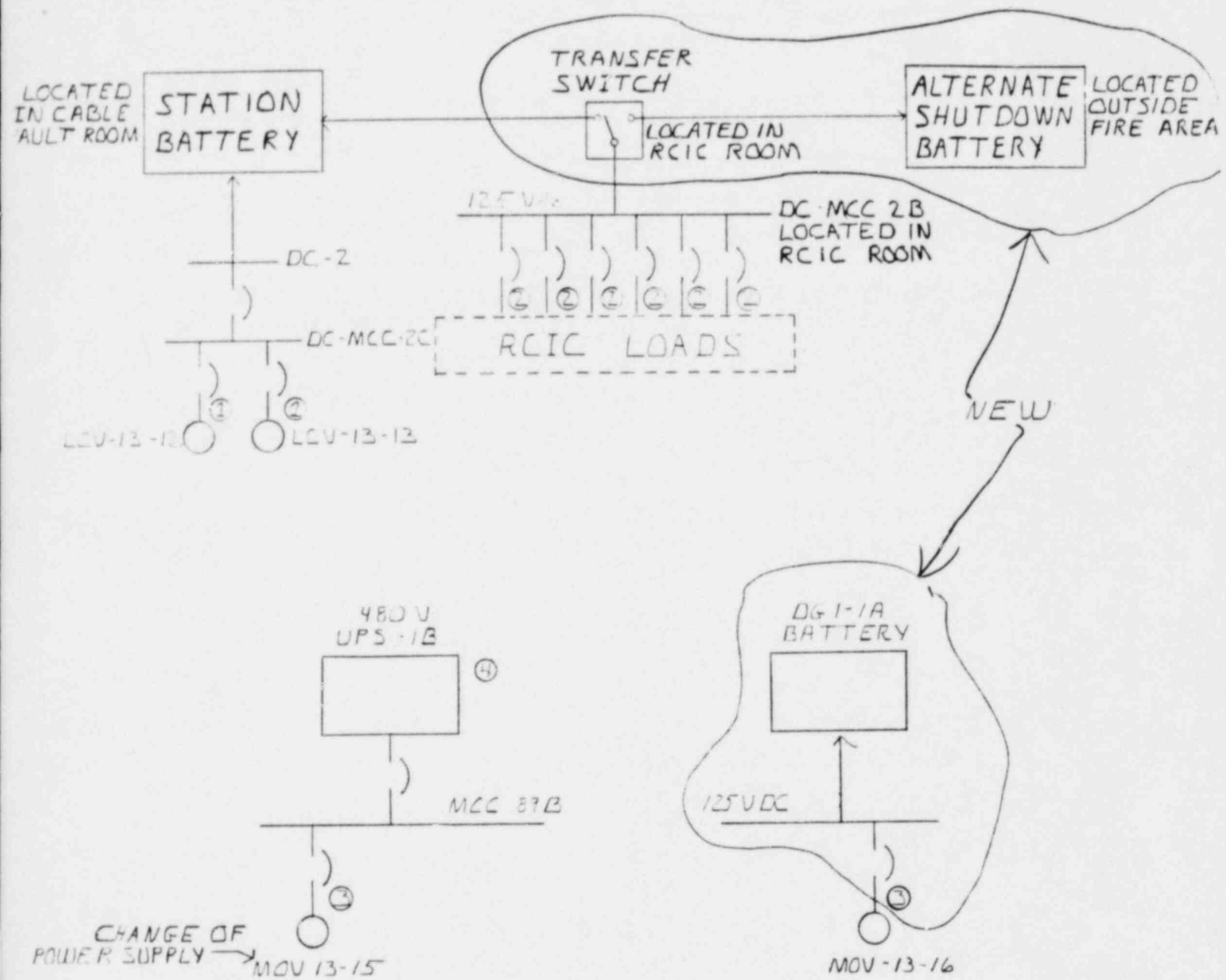
Control Rod Drive System and Mode Switch

TABLE 2

High-Low Pressure Interfaces Using
Redundant Electrically Controlled Devices

Device	Function
MOV-10-17 MOV-10-18	RHR Suction from Reactor
FCV-2-17 FCV-2-18	Reactor Head Vents

RCIC ELECTRICAL MODIFICATIONS



① CONTROL CIRCUITS ENTERING FIRE ZONES CAN BE ISOLATED BY SWITCHING AT THE RCIC PANEL

② CONTROL CIRCUITS ENTERING FIRE ZONES CAN BE ISOLATED BY SWITCHING AT THE RCIC PANEL. ALTERNATE CONTROL AND INDICATION IS PROVIDED AT THE RCIC PANEL.

③ CONTROL CIRCUITS ENTERING FIRE ZONES CAN BE ISOLATED BY SWITCHING LOCALLY AT A PANEL OUTSIDE THE FIRE ZONES. ALTERNATE CONTROL AND INDICATION IS PROVIDED AT THE SAME PANEL.

④ CONTROL CIRCUITS AFFECTING OPERATION OF THE UPS WILL BE ISOLATED BY SWITCHING.

FIGURE 1

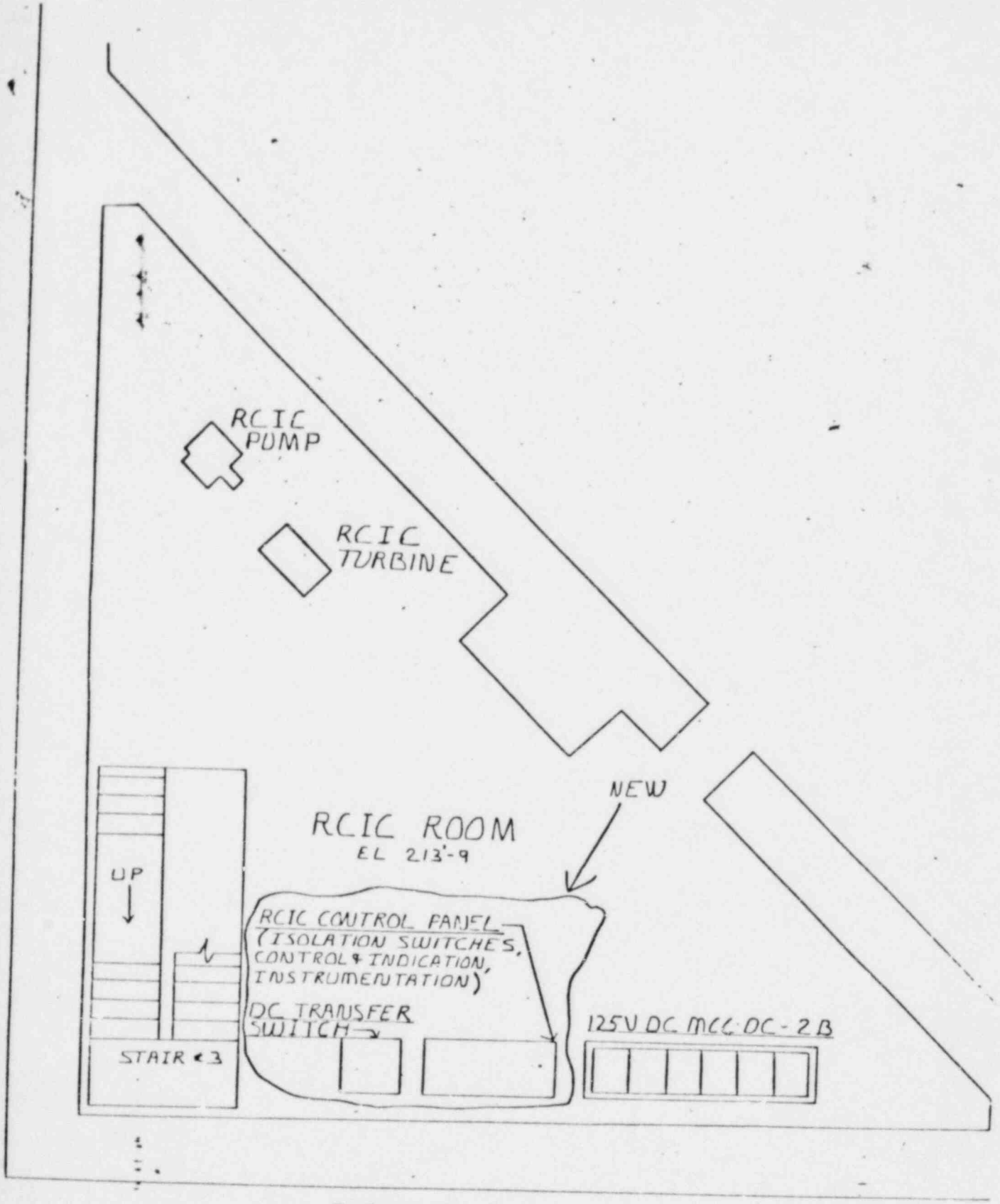
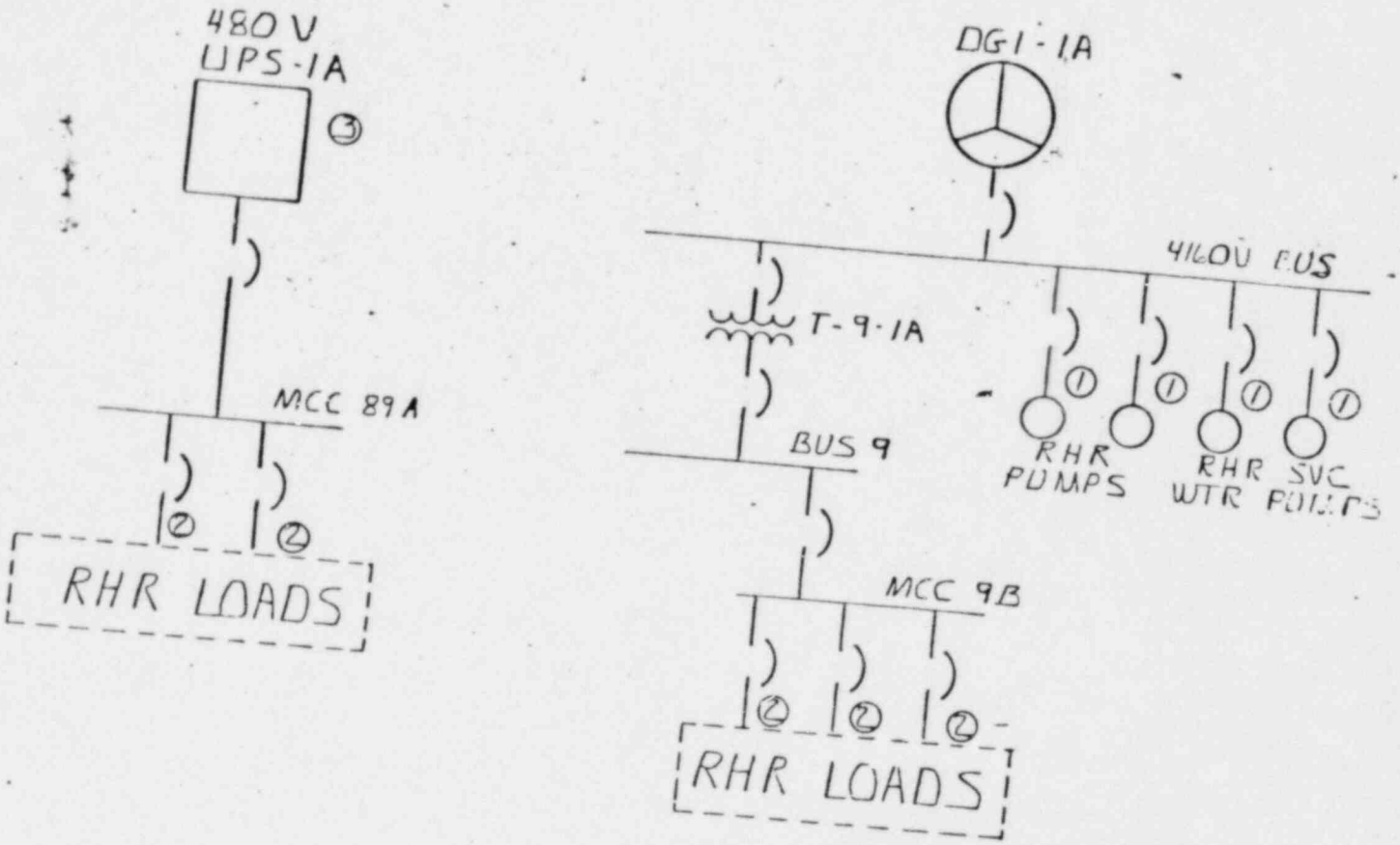

RCIC PUMP
RCIC TURBINE
NEW
RCIC ROOM
EL 213'-9
UP
RCIC CONTROL PANEL
(ISOLATION SWITCHES, CONTROL & INDICATION, INSTRUMENTATION)
DC TRANSFER SWITCH
125V DC MCC DC-2B
STAIR #3

FIGURE 2

RHR

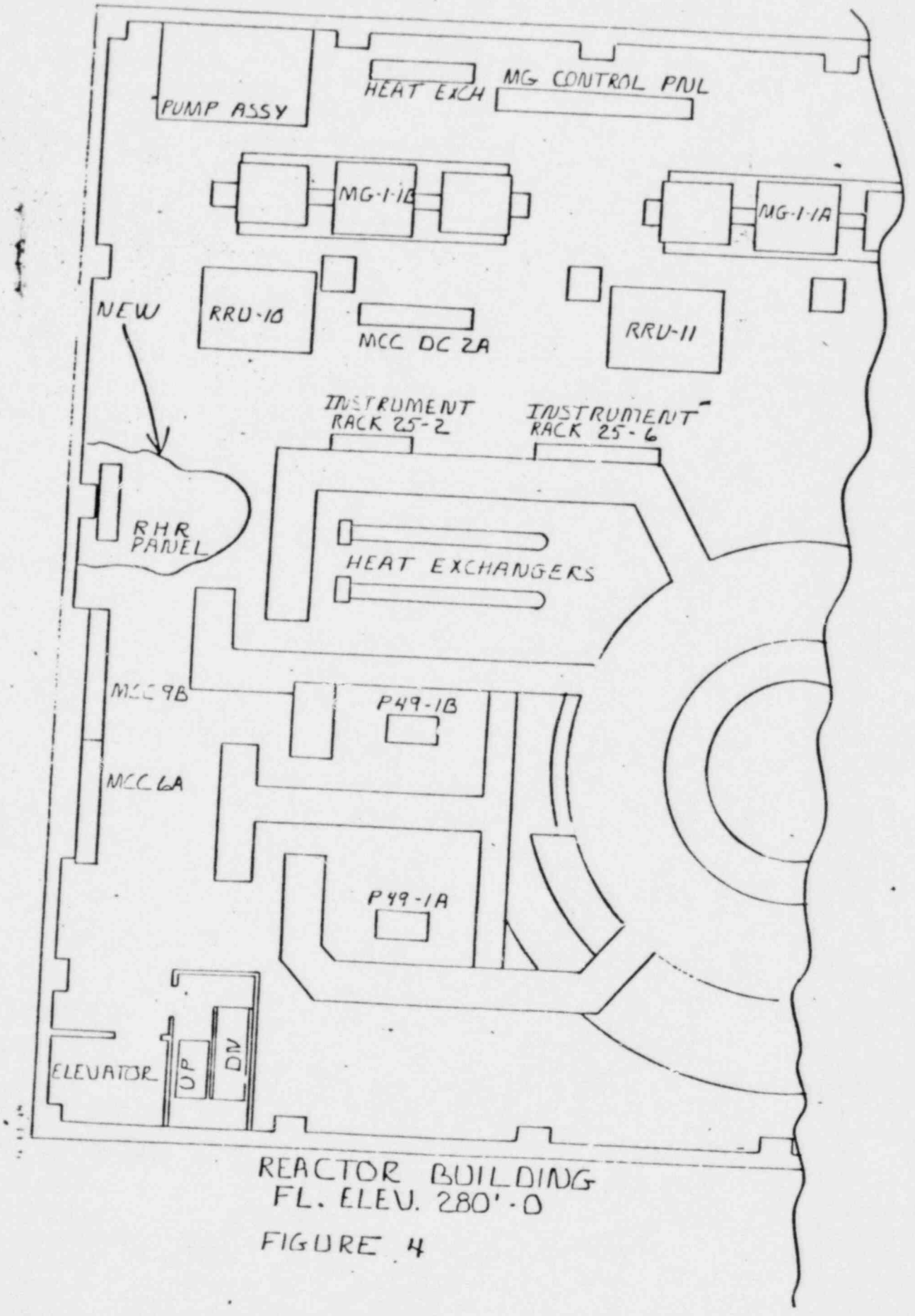


① 125 V DC CONTROL POWER WILL BE CHANGED TO BE NORMALLY SUPPLIED FROM THE NEW DIESEL GENERATOR 1-1A BATTERY. CONTROL CIRCUITS ENTERING FIRE ZONES WILL BE ISOLATED BY SWITCHES LOCATED IN THE INDIVIDUAL COMPARTMENTS OF THE SWITCHGEAR.

CONTROL CIRCUITS ENTERING FIRE ZONES CAN BE ISOLATED LOCALLY BY SWITCHING AT THE RHR PANEL WHICH IS OUTSIDE FIRE ZONES. ALTERNATE CONTROL AND INDICATION IS PROVIDED AT THE RHR PANEL.

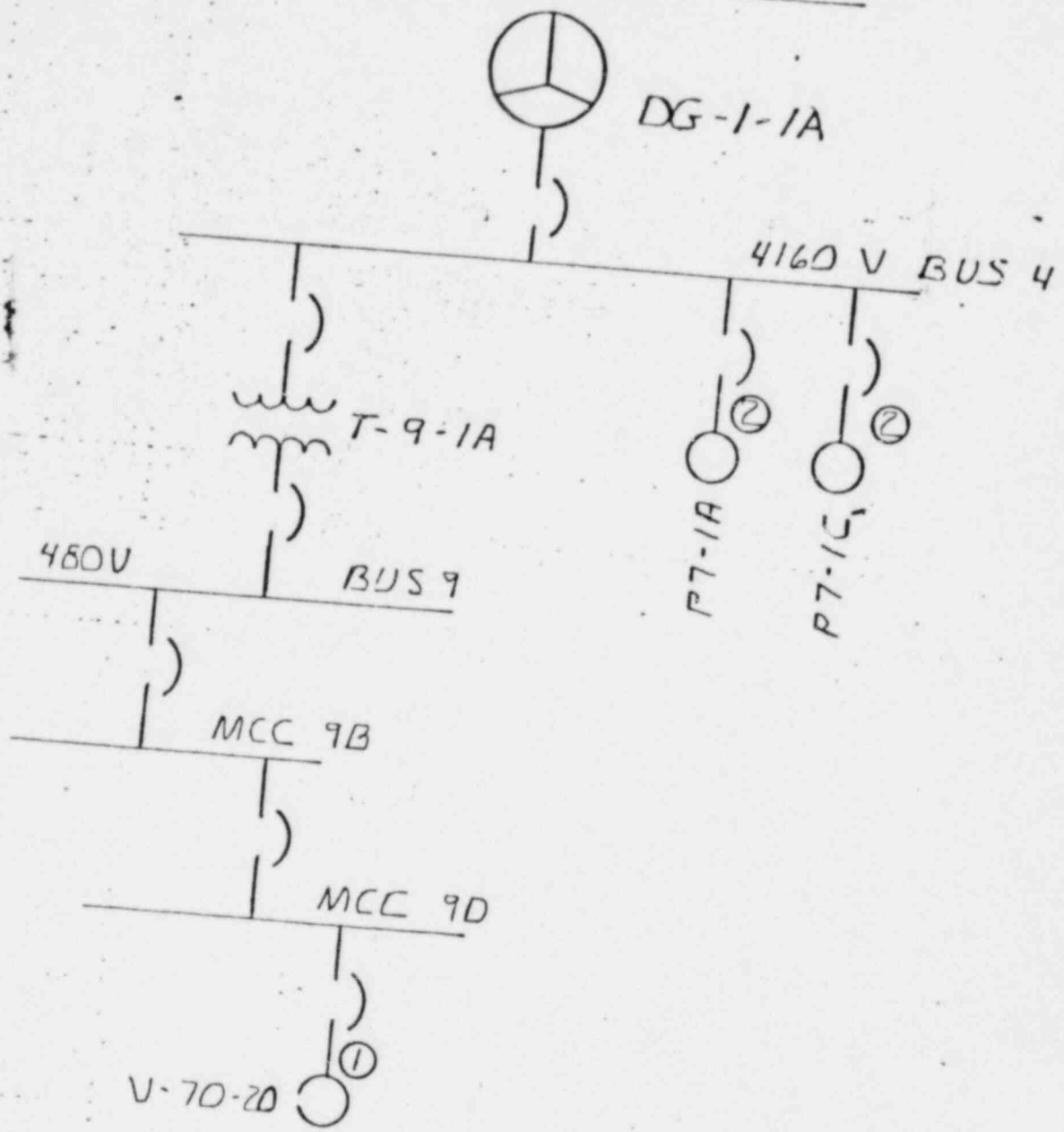
CONTROL CIRCUITS AFFECTING OPERATION OF THE UPS WILL BE ISOLATED BY SWITCHING.

FIGURE 3



REACTOR BUILDING
FL. ELEV. 280'-0

FIGURE 4

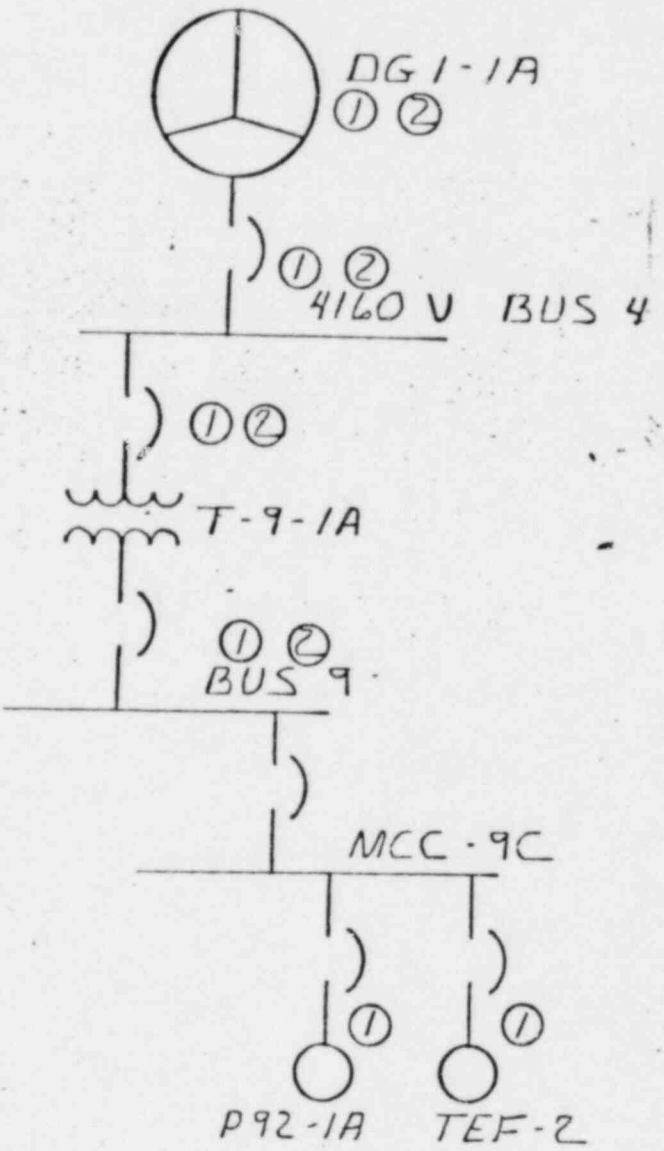


① CONTROL CIRCUITS ENTERING FIRE ZONES CAN BE ISOLATED LOCALLY BY SWITCHING AT A PANEL WHICH IS OUTSIDE THE FIRE ZONES. ALTERNATE CONTROL AND INDICATION IS PROVIDED AT THE PANEL

② 125 V.DC CONTROL POWER WILL BE CHANGED TO BE NORMALLY SUPPLIED FROM THE NEW DIESEL GENERATOR 1-1A BATTERY. CONTROL CIRCUITS ENTERING FIRE ZONES WILL BE ISOLATED BY SWITCHES LOCATED IN THE INDIVIDUAL COMPARTMENT OF THE SWITCHGEAR.

FIGURE 5

DG 1-1A



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① CONTROL CIRCUITS ENTERING FIRE ZONES AND AFFECTING DIESEL OPERATION WILL BE ISOLATED BY SWITCHING OUTSIDE THE FIRE ZONES. LOCAL CONTROLS WILL BE PROVIDED FOR OPERATION OF DIESEL AND AUXILARIES.

② 125 V DC CONTROL POWER INDEPENDENT OF THE FIRE ZONES WILL BE PROVIDED BY A NEW BATTERY

FIGURE 6

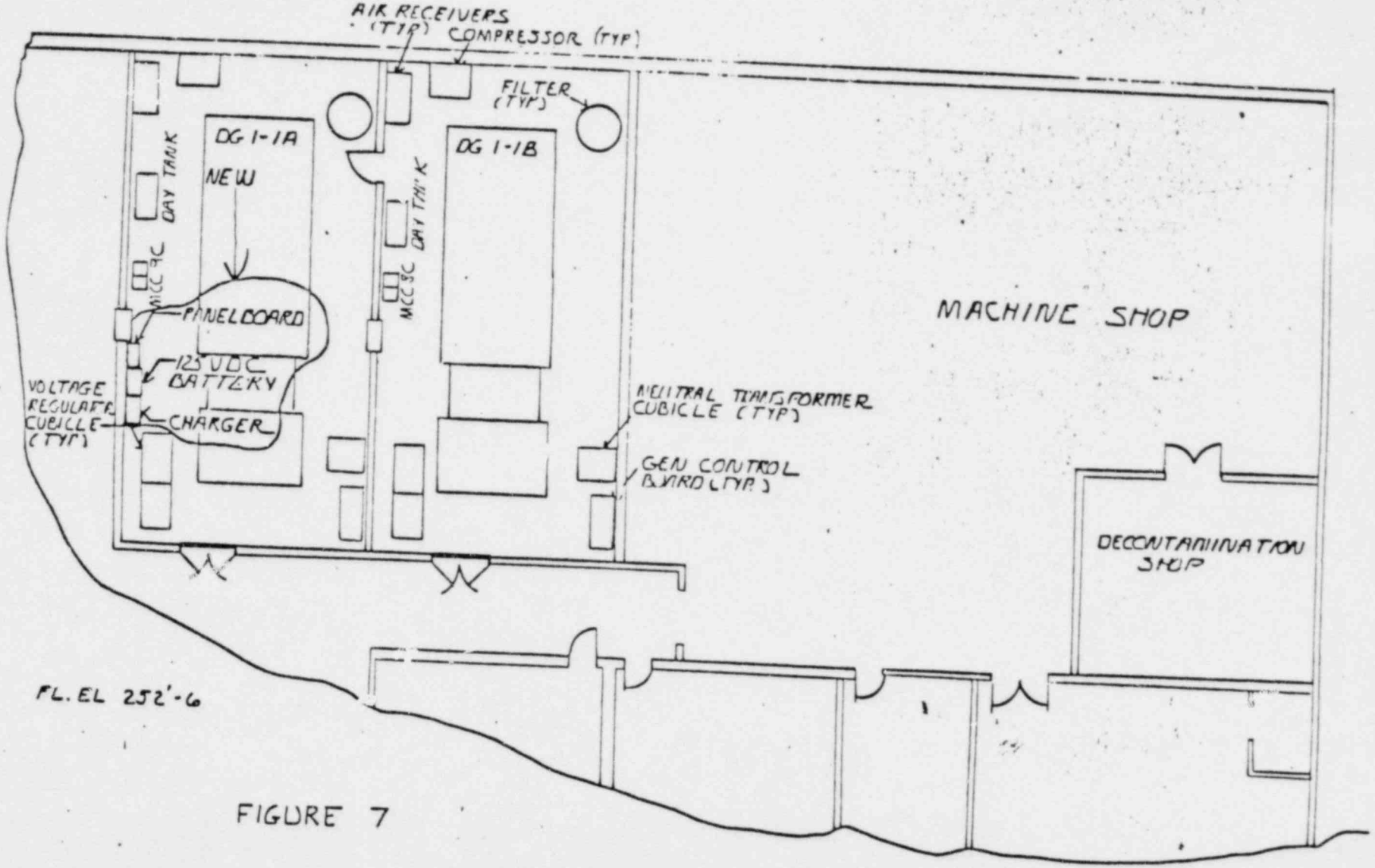

AIR RECEIVERS (TYP)
COMPRESSOR (TYP)
FILTER (TYP)
DG 1-1A
NEW
DG 1-1B
DAY TANK
MCC 9C
MCC 9C DAY TANK
PANELBOARD
125 VDC BATTERY
CHARGER
VOLTAGE REGULATOR CUBICLE (TYP)
NEUTRAL TRANSFORMER CUBICLE (TYP)
GEN CONTROL BOARD (TYP)
MACHINE SHOP
DECONTAMINATION SHOP
FL. EL 252'-6

FIGURE 7

ALTERNATE SHUTDOWN DC DISTRIBUTION

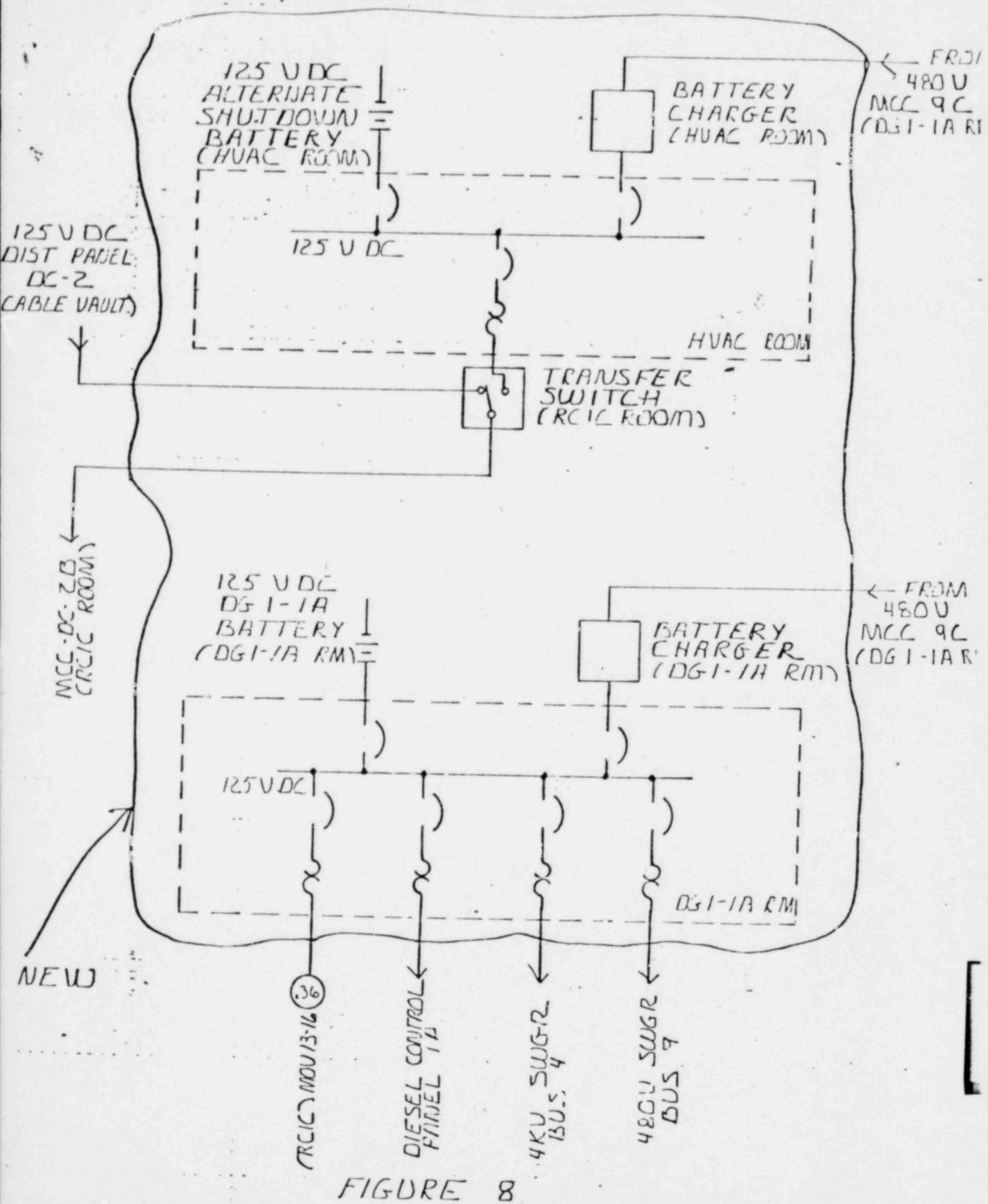
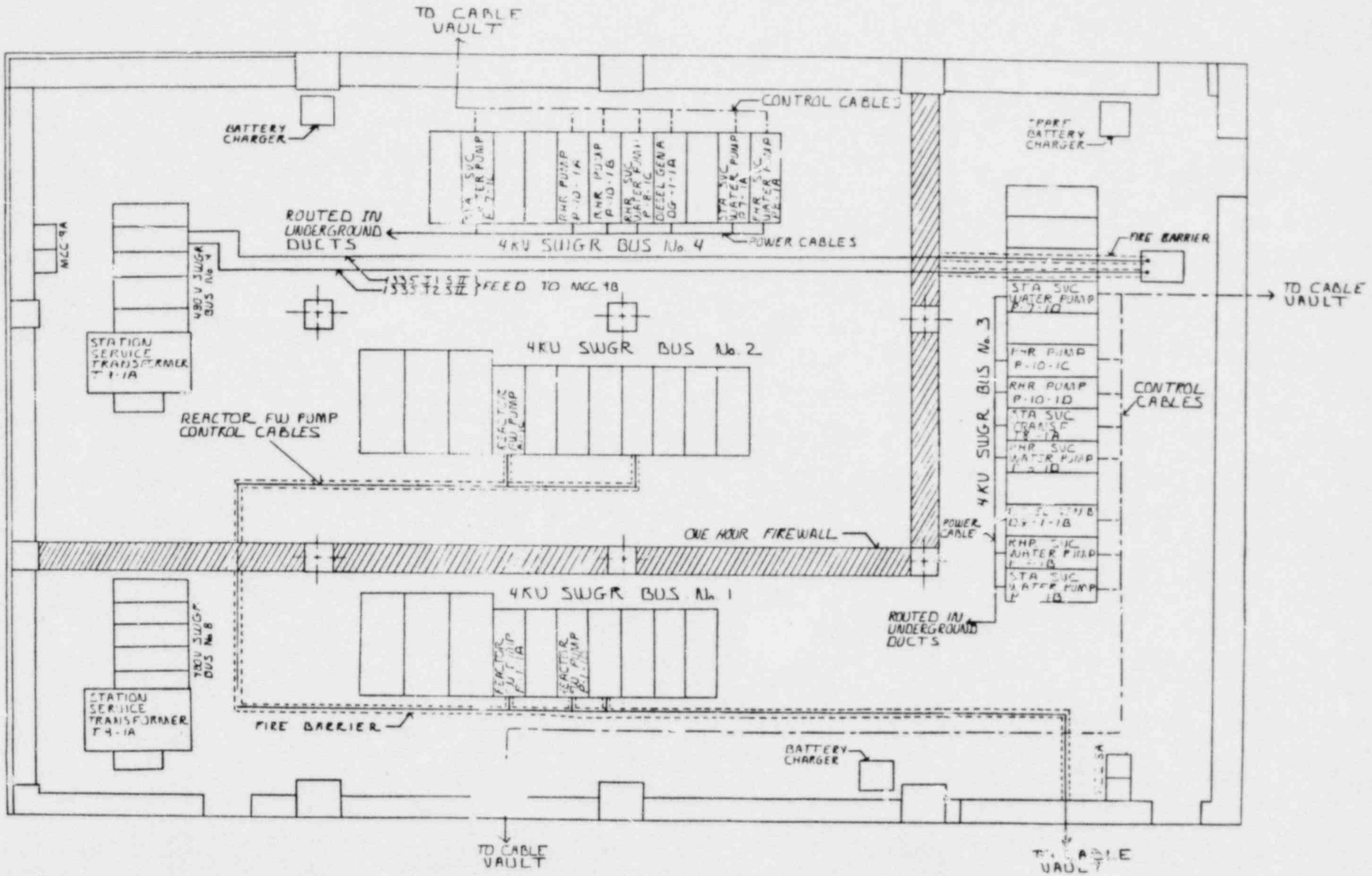


FIGURE 8



SWITCHGEAR ROOM
FIGURE 9