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SUBJECT: Forwards conceptual design summary of dedicated shutdown sys, emphasizing associated circuits & separation to be provided between existing circuits & new sys. Concurrence required before design, procurement & installation of sys.

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November 9, 1981

Director of Nuclear Reactor Regulation
Attention: Mr. Dennis M. Crutchfield, Chief
Operating Reactors Branch No. 5
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Fire Protection Dedicated Shutdown System
R. E. Ginna Nuclear Power Plant Unit #1
Docket No. 50-244

Dear Mr. Crutchfield:

In response to 10CFR 50.48 and Appendix R to 10CFR Part 50, we submitted reports on March 19, May 19, and October 16, 1981 which described potential modifications at the R. E. Ginna Nuclear Power Plant for a dedicated shutdown system. The potential modifications are the result of a fire protection safe shutdown study submitted December 28, 1979 and a subsequent conceptual design effort.

Enclosed is a conceptual design summary of the dedicated shutdown system. This report places emphasis on associated circuits and the separation that will be provided between existing shutdown circuits and the new dedicated shutdown system.

The dedicated shutdown system design is based on the very conservative assumption that no detection, no automatic suppression, and no fire brigade suppression is effective in controlling or limiting fire damage. Even with the complete failure of all detection and suppression, the proposed system will provide adequate capability to maintain a safe shutdown condition and, therefore, no undue risk to the public health and safety will exist. Conversely, because of the detection and suppression systems which have recently been installed, the probability of ever using the dedicated shutdown system is small.

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We have completed our conceptual design of the dedicated shutdown system and have established the criteria that we believe should be applied to the detailed design of the system. We require your concurrence, based upon the information which we provided with this letter and the letters in March, May, and October 1981, before proceeding with engineering design, procurement and installation of the system. Although the system is only yet conceptual, we have described a system which is quite specific. Because this level of detail is usually not established until later in a design effort, some of the specific items of the system may change when the detailed engineering proceeds. Depending upon the outcome of your review, however, we expect the concepts to remain the same. If you require additional information or clarification we will be happy to work with you during your review cycle.

Very truly yours,

John E. Maier

Enclosure

DEDICATED SHUTDOWN SYSTEM

CONCEPTUAL DESIGN SUMMARY

Rochester Gas & Electric Corporation
R. E. Ginna Nuclear Power Plant
Docket No. 50-244

November, 1981

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FIGURES

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R. E. GINNA STATION DEDICATED SHUTDOWN SYSTEM

1.0 SUMMARY DESCRIPTION OF THE DESIGN

1.1 SUMMARY

The dedicated shutdown (DS) system has been developed in response to the requirements for fire protection of Ginna Station as defined by 10CFR, Part 50.48 and 10CFR, Part 50, Appendix R. The basis for the DS system is established by the References listed in Section 6.0.

The objective of the dedicated shutdown system modification is to ensure that at least one essential train, subsystem, or component will be made available for performance of each of the required safe shutdown functions in the event of a severe fire in any one of the designated plant fire zones. The required modifications are classified as follows:

o Dedicated Shutdown Control Panel

A separate control and monitoring station (the DS control panel) will be installed in the Technical Support Center incorporating dedicated primary and secondary system instrumentation to provide continuous displays of critical safe-shutdown-related parameters. A centralized control transfer scheme shall be provided in the Technical Support Center to activate the dedicated controls and status indication for critical safe-shutdown-related equipment.

o Dedicated Shutdown Power Source

New safety-related 480-V switchgear bus, motor control center, and dedicated feeder(s) will be installed, as required to ensure that power will be available for shutdown operation in the event of a fire in any single fire area, under any conditions of offsite/onsite power availability. The new switchgear bus and motor control center will be dedicated units, supporting only dedicated shutdown-related equipment.

o Direct Manual Control Provisions

The DS modification will provide for disconnection or override of the normal electrical or pneumatic supply to safe-shutdown-related actuated devices to permit direct manual control. Device status indication shall be provided on the DS control panel as required.

o Deenergization of Equipment (When Operation Is Not Required)

The DS modification will provide for deenergization of AC or DC power to selected actuated devices during normal plant operations (or upon detection of fire in a critical plant area) to preclude the possibility of fire-induced spurious actuations.

o Cable Rerouting

Control and power cables will be rerouted to avoid specific fire zones generally occupied by redundant cables or components.

o Fire Barriers

Critical shutdown-related cables in selected areas will be protected with appropriately rated fire barriers. Equipment will be protected by constructing new fire areas (i.e., enclosing areas within existing fire zones with appropriately rated barriers).

1.2 FUNCTIONS

The DS modification functional and hardware requirements are listed on Table 1. The following subsections provide functional descriptions for each of the DS features.

1.2.1 Dedicated Power System

1.2.1.1 480-V Switchgear Buses

The existing 480-V distribution system will be modified to ensure the availability of power for safe-shutdown-related loads under all postulated conditions of offsite and onsite power availability. Following completion of this modification, a fire occurring in any single fire area will not cause the loss of both power trains. The specific components affected are:

o 480-V Switchgear Bus 14 (Train A)

Safety-related 480-V buses 14 and 16 are presently common to several areas. To ensure the availability of a dedicated shutdown power source, a new 480-V bus (14A) will be installed. This bus will be configured as shown on Figure 1 . All dedicated shutdown loads will be permanently assigned to this new, safety-related bus, which will be located in the standby auxiliary feedwater (SAF) building.

During normal plant operation, buses 14 and 14A will be connected through tie breakers as shown on Figure 2, with power supplied to both buses from (new) station service transformer 14A. Under accident conditions, the safety-related loads on buses 14 and 14A will be supplied by offsite power or diesel generator 1A (DG1A), as required. If required during an accident, DG1A will supply power through the existing safety-related feeder. In the event of a fire in any of several critical areas, however, DG1A will be capable of supplying power to bus 14A through a dedicated feeder, as shown on Figure 1. The breakers served by DG1A shall be interlocked and remotely operable from the DS control panel. Overcurrent and undervoltage trip functions shall be provided for both diesel generator breakers (DG1A and DG1B).

The undervoltage trip feature is not required for the diesel generator to bus 14A feeder breaker (DG1A-1). All three breakers (DG1A-1, DG1A-2, DG1B) will be Class 1E-qualified, capable of remaining fully operational during and following a safe-shutdown earthquake.

The new switchgear consisting of circuit breakers DG1A-1, DG1A-2, DG1A-3, DG1A-4, and DG1B will be installed in a seismic Category I structure.

1.2.1.2 480-V Dedicated Shutdown Motor Control Center

All DS-related motor starter loads (shown on Table 3), including pumps, fans, coolers, and valve operators will be operated by motor starters that are fed from 480-V DS bus 14A (refer to Figure 1). A dedicated shutdown motor control center (MCC-DS) will be installed, and will be permanently fed from DS bus 14A. All DS-related Train A motor starter loads shall be permanently assigned to this MCC.

1.2.1.3 New Station Service Transformer 14A

Existing station service transformer 14 (SS14) is a dry-type transformer, integral with 480-V bus 14. Due to the physical proximity of train A and train B cables in the bus 14-16 area, it is assumed that a fire involving either bus 14 (Train A) or bus 16 (Train B) would cause the loss of SS14 as a reliable power source. To ensure the availability of an offsite power source (assuming no Loss of Offsite Power), a new, non-Class 1E station service transformer, designated SS14A, will be installed adjacent to the SAF building. The existing station service transformer (SS14) will be disconnected and retained as an installed spare, and the new transformer will be supplied by the existing breaker on 4160-V bus 12A presently serving station service transformer 14. The new transformer shall be sized to accommodate the loads on buses 14 and 14A. All cable associated with this unit shall be routed so as to avoid those fire areas occupied by cables serving power train B.

1.2.1.4 Diesel Generator Circuit Breakers

At present, circuit breakers for protection of the diesel generator feeders are provided only at 480-V buses 14 and 16. Consequently, a fire occurring in the diesel generator duct runs or cable vaults may cause the diesel generators, if operating, to feed directly into fire-induced faults. To mitigate this, circuit breakers shall be installed for both diesel generators 1A and 1B as shown on Figure 1. In addition, diesel generator 1A shall be provided with a second breaker, interlocked with the primary breaker, to permit the transfer of power between the bus 14 and bus 14A feeders.

1.2.2 Dedicated Shutdown Control Panel

1.2.2.1 Location

The dedicated shutdown control panel will be located in the Technical Support Center. The DS area selected will provide the following:

- Adequate emergency lighting and communications facilities to support the use of the DS control panel under all postulated fire and loss-of-power conditions.
- A ventilation system which is capable of operating in a recirculation/filtering mode if required to prevent the intake of fire-generated toxic fumes and smoke.

1.2.2.2 Functions

The DS control panel will be provided with all control, indication, and instrumentation functions listed on Table 2. The panel will permit the performance of control and monitoring tasks.

1.2.3 Mechanical Modifications

1.2.3.1 Instrument Air System Modification

Although not required for plant shutdown, provisions are being made to assure availability of instrument air. Instrument air compressor 1A will be reassigned from 480-V bus 13 to 480-V DS bus 14A, as shown on Figure 1. This modification will ensure the operability of one air compressor in the event of all fires except perhaps those occurring in the immediate vicinity of the air compressors. In that event, it is assumed that the compressors and cables will be damaged and consequently they will be inoperable.

In order to ensure an instrument air supply under these conditions, electrical and mechanical connectors will be installed, to permit the connection of a portable air compressor for emergency service, if required. The air hose connections, provided for both instrument air trains A and B, will be located upstream of the instrument air aftercoolers. A dedicated 480-V, 3-phase outlet, connected to the DS MCC, will also be provided to permit connection of the portable compressor for use in either instrument air train A or train B. The portable air compressor will be maintained on site, and will be available for dedicated shutdown service, if required.

1.2.3.2 Spare Component Cooling Pump

In order to ensure the operability of one component cooling train for dedicated shutdown service, component cooling pump 1A will be reassigned from 480-V bus 14 to 480-V DS bus 14A, as shown on Figure 1. This modification will ensure the operability of one CCW pump in the event of any fires except those occurring in the immediate vicinity of the CCW pumps. In that event, it is assumed that the pumps and cables will be damaged and consequently will be inoperable.

As indicated in reference 6.4, provisions will be made for installation of a replacement CCW pump, if required. The following equipment will be maintained on site:

- Spare pump and motor with adequate flow and head characteristics. Flange connections will be compatible with those provided for component cooling pump 1A.
- Cable sized to supply the motor; length will be as required to route from the CCW pump area to 480-V bus 14A in the standby auxiliary feedwater building.
- A sleeve (capped) will be installed in the wall joining the auxiliary building and the standby auxiliary feedwater building. This sleeve will be used for routing of the emergency feeder cable, when required.

1.2.4 Service Water System/Screen House Modification

1.2.4.1 Existing Physical Configuration

The four service water pumps and both trains of safety-related switchgear (buses 17 and 18) are installed on the screen house operating floor. Rated fire barriers have not been constructed to separate redundant equipment or power trains. Power and control cables are routed through the screen house basement without separation or barriers which meet the requirements of 10CFR 50 Appendix R.

In the event of a fire in the screen house, the service water pumps may be exposed to a common fire threat and it is postulated that the pumps may be left inoperable.

1.2.4.2 Service Water Functional Requirements

In order to achieve cold shutdown conditions, at least one service water pump and valve train must remain operable. Non-shutdown-related loads will be selectively valved out during post-fire operation to minimize the heat load.

1.2.4.3 Requirements of 10 CFR 50, Appendix R

In order to bring the service water system into compliance with 10 CFR 50, Appendix R, a one-hour-rated fire barrier will be installed between the redundant shutdown equipment trains (separate service water pump 1A from pumps 1B, 1C, and 1D). This barrier, in conjunction with the existing fire detection and suppression systems, will establish compliance with 10 CFR 50, Appendix R.

1.2.4.4 One-Hour Rated Enclosure

Enclose service water pump 1A (SWP 1-A) with a 1-hour-rated barrier. This enclosure will have the following features:

- Structural steel framing with fireproof structural insulation panels used for walls and roof.
- Panels removable for major maintenance access.
- Fire-rated door for inspection and routine maintenance access.
- Entire structure seismically qualified to SSE criteria.
- Cooling unit integral to enclosure draws air from outside screen house, providing pump cooling during normal operation and during fire.
- Existing SWP 1-A circuit breaker in 480V bus 18 is abandoned in place. New circuit breakers shown on Figure 1 will be located in a seismically qualified structure. A dedicated duct run will be provided from DG1A to screen house; new cables feeding service water pump 1A and its dedicated cooling unit will be routed in insulated conduit (having a 1-hour fire rating) from the point of entry into the screen house basement up to the point of penetration through the operating floor into the pump 1A enclosure.

2.0 DEDICATED SHUTDOWN CONTROL PANEL FUNCTIONS

2.1 DEDICATED SHUTDOWN EQUIPMENT CONTROLS

The dedicated shutdown equipment will be provided with dedicated remote controls, located on the DS control panel. These controls will be provided for each component in addition to the existing control equipment in the main control room, and each component will be fully operable from either control location.

The control circuits at the DS control panel will differ in that they will not incorporate the protective or safety-related interlocks found in the normal control circuits. All components that are permanently reassigned to bus 14A, the DS MCC, or the DS 125-V DC source shall retain all of the protective and safety-related trip and reclose functions presently associated with these devices. When the device controls are transferred to the DS panel, all of the protective and safeguards interlocks will be bypassed. In this way, positive device control can be maintained at the DS panel, by avoiding the spurious actuations that may be caused by interlock circuits exposed to postulated fires.

Controls for dedicated shutdown equipment consist of several generic types:

- 480-V circuit breaker controls
- 480-V motor starter controls, including reversing and non-reversing starters
- 125-V DC valve controls (pilot solenoid air-operated)

- Electropneumatic control loops and variable-power (SCR) controls

These controls, which will be located on the DS control panel, provide for the operation of all DS-related equipment listed on Table 2. Controls provided for each device will include status indicating lights (run/stop, open/closed), a control transfer switch, and control switches.

During normal plant operation from the main control board, the control transfer switches will be maintained in the "normal" (control room) position. Under these conditions, the status indicating lights on the DS panel will remain dark. Any attempt to assume control at the DS panel by operating the control transfer switches will be ineffectual; in order to transfer control, the control transfer permissive link must first be activated. As shown on Figure 4, activation of the control transfer permissive will enable the application of power to the control transfer relay, through permissive contact "K2".

Following activation of the control transfer permissive, individual device control transfer switches may be operated to selectively take control of components. By placing a control transfer switch in the "DS" position, the following actions take place:

- All control, power, and indication circuits to the control room are opened and isolated from DS circuits by the open transfer switch contacts.
- Control power for operation of the component is supplied through the DS panel (refer to Figure 5) from the TSC uninterruptible power supply.
- Status indication lights are energized to indicate valve position.
- Loads energized through circuit breakers or motor starters will be deenergized upon transfer of control as a result of the temporary loss of control power. The status indicating lights on the DS panel will reflect this condition.

After transferring control to the DS panel, individual components may be energized as required by using the control switches provided. Status lights will change state in accordance with circuit breaker position, motor starter contactor position, and valve position. In no case shall control <u>switch</u> position be used as the input for operation of status lights.

The general configuration to be used in the implementation of the transfer, control and indication features described above is shown on Figure 4.

2.2 DEDICATED SHUTDOWN INSTRUMENTATION

Dedicated instrumentation shall be provided on the DS control panel to permit the monitoring of all essential primary, secondary, and support system process variables. All new instrumentation shall be installed on the DS control panel and will utilize the Technical Support Center 120-V uninterruptible power supply (UPS) as a power source. The required instrumentation is listed on Table 2. All DS instrumentation, with the exception of primary system temperature monitoring, will consist of independent loops or channels having no electrical interface with the control room, relay room, or other critical fire areas as defined in this document. Consequently, DS instrumentation will not be susceptible to failure caused by any fire that could simultaneously affect control room instrumentation. The RCS temperature indication will be as shown on Figure 11. This arrangement will isolate faults or hot shorts from the DS panel circuits which may occur as the result of fires in the control room, relay room or other critical fire areas listed in Section 3.1.1. Protection between indications from each loop will be provided to assure that at least one set (one loop) of temperature indication is always available.

The required instrument channel configurations are shown on Figures 9, 10, 11, and 12. Instrument loops will be provided with new process taps on existing instrument lines, where available (as shown on Figures 9 and 10.) Where new process taps are installed in existing instrument lines, new transmitters and cable shall be separated from existing equipment in accordance with the separation requirements of 10 CFR 50, Appendix R.

2.3 CONTROL

2.3.1 General

The equipment designated for dedicated shutdown operation shall be monitored and operated from the dedicated shutdown control panel. This panel will provide an alternative means of control for achieving cold shutdown status in the event that the control room is disabled by fire (either in the control room or by a fire in another plant area which disables control or instrumentation circuits that interface with the control room). The dedicated shutdown control panel will provide for the transfer of control of selected components from the control room and will provide a single channel of all instrumentation required to achieve and maintain cold shutdown.

2.3.2 Control and Instrumentation Power

During normal plant operation, 125-V DC control power and 120-V AC instrumentation power will be supplied by the existing (safety-related) 125-V DC battery buses and 120-V AC instrument buses, respectively. The transfer of DC control power sources is shown schematically on Figure 5.

For post-fire operation, control and instrumentation power will be supplied by the Technical Support Center 125-V DC battery bus and 120-V AC uninterruptible power supply (UPS), respectively. Utilization of the DS control power sources is accomplished by the remote manual transfer of control from the control room to the DS control panel. The DS instrumentation (located on the DS control panel) will be permanently assigned to the Technical Support Center 120-V AC UPS.

2.3.3 Control Transfer - Control Room to DS Panel

Transfer of control from the control room shall be effected using transfer switches installed on the DS control panel. As shown on Figure 13 (RG&E drawing 21489-374) the transfer scheme will utilize optical links between the DS control panel and local isolation/transfer relay cabinets.

During normal operation, controls on the DS panel will be deenergized; upon transfer of the control to the DS panel, the DS controls will be energized, control room controls deenergized, and an annunciator will be activated in the control room to indicate that local control has been assumed.

2.3.4 480V Switchgear and Motor Control Center

Each DS component shown on the DS single-line diagram (Figure 1) will be provided with a control-transfer switch and DS control switches and indicating lights, located on the DS panel. These controls will be provided in addition to any switches on the main control board.

2.4 MODES OF OPERATION

2.4.1 Normal Plant Operation (Including Accident Conditions)

During normal plant operation (and postulated accident conditions) safety-related buses 14 and 14A will be connected through the bus tie, as shown on Figure 2. With offsite power available, station service transformer 14A, fed from 4160-V bus 12, will provide 480V power to buses 14 and 14A. Motor control center IC (non-DS loads) will continue to be energized by the existing feeder from bus 14. The DS motor starters will be energized from DS bus 14A, as shown on Figure 2.

In the event of loss of offsite power (LOP), buses 14 and 14A will be fed by DG1A through the existing safety-related feeder as shown on Figure 2. During normal operation, the diesel generator breakers will be aligned as shown on Figure 2 to ensure the immediate availability of DG1A, if required, to mitigate the consequences of an accident.

2.4.2 Operation Through the DSS

In the event of a fire in a critical fire zone (control room, cable tunnels, relay room, etc.) it is presumed that 480-V bus 14

and/or its loads will be partially or completely disabled. In this event, the bus tie breakers will be manually tripped using control switches on the dedicated shutdown panel located in the TSC. This will effectively isolate bus 14 from 14A, deenergizing bus 14 and the non-DS loads on MCC-1C, as shown on Figure 3. Bus 14A will continue to be fed by station service transformer 14A, and the DS-related motor starters will be supplied by bus 14A. The DS-related loads will be controlled from the DS control panel after effecting the necessary control and/or power transfers (see Section 1.4).

In the event of a fire in a critical fire zone concurrent with the loss of offsite power, operation will be identical to operation with offsite power available, except for the diesel generator breaker alignment. Diesel generator 1A power transfer breakers will be operated using controls provided on the DS panel to transfer supply from bus 14 to bus 14A. When feeding bus 14A in this mode, diesel generator 1A will be supplying power through a non-safety-related feeder, as shown on Figure 3.

3.0 INSTRUMENTATION AND CONTROL MODIFICATIONS

3.1 CABLE ROUTING

3.1.1 General

It is the intent of the DS modification to meet the requirements of 10CFR 50 Appendix R. Selective cable rerouting will be performed to meet the requirements of section III.G.2. The only exception to these requirements which have been identified are in the RHR pit, the RHR fan cooler area and in the containment basement near four RHR valves. Justification for these exceptions and a request for exemption from the regulations is contained in reference 6.4.

All new cables installed in support of the DS modification will be routed so as to avoid the following critical fire areas:

- Cable tunnel
- Control room (except annunciator circuits from the DS control panel)
- Relay room
- Battery rooms 1A and 1B
- Air-handling room.

In addition, cables installed in support of specific shutdown functions will be routed so as to avoid other critical fire areas, as defined in the following sections.

Where redundant shutdown-related circuits must be routed through a common fire area, train separation in accordance with the requirements of 10 CFR 50, Appendix R shall be maintained.

3.1.2 480-V Distribution Equipment - Switchgear and MCC

In routing new control and power circuits for the 480-V DS switchgear and motor control center, the fire areas listed in Section 3.1.1 will be avoided. In addition, these circuits will be routed outside the following areas:

- Turbine building mezzanine
- Turbine building basement
- Diesel generator room 1B
- Diesel generator 1A and 1B cable vaults
- Screen house operating floor
- Screen house basement floor
- Auxiliary building mezzanine

3.1.3 125V DC and 120V AC Control and Instrumentation Power

All new circuits installed in support of the 125V DC and 120V AC DS power supplies will meet the routing requirements of Sections 3.1.1 and 3.3.

3.2 CONTROL TRANSFER/ISOLATION DEVICES

3.2.1 Inadvertent Control Transfer Protection

The remote control transfer and isolation devices, as shown on Figure 13, will be designed to minimize the probability of inadvertent transfer of control from the control room to the DS panel in the event of fire, seismic event, or missile damage. The transfer-permissive code, as noted on Figure 13, shall be designed to limit this probability to less than 10^{-7}.

The isolation/transfer relay cabinets will be installed in a seismic Category I structure and will be mounted so as to remain physically intact and electrically functional during and after a safe-shutdown earthquake. The transfer relays, isolation devices, and associated components shall be Class 1E-qualified, capable of remaining functional under design-basis seismic and environmental conditions.

3.2.2 Isolation Requirements

In the event of a severe fire in the cable tunnel, relay room, or other critical fire areas, fire-induced electrical faults and "hot shorts" are anticipated. To prevent potentially damaging voltages from reaching (and disabling) DS control circuits, the isolation devices shown on Figure 6 will provide a minimum isolation level of 600V AC.

3.3 INSTRUMENTATION REQUIREMENTS

3.3.1 Pressurizer Level Indication - Wide Range

Install a dedicated pressurizer level monitoring channel, consisting of a transmitter, power supply, and indicator as shown on Figure 9.

The new transmitter will be installed in the containment vessel, and will therefore be located in the same fire area as the redundant shutdown-related transmitter. The redundant transmitters and cables will be separated within containment using one of the following options:

1. Separate redundant transmitters and cables by a horizontal distance of greater than 20 feet, with no intervening cable trays or other combustible materials.

2. Separate redundant transmitters and cables with a radiant energy barrier. This barrier will consist of a fire-resistant blanket wrap around all conduit and a partial shield protecting each transmitter (constructed of structural insulating panels, or equivalent). The shields will be constructed and installed so that radiant energy from a postulated fire in containment cannot simultaneously impinge on both transmitters.

If necessary, other justifiable means may be used to provide separation or to accomplish the function.

Cable routing for the DS, pressurizer level transmitter will avoid the plant areas listed in Section 3.1.1 and the following:

- Auxiliary building mezzanine
- Auxiliary building basement
- Containment electrical penetration area "B"; intermediate building basement -north.

3.3.2 Reactor Coolant System Pressure Indication - Wide Range

A dedicated RCS pressure monitoring channel, consisting of a transmitter, power supply, and indicator as shown on Figure 9 will be installed.

The new transmitter will be installed in the containment vessel, and will therefore be located in the same fire area as the redundant (pressurizer pressure) shutdown-related transmitter. The redundant transmitters and cables shall be separated inside containment as described in Section 3.3.1.

Cable routing for the DS transmitter shall avoid the plant areas listed in Section 3.1.1 and the following:

- Auxiliary building mezzanine
- Containment electrical penetration area occupied by PT 420 circuits.

3.3.3 Steam Generator A and B Level Indication - Wide Range

Install a dedicated level monitoring channel for each steam generator, consisting of a transmitter, power supply, and indicator as shown on Figure 9.

The new transmitters will be installed in the containment vessel, and will therefore be located in the same fire area as the redundant shutdown-related transmitters. The redundant transmitters and cables shall be separated inside containment as described in Section 3.3.1.

Cable routing for the DS transmitters shall avoid the plant areas listed in Section 3.1.1 and the following:

- Auxiliary building mezzanine
- Containment electrical penetration area "B"; intermediate building basement-north.

3.3.4 Steamline A and B Pressure Indication - Wide Range

Install a dedicated pressure monitoring channel for each steamline, consisting of a transmitter, power supply, and indicator as shown on Figure 10.

The new transmitters shall be installed in the intermediate building and shall be located so as to provide separation from the existing (steam generator pressure) transmitters and cables by three-hour-rated fire barriers or equivalent means.

Cable routing for the DS transmitters shall avoid the plant areas listed in Section 3.1.1 and the following:

- Intermediate building mezzanine

3.3.5 Reactor Coolant System Hot and Cold Leg Temperature Indication

It is presently anticipated that dual element RTDs will be installed to replace the existing RTDs. One element will be used for safety related purposes with the other used for the dedicated shutdown system. If these are not installed, then install dedicated temperature monitoring interfaces for the hot and cold legs of both RCS loops. The required hardware, as shown on Figure 11, consists of a millivolt amplifier, a signal repeater, and a temperature indicator for each channel.

The RTDs will be shared with other plant functions. The RTDs will be interfaced at the existing containment electrical penetrations; dedicated circuits to the DS control panel and repeaters will be added to the existing outboard wiring for the RTDs. During normal plant operation, signals are fed to the control/relay room to perform the existing functions while simultaneously indicating temperature on the DS panel. In the event of a fire in the control room, relay room, or other critical area, the repeater will function as an isolation device, preventing loss of signal at the DS panel.

In either case, cable routing for the hot and cold leg temperature channels to the DS panel shall avoid the plant areas listed in Section 3.1.1.

3.3.6 Source-Range Neutron Monitoring Channel

Install a dedicated source-range neutron monitoring channel, as shown on Figure 12, consisting of a preamplifier, a complete source-range instrumentation drawer, and cable and connectors necessary to interface with an existing spare source-range detector. Cable routing for the DS source-range channel shall avoid the plant areas listed in Section 3.1.1

3.3.7 Refueling Water Storage Tank Level Indication - Wide Range

Install a dedicated level monitoring channel, consisting of a transmitter, power supply, and indicator as shown on Figure 10.

The new transmitter shall be installed in the auxiliary building, and shall be located so as to provide separation from the existing RWST level transmitter and cables by three-hour-rated fire barriers or by equivalent means. Cable routing for the DS transmitter shall avoid the plant areas listed in Section 3.1.1.

3.3.8 Condensate Storage Tank Level Indication - Wide Range

Install a dedicated level monitoring channel, consisting of a transmitter, power supply, and indicator as shown on Figure 10. The DS transmitter shall be installed at the condensate storage tank; cable routing for the transmitters shall avoid the plant areas listed in Section 3.1.1.

3.3.9 SI System Cold Leg Injection Line Flow Indication

Install a dedicated flow monitoring channel, consisting of a transmitter, power supply, and indicator as shown on Figure 9.

The new transmitter will be installed in the containment vessel, and will therefore be located in the same fire area as the redundant (SI loop B flow) transmitter. The redundant transmitters and cables shall be separated inside containment as described in Section 3.3.1.

Cable routing for the DS transmitter shall avoid the plant areas listed in Section 3.1.1 and the following:

- Auxiliary building mezzanine

3.3.10 RHR System Flow Indication

Install a dedicated flow monitoring channel, consisting of a transmitter, power supply, and indicator as shown on Figure 10.

The new transmitter shall be installed in the auxiliary building, and shall be located so as to provide separation from the existing (RHR return flow) transmitter and cables by three-hour-rated fire barriers or by equivalent means. Cable routing for the DS transmitter shall avoid the plant areas listed in Section 3.1.1.

3.3.11 Charging Pump Flow Indication

Install a dedicated flow monitoring channel, consisting of a transmitter, power supply, and indicator as shown on Figure 10.

The new transmitter shall be installed in the auxiliary building, and shall be located so as to provide separation from the redundant inventory makeup (Safety Injection) transmitter and cables by three-hour-rated fire barriers or by equivalent means. Cable routing for the DS transmitter shall avoid the plant areas listed in Section 3.1.1

3.3.12 Auxiliary Feedwater Flow Indication

Turbine-Driven Pump

Install a dedicated flow monitoring channel, consisting of a transmitter, power supply, and indicator as shown on Figure 10.

The new transmitter shall be installed in the intermediate building, and shall be located so as to provide separation from the redundant standby auxiliary feedwater pump 1C circuits in accordance with Appendix R Section III.G.2. Cable routing for the DS transmitter shall avoid the plant areas listed in Section 3.1.1.

Standby Auxiliary Feedwater Pump 1C

Install a dedicated flow monitoring channel, consisting of a transmitter, power supply, and indicator as shown on Figure 10.

The new transmitter shall be installed in the standby auxiliary feedwater building, and will be located so as to provide separation from the redundant turbine driven auxiliary feedwater pump circuits in accordance with Appendix R Section III.G.2. In addition, cable routing for the DS transmitter shall avoid the plant areas listed in Section 3.1.1.

3.3.13 Service Water Header Pressure Indication

Install a dedicated flow monitoring channel, consisting of a transmitter, power supply, and indicator as shown on Figure 10. Process taps shall be installed on the auxiliary building service water header. Cable routing for the DS transmitter shall avoid the plant areas listed in Section 3.1.1.

3.4 CONTROL REQUIREMENTS

3.4.1 4160-V Circuit Breaker Controls

Install a control transfer switch, a trip/close selector switch, and indicating lights on the DS control panel for operation of the station service transformer 14A feeder breaker. The breaker used for this service will be the existing compartment in 4160-V bus 12A presently serving station service transformer 14.

The control equipment and wiring shall be configured and will interface with existing controls as shown on Figure 4, and interconnecting cables shall be routed so as to avoid the plant areas listed in Section 3.1.1.

3.4.2 480-V Circuit Breaker Controls

3.4.2.1 Diesel Generator 1A to Bus 14 (Breaker DG1A-1)

Provide controls and indication (as described in 3.4.1) at the DS control panel. Cable routing for these controls shall avoid the plant areas identified in Section 3.1.1 and the following:

- Turbine building mezzanine
- Turbine building basement
- Diesel generator room 1B
- Diesel generator cable vault 1B
- Screen house.

3.4.2.2 Diesel Generator 1A to Bus 14 (Bus 14, Compt. 18C)

Provide controls and indication (as described in 3.4.1) at the DS control panel. Cable routing for these controls shall avoid the plant areas identified in Section 3.1.1 and the following:

- Turbine building mezzanine
- Turbine building basement
- Diesel generator room 1B
- Diesel generator cable vault 1B
- Screen house.

3.4.2.3 Diesel Generator 1A to Bus 14A (Breaker DG1A-2)

Provide controls and indication (as described in 3.4.1) at the DS control panel. Cable routing for these controls shall avoid the plant areas listed in Section 3.1.1 and the following:

- Auxiliary building mezzanine
- Auxiliary building operating floor
- Turbine building mezzanine
- Turbine building basement
- Diesel generator room 1B
- Diesel generator cable vault 1B
- Screen house.

3.4.2.4 Diesel Generator 1A to Bus 14A (Bus 14A, Compt. 2)

Provide controls and indication (as described in 3.4.1) at the DS control panel. Cable routing for these controls shall avoid the plant areas listed in Section 3.1.1 and the following:

- Turbine building mezzanine
- Turbine building basement

- Diesel generator room 1B
- Diesel generator cable vault 1B
- Screen house
- Auxiliary Building

3.4.2.5 Bus Tie - 14 to 14A (Bus 14, Compt. 18B and Bus 14A, Compt. 1)

Provide controls and indication for both breakers (as described in 3.4.1) at the DS control panel. Cable routing for these controls shall avoid the plant areas listed in Section 3.1.1 and the following:

- Turbine building mezzanine
- Turbine building basement
- Diesel generator room 1B
- Diesel generator cable vault 1B

In addition, these breakers shall be provided with a control selector switch and indicating lights in the main control room. Although the cable serving these controls to the control room is not subject to any routing requirements, the control room interface shall be provided with appropriate isolation, through the DS control transfer and isolation cabinet (refer to Figure 4).

3.4.2.6 Diesel Generator 1B to Bus 16 (Breaker DG1B-1)

Provide a breaker control selector switch and indicating lights for this breaker in the main control room only. Cable routing for these controls shall avoid the plant areas listed in Section 3.1.1. This modification is not required for dedicated shutdown and is being performed for commercial reasons only.

3.4.2.7 Station Service Transformer 14A to Bus 14A (Bus 14A, Compt. 12)

Provide controls and indication (as described in 3.4.1) at the DS control panel. Cable routing for these controls shall avoid the plant areas listed in Section 3.1.1 and the following:

- Turbine building mezzanine
- Turbine building basement
- Diesel generator room 1B
- Diesel generator cable vault 1B

In addition, these breakers shall be provided with a control selector switch and indicating lights in the main control room. Although the cable serving these controls to the control room is not subject to any routing requirements, the control room interface shall be provided with appropriate isolation, through the DS control transfer and isolation cabinet (refer to Figure 4.)

3.4.2.8 Diesel Generator 1A to Service Water Pump 1A (Breaker DG1A-3) and Bus 14A to Service Water Pump 1A (Breaker DG1A-4)

Provide controls and indication (as described in 3.4.1) at the DS control panel. Cable routing for these controls shall avoid the plant areas listed in Section 3.1.1 and the following:

- Turbine building mezzanine
- Turbine building basement
- Diesel generator room 1B
- Diesel generator cable vault 1B
- Screen house

In addition, these breakers shall be provided with a control selector switch and indicating lights in the main control room. Although the cable serving these controls to the control room is not subject to any routing requirements, the control room interface shall be provided with appropriate isolation, through the DS control transfer and isolation cabinet (refer to Figure 4.)

By providing controls for breakers DG1A-3 and DG1A-4 on the DS panel, service water pump 1A may be selectively operated from either Bus 14 or 14A, using offsite or onsite power.

3.4.2.9 Charging Pump 1A

Provide breaker controls and indication (as described in 3.4.1 and shown on Figure 4) on the DS control panel. For charging pump 1A, the DS circuit breaker controls shall be supplemented by a pump speed controller, also to be located on the DS panel. This controller shall provide for manual control of pump speed from the DS panel.

Cables associated with the circuit breaker and speed control features shall be routed so as to avoid the plant areas listed in Section 3.1.1 and the following:

- Auxiliary building mezzanine
- Auxiliary building basement (except charging pump room)

3.4.2.10 Component Cooling Pump 1A

Provide controls and indication (as described in 3.4.1) on the DS control panel. Cable routing for these controls shall avoid the plant areas listed in Section 3.1.1.

3.4.2.11 Safety Injection Pump 1A

Provide controls and indication (as described in 3.4.1) on the DS control panel. Cable routing for these controls shall avoid the plant areas listed in Section 3.1.1 and the following:

- Auxiliary building mezzanine
- Charging pump room

3.4.2.12 Residual Heat Removal Pump 1A

Provide controls and indication (as described in 3.4.1) on the DS control panel. Cable routing for these controls shall avoid the plant areas listed in Section 3.1.1 and the following:

- Auxiliary building mezzanine

3.4.2.13 Pressurizer Heater Control Group and SCR Controller Circuit

Provide controls and indication (as described in 3.4.1 and shown on Figure 4) on the DS control panel. For the pressurizer heater control group, the DS circuit breaker controls shall be supplemented by a variable-power controller, also to be located on the DS panel. This controller shall provide for operation of the existing SCR controller from the DS panel.

Cables associated with the circuit breaker and variable-power control features shall be routed so as to avoid the plant areas listed in Section 3.1.1 and the following:

- Auxiliary building mezzanine
- Intermediate building - north and east containment electrical penetration areas.

3.4.2.14 Standby Auxiliary Feedwater Pump 1C

Provide controls and indication (as described in 3.4.1) on the DS control panel. The controls and indication will be installed so as to provide separation from the redundant turbine driven auxiliary feedwater pump circuits in accordance with Appendix R Section III.G.2. Cable routing shall avoid the plant areas listed in Section 3.1.1 and the following:

- Auxiliary building mezzanine
- Intermediate Building

It should be noted that standby auxiliary feedwater pump 1C will remain on 480-V Bus 14 (i.e., will not be reassigned to 480-V DS Bus 14A). However, the control and indication features will be configured as shown on Figure 4.

3.4.2.15 Instrument Air Compressor 1A

For instrument air compressor 1A, provide controls and indication (as described in 3.4.1) on the DS control panel. Cable routing for these controls shall avoid the plant areas listed in Section 3.1.1 and the following:

- Auxiliary building mezzanine

3.4.3 480-V Motor Starter Controls

3.4.3.1 Safety Injection Pump Cooling Unit 1A

Provide controls and indication (as described in 3.4.1 and shown on Figure 4) on the DS control panel. Cable routing for these controls shall avoid the plant areas listed in Section 3.1.1 and the following:

- Charging pump room
- Auxiliary building mezzanine

3.4.3.2 Residual Heat Removal Pump Cooling Unit 1A

Provide controls and indication (as described in 3.4.1) on the DS control panel. Cable routing for these controls shall avoid the plant areas listed in Section 3.1.1 and the following:

- Auxiliary building mezzanine

3.4.3.3 (New) DS Charging Pump Room Cooling Unit

Provide controls and indication (as described in 3.4.1) on the DS control panel. Cable routing for these controls shall avoid the plant areas listed in Section 3.1.1 and the following:

- Auxiliary building mezzanine
- Auxiliary building basement (outside charging pump room)

3.4.3.4 Turbine-Driven Auxiliary Feedwater Pump Oil Pump

Provide controls and indication (as described in 3.4.1) on the DS control panel. The controls and indication will be installed so as to provide separation from the redundant standby auxiliary feedwater pump circuits in accordance with Appendix R Section III.G.2. Cable routing for these controls shall avoid the plant areas listed in Section 3.1.1 and the following:

- Auxiliary building mezzanine
- Standby auxiliary feedwater building

3.4.3.5 Pressurizer Relief Block Valves V-515, V-516

Install control transfer switches, open/close selector switches, and valve position indicating lights on the DS control panel for operation of motor-operated valves V-515 and V-516. The DS control and indication circuits associated with valve V-515 shall be configured as shown on Figure 6. Cable routing for the DS circuits shall avoid the plant areas listed in Section 3.1.1 and the following:

- Auxiliary building mezzanine

Within containment, cables serving block valve V-515 shall be separated from cables serving the associated PORV, PCV-431C, using one of the methods described in Section 3.3.1.

Pressurizer relief valve train "B" is normally associated with power distribution train B, and consequently, block valve V-516 will not be permanently assigned to the DS MCC (train A). In order to provide for operation of V-516 from the DS MCC under post-fire conditions, it is necessary to provide both control and power transfer features, as shown on Figure 7. The control transfer is similar to that used for V-515; the power transfer requires a 480-V contactor scheme, operated by the control transfer relay located in the control transfer and isolation cabinet. (Transfer of valve control will simultaneously cause actuation of the contractors to transfer power sources.) Cable routing for the valve V-516 DS circuits shall be subject to the same requirements applicable to V-515.

Within containment, cables serving block valve V-516 shall be separated from cables serving the associated PORV, PCV-430, using one of the methods described in Section 3.3.1.

3.4.3.6 Service Water Auxiliary Building Isolation Valves 4615, 4616, 4734, 4735

Install control transfer switches, open/close sector switches, and valve position indicting lights on the DS control panel for operation of motor-operated valves 4615, 4616, 4734, and 4735. The DS control and indication circuits associated with valves 4616 and 4615 shall be configured as shown on Figure 6. Cable routing for the DS circuits shall avoid the plant areas listed in Section 3.1.1 and the following:

- Auxiliary building mezzanine

In order to provide for the operation of valves 4735 and 4734 from the DS MCC under post-fire conditions, it is necessary to provide both control and power transfer features, as shown on Figure 7. Cable routing for valve 4735 and 4734 DS circuits shall be subject to the same requirements applicable to valves 4616 and 4615.

3.4.3.7 Safety Injection Pump Suction Valve V-825A

Install a control transfer switch, an open/close selector switch, and valve position indicating lights on the DS control panel for operation of motor-operated valve V-825A. The DS control and indication circuits associated with valve V-825A shall be configured as shown on Figure 6. Cable routing for the DS circuits shall avoid the plant areas listed in Section 3.1.1 and the following:

- Auxiliary building mezzanine
- Charging pump room

3.4.3.8 Turbine-Driven Auxiliary Feedwater Pump Steam Supply Valve V-3505

Install a control transfer switch, an open/close selector switch, and valve position indicating lights on the DS control panel for operation of motor-operated valve V-3505. The DS control and indication circuits associated with valves V-3505 shall be configured as shown on Figure 6. Cable routing for the DS circuits shall avoid the plant areas listed in Section 3.1.1 and the following:

- Standby auxiliary feedwater building

3.4.4 125-VDC Air-Operated Valve Controls

3.4.4.1 Turbine-Driven Auxiliary Feedwater Pump Discharge Valves CV-54 CV-55

Install a control transfer switch, manual/auto control station, and valve position indication on the DS control panel for operation of each of these valves. The DS control and indication circuits associated with each of these valves shall be configured as shown on Figure 8 (throttling-type valves). Cable routing for the DS circuits shall avoid the plant areas listed in Section 3.1.1 and the following:

- Auxiliary building mezzanine
- Standby auxiliary feedwater building

3.4.4.2 Pressurizer PORVs PCV-430, PCV-431C

Install a control transfer switch, a manual/auto control station, and valve position indication on the DS control panel for operation of each of these valves. The DS control and indication circuits associated with each of these valves shall be configured as shown on Figure 8 (throttling-type valves). Cable routing for the DS circuits shall avoid the plant areas listed in Section 3.1.1 and the following:

- Auxiliary building mezzanine

Within containment, cables serving relief valve PCV-431C shall be separated from cables serving the associated block valve, V-515, using one of the methods described in Section 3.3.1. Cables serving relief valve PCV-430 shall be separated from cables serving the associated block valve, V-516, in a similar manner.

3.4.4.3 Main Steam PORVs CV-56, CV-57

Install a control transfer switch, a manual/auto control station, and valve position indication on the DS control panel for operation

of each of these valves. The DS control and indication circuits associated with each of these valves shall be configured as shown on Figure 8. Cable routing for the DS circuits shall avoid the plant areas listed in Section 3.1.1 and the following:

- o Auxiliary building mezzanine
- o Turbine building basement

3.5 STATUS INDICATION

Indicating lights shall be provided on the DS control panel to visually annunciate the operating status of a number of components. The DS panel will have no capability for control of these components. Install a dedicated position monitoring circuit for each valve listed below. Each circuit shall consist of an electrically isolated interface with the existing valve position switches; isolation will be established through the DS control transfer and isolation cabinet. Contact outputs shall be provided to lights on the DS control panel, which will indicate valve fully open, valve partly open (or travelling), or valve fully closed.

Cable routing for these circuits shall avoid the plant areas listed in Section 3.1.1 and the auxiliary building mezzanine.

Valves requiring DS position monitoring circuits:

- o RHR isolation valves V-700, V-701, V-720, V-721
- o RWST to SI pump suction valve V-825A
- o RHR heat exchanger component cooling water inlet valve V-738A
- o SI accumulator discharge valves V-841, V-865

4.0 ASSOCIATED CIRCUITS/DEDICATED SHUTDOWN IMPACT

4.1 IDENTIFICATION OF ASSOCIATED CIRCUITS AND MEANS OF RESOLUTION

Circuits that may be associated with dedicated shutdown cables or components are those separated from the DS equipment by less than the extent allowable by Section III.G.2 of 10 CFR 50, Appendix R and having one or more of the following characteristics:

1. A common power source with DS equipment and the power source is not electrically protected from the associated circuits by appropriate isolation devices.

2. Connection to circuits of equipment whose spurious operation will adversely affect the shutdown capability.

3. A common enclosure (raceway or cabinet) with DS cables and not isolated from the DS circuits by suitable isolation devices.

At present, associated circuits of all three types exist at Ginna Station in the normal shutdown circuits; these will be resolved by the design of the DS modification, as follows (numbers correspond to the type of associated circuit, as defined above):

Type 1

During post-fire operation, the DS power sources will interface only with DS loads, as described in Section 4.3 and shown on Figures 1, 2, 3, and 5. All associated circuits will be isolated from the DS power sources by open circuit breakers or contactors providing a minimum isolation level of 600 VAC.

Type 2

Isolation -- During post-fire operation, DS-related circuits will be isolated from all other circuits as described in Sections 4.3 through 4.7; DS equipment will not be affected by failures of any non-DS (associated) circuits.

Rerouting -- Circuits serving some components whose spurious actuation could adversely affect DS equipment are, at present, routed through fire areas also occupied by the existing shutdown DS circuits. Although these circuits may not be directly connected to shutdown equipment, they are subject to damage (with resultant spurious actuations) as a result of fires that may also damage shutdown circuits. By implementing the installation/routing requirements of Section 3.4, the separation requirements of 10 CFR 50, Appendix R, Section III.G.2 will be met; new DS circuits will be separated from the existing associated circuits in accordance with the routing instructions of section 3.4.

Typical cable rerouting (for charging pump 1A) is illustrated by Figure 14. Because the dedicated shutdown modification is presently at the conceptual design stage, detailed schematic drawings are not yet available for submittal.

Deenergization -- Several valves will be deenergized (AC power disconnected) during normal plant operation to preclude the occurrence of fire-induced spurious actuations that would adversely affect the operation of DS equipment. This administrative modification is described in Section 5.2.

Type 3

All DS circuits will be routed in dedicated conduit, and will share no common raceways with any (non-DS) circuits. Where DS and non-DS circuits must occupy a common panel (i.e., control transfer and isolation relay cabinet), they will be isolated as described in Sections 4.4, 4.5, and 4.6, and as shown on Figures 4 through 8.

4.2 GENERIC CABLE ROUTING CONSIDERATIONS

Circuits that are associated with existing shutdown cables, power sources, or components are presently located in many of the plant fire areas. These circuits are located predominantly in the fire areas containing high-density cable routing, particularly in cable trays. These areas include the following:

- Air handling room
- Battery rooms 1A and 1B
- Cable tunnel
- Containment electrical penetration areas
- Relay room
- Control room

Because of the high density of cables in these areas and the complexity of cable routing, no attempt has been made to selectively separate the existing shutdown circuits from their associated circuits. As described in Section 3 of this document, the new dedicated shutdown circuits will be routed outside these areas, in separate conduit, with appropriate electrical isolation at all dedicated shutdown/normal shutdown circuit interfaces.

For each DS component, additional specific cable routing requirements are imposed, as described in Section 3. These additional requirements were developed based on the routing of existing cables serving the (redundant) shutdown-related components. The additional cable routing instructions are provided in order to ensure that both the normal and DS circuits for a given shutdown function are not routed through common fire areas.

4.3 DEDICATED SHUTDOWN POWER DISTRIBUTION

Figure 1 is a single-line representation of the shutdown-related 480-V distribution system; Figures 2 and 3 describe the 480-V system configuration for plant normal and emergency (post-fire) operating conditions, respectively. A detailed description of the circuit breaker alignment under both operating conditions is provided in Section 2. Under DSS operating conditions, 480-V Busses 14 and 14A will be electrically separated by opening of the bus tie breakers. No electrical loads other than those required for safe shutdown (and shown on Figure 1) will be connected to Bus 14A under these conditions. Consequently, any fire-induced failures or spurious actuations affecting Bus 14 will have no effect on DS Bus 14A.

Figure 5 illustrates the concept used for energization of DS 125-V DC control circuits. Concurrent with the isolation of Bus 14A for post-fire operations, the control power source will be transferred from the station battery bus to the Technical Support Center 125-V DC battery system. The TSC 125V DC system will be provided with manual disconnect switches which will permit the DS system to be energized independent of other TSC DC loads. In this way any fire induced faults that may affect the TSC

equipment (including the safety parameter display system, SPDS) will be isolated from the source supplying the DS system. In addition, these provisions will allow the use of the TSC/SPDS during fire and post fire conditions, if required.

4.4 DEDICATED SHUTDOWN EQUIPMENT CONTROL CIRCUITS

As shown on Figure 1, all DS-related 480-V switchgear loads, with the exception of standby auxiliary feedwater pump 1C, are permanently assigned to 480-V (DS) Bus 14A. Figure 6 presents a typical configuration to be used in implementing the DS control transfer and isolation features for the components supplied by this bus.

When operating from the control room, the circuits serving the DS control panel are isolated from the control room circuits by relay K1. In addition, the control circuit at the switchgear cubicle is buffered from the control room through a separate isolation circuit. This circuit serves to protect the circuit at the switchgear from potentially damaging overvoltage conditions that may be introduced in circuits routed to the control room in the event of a fire in one of the areas listed in Section 4.2.

When operating from the DS control panel, the normal and DS circuits continue to be isolated by relay K1. In this way, any fire affecting the normal control circuits will have no effect on the DS circuits serving the shutdown component.

The power circuits serving the components on Bus 14A are not associated with any non-DS circuits; in the event of a fire that damages one of these circuits or Bus 14A, the redundant bus (14) circuits and components will be available for shutdown service as a result of the cable routing precautions addressed in Section 4.2 and Section 3.4.

4.5 480-V DEDICATED SHUTDOWN MOTOR STARTER LOADS

For 480-V non-reversing starter loads (e.g., charging pump room cooling unit), the isolation, control transfer, and control concepts shown on Figure 4 and described in Section 4.4 will apply.

For 480-V reversing starter loads (motor-operated valves), the isolation, control transfer, and control concepts shown on Figures 6 and 7 and described in Section 4.4 will apply. It should be noted that Figure 7 addresses motor-operated valves normally assigned to a Train B motor-control center; control and power for these valve operators are transferred to the Train A DS MCC for post-fire shutdown operations, as shown. As a result of the electromechanical interlocks (transfer relays and contactors shown on Figure 7), at no time will train A and train B power be present in a common enclosure. Separation and isolation between trains A and B will meet the requirements of Regulatory Guide 1.75 and Appendix R Section III.G.3.

A listing of the DS-related motor starter loads is provided as Table 3.

4.6 DEDICATED SHUTDOWN AIR-OPERATED VALVE CONTROLS

The isolation, control transfer, and control concepts shown on Figure 8 and described in Section 4.4 are also applicable for 125-V DC air-operated valve controls.

4.7 DEDICATED SHUTDOWN INSTRUMENTATION

Typical configurations for dedicated shutdown instrument channels are presented as Figures 9, 10, 11, and 12. With the exception of the reactor coolant system temperature-monitoring channels (Figure 11), all instrumentation channels are electrically independent from the normal instrument channels and are designated solely for dedicated shutdown service. All instrument channels depicted by Figures 9, 10, and 12 are stand-alone channels, having no electrical interface with any (control room) instrument loops or station vital power sources. Power is supplied from the TSC uninterruptible power supply, and cables serving these loops will be routed in accordance with the criteria of Section 3.3. Consequently, any failure affecting normal plant instrument loops, power supplies, or indicators will have no impact on these dedicated shutdown instrument loops.

The reactor coolant temperature-monitoring channels will be installed in accordance with similar criteria, with the exception that the channels will interface with existing sensors. The configuration, as shown on Figure 11, provides for dedicated displays on the DS control panel; the signal to the control room, however, is buffered through a repeating unit. In the event of a fire affecting any of the critical areas listed in Section 3.1.1, the circuits serving control room RCS temperature-monitoring loops may be damaged. The repeater, as shown, will isolate faults or hot shorts from the DS control panel circuits.

These instrument channels will also be powered by the TSC uninterruptible power supply, and therefore will not be subject to loss of function as a result of (potential) station vital power system failure. Cables serving these channels will be routed in accordance with the criteria of Section 3.3.5.

5.0 OPERATIONAL REQUIREMENTS

5.1 DS CONTROL PANEL OPERATIONAL SEQUENCE

During normal plant operation, the DS (control) panel will be deenergized, with all components under control from the control room. In the event of a fire that may affect shutdown-related equipment trains, the DS panel will be activated through the DS control permissive interlock. Control for individual components will then be transferred to the DS panel at the discretion of the shift foreman.

In the event of a fire that only affects few DS-related components, plant operation may be shared between the control room and the DS panel for some time. Continuous communications will be maintained between the control room and DS panel under these conditions. In the event of a catastrophic fire, all controls will be transferred to the DS panel, which will then serve as the only control/operating station.

Early in the fire scenario, all DS instrumentation (if not already energized) will be energized simultaneously and will remain energized to ensure the stability of all indications. After the fire has been extinguished and equipment damage assessed and repaired (as required), control for the DS components will be transferred back to the control room on a selective basis, at the discretion of the shift foreman.

5.2 ADMINISTRATIVE MODIFICATIONS REQUIRED

Several motor-operated valves which control critical flow paths are subject to spurious actuation in the event of a fire that causes shorting of control cables. Individual valves could, in that event, isolate a critical flow path or open other flowpaths, leading to potential LOCA conditions or drainage of critical makeup water supplies.

Because these valves can be manually actuated if required, and do not have automatic safety-related functions, they will be deenergized during normal plant operation (control power removed or MCC circuit breaker tripped) to preclude the possibility of spurious actuation. The control for the RWST discharge valves will be modified to prevent spurious actuation and also to allow post LOCA operation of the valves in a timely manner.

The affected valves are:

- RHR isolation valves V-700, V-701, V-720, V-721
- RWST delivery valve V-856
- RWST discharge valves V-896A, V-896B
- Safety injection cold leg injection valves V-878B, V-878D
- Safety injection accumulator isolation valves V-841, V0865

6.0 REFERENCES

6.1 Fire Protection - Shutdown Analysis, RG&E letter from L. D. White, Jr., to Mr. Dennis L. Ziemann, USNRC, dated December 28, 1979. This study evaluates cable and equipment locations for equipment that could be used for plant shutdown in the event of a fire in any given fire zone. Both failure of the equipment to function when required and inadvertent operation were postulated in order to address all possible scenarios.

6.2 Fire Protection Safe Shutdown Capability Analysis, RG&E letter from John E. Maier to Mr. Dennis M. Crutchfield, USNRC, dated March 1981. Utilizing the December 28, 1978

submittal as a program basis, this report identifies the plant modifications required to ensure the capability to bring the plant to cold shutdown following a severe fire in any fire area. The modification, as described, provides for a dedicated shutdown control panel, dedicated instrumentation and displays, dedicated controls and power supplies for critical (dedicated-shutdown-related) components, and several plant physical modifications required for fire protection purposes.

6.3 Fire Protection Dedicated Shutdown System, RG&E letter from John E. Maier to Mr. Dennis M. Crutchfield, USNRC, dated May 19, 1981. This transmittal provided responses to NRC questions concerning safe-shutdown capability, and further described features of the proposed dedicated shutdown system.

6.4 Fire Protection Dedicated Shutdown System, RGE letter from John E. Maier to Mr. Dennis M. Crutchfield, USNRC, dated October 16, 1981. This letter provided commitments for DSS instrumentation and addressed plant capability to achieve cold shutdown in 72 hours.

TABLE 1
DEDICATED SHUTDOWN MODIFICATION
FUNCTIONAL AND HARDWARE REQUIREMENTS

Plant Functional Requirements	Equipment Functional Requirements	Minimum Equipment Requirements
Monitor and control primary system inventory and pressure	Monitor RCS inventory	One dedicated wide-range pressurizer level channel
	Provide borated makeup water	Charging pump 1A and injection path or SI pump 1A and injection path
	Borated makeup water source	RWST and level indication
	Monitor RCS pressure	One dedicated wide-range pressurizer pressure channel
	Pressure control-increase	Charging pump 1A and injection path or SI pump 1A and injection path; pressurizer heater control group
	Pressure control-decrease	Pressurizer PORVs and main steam PORVs
	Provide RCS letdown capability	Letdown isolation valves, letdown orifices, temperature/pressure control valves, and letdown heat exchanger

TABLE 1 (Continued)

Plant Functional Requirements	Equipment Functional Requirements	Minimum Equipment Requirements
Remove decay heat by: a) Feedwater addition to the steam generators with steam venting to atmosphere	Provide feedwater	Turbine-driven auxiliary feedwater pump and associated valves or standby auxiliary feedwater pump 1C and associated valves
	Monitor steam generator level	One dedicated wide-range level channel per loop
	Vent main steam to atmosphere	Main steam PORVs and positioners
	Monitor RCS temperature	One dedicated channel of cold leg and hot leg temperature per loop.
b) Decay heat removal to cold shutdown	Remove residual heat	RHR pump 1A, heat exchanger 1A, and associated valve train. If the RHR system is unavailable, utilize secondary coolant loop in solid steam generator operation.
Verify that reactor is subcritical	Monitor RCS boron concentration to ensure that subcriticality is maintained or monitor neutron flux	Dedicated source-range neutron monitoring channel

TABLE 1 (Continued)

Plant Functional Requirements	Equipment Functional Requirements	Minimum Equipment Requirements
Auxiliary services required by the components that directly perform the above functions	Component cooling	Component cooling pump 1A and associated valve train
	Service water	Service water pump 1A and associated valves
	480-Vac power distribution	One 480-V bus: 14A/14, or 16, and associated MCC
	120-Vac power distribution	Technical Support Center 120-V UPS distribution panel
	125-Vdc power distribution	Technical support center 125-V DC distribution panel
	Emergency AC power source	Diesel generator 1A and support systems
	Pump cooling: RHR, charging, and SI	One fan cooler per system
Auxiliary services provided for operator convenience	Instrument air	One (instrument air) compressor and containment instrument air isolation valves. Provisions shall also be made for the connection of an additional (portable) air compressor to the existing system.

TABLE 2

DEDICATED SHUTDOWN EQUIPMENT
DS CONTROL PANEL - CONTROLS AND INSTRUMENTATION

INSTRUMENTATION

Reactor Coolant System

Pressurizer Level - Wide Range
Pressurizer (or RCS) Pressure - Wide Range
Cold and Hot Leg Temperature (Both RCS Loops)
Source-Range Neutron Monitoring Channel

Secondary System

Steam Generator A Level - Wide Range
Steam Generator B Level - Wide Range
Steamline A and B Pressure - Wide Range

Support Systems

Refueling Water Storage Tank Level - Wide Range
Condensate Storage Tank Level - Wide Range
Safety Injection System Cold Leg Injection Line Flow
RHR System Flow
Charging Pump Flow
Auxiliary Feedwater Flow (Turbine-Driven Pump)
Auxiliary Feedwater Flow (Standby Auxiliary Feedwater Pump 1C)
Service Water Header Pressure
Component Cooling Water Header Pressure

CONTROLS

4160-V Circuit Breaker Controls

The single control unit will operate the station service transformer 14A feeder breaker, to be located in 4160-V switchgear bus 12. The control unit consists of:

- Control transfer switch
- Trip/close selector switch
- Trip/close indicating lights

TABLE 2 (Continued)

CONTROLS (Continued)

480-V Circuit Breaker Controls

Each control unit consists of:

- o Control transfer switch
- o Trip/close selector switch
- o Trip/close indicating lights

Diesel Generator 1A to Bus 14 (Breaker DG1A-1)
Diesel Generator 1A to Bus 14 (Bus 14 Compt. 18C)
Diesel Generator 1A to Bus 14A (Breaker DG1A-2)
Diesel Generator 1A to Bus 14A (Bus 14A Compt. 2)
Bus Tie - 14 to 14A (Bus 14 Compt. 18B)
Bus Tie - 14 to 14A (Bus 14A Compt. 1)
Station Service Transformer 14A to Bus 14A (Bus 14A Compt. 12)
Diesel Generator 1A to Service Water Pump 1A (Breaker DG1A-3)
Bus 14A to Service Water Pump 1A (Breaker DG1A-4)
Charging Pump 1A (including speed control)
Component Cooling Pump 1A
Safety Injection Pump 1A
Residual Heat Removal Pump 1A

Pressurizer Heater Control Group and (variable-power) SCR Controller Circuit
Standby Auxiliary Feedwater Pump 1C
Instrument Air Compressor 1A

480-V Motor Starter Controls

Each control unit consists of:

- o Control transfer switch
- o Run/stop pushbutton switches (non-reversing starters)
- o Open/close selector switch (reversing starters)
- o Run/stop or open/closed indicating lights

Non-Reversing Starters
Safety Injection Pump Cooling Unit 1A
DS Charging Pump Room Cooling Unit
RHR Pump Cooling Unit 1A
Turbine-Driven Auxiliary Feedwater Pump Oil Pump
Reversing Starters
Pressurizer Relief Block Valve V-515
Service Water Auxiliary Building Isolation Valve 4616
Safety Injection Pump Suction Valve V-825A
Service Water Auxiliary Building Isolation Valve 4615
Turbine-Driven Auxiliary Feedwater Pump Steam Supply Valve V-3505
Pressurizer Relief Block Valve V-516
Service Water Auxiliary Building Isolation Valve 4734
Service Water Auxiliary Building Isolation Valve 4735

TABLE 2 (Continued)

CONTROLS (Continued)

DC Controls/Pilot-Solenoid-Operated Valves

Each control unit consists of:

- o Control transfer switch
- o Open/close selector switch
- o Open/closed indicating lights

Turbine-Driven Auxiliary Feedwater Pump Discharge Valves CV-54, CV-55

Pressurizer PORVs PCV-430, PCV-431C

Main Steam PORVs (atmospheric dump) CV-56, CV-57

Miscellaneous Controls

(Variable-speed, proportional, setpoint stations, flow controllers)

Charging Pump 1A Speed Controller

Pressurizer Heater Control Group Variable-Power (SCR control) Circuit

Diesel Generator 1A 125-VDC Control Power Transfer Switch

STATUS INDICATION ONLY

No controls for this equipment are provided on the DS control panel; operation is by either local automatic control or direct manual operation, as applicable. Status indication consists of "run/stop" or "open/closed" indicating lights.

RHR Isolation Valves V-700, 701, 720, 721
RWST to SI Pump Suction Valve V-825A
RWST Discharge Valves V-896A, B
RHR Heat Exchanger Component Cooling Water Inlet Valve V-738A
SI Accumulator Discharge Valves V-841, V-865

TABLE 3
480-V MOTOR CONTROL CENTERS 1C, 1D, AND DS
LOAD SCHEDULE - MODIFIED FOR DEDICATED SHUTDOWN

NON-DS LOADS	DS LOADS
Remain on MCC-1C	Reassigned from MCC-1C to DS MCC
Sump Tank Pump 1A	Turbine-Driven Auxiliary Feedwater Pump Oil Pump
Boric Acid Trans. Pump 1A	Pressurizer Relief Block Valve V-515
Reactor Compt. Fan 1A	Service Water Aux. Bldg. Isolation Valve 4616
Aux. Bldg. Charc. Filt. Fan 1A	
Aux. Bldg. Exh. Fan 1E	Safety Injection Pump Suction Valve V-825A
Mot. Dr. Aux. FPIA Oil Pump	RHR Heat Exchanger Inlet Valve V-738A
Penetration Cooling Fan 1A	
Reactor Cool. Dr. Tank Pump 1A	Service Water Aux. Bldg. Isolation Valve 4615
Vap. Cont. Aux. Filt. Fan 1A	Charging Pump Fan 1A
Chg. Pump Leak Off Return Pump 1A	RHR Pump Fan 1A
Spent Fuel Pit Pump	Safety Injection Pump Fan 1A
Boric Acid Tank 1A Htr.	Feeder to MCC-1H (DG1A Auxiliaries)
Conc. Holding Tank Htr.	Loads Transferred from MCC-1D to DS MCC During or Following a Fire In a Critical Area*
Constant Volt Inst. Transf. 1A	Pressurizer Relief Block Valve V-516
Battery Charger 1A	Service Water Auxiliary Building Isolation Valve 4734
Ltg. Transf. 1D	
Emerg. Ltg. Transf. 1A	

*These loads normally assigned to MCC-ID

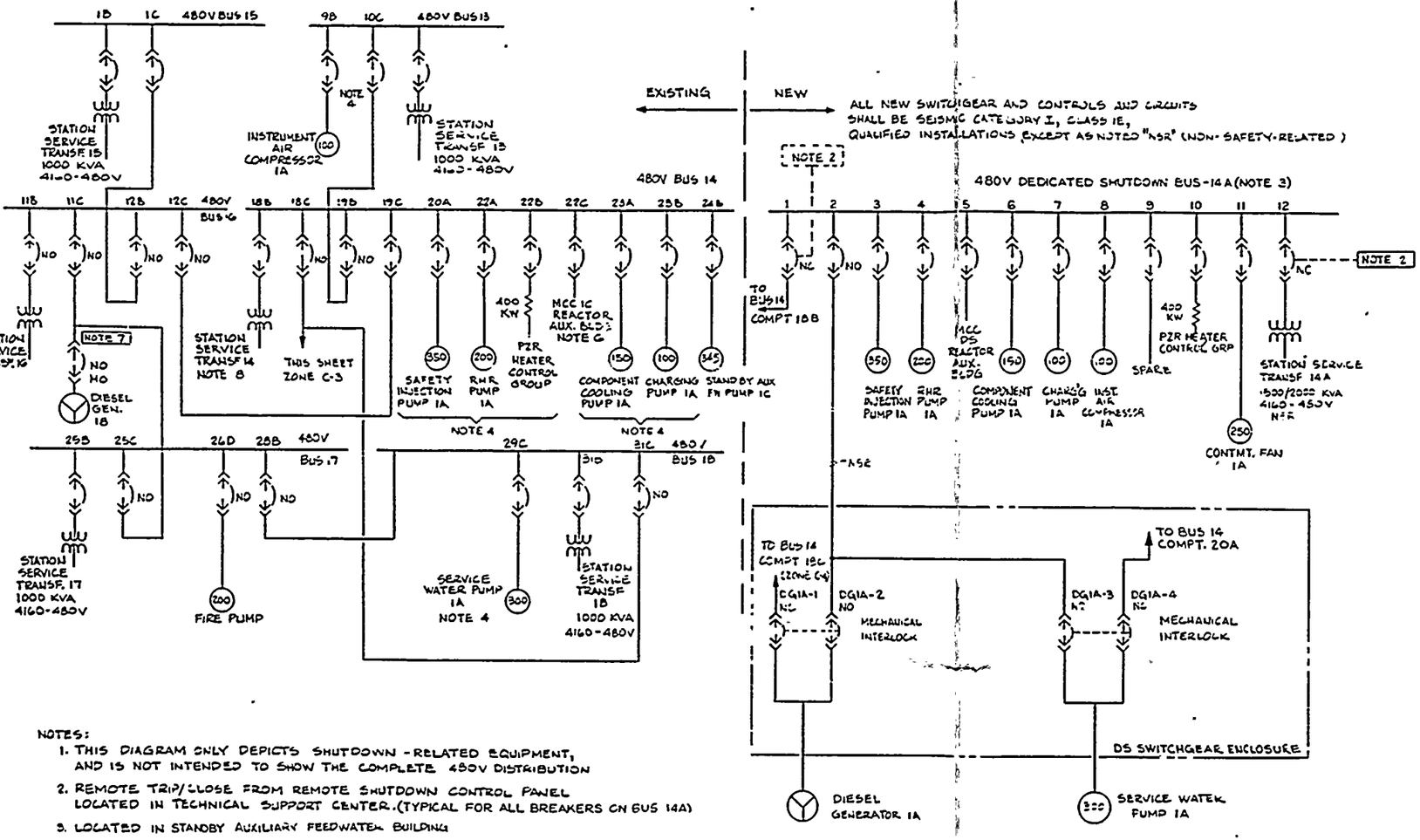
TABLE 3 (Continued)

NON-DS LOADS	DS LOADS
Heat Trace Transf. 1A	Service Water Auxiliary Bldg. Isolation Valve 4735
Paging System Transf.	
A.B. Vent Air Part. Mon. Pump	
Aux. Bldg. Supply Fan 1B Emergency Ltg.	
H_2 Recombiner Cont. Pnl. 1A	
Inst. Htrs. Transf. 1A	
480-V MCC #1K	
480-V MCC #1H	
Valve 850A - Cont. Sump Suct.	
Mot. Dr. Aux. F.P. 1A Disch. Valve	
Valve 700 - Res. Heat. Hot Leg Valves	
Valve 720 - Res. Heat. Rem. Loop	
Valve 852A - RHR Loop Inlet to R.V.	
Valve 857A - RHR Loop Ref. Wtr.	
Valve 878A - S.I. Loop A Hot Leg	
Valve 878C - S.I. Loop A Cold Leg	
Valve 860A - C.S. Pump 1A Disch.	
V896A - Ref. W Storage Tank Outlet	
826A Emerg. Boric Acid Inj. Valve	
826B Emerg. Boric Acid Inj. Valve	
Valve 856 - Refuel. W. to R.H.P.	
813 React. Sup. Cool. Line In	
749A R.C.P. 1A Comp. Cool. In.	

TABLE 3 (Continued)

NON-DS LOADS	DS LOADS
851A Ctmt. Sump Suct.	
871A S.I. Crossover	
860C Cont. Spray Pump 1B Disch.	
480V MCC 1L	
Air Cond. Chiller Serv. Wtr. Iso. Vlv. 1A1	
Mot. Dr. Aux. FPIA Serv. Wtr. Sup. Vlv.	
Accum. Tank 1A Shutoff Vlv. #841	
Vlv. 759A - C.W. From R.C.P.	
React. Makeup Water Pump 1A	
Refuel Water Purification Pump	
Valve 313 - RCP Seal Wtr. Out.	
1813A - R.C. Dr. Tank Pump Suct. 1A	
V875A - Char. Filter 1A Dousing	
V876A - Char. Filter 1B Dousing	
Aux. Bldg. Serv. Wtr. Iso. Vlv. 1B1	
Relay M6-6 (RIC)	
V704A R.H. Removal Pump A Suct.	
V857C R.H. Exchanger 1A Out to RWST	
V1815A SI Sump 1C Suct.	
Aux. Bldg. Sump Pump 1A	
480V - Inverter/Cvt. 1A	
S.I. Pump Fan 1C	

REVISIONS	
A	ISSUED FOR REVIEW
B	REVISED PER CLIENT COMMENTS CHANGED DWG NO FROM E-6000 TO M4000.



NOTES:

1. THIS DIAGRAM ONLY DEPICTS SHUTDOWN-RELATED EQUIPMENT, AND IS NOT INTENDED TO SHOW THE COMPLETE 480V DISTRIBUTION
2. REMOTE TRIP/CLOSE FROM REMOTE SHUTDOWN CONTROL PANEL LOCATED IN TECHNICAL SUPPORT CENTER. (TYPICAL FOR ALL BREAKERS ON BUS 14A)
3. LOCATED IN STANDBY AUXILIARY FEEDWATER BUILDING
4. ABANDON EXISTING CONNECTION, RECONNECT TO 480V DEDICATED SHUTDOWN BUS 14A.
5. NO INDICATES BREAKER NORMALLY OPEN. NC INDICATES BREAKER NORMALLY CLOSED.
6. MCC-1C NON-SHUTDOWN RELATED LOADS ONLY. ALL SHUTDOWN RELATED LOADS ARE PERMANENTLY REASSIGNED TO NEW DS MCC, FED FROM BUS 14A.
7. DIESEL GENERATOR BREAKER TO BE INSTALLED FOR DG1B, SIMILAR TO DG1A.
8. ABANDON EXISTING CONNECTION TO STATION SERVICE TRANSFORMER 14. RECONNECT LINE SIDE OF BREAKER 18B.
9. REASSIGNMENT OF LOADS ON BUS 14 WILL REQUIRE THAT CIRCUIT BREAKER FRAME SIZES, RATINGS, AND PROTECTION BE REEVALUATED AND MODIFIED ACCORDINGLY.

DRAWING STATUS: PRELIMINARY

DESIGNED	T Tubbs	7/20/81
CHECKED	NTK	7/31/81
COG. RESP. ENGR.	RE Ellis	7/31/81
PROJECT MGR.		7/31/81
APPROVAL		
APPROVAL		
APPROVAL PROJ.		
APPROVAL CLIENT		

ROCHESTER GAS & ELECTRIC CORPORATION
ROBERT EMMETT GINNA NUCLEAR POWER STA. UNIT NO. 1

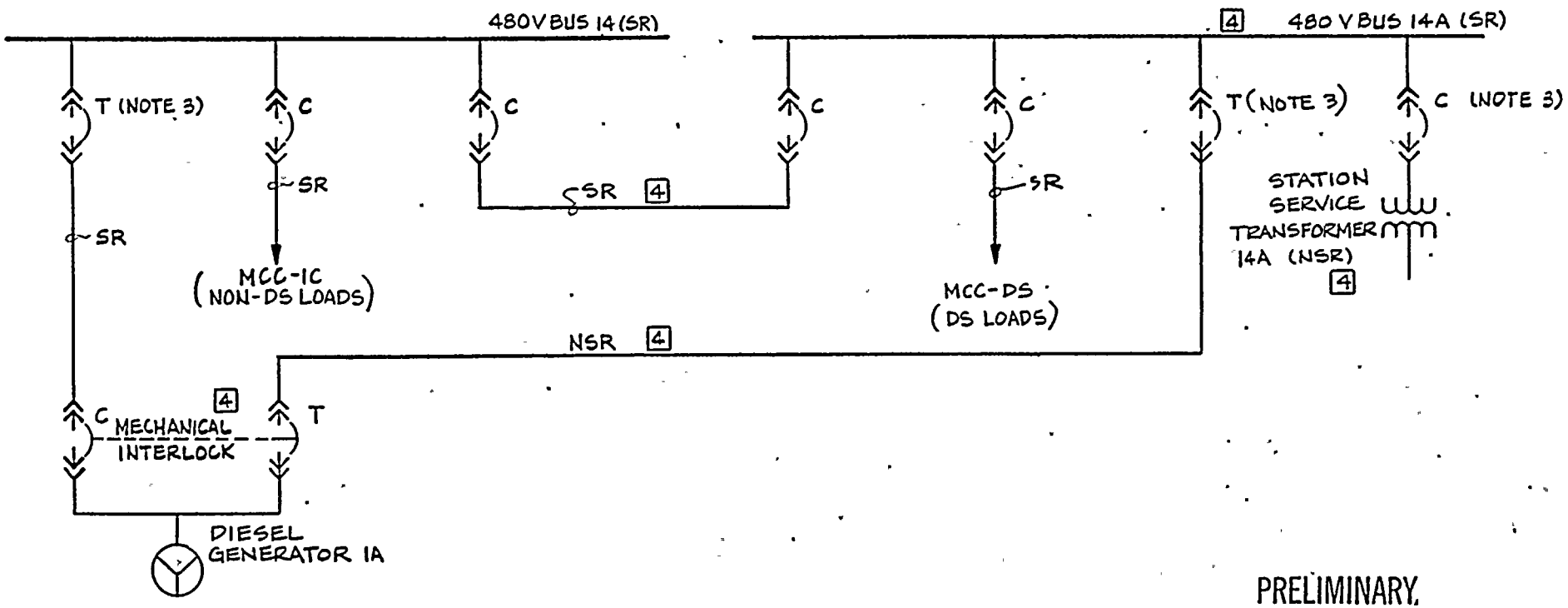
480 V POWER DISTRIBUTION ONE LINE DIAGRAM

NUS CORPORATION ROCKVILLE MD

5426M4000 D

SCALE N/A

FIGURE 1



PRELIMINARY

NOTES:

1. T = BREAKER TRIPPED
   C = BREAKER CLOSED
2. SR= SAFETY-RELATED BUS OR FEEDER
   NSR= NON-SAFETY-RELATED BUS OR FEEDER
3. BREAKER POSITION SHOWN FOR OFFSITE POWER AVAILABLE. BREAKER TO CHANGE STATE IN THE EVENT OF LOP. (UV TRIP)
4. NEW COMPONENT – ADDED BY DS MODIFICATION

	Date
DRAWN R. Billeland	7/24/81
CHECKED M T Kleiman	10/21/81
COG. ENGINEER K P Ellett	11/3/81
DISCIP. MGR. APPVL.	11/3/81
APPROVAL.	
APPROVAL.	
APPROVAL. PROJ.	11/3/81
APPROVAL. CLIENT	

ROCHESTER GAS & ELECTRIC CORPORATION
ROBERT EMMETT GINNA NUCLEAR POWER STA.
UNIT NO. 1

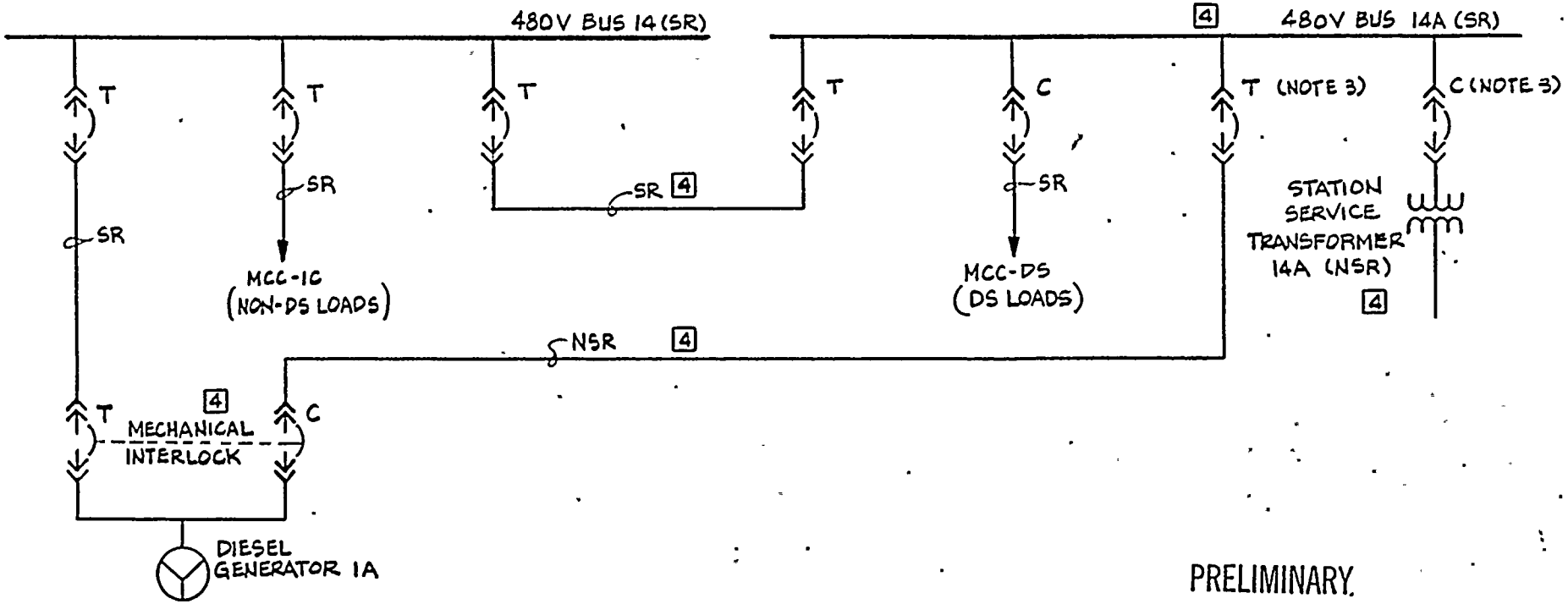
480 V POWER DISTRIBUTION
BREAKER ALIGNMENT FOR NORMAL PLANT
OPERATIONS(INCLUDING ACCIDENT CONDITIONS)

NUS CORPORATION
ROCKVILLE, MD.

DRAWING NO. 5426M4001 REV. A

SCALE: NONE SHEET 1 OF 1

FIGURE 2



NOTES:

1. T = BREAKER TRIPPED
   C = BREAKER CLOSED
2. SR = SAFETY-RELATED BUS OR FEEDER
   NSR = NON-SAFETY RELATED BUS OR FEEDER
3. BREAKER POSITION SHOWN FOR OFFSITE POWER AVAILABLE. BREAKER TO CHANGE STATE IN THE EVENT OF LOP. (UV TRIP)
4. NEW COMPONENT - ADDED BY DS MODIFICATION.

	Date
DRAWN F. Billstrand	7/24/81
CHECKED M T Kutman	11/4/81
COG. ENGINEER K P Elliott	11/3/81
DISCIP. MGR. APPVL.	11/3/81
APPROVAL,	
APPROVAL,	
APPROVAL: PROJ.	11/4/81
APPROVAL, CLIENT	

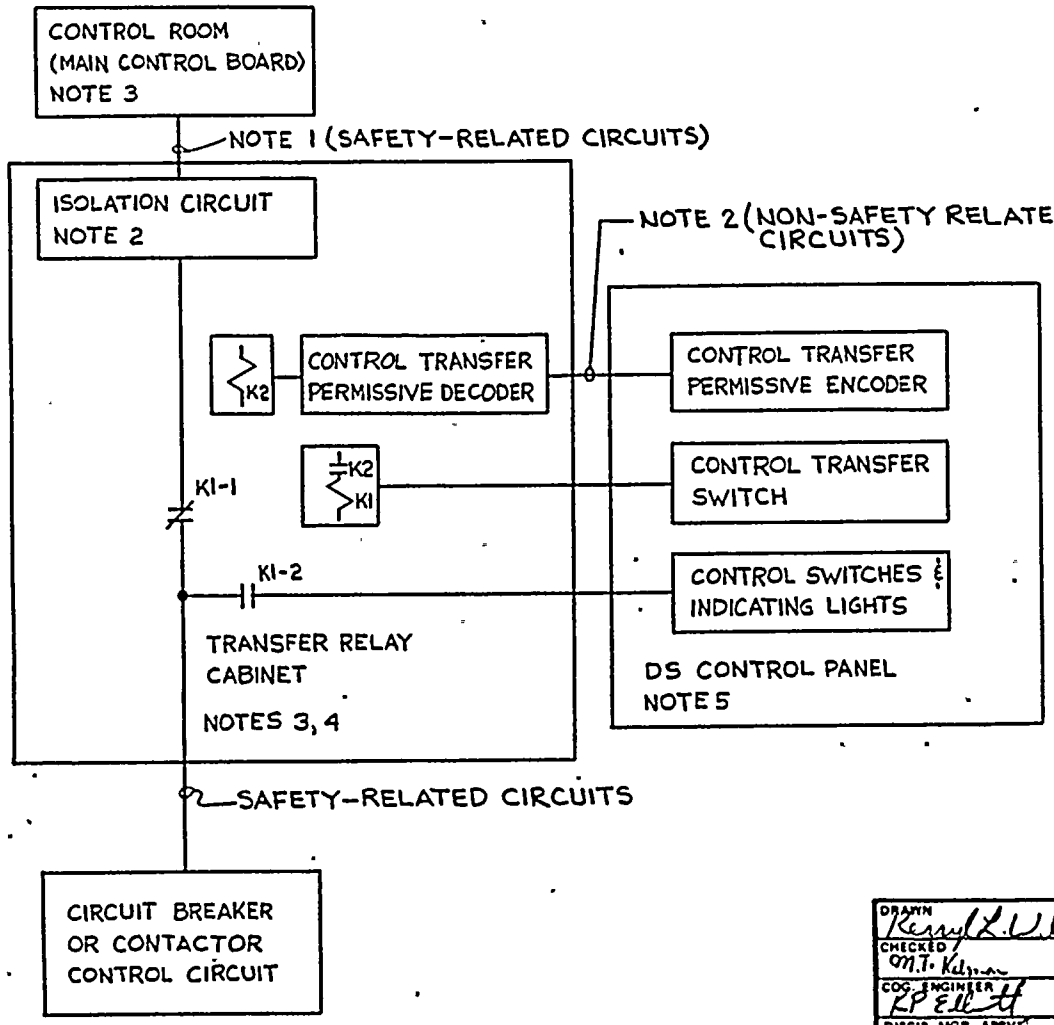
ROCHESTER GAS & ELECTRIC CORPORATION
ROBERT EMMETT GINNA NUCLEAR POWER STA
UNIT NO. 1

480 POWER DISTRIBUTION
BREAKER ALIGNMENT DURING AND
AFTER FIRE EVENT

NUS CORPORATION
ROCKVILLE, MD.

DRAWING NO. 5426M4002
REV. A
SCALE: NONE
SHEET 1 OF 1

FIGURE 3



NOTES

1. SINGLE CONDUCTOR SHOWN FOR CLARITY. ISOLATION AND TRANSFER HARDWARE ARE TYPICAL FOR ALL CONDUCTORS.
2. REFERENCE RG&E DWG. 21489-374, REV. 1
3. INDICATES SAFETY-RELATED, CLASS 1E QUALIFIED EQUIPMENT INSTALLED IN ACCORDANCE WITH CATEGORY I SEISMIC CRITERIA.
4. LOCATED IN AUXILIARY BUILDING.
5. LOCATED IN TECHNICAL SUPPORT CENTER.

PRELIMINARY

		Date
DRAWN	Kerry L. Wilson	9/23/81
CHECKED	M.T. Kalyan	11/1/81
COG. ENGINEER	R.P. Elliott	11/3/81
DISCIP. MGR. APPVL.	J.C. Bucky	11/3/81
APPROVAL		
APPROVAL		
APPROVAL, PROJ.	R.E. Pagano	11/3/81
APPROVAL, CLIENT		

ROCHESTER GAS & ELECTRIC CORPORATION
ROBERT EMMETT GINNA NUCLEAR POWER STA.
UNIT NO. 1

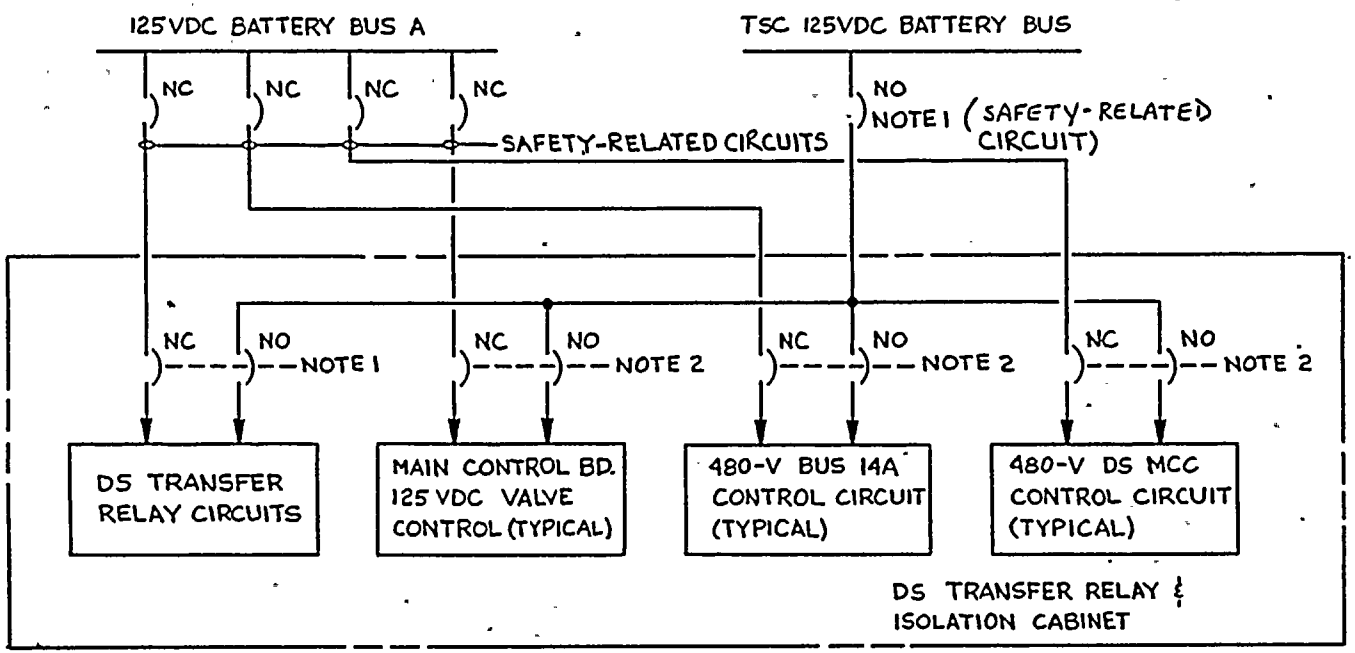
DEDICATED SHUTDOWN CONTROLS
TYPICAL DS BREAKER OR MOTOR STARTER

NUS CORPORATION
ROCKVILLE, MD.

DRAWING NO. 5426 M 4012 REV. A

SCALE: NONE SHEET 1 OF 1

FIGURE 4



NOTES

1. CONTACTOR POSITION CONTROLLED BY CONTROL TRANSFER PERMISSIVE SWITCH ON DS PANEL.
2. CONTACTOR POSITION CONTROLLED BY CONTROL TRANSFER SWITCH ON DS PANEL.

PRELIMINARY

		Date
DRAWN	Kenneth L. Wilson	9/24/81
CHECKED	W. T. Silva	10/21/81
COG. ENGINEER	R. P. Elliott	11/3/81
DISCIP. MGR. APPVL.	[illegible]	11/3/81
APPROVAL		
APPROVAL		
APPROVAL, PROJ.	[illegible]	11/4/81
APPROVAL, CLIENT		

ROCHESTER GAS & ELECTRIC CORPORATION
ROBERT EMMETT GINNA NUCLEAR POWER STA.
UNIT NO. 1

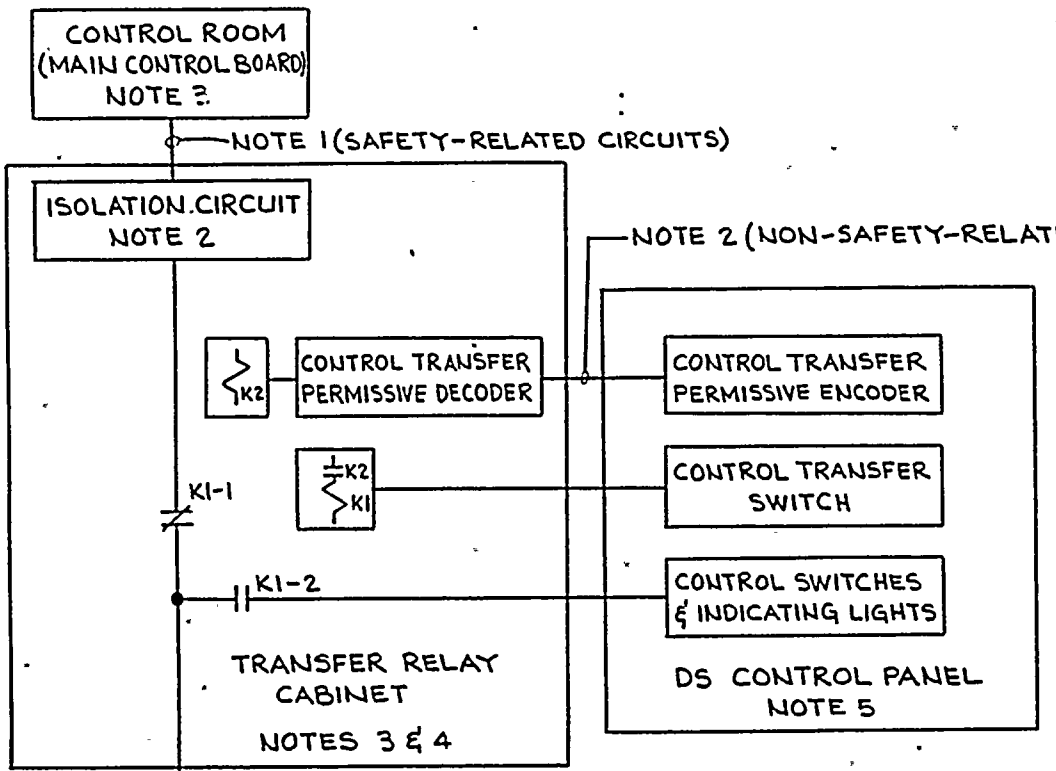
DEDICATED SHUTDOWN CONTROLS
DC CONTROL POWER DISTRIBUTION

NUS CORPORATION
ROCKVILLE, MD.

DRAWING NO. 5426 M 4014 REV. A

SCALE: NONE SHEET 1 OF 1

FIGURE 5



FOR NOTES SEE NUS DRAWING 5426M4012.

PRELIMINARY.

		Date
DRAWN	ASRU GHOSH	10-30-81
CHECKED		
COG. ENGINEER		11/3/81
DISCIP. MGR. APPR.		11/3/81
APPROVAL		
APPROVAL		
APPROVAL, PROJ.		11/3/81
APPROVAL, CLIENT		

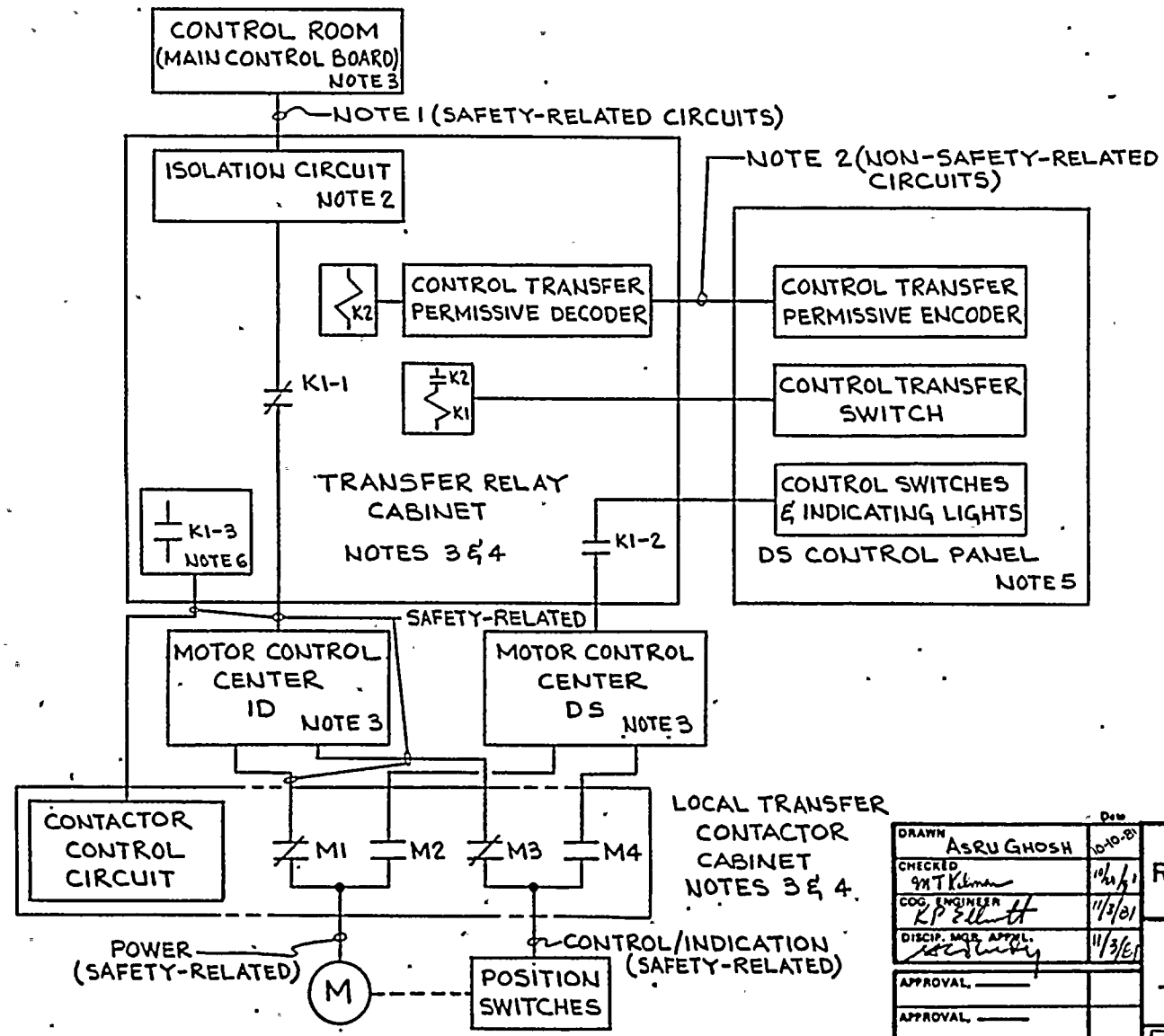
ROCHESTER GAS & ELECTRIC CORPORATION
ROBERT EMMETT GINNA NUCLEAR POWER STA.
UNIT NO. 1

DEDICATED SHUTDOWN CONTROLS
TYPICAL TRAIN "A" MOTOR OPERATED VALVE

NUS CORPORATION
ROCKVILLE, MD.

DRAWING NO. 5426M4016
REV. A
SCALE: NONE
SHEET 1 OF 1

FIGURE 6



NOTES

1. SINGLE CONDUCTOR SHOWN FOR CLARITY. ISOLATION AND TRANSFER HARDWARE ARE TYPICAL FOR ALL CONDUCTORS.
2. REFERENCE RG&E DWG. 21489-374, REV 1
3. INDICATES SAFETY-RELATED, CLASS 1E QUALIFIED EQUIPMENT INSTALLED IN ACCORDANCE WITH CATEGORY I SEISMIC CRITERIA.
4. LOCATED IN AUXILIARY BUILDING.
5. LOCATED IN TECHNICAL SUPPORT CENTER.
6. TRANSFER RELAY CONTACT K1-3 (NORMALLY OPEN) IS USED AS INITIATING CONTACT WHICH IS MULTIPLIED AT THE LOCAL TRANSFER CONTACTOR CABINET TO ENERGIZE CONTACTORS M1, M2, M3 AND M4.

PRELIMINARY

		Date
DRAWN	ASRU GHOSH	10-10-81
CHECKED	[illegible]	10/12/81
COG. ENGINEER	[illegible]	11/3/81
DISCIP. MGR. APPVL.	[illegible]	11/3/81
APPROVAL		
APPROVAL		
APPROVAL, PROJ.	[illegible]	11/3/81
APPROVAL, CLIENT		

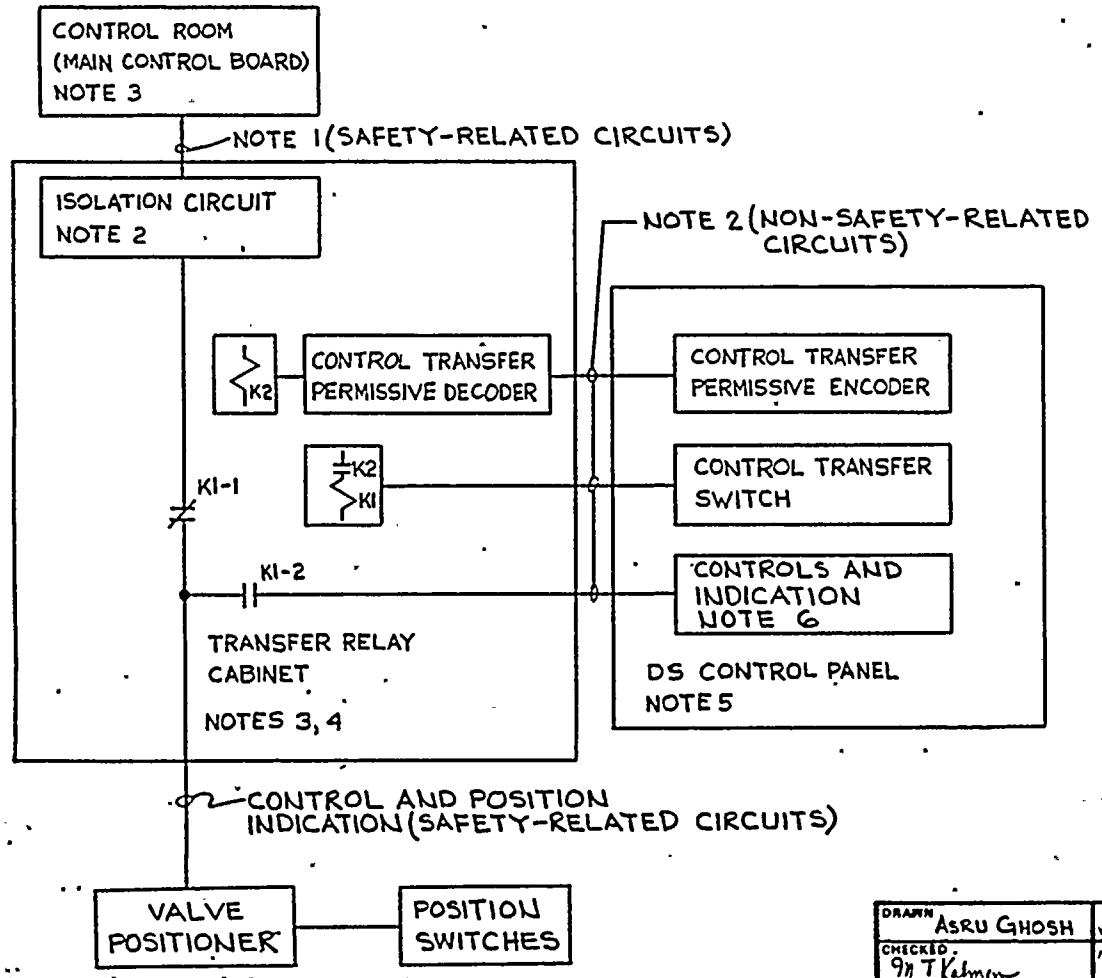
ROCHESTER GAS & ELECTRIC CORPORATION
ROBERT EMMETT GINNA NUCLEAR POWER STA.
UNIT NO. 1

DEDICATED SHUTDOWN CONTROLS
TYPICAL TRAIN "B" MOTOR OPERATED VALVE

NUS CORPORATION
ROCKVILLE, MD.

DRAWING NO. 5426M4017
REV. A
SCALE: NONE
SHEET 1 OF 1

FIGURE 7



NOTES

1. SINGLE CONDUCTOR SHOWN FOR CLARITY. ISOLATION AND TRANSFER HARDWARE ARE TYPICAL FOR ALL CONDUCTORS.
2. REFERENCE RG&E DWG. 21489-374, REV 1
3. INDICATES SAFETY-RELATED, CLASS 1E QUALIFIED EQUIPNENT INSTALLED IN ACCORDANCE WITH CATEGORY I SEISMIC CRITERIA.
4. LOCATED IN AUXILIARY BUILDING.
5. LOCATED IN TECHNICAL SUPPORT CENTER.
6. CONTROL SWITCHES AND INDICATING LIGHTS FOR NON-THROTTLING VALVES, MANUAL/AUTO STATION AND LOOP POWER SUPPLY FOR FOR THROTTLING VALVES.

PRELIMINARY.

		Date
DRAWN	Asru Ghosh	10-12-81
CHECKED	[illegible]	11/3/81
COG. ENGINEER	[illegible]	11/3/81
DISCIP. MGR. APPVL.	[illegible]	11/3/81
APPROVAL		
APPROVAL		
APPROVAL, PROJ.	[illegible]	11/3/81
APPROVAL, CLIENT		

ROCHESTER GAS & ELECTRIC CORPORATION
ROBERT EMMETT GINNA NUCLEAR POWER STA.
UNIT NO. 1

DEDICATED SHUTDOWN CONTROLS
TYPICAL AIR-OPERATED VALVE CONTROL

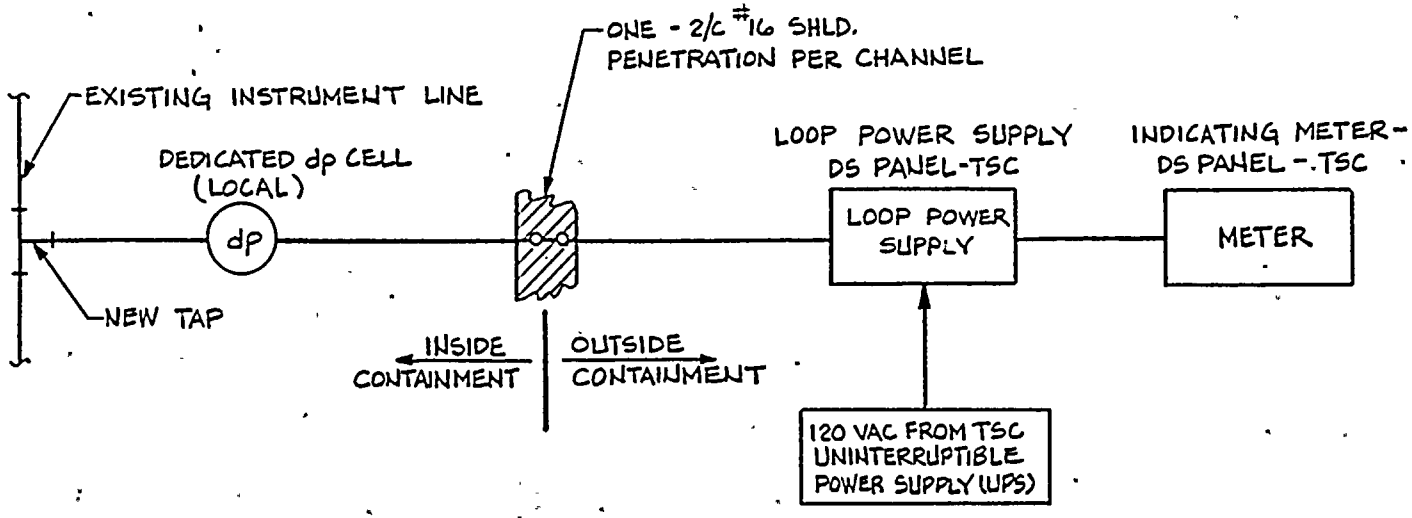
NUS CORPORATION
ROCKVILLE, MD.

DRAWING NO. 5426 M 4019 REV. A

SCALE: NONE SHEET 1 OF 1

FIGURE 8

AF 12096



NOTES:

1. CONFIGURATION SHOWN IS TYPICAL FOR ONE CHANNEL EACH OF:
   - PRESSURIZER LEVEL
   - PRESSURIZER/RCS PRESSURE
   - MAIN STEAM LINE A,B PRESSURE
   - STEAM GENERATOR A,B LEVEL
   - SIS COLD LEG INJECTION LINE FLOW

PRELIMINARY.

B	REVISED TO INCORPORATE CLIENT COMMENTS T.A. Cooney 11/3/81 KP Elliott 11/3/81 S.C. Shaw 11/3/81	
A	ISSUED FOR REVIEW	

		Date
DRAWN	K. Billstrand	7/29/81
CHECKED	M T Klein	11/3/81
COG. ENGINEER	KP Elliott	11/3/81
DISCIP. MGR APPVL	S.C. Shaw	11/3/81
APPROVAL		
APPROVAL		
APPROVAL, PROJ.	T.A. Cooney	11/3/81
APPROVAL, CLIENT		

ROCHESTER GAS & ELECTRIC CORPORATION
ROBERT EMMETT GINNA NUCLEAR POWER STA
UNIT NO. 1

DEDICATED SHUTDOWN INSTRUMENTATION
(IN-CONTAINMENT)
ANALOG CURRENT LOOP

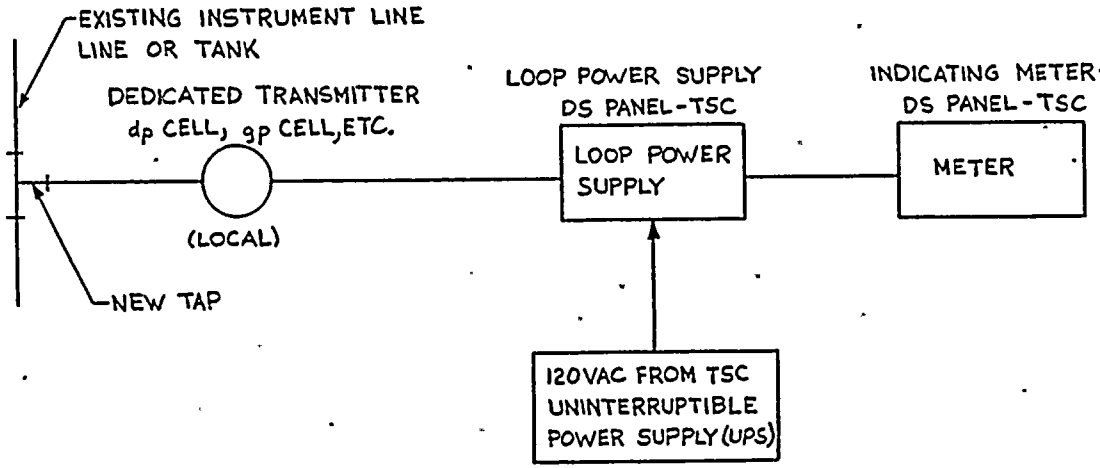
NUS CORPORATION
ROCKVILLE, MD.

DRAWING NO. 5426-M 4005 REV. B

SCALE: NONE SHEET 1 OF 1

FIGURE 9

AP 12066



NOTES

1. CONFIGURATION SHOWN IS TYPICAL FOR ONE CHANNEL EACH OF:
   - REFUELING WATER STORAGE TANK LEVEL
   - CONDENSATE STORAGE TANK LEVEL
   - RHR SYSTEM FLOW
   - CHARGING PUMP IA FLOW
   - VOLUME CONTROL TANK LEVEL
   - TURBINE-DRIVEN AUXILIARY FEEDWATER PUMP FLOW
   - STANDBY AUXILIARY FEEDWATER PUMP IC FLOW
   - SERVICE WATER HEADER PRESSURE
   - LETDOWN LINE FLOW

PRELIMINARY

		Date
DRAWN	Kenneth L. Wilson	9/22/81
CHECKED	M T Kilmer	10/13/81
COG. ENGINEER	K P Elliott	11/3/81
DISCIP. MGR. APPVL		11/3/81
APPROVAL		
APPROVAL		
APPROVAL, PROJ.		11/3/81
APPROVAL, CLIENT		

ROCHESTER GAS & ELECTRIC CORPORATION
ROBERT EMMETT GINNA NUCLEAR POWER STA.
UNIT NO. 1

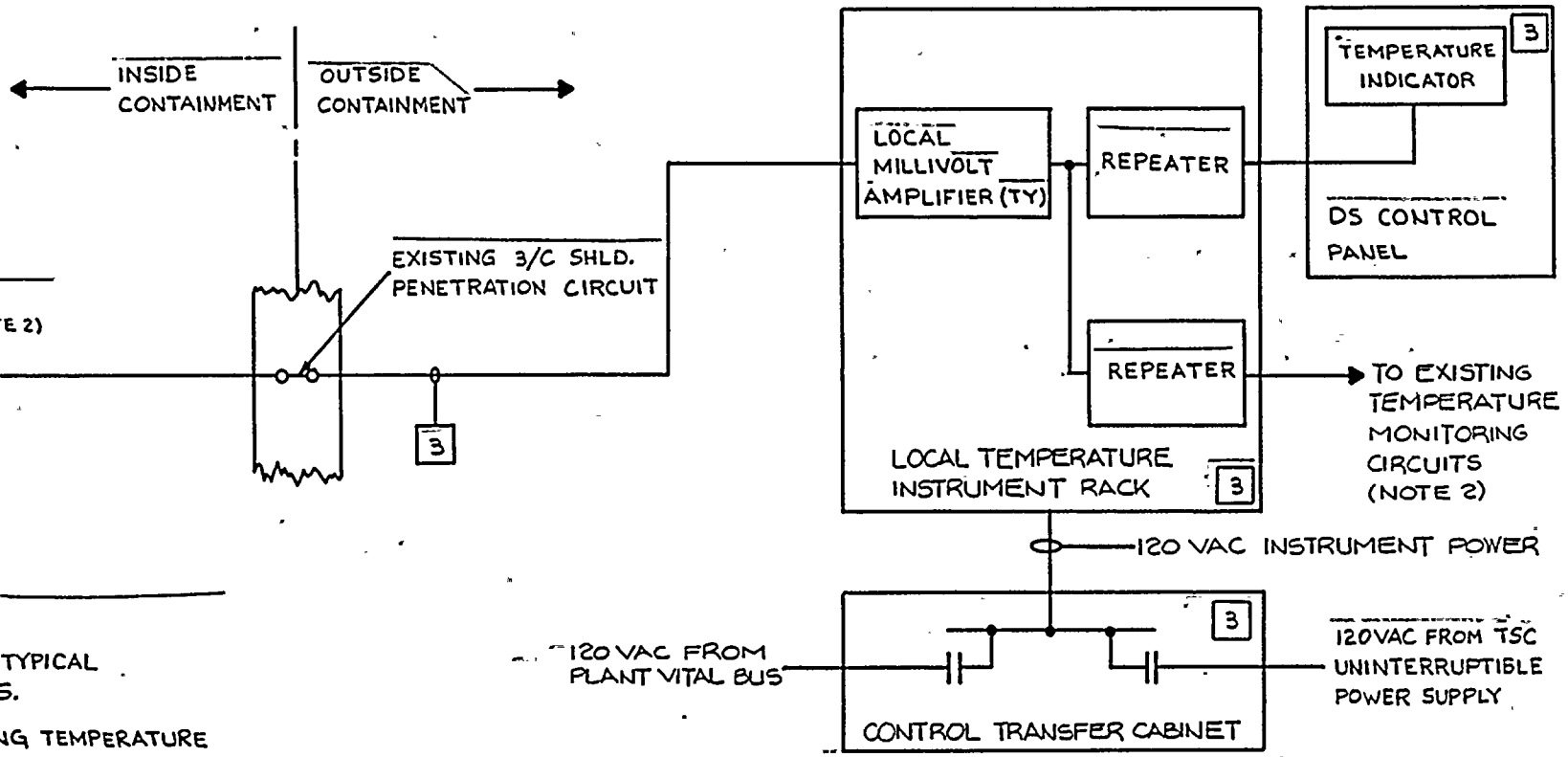
DEDICATED SHUTDOWN INSTRUMENTATION
(OUTSIDE CONTAINMENT)
ANALOG CURRENT LOOP

NUS CORPORATION
ROCKVILLE, MD.

DRAWING NO. 5426 M 4010 REV. A

SCALE: NONE SHEET 1 OF 1

FIGURE 10



NOTES

1. CONFIGURATION TYPICAL FOR TWO LOOPS.
2. INPUT TO EXISTING TEMPERATURE MONITORING INSTRUMENTATION IN RELAY ROOM.
3. NEW COMPONENT OR CABLE.

PRELIMINARY.

	Date
DRAWN Kenneth L. Wilson	9/21/81
CHECKED M T Kleven	10/1/81
COG ENGINEER R P Elliott	11/3/81
DISCIP. MGR. APPV.	11/3/81
APPROVAL.	
APPROVAL.	
APPROVAL. PROJ.	11/3/81
APPROVAL. CLIENT	

ROCHESTER GAS & ELECTRIC CORPORATION
ROBERT EMMETT GINNA NUCLEAR POWER STA.
UNIT NO. 1

DEDICATED SHUTDOWN INSTRUMENTATION
PRIMARY LOOP TEMPERATURE MONITORS

NUS CORPORATION
ROCKVILLE, MD.

DRAWING NO. 5426 M 4011

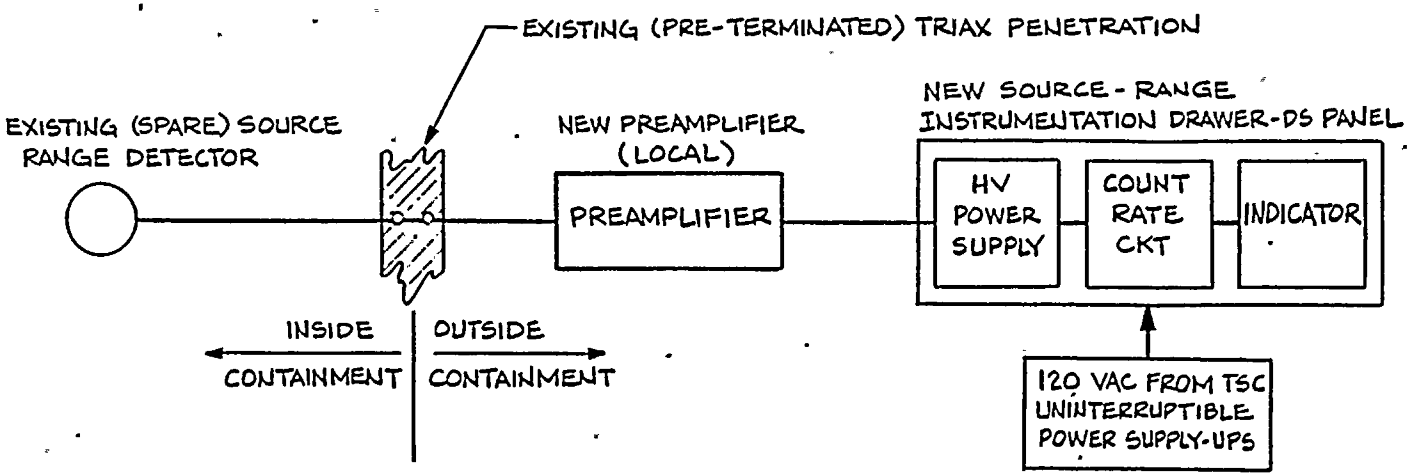
REV. A

SCALE: NONE

SHEET 1 OF 1

FIGURE 11

AF 12C06



PRELIMINARY.

REV.	DESCRIPTION
B	REVISED TO INCORPORATE CLIENT COMMENTS 11/3/81 11/3/81 11/3/81
A	ISSUED FOR REVIEW

	Date
DRAWN	7/24/81
CHECKED	10/29/81
COG. ENGINEER	11/3/81
DISCIP. MGR. APPVL.	11/5/81
APPROVAL	
APPROVAL	
APPROVAL, PROJ	11/3/81
APPROVAL, CLIENT	

ROCHESTER GAS & ELECTRIC CORPORATION
ROBERT EMMETT GINNA NUCLEAR POWER STA.
UNIT NO. 1

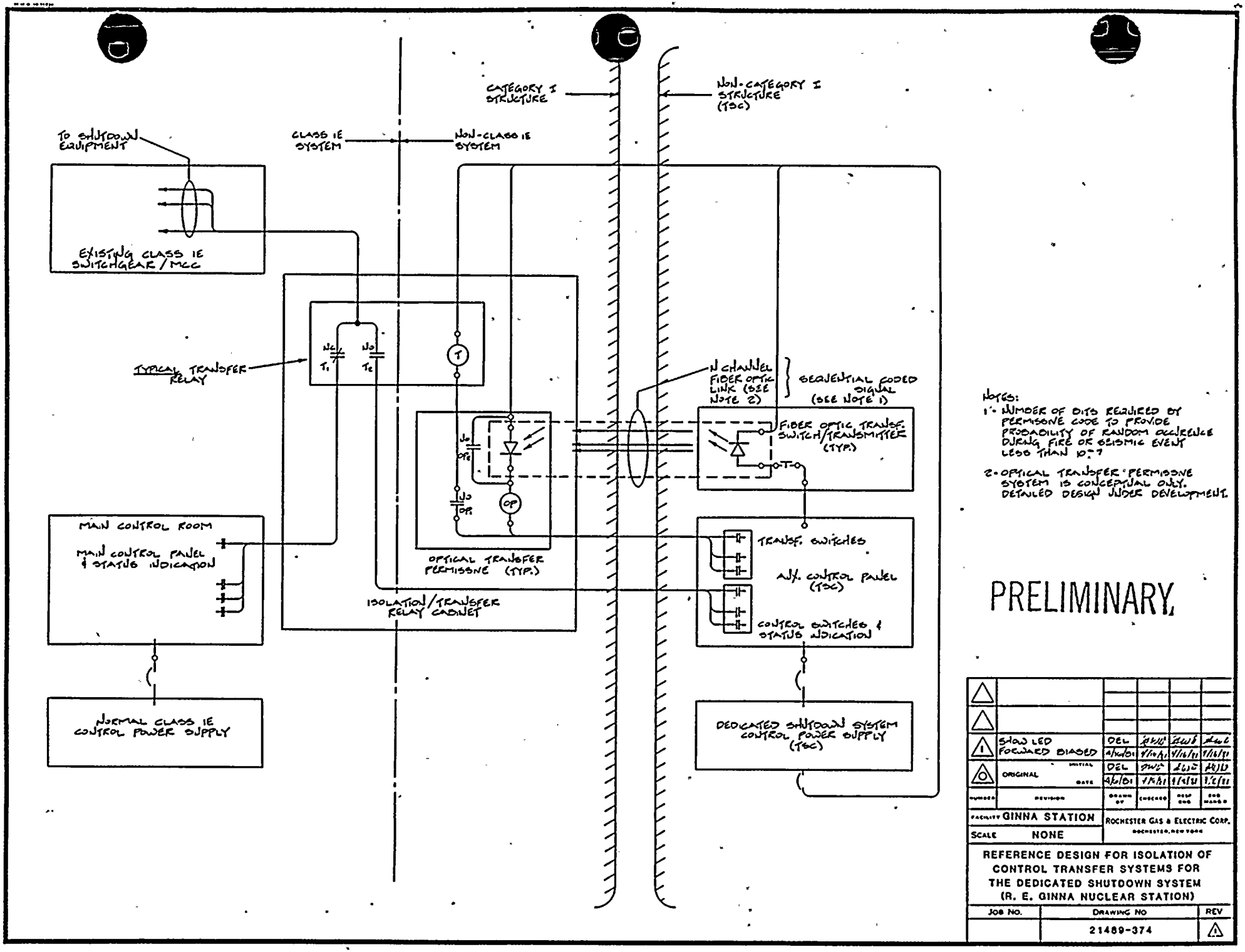
DEDICATED SHUTDOWN
INSTRUMENTATION SOURCE
RANGE NEUTRON MONITORING CHANNEL

NUS CORPORATION
ROCKVILLE, MD.

DRAWING NO. 5426 M 4006 REV. B

SCALE: NONE SHEET 1 OF 1

FIGURE 12



NOTES:
1. NUMBER OF BITS REQUIRED BY PERMISSIVE CODE TO PROVIDE PROBABILITY OF RANDOM OCCURENCE DURING FIRE OR SEISMIC EVENT LESS THAN 10^{-7}
2. OPTICAL TRANSFER PERMISSIVE SYSTEM IS CONCEPTUAL ONLY. DETAILED DESIGN UNDER DEVELOPMENT.

PRELIMINARY

NUMBER	REVISION	DRAWN BY	CHECKED	RESP ENG	ENG MANAGER
1	SHOW LED FORWARD BIASED	DEL 4/4/01	[illegible] 9/10/01	[illegible] 9/16/11	[illegible] 9/16/11
0	ORIGINAL (INITIAL / DATE)	DEL 4/6/01	[illegible] 9/5/11	[illegible] 9/5/11	[illegible] 9/2/11

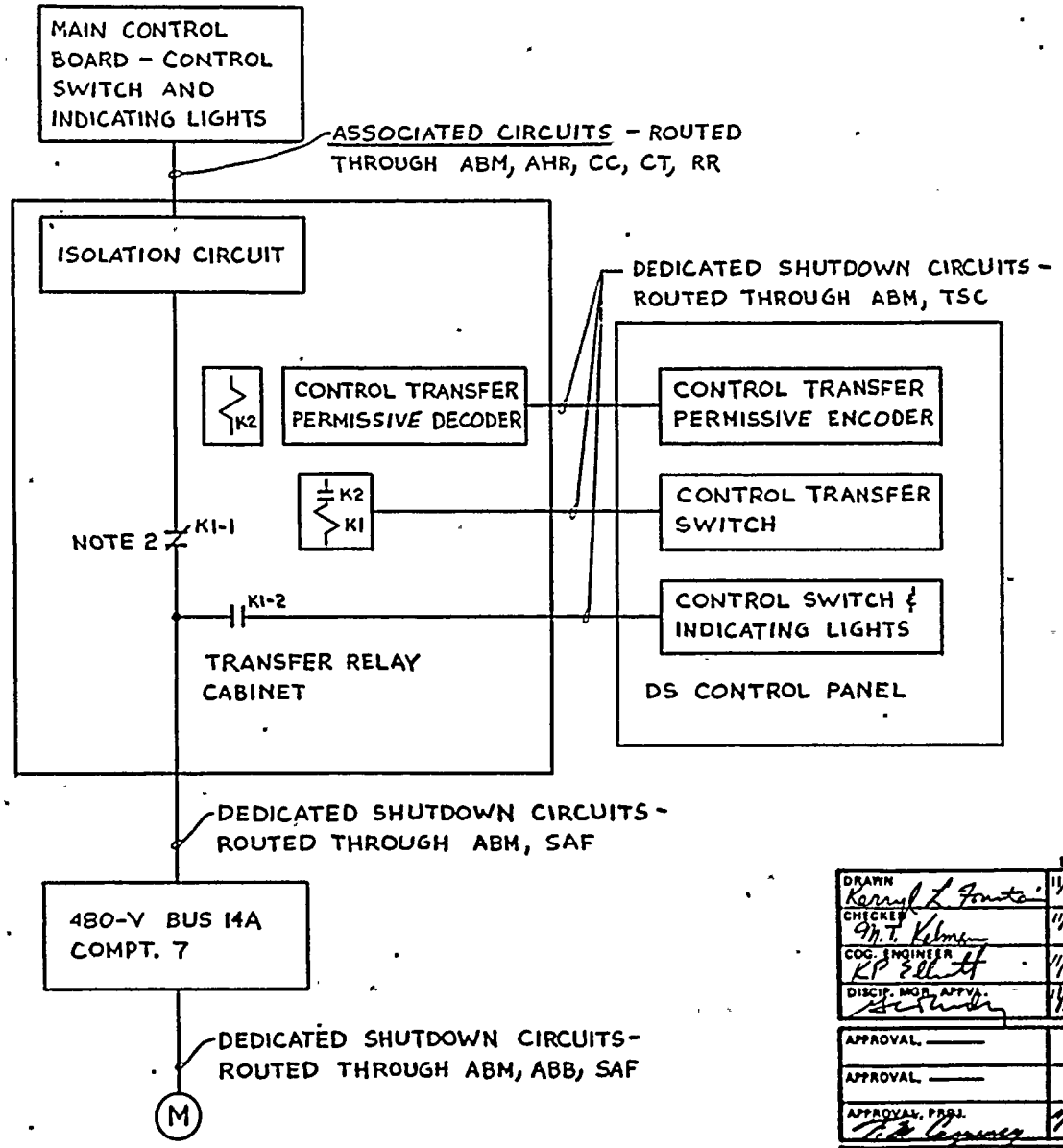
FACILITY: GINNA STATION — ROCHESTER GAS & ELECTRIC CORP., ROCHESTER, NEW YORK
SCALE: NONE

REFERENCE DESIGN FOR ISOLATION OF CONTROL TRANSFER SYSTEMS FOR THE DEDICATED SHUTDOWN SYSTEM (R. E. GINNA NUCLEAR STATION)

JOB NO.	DRAWING NO	REV
	21489-374	1

FIGURE 13

AP 1208A



NOTES

1. KEY TO FIRE AREA ABBREVIATIONS:
   - ABB - AUXILIARY BLDG. BASEMENT
   - ABM - AUXILIARY BLDG. MEZZANINE
   - AHR - AIR HANDLING ROOM
   - CC - CONTROL ROOM
   - CT - CABLE TUNNEL.
   - RR - RELAY ROOM
   - SAF - STANDBY AUXILIARY FEEDWATER BLDG.
   - TSC - TECHNICAL SUPPORT CENTER
2. CLOSED DURING NORMAL PLANT OPERATION, OPEN DURING POST-FIRE DS OPERATION.

PRELIMINARY

		Date
DRAWN	Kerry L. Fonte	11/3/81
CHECKED	M.T. Kelmon	11/3/81
COG. ENGINEER	K.P. Elliott	11/3/81
DISCIP. MGR. APPVL.		11/3/81
APPROVAL		
APPROVAL		
APPROVAL, PROJ.		11/3/81
APPROVAL, CLIENT		

ROCHESTER GAS & ELECTRIC CORPORATION
ROBERT EMMETT GINNA NUCLEAR POWER STA.
UNIT NO. 1

TYPICAL. ASSOCIATED CIRCUIT RESOLUTION
CHARGING PUMP 1A

NUS CORPORATION
ROCKVILLE, MD.

DRAWING NO. 5426 M 4022 REV. A

SCALE: NONE SHEET 1 OF 1

FIGURE 14