8207060127

# INTRODUCTION

## BROWNS FERRY NUCLEAR PLANT
## 10CFR50 APPENDIX R SECTION III.G
## EVALUATION

The modifications made during the recovery from the March 22, 1975, fire were intended to provide protection against the loss of more than one division of safety equipment in the event of a fire. The modifications included physical moving of certain electrical conduits, the application of a fire resistant cable coating, and the addition of extensive fire protection systems. These changes and the plant's original separation criteria for Class 1E circuits as outlined in our FSAR are consistent with the philosophy outlined in section III.G.1. However, to be able to respond fully to section III.G and Fire Protection Rule Generic Letter 81-12, TVA performed a detailed analysis to compare the Browns Ferry safe shutdown systems and their associated circuits for compliance with section III.G. TVA contends that Browns Ferry, upon completion of identifed modifications, will satisfy the intent of the requirements of section III.G.

The safe shutdown analysis and the manner in which it was performed is discussed in Attachment 1. The required shutdown equipment and time frames in which it is required is identified in Attachment 2. An analysis of circuits which can become associated with safe shutdown circuits is presented in Attachment 3. Attachments 4 and 5 discuss the electrical modifications, administrative controls, and fire protection modifications required to bring Browns Ferry into compliance with section III.G. A discussion of the impact on safety due to proposed modifications is presented in Attachment 6. Attachment 7 identifies the exceptions to the requirements of section III.G and provides justification for each exemption requested. The request for additional information made by the NRC in Enclosures 1 and 2 of Generic Letter 81-12 is presented in Attachment 8. Attachment 9 is the implementation schedule for modifications described in Attachments 4 and 5.

ATTACHMENT 1

SAFE SHUTDOWN ANALYSIS

## 1.0 SCOPE

The following document summarizes the definitions, limiting safety conditions, separation criteria, requirements and assumptions, and procedure used to perform the Browns Ferry Nuclear Plant safe shutdown analysis considering a fire as the initiating event.

## 2.0 DEFINITIONS

2.1 Associated Circuits - Those safety-related and non-safety-related circuits that are not directly required to perform a safe shutdown function but have either:

1. A common power source with a shutdown circuit where the power source is not electrically protected from the shutdown circuit by coordinated circuit breakers, fuses or similar devices, or

2. A connection to circuits of equipment whose spurious operation will adversely affect the shutdown capability, or

3. A common enclosure, cable tray, conduit, panel, or junction box with a shutdown circuit and:

   a. Are not electrically protected from the shutdown circuit by circuit breakers, fuses, or similar devices, or

   b. Will allow propagation of the fire into the common enclosure.

2.2 Postulated fire - A fire that is assumed to occur in a specific area of the plant. The origin of the fire and the combustible materials involved are not defined.

2.3 Safe shutdown - The process of bringing all three reactors from power operation to hot shutdown and then cold shutdown.

2.4 Hot shutdown - A stable plant condition where all three reactors are subcritical and have average coolant temperatures above 212°F.

2.5 Cold shutdown - A stable plant condition where all three reactors are subcritical and have average coolant temperatures below 212°F.

2.6 Fire area - An area completely enclosed by fire-rated barriers.

2.7 Fire zone - A subdivision of a fire area.

## 3.0 LIMITING SAFETY CONDITIONS

The safe shutdown analysis determines the plant modifications required to ensure the following damage limits are not exceeded as a result of a single postulated fire:

3.1 Electrical cables and associated circuits of a minimum set of equipment necessary to achieve hot shutdown must be maintained free of fire damage.

3.2 Electrical cables and associated circuits of equipment necessary to achieve cold shutdown may be damaged. However, the damage must be limited so that a minimum set of equipment can be repaired or made operable within 72 hours using onsite capability.

3.3 Electrical circuits of equipment necessary for mitigation of design basis events may be damaged.

## 4.0 SEPARATION CRITERIA

The following means of protecting the safe shutdown capability from postulated fires are acceptable:

4.1 Separation of cables and associated circuits of redundant safe shutdown equipment by a fire barrier having a 3-hour rating, or

4.2 Separation of cables and associated circuits of redundant safe shutdown equipment by a horizontal distance of more than 20 feet if there are no intervening combustibles and if fire detectors and an automatic fire suppression system are installed in the area, or

4.3 Separation of cables and associated circuits of redundant safe shutdown equipment by a fire barrier having a 1-hour rating if fire detectors and an automatic fire suppression system are installed in the area around the barrier.

## 5.0 REQUIREMENTS AND ASSUMPTIONS

5.1 The only unacceptable consequence of a fire is the inability to safely achieve and maintain safe shutdown conditions.

5.2 All three units are operating at 100 percent power when a fire is postulated.

5.3 A postulated fire is not considered inside Primary Containment since it is inerted with nitrogen during power operations.

5.4 A postulated fire is assumed to occur in any other area containing electrical circuits necessary for safe shutdown, whether or not the area contains permanent combustible materials.

5.5 The zone of influence of a postulated fire is bounded by the largest area defined by the separation criteria of section 4.0.

5.6 Safe shutdown circuits and associated circuits are assumed to be damaged if they are in the zone of influence of a postulated fire.

5.7 No failures other than those directly attributable to a postulated fire will be considered.

5.8 No design basis events are considered concurrent with a postulated fire.

5.9 Equipment required for safe shutdown during a postulated fire must be capable of being powered by onsite emergency power systems.

5.10 Equipment required for safe shutdown during a postulated fire need not be designed to meet seismic Category I criteria, single failure criteria, or other design basis event criteria.

5.11 Cables whose exposed surfaces are coated with flamemastic or are enclosed in conduits are not considered an intervening combustible for the purposed of meeting the separation criteria of section III.G.2.

5.12 For the first hour of a postulated fire, manual actions by operations personnel are limited to manipulation of controls located in the Main Control Room or Backup Control Stations.

5.13 After the first hour of a postulated fire, manual actions by operations personnel may include manipulation of equipment located anywhere in the plant.

5.14 During a post fire shutdown, the fission product boundary integrity must be maintained (e.g., no fuel clad damage, no rupture of any primary coolant boundary, no rupture of the containment boundary).

## 6.0 PROCEDURE FOR PERFORMING ANALYSIS

6.1 Determine the functions required to achieve and maintain safe plant shutdown.

6.2 Produce shutdown logic diagrams that define minimum systems that can perform required safe shutdown functions and satisfy section 4.0.

6.3 Group specific rooms or buildings into fire areas where a postulated fire requires the availability of similar safe shutdown equipment.

6.4 For each fire area defined in 6.3, identify one or more paths through the Shutdown Logic Diagrams that will satisfy each required shutdown function. Identify one path if the required systems are located outside the fire area under consideration. If a function could not be satisfied with equipment located outside the fire area, identify redundant paths consisting of widely separated equipment inside the fire area.

6.5 Develop functional criteria that define the required equipment for the shutdown paths identified in 6.4.

6.6 Identify power and control cables for:

1. The equipment identified in 6.5 that is directly involved in performing required safe shutdown functions, or

2. Associated cables that are not adequately isolated from the safe shutdown cable.

6.7 Mark the routing of the cables defined in 6.6 on cable tray or conduit drawings in such a manner that one can distinguish between redundant circuits.

6.8 Identify all interactions of redundant shutdown equipment whose circuits did not meet the separation criteria of section 4.0.

6.9 Determine whether the redundant shutdown circuit interactions are to be:

1. Corrected by cable rerouting, or
2. Corrected by separation of redundant circuits by fire rated barriers, or
3. Corrected by addition of protective devices, or
4. Corrected by relocation or addition of equipment, or
5. Justified by analysis, or
6. Any combination of the above.

6.10 Determine if additional fire suppression and detection systems were needed in the redundant shutdown circuit interaction areas.

ATTACHMENT 2

FUNCTIONAL CRITERIA

## I. SCOPE

The functions required for safe shutdown of Browns Ferry Nuclear Plant are identified in shutdown logic diagrams, figures I.a, I.b, and I.c. The methods of accomplishing these functions and the timing of the required operations are addressed in this criteria.

For the purpose of the safe shutdown analysis, the plant is divided into the following fire areas:

Reactor building/diesel generator building (RB/DGB)—Includes all areas of the diesel generator buildings and reactor buildings with the exception of the shutdown board rooms.

Shutdown board rooms (SBRs)—Each SBR is considered separately, figures 1.d through 1.k.

Control building (CB)—Includes all areas of the control building with the exception of the battery board rooms.

Battery board rooms (BBR)—Includes the battery and battery board rooms 1, 2, and 3, figures 1.1 through 1.n.

Turbine building/intake pumping station (TB/IPB)—Includes all areas of the turbine building and the intake pumping station.

Existing compartmentation was utilized in the selection of these fire areas. Each area, with the exception of the BBRs, is enclosed by an equivalent 3-hour rated fire barrier. The BBRs are enclosed by 1-1/2-hour rated fire barriers.

The fire area boundaries were selected so that comparable actions are needed to safely shut the plant down for a fire anywhere in the area.

## II. CRITERIA

All times identified in the following discussions are measured from the initiation of fire shutdown procedures and not from the start of the fire.

Operating personnel are expected to use normal procedures to bring the plant to a safe shutdown condition when a fire is detected. The equipment outlined in this document will be available for use following emergency procedures if operating personnel determine that the normal procedures cannot be completed due to fire induced equipment failures.

A. Time Less Than One Hour (Figure I.a)

1. Reactor Coolant System (RCS) Integrity

a. RB/DGB, SBR, BBR, or TB/IPS Fire

Control of a minimum set of valves is required to maintain RCS integrity during a fire. Table II.A.1 lists the individual valves, their mode of operation and their required position. By ensuring the RCS will be isolated, other system requirements can be minimized.

b. CB Fire

A minimum of one valve per process line (i.e., inboard or outboard) as listed in Table II.A.1 must be controlled at the backup control stations with a fire in the CB.

2. Reactor Pressure Vessel (RPV) Water Inventory Control

a. RPV Depressurization System

Figure I.A indicates that an air supply is required for the safety/relief (S/R) valves during the first hour. This air supply will consist of the ADS accumulators or the Drywell Control Air receivers. This is a passive system; therefore, no other consideration is required.

(1) RB/DGB, TB/IPS, or BBR Fire

A minimum of four S/R valves per unit must be capable of being operated from the main control room (MCR) and no S/R valves may spuriously operate except at their pressure setpoints. See table II.A.2.a for a listing of the valves required and their respective mode of operation.

(2) CB Fire

Back-up control must be provided for a minimum of four S/R valves per unit with the remaining valves being adequately isolated from the CB to prevent spurious actuation. Refer to table II.A.2.a for the specific valves required.

(3) SBR Fire

Each SBR is considered as a separate fire area as shown in figures I.d-I.k. Board rooms A, C, and E are divided into two separate fire zones as follows: One zone will encompass the panel 25-32 and the closest distribution board (labled A1, C1, and El respectfully in the SBR analysis) while the other zone will include the whole room excluding panel 25-32 (labled A2, C2, and E2 respectfully in the SBR analysis). Refer to figure I.d, I.f, and I.h for the above descriptions.

The requirements for the S/R valves for all board rooms except A1, C1, and El are the same as those discussed in section II.A.2.a.(1).

For board rooms A1, C1, and E1, it is possible that some S/R valves can spuriously operate. By having a maximum of seven S/R manual control circuits in one fire area, the assumption is made that no more than four of the S/R valves will operate simultaneously. Figure II.A.2.a.(3) illustrates RPV water level as a function of time with four S/R valves operating to depressurize the vessel and one Core Spray System and one RHR system automatically making up vessel inventory. It is evident that more than adequate inventory makeup is available to reflood the core and then keep the core covered. Therefore, a maximum of seven S/R valve manual control circuits may be grouped together provided a minimum of one Core Spray System and one RHR System (2 pumps) will function automatically at their respective setpoints for the affected unit. See table II.A.2.a for specific valves required.

b. Residual Heat Removal (RHR) System

(1) RB/DGB Fire

One RHR pump and its associated valves must be available at the backup control stations for the fire affected unit. The minimum amount of equipment is justified by ensuring RCS integrity (sections II.A.1.a and II.A.2.a.(1)). The pumps to be used will be pumps 1B and 2D for a unit 1 fire; pumps 1A and 2C for a unit 2 fire; and pump 3C for a unit 3 fire. Table II.A.2.b.(1) lists the requirements for each unit. The use of one RHR pump in conjunction with manual actuation of four S/R valves to depressurize the vessel as an inventory makeup method is equivalent of one RHR pump operating with the Automatic Depressurization System.

(2) TB/IPS or BBR Fire

Since RCS Integrity will be ensured for fires in these areas (see sections II.A.1.a and II.A.2.a.(1)), manual operation and minimal system requirements are justified. Table II.A.2.b.(2) lists the equipment required and their respective mode of operation with control from the MCR.

(3) CB Fire

The equipment listed in table II.A.2.b.(1) must be operable for a fire in the CB. This will provide a minimum of one RHR system (one pump) per unit to meet RPV inventory requirements.

(4) SBR Fire

For all SBRs except A1, C1, and E1, the requirements are identical to those given in section II.A.2.b.(2).

For board rooms A1, C1, and E1, an RHR System (2 pumps) is required to operate automatically in the unit affected by the spurious S/R valve operation. For those units unaffected by the S/R valves, the requirements are the same as those given in section II.A.2.b.(2). Refer to table II.A.2.b.(3) for automatic RHR system requirements.

c. Core Spray (CS) System

(1) RB/DGB, BBR, TB/IPS or CB Fire

There are no requirements for the CS system for a fire in these areas.

(2) SBRs Fire Areas

For a fire in board room A1, C1, or E1, one CS system is required to operate automatically as shown in table II.A.2.c.(2) for the unit affected by the spurious S/R valves (i.e., A1-unit 1, C1-unit 2, E1-unit 3). For other SBR fire areas see the requirements for CS system in section II.A.2.c.(1).

d. High Pressure Core Injection (HPCI) System

(1) RB/DGB, TB/IPS, CB, BBR, or SBR Fire

There are no requirements for the HPCI System for a fire in these areas.

e. Reactor Core Isolation Cooling (RCIC) System

(1) RB/DGS, TB/IPS, CB, BBR, or SBR Fire

There are no requirements for the RCIC System for these fire areas.

f. Emergency Equipment Cooling Water (EECW) System

(1) RB/DGS, TB/IPS, or SBR Fire

A minimum of two RHRSW pumps, which service the EECW system in the same header (i.e., north or south) are required to start automatically and no more than one valve to close in the respective header being relied upon. The requirements for the system are listed in table II.A.2.f.

(2) CB Fire

A minimum of two pumps and three of its associated valves are required to have back-up control isolation. See table II.A.2.f for equipment required.

3. Reactivity Control

a. Reactor Protection System (RPS)

(1) RB/DGB or TB/IPS

An automatic scram signal is required if one of the following transients occur and off-site power is available: (a) RPV Low Water Level or, (b) High RPV Pressure. A manual scram signal is also required for the above fire areas. Once a scram signal is generated, the signal must also reach the Control Rod Drive Hydraulic (CRDH) system to ensure a successful scram.

(2) SBR or BBR Fire

A fire in any of these areas would not defeat the ability of the RPs to generate a scram signal. A loss of power to the logic would be the only effect a fire would have on the RPs for the areas given, and such a loss would generate a scram signal. Therefore, the RPs meets the criteria for these areas with no further analysis.

(3) CB Fire Area

A reactor scram will be obtained by opening the power disconnect to the RPs at the Battery Board. The RPs will generate a scram signal upon loss of power. The RPs Panels are grounded and all connections to power are fused. Therefore, no hot shorts to maintain power are credible and a scram signal can be generated.

b. Control Rod Drive Hydraulic (CRDH) System

(1) RB/DGB Fire

A signal to the CRDH system to scram will be assured as discussed in the RPs description for the same fire area. The CRDH system will lose power which will cause the control rods to insert. This will limit our concern to hot shorts. No power for the control rod drive solenoid valves will be available except for hot shorts from other systems located in the same area. Therefore, it is highly unlikely that any more than a few will fail to insert due to a fire. These few will then be assured to insert by requiring one set of the back-up scram solenoids to operate, and venting any control air and allowing the remaining rods to insert due to loss of control air. See table II.A.3.b for the CRDH system requirements.

(2) TB/IPS, CB, SBR, or BBR Fire

The RPs description (section II.A.3.a) assures a scram signal will be received at the CRDH system panels. These panels are located solely in the RB area and will be unaffected by a fire in any of these areas.

4. Process Instrumentation

a. RB/DGB, TB/IPS, CB, SBR, or BBR Fire

The instrumentation required for all fire areas is (a) RPV Water Level (-155" to +55"), and (b) RPV Pressure (0 to 1500 $lb/in^2g$). These variables will provide sufficient information to allow the operator to take all manual actions required. RPV water level and pressure will allow the operator to maintain adequate inventory (see figure I.A). Reactivity control and RCS integrity are being assured (sections II.A.1 and II.A.3). Therefore, these variables will be adequate to ensure a hot shutdown condition in the first hour of the event.

The minimum instrumentation loops needed to monitor the variables for each fire area are listed in table II.a.4. For a CB fire the indicators for these variables are required on the backup control panels. Indicators for a fire in any other area are required in the MCR.

5. Auxiliary Power

a. RB/DGB Fire

Power must be available to the minimum equipment required for a fire in this area. The power requirements are divided into three sections. Sections (1), (2), and (3) list the minimum distribution boards required for a unit 1, unit 2, and unit 3 fire respectfully.

(1) Unit 1 Fire

The following distribution boards are required to have power available to accommodate the RHR system circuits associated with the boards:

| Unit 1 | Unit 2 | Unit 3 |
|---|---|---|
| 4-kV Shutdown Bd C | 4-kV Shutdown Bd D | 4-kV Shutdown Bd 3EB |
| 480-V Shutdown Bd 1B | 480-V Shutdown Bd 2B | 480-V Shutdown Bd 3A |
| 480-V RMOV Bd 1B | 480-V RMOV Bd 2B | 480-V RMOV Bd 3A |
| 480-V RMOV Bd 1E | 480-V RMOV Bd 2E | 480-V RMOV Bd 3D |

The above requirements also hold true for a fire in the units 1 and 2 diesel generator building (DGB). Other distribution boards must be available for the equipment being relied upon.

(2) Unit 2 Fire

The following distribution boards are required to have power available to accommodate the RHR system circuits associated with the boards:

| Unit 1 | Unit 2 | Unit 3 |
|---|---|---|
| 4-kV Shutdown Bd A | 4-kV Shutdown Bd B | 4-kV Shutdown Bd 3EC |
| 480-V Shutdown Bd 1A | 480-V Shutdown Bd 2A | 480-V Shutdown Bd 3B |
| 480-V RMOV Bd 1A | 480-V RMOV Bd 2A | 480-V RMOV Bd 3B |
| 480-V RMOV Bd 1D | 480-V RMOV Bd 2D | 480-V RMOV Bd 3E |

Other distribution boards must be available for the equipment being relied upon.

(3) Unit 3 Fire

The following distribution boards are required to have power available to accommodate the RHR system circuits associated with the boards:

| Unit 1 | Unit 2 | Unit 3 |
|---|---|---|
| 4-kV Shutdown Bd A | 4-kV Shutdown Bd D | 4-kV Shutdown Bd 3EB |
| 480-V Shutdown Bd 1A | 480-V Shutdown Bd 2B | 480-V Shutdown Bd 3A |
| 480-V RMOV Bd 1A | 480-V RMOV Bd 2B | 480-V RMOV Bd 3A |
| 480-V RMOV Bd 1D | 480-V RMOV Bd 2E | 480-V RMOV Bd 3D |

Other distribution boards must be available for the equipment being relied upon. In the unit 3 DGB, any combination may be used provided the minimum equipment has the power required.

b. CB, TB/IPS, BBR, or SBR Fire

Adequate power must be available to supply the equipment being relied upon for the above fire areas.

3.2 Time Greater Than One Hour (Figure I.B)

1. Reactor Coolant System (RCS) Integrity

a. RB/DGB, SBR, BBR, or TB/IPS Fire

The requirements for equipment are the same as those identified in section II.A.1.a.

b. CB Fire

The requirements for equipment are the same as those identified in section II.A.1.a.

2. Reactor Pressure Vessel (RPV) Water Inventory Control

a. RPV Depressurization System

The control air for the S/R valves is still required after one hour. The air supply is required to be capable of manual manipulation.

(1) RB/DGB, TB/IPS, or BBR Fire

The requirements for equipment are the same as those identified in section II.A.2.a.(1) with the exception that only one S/R valve is required to be operable.

(2) CB Fire

The requirements for equipment are the same as those identified in section II.A.2.a.(2) with the exception that only one S/R valve is required to be operable.

(3) SBR Fire

The requirements for equipment are the same as those identified in section II.A.2.a.(3) with the exception that only one S/R valve is required to be operable.

b. Residual Heat Removal (RHR) System

See section II.B.5 for additional RHR requirements.

(1) RB/DGB Fire

The requirements for equipment are the same as those identified in section II.A.2.b.(1) with the exception being that FCV-74-52 or FCV-74-66 must be capable of being throttled.

(2) TB/IPS or BBR Fire

The requirements for equipment are the same as those identified in section II.A.2.b.(2) with the exception that FCV-74-52 or FCV-74-66 must be capable of being throttled.

(3) CB Fire

The requirements for equipment are the same as those identified in section II.A.2.b.(3) with the exception that FCV-74-52 or FCV-74-66 must be capable of being throttled.

(4) SBR Fire

The requirements are the same as those listed in section II.B.2.b.(2).

c. Emergency Equipment Cooling Water (EECW) System

(1) RB/DGB, TB/IPS, BBR, CB, or SBR Fire

A minimum of two RHRSW pumps in the same EECW header are required to remain operable and three of its associated valves remain open for all of these areas. See table II.A.2.f for the equipment required.

d. Residual Heat Removal Service Water (RHRSW) System

See section II.B.5.b for RHRSW requirements.

3. Reactivity Control

a. RB/DGB Fire

The method for assuring the control rods remain fully inserted will be to isolate the control air supply to the control rod flow solenoid valves.

b. BBR, CB, TB/IPS or SBR Fire

The flow solenoid valves will remain deenergized (safe state) for the above fire areas to preclude withdrawal of the control rods.

4. Process Instrumentation

a. RB/DGB, TB/IPS, CB, SBR, or BBR Fire

The requirements for equipment are still the same as those identified in section II.A.4.a.

5. Decay Heat Removal

a. Residual Heat Removal (RHR) System

(1) RB/DGB, TB/IPS, CB, BBR, or SBR Fire

One RHR pump and its associated valves are required to be operable in the torus cooling mode. This pump may be the same pump being used for RPV Water Inventory Control. Figure II.B.5.a illustrates the pool heat-up as a function of time with pool cooling beginning at 1 hour. The following considerations have been analyzed to ensure one pump is sufficient for torus cooling: (a) RHR Net Positive Suction Head (NPSH), (b) Thermal Stresses on Torus and Attached Piping, and (c) Adequate Suppression of Steam. See table II.B.5.a for valve position requirement.

b. RHR Service Water (RHRSW) System

(1) RB/DGB, TB/IPS, CB, BBR, or SBR Fire

A minimum of one RHRSW pump per corresponding RHR pump must be operable after one hour. The valves associated with the RHRSW pump must be in their required position to accommodate the flow path for the RHRSW system. See table II.B.5.b for system requirements.

c. Essential Equipment Cooling Water (EECW) System

(1) RB/DGB, TB/IPS, CB, SBR, or BBR Fire

See section II.B.2.c for EECW requirements.

6. Shutdown Control Area Environmental Control

a. Heating, Ventilating, and Air Conditioning (HVAC) System

(1) RB/DGB, TB/IPS, SBR, or BBR Fire

For a fire in these areas the MCR HVAC must be capable of operation via local or remote control after 1 hour. The equipment required is listed in table II.B.6.a.(1).

(2) CB Fire

The equipment listed in table II.B.6.a.(2) is required to have adequate isolation from the CB fire area.

7. Auxiliary Power

a. RB Fire

The requirements are the same as those specified in section II.A.5.a for the respective units fire areas with one addition being that either 4-kV Shutdown Board A or C be energized.

b. CB,TB/IPS, SBR, or BBR Fire

See section II.A.5.b for the requirement in the above fire areas.

c. Time Before Seventy Two Hours (Figure I.c)

1. Reactor Coolant System (RCS) Integrity

a. RB/DGB, CB, SBR, TB/IPS, or BBR Fire

The requirements are the same as those given in section II.A.1.a with exception to the RPV head vent valves and shutdown cooling suction valves. These valves are not required once RPV pressure and RPV temperature are below the setpoints given on figure I.c.

2. Heat Removal and Inventory Control

a. Residual Heat Removal (RHR) System

(1) RB/DGB, TB/IPS, CB, SBR, or BBR Fire

Once RPV pressure is below 75 $lb/in^2g$, the RHR system being used can be placed in the shutdown cooling mode of operation. This is done by repositioning of some RHR valves. See table II.C.2.a for the RHR system requirements.

b. RHR Service Water (RHRSW) System

(1) RB/DGB, TB/IPS, CB, BBR, or SBR Fire

See section II.B.5.b for system requirements for the above fire areas.

c. Essential Equipment Cooling Water (EECW) System

(1) RB/DGB, TB/IPS, CB, SBR, or BBR Fire

See section II.B.2.c for EECW requirements.

3. Reactivity Control

a. RB Fire

See section II.B.3.a for reactivity control requirements.

b. BBR, CB, TB/IPS, or SBR Fire

See section II.B.3.b for reactivity control requirements.

4. Process Instrumentation

a. RB/DGB, TB/IPS, CB, SBR, or BBR Fire

See section II.B.4.a for instrumentation requirements.

5. Shutdown Control Area Environmental Control

a. Heating, Ventilating, and Air Conditioning (HVAC) System

(1) RB/DGB, TB/IPS, SBR, or BBR Fire

See section II.B.6.a.(1) for system requirements.

(2) CB Fire

See section II.B.6.b.(1) for system requirements.

6. Auxiliary Power

a. RB/DGB, TB/IPS, CB, BBR, or SBR Fire

A minimum amount of distribution boards are required to supply power to the necessary equipment.

## III. CONCLUSION

By ensuring the minimum equipment in section II will be available for the respective fire areas, a stable hot and cold shutdown can be accomplished regardless of a fire in any area of the plant.

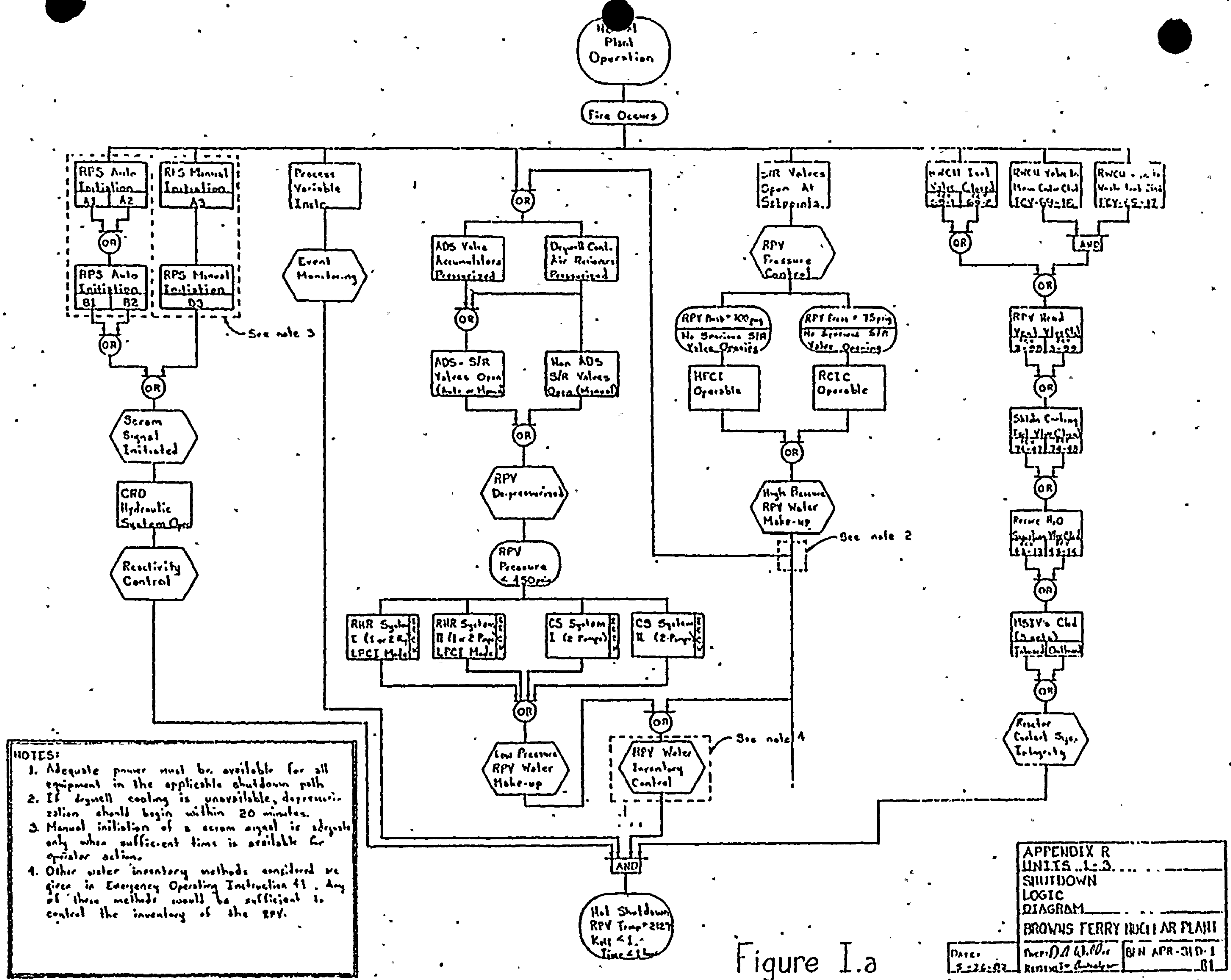
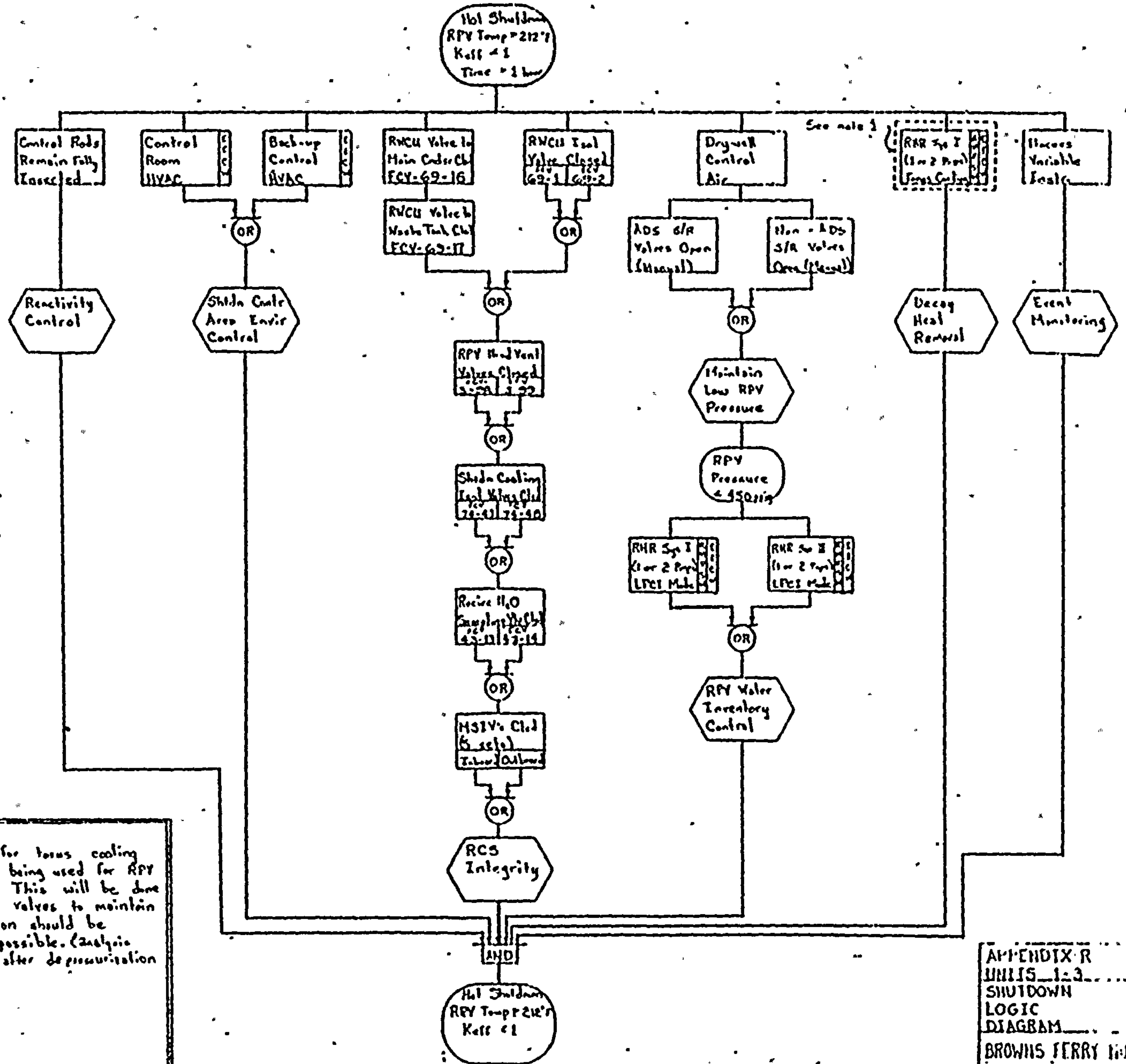

Normal Plant Operation
Fire Occurs
RPS Auto Initiation A1 A2
RPS Manual Initiation A3
OR
RPS Auto Initiation B1 B2
RPS Manual Initiation B3
See note 3
Scram Signal Initiated
CRD Hydraulic System Oper
Reactivity Control
Process Variable Instr
Event Monitoring
ADS Valve Accumulators Pressurized
Drywell Cont. Air Receivers Pressurized
ADS - S/R Valves Open (Auto or Manual)
Non ADS S/R Valves Open (Manual)
RPV Depressurized
RPV Pressure < 150psig
RHR System I (1 or 2 Pumps) LPCI Mode
RHR System II (1 or 2 Pumps) LPCI Mode
CS System I (2 Pumps)
CS System II (2 Pumps)
Low Pressure RPV Water Make-up
S/R Valves Open At Setpoints
RPV Pressure Control
No Spurious S/R Valve Opening
HPCI Operable
RCIC Operable
High Pressure RPV Water Make-up
See note 2
HPV Water Inventory Control
See note 4
RPV Head Vent Vlvs Clsd
Shtdn Cooling Iso Vlvs Clsd
MSIV's Clsd (Inboard) (Outboard)
Reactor Coolant Sys. Integrity
AND
Hot Shutdown RPV Temp > 212°F Keff < 1
NOTES:
1. Adequate power must be available for all equipment in the applicable shutdown path
2. If drywell cooling is unavailable, depressurization should begin within 20 minutes.
3. Manual initiation of a scram signal is adequate only when sufficient time is available for operator action.
4. Other water inventory methods considered are given in Emergency Operating Instruction 41. Any of these methods would be sufficient to control the inventory of the RPV.
APPENDIX R
UNITS 1-3
SHUTDOWN
LOGIC
DIAGRAM
BROWNS FERRY NUCLEAR PLANT
Date: 5-26-82
APR-310-1

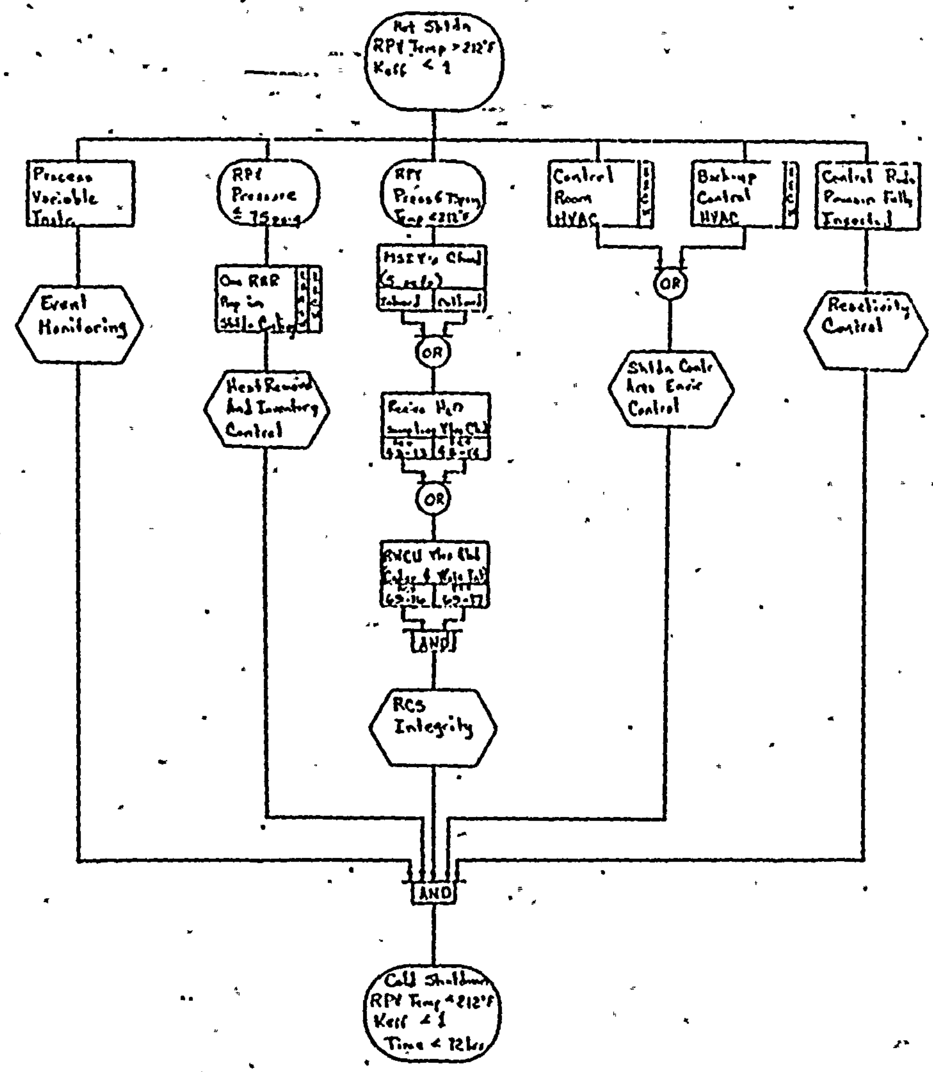
Figure I.a




NOTES:
1 The RHR pump required for torus cooling may be the same pump being used for RPV Water Inventory Control. This will be done by throttling appropriate valves to maintain vessel level. This function should be initiated as soon as possible. (Analysis assumes initiation one hour after depressurization begins).

Figure I.b

| | |
|---|---|
| APPENDIX R UNITS 1-3 SHUTDOWN LOGIC DIAGRAM | |
| BROWNS FERRY NUCLEAR PLANT | |
| Date: 9-26-82 | BFN-APR-SLD-2 R1 |




APPENDIX R
UNITS 1-3
SHUTDOWN
LOGIC
DIAGRAM

BROWNS FERRY NUCLEAR PLANT

| | | |
|---|---|---|
| DATE: 5-26-82 | | BFN-APR-SLD-3 |

Figure I.c

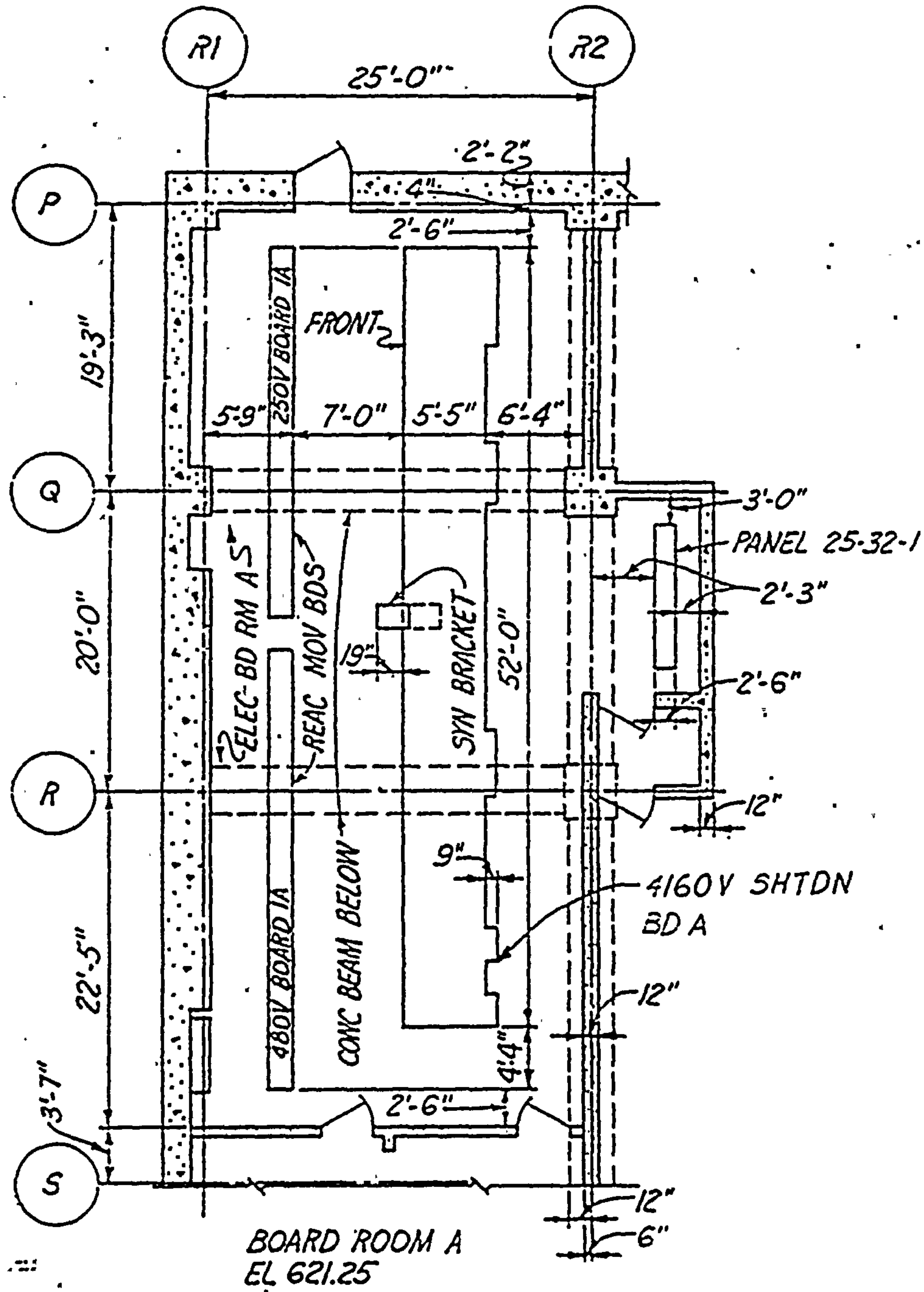
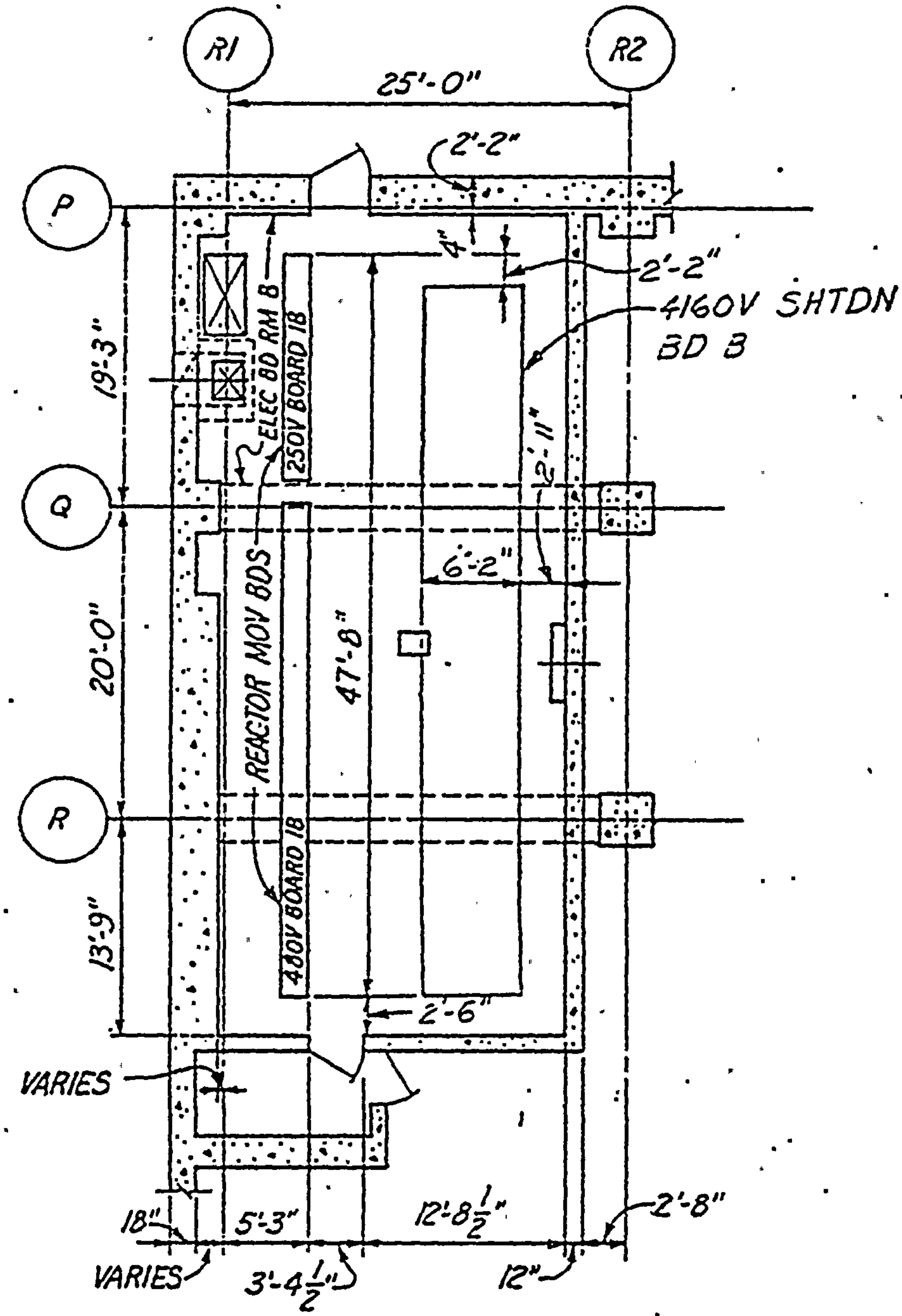
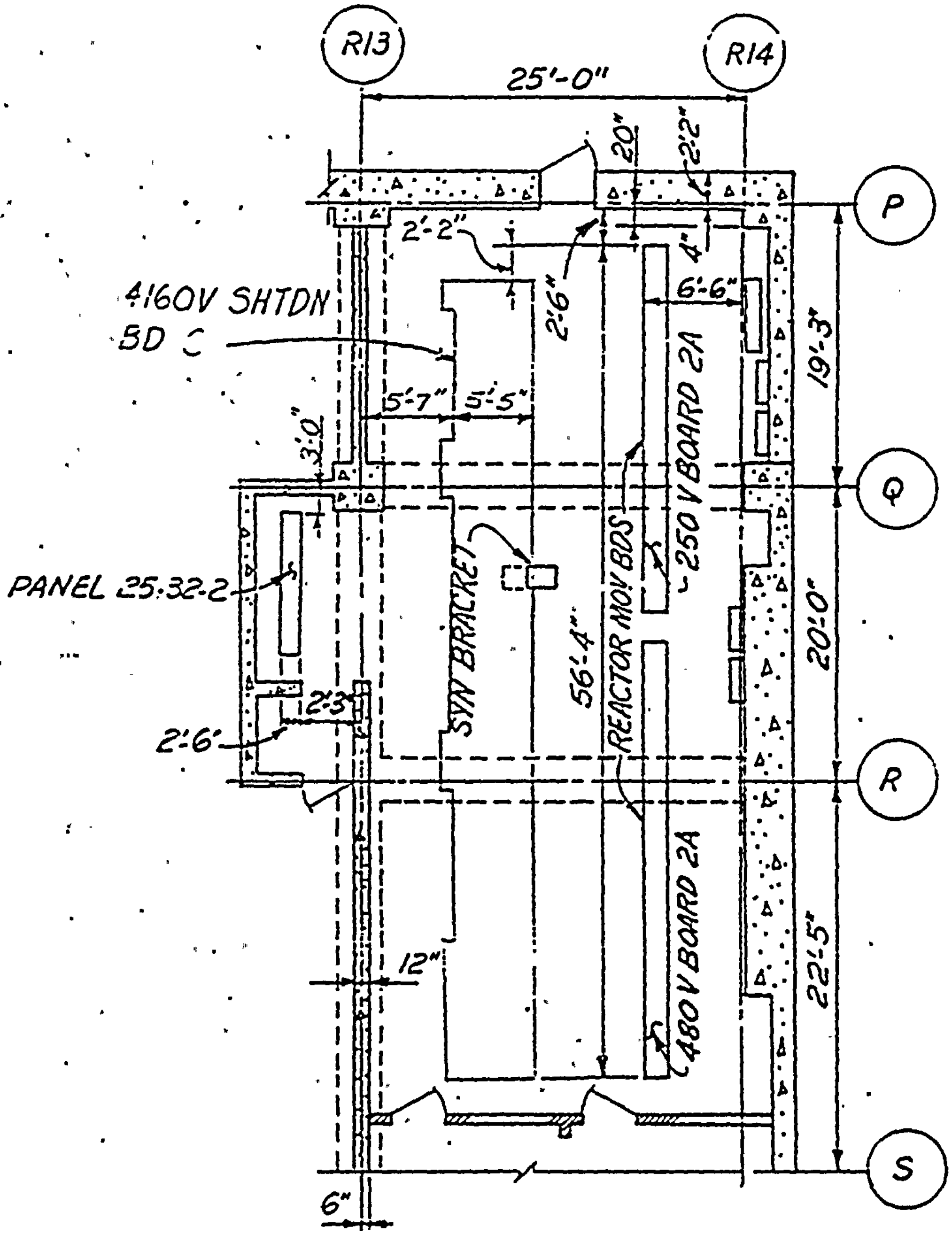

R1
R2
25'-0"
2'-2"
4"
2'-6"
P
Q
R
S
19'-3"
20'-0"
22'-5"
3'-7"
250V BOARD 1A
FRONT
5'-9"
7'-0"
5'-5"
6'-4"
3'-0"
PANEL 25-32-1
2'-3"
ELEC-BD RM A
REAC MOV BDS
SYN BRACKET
52'-0"
19"
2'-6"
12"
9"
4160V SHTDN
BD A
480V BOARD 1A
CONC BEAM BELOW
4'-4"
2'-6"
12"
12"
6"
BOARD ROOM A
EL 621.25

FIGURE I.d

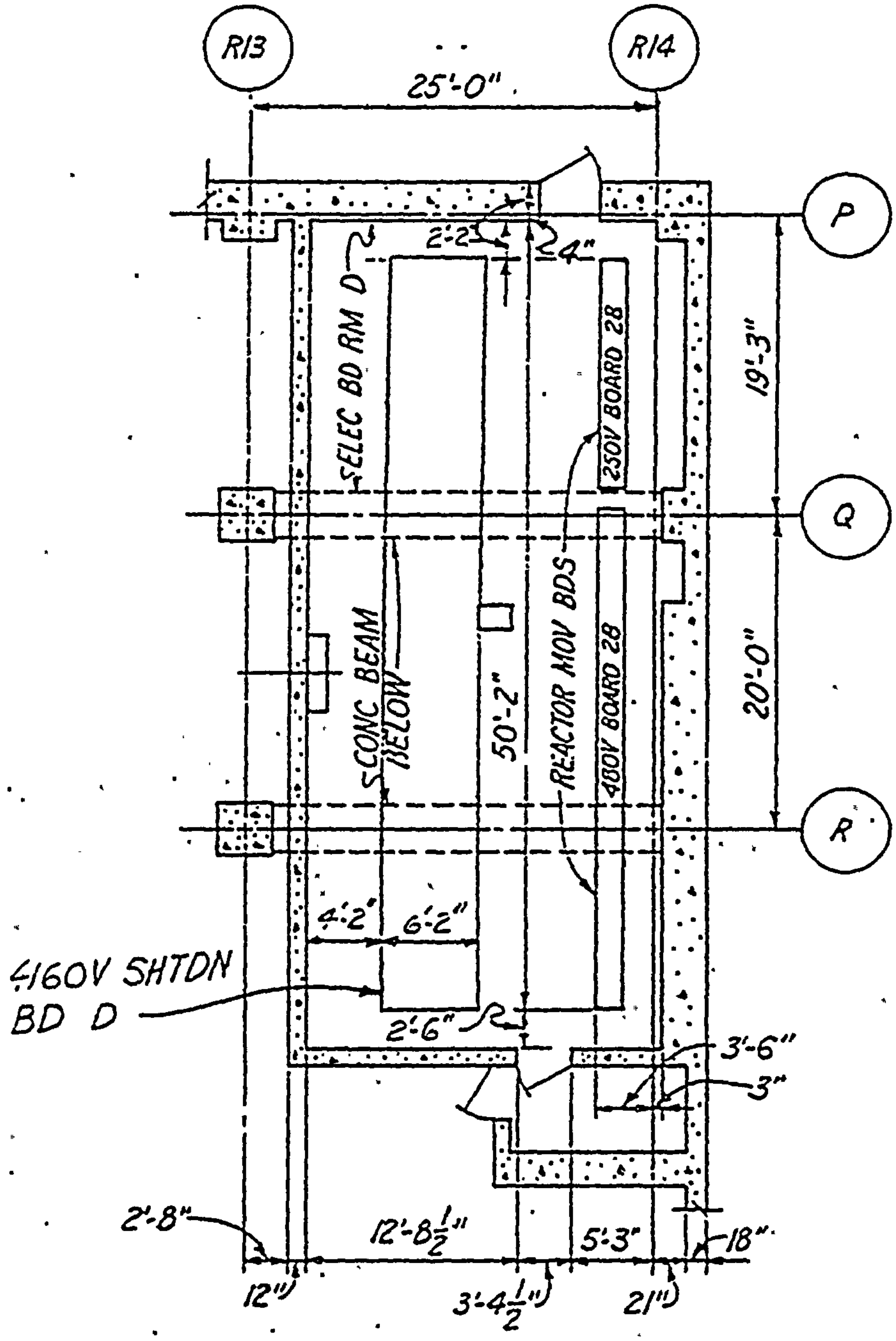



BOARD ROOM B
EL 593.0

FIGURE I.e

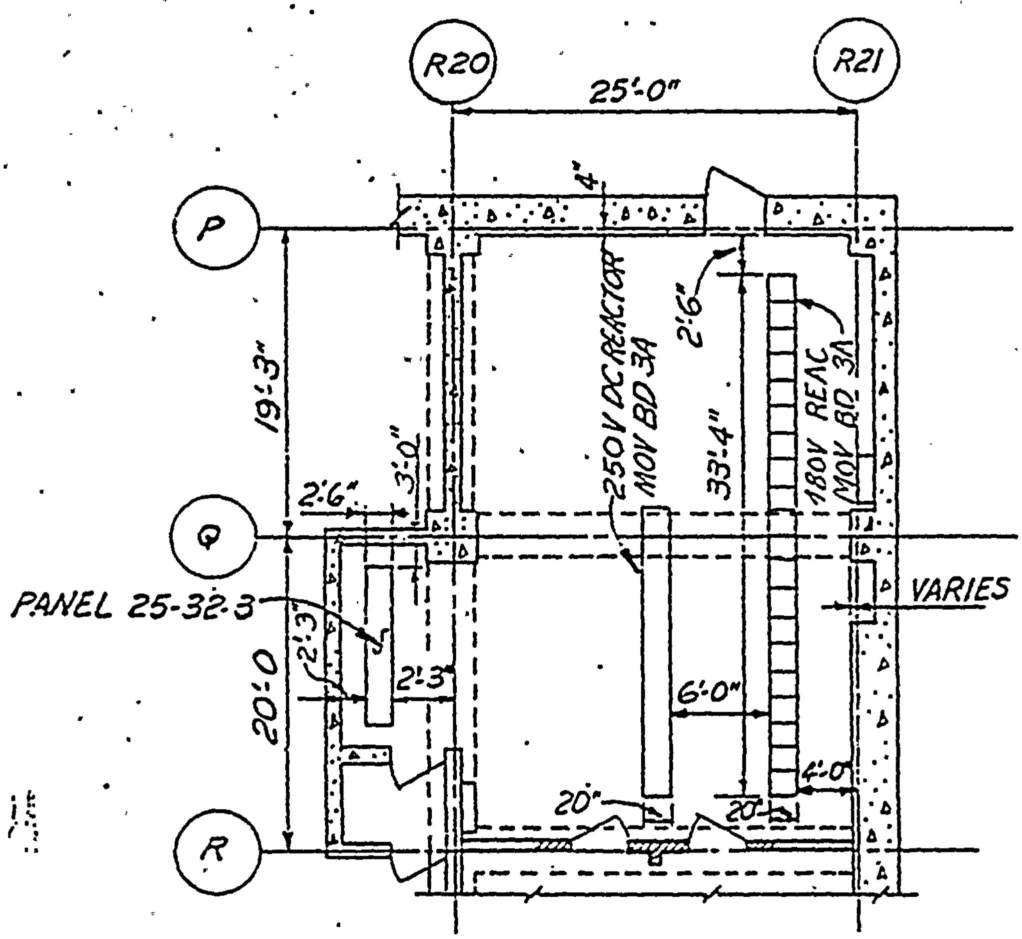



BOARD ROOM C
EL 621.25
FIGURE I.f

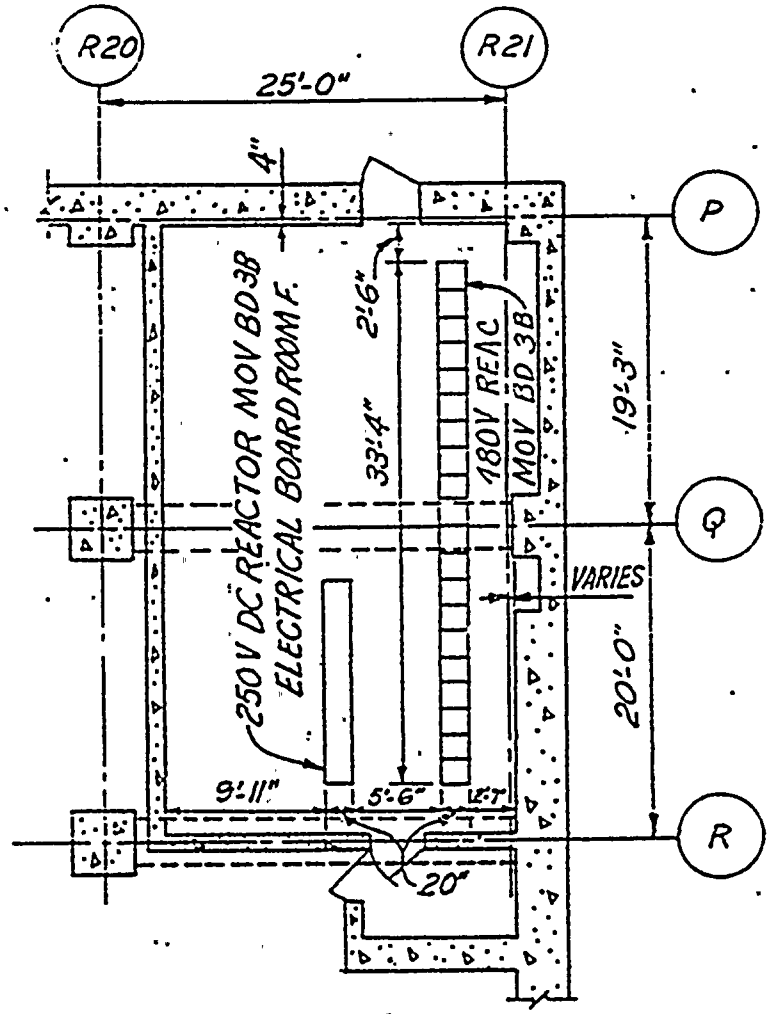



BOARD ROOM D
EL 593.0

FIGURE I.9




BOARD ROOM E
EL 621.25
FIGURE I.h




BOARD ROOM F
EL 593.0
FIGURE I-i

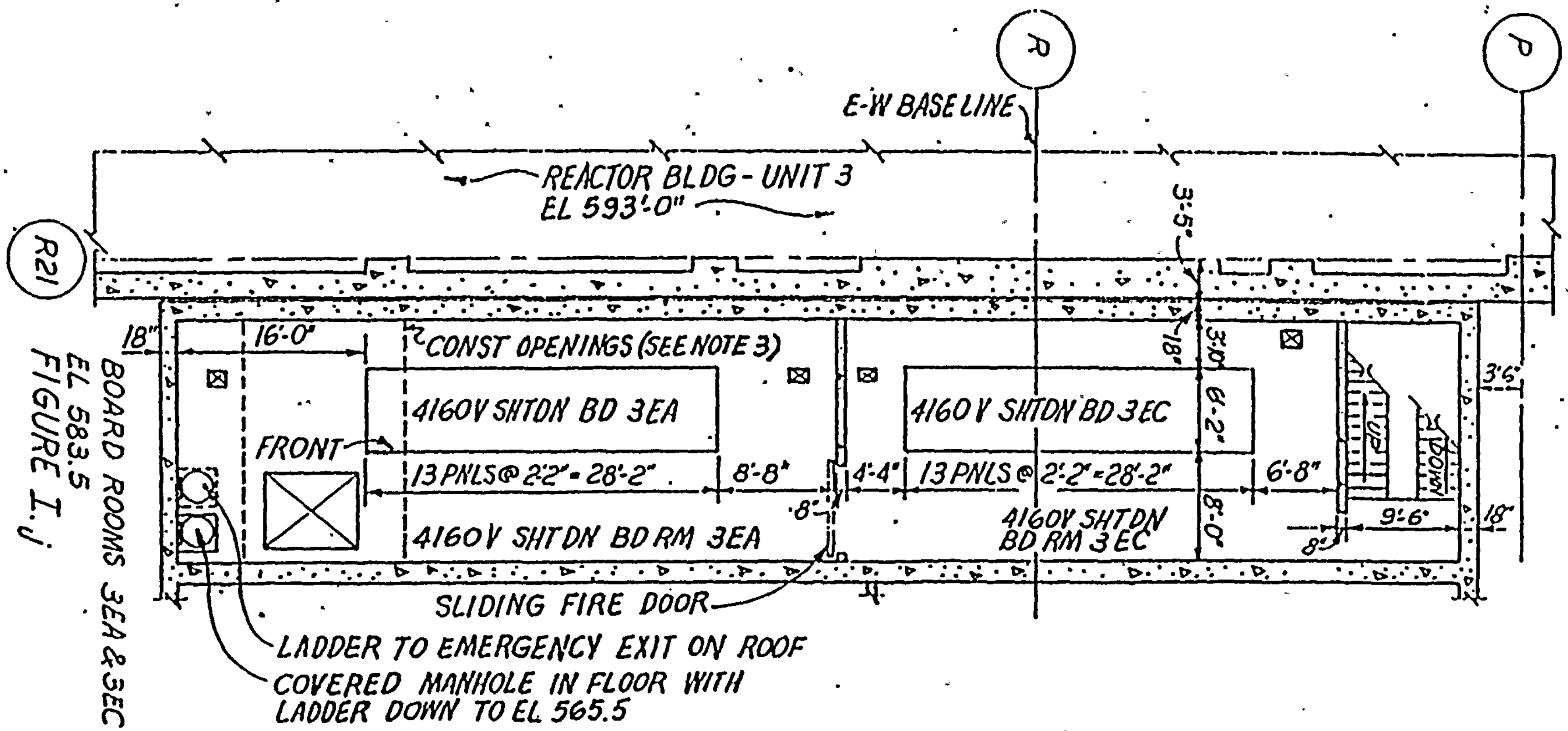
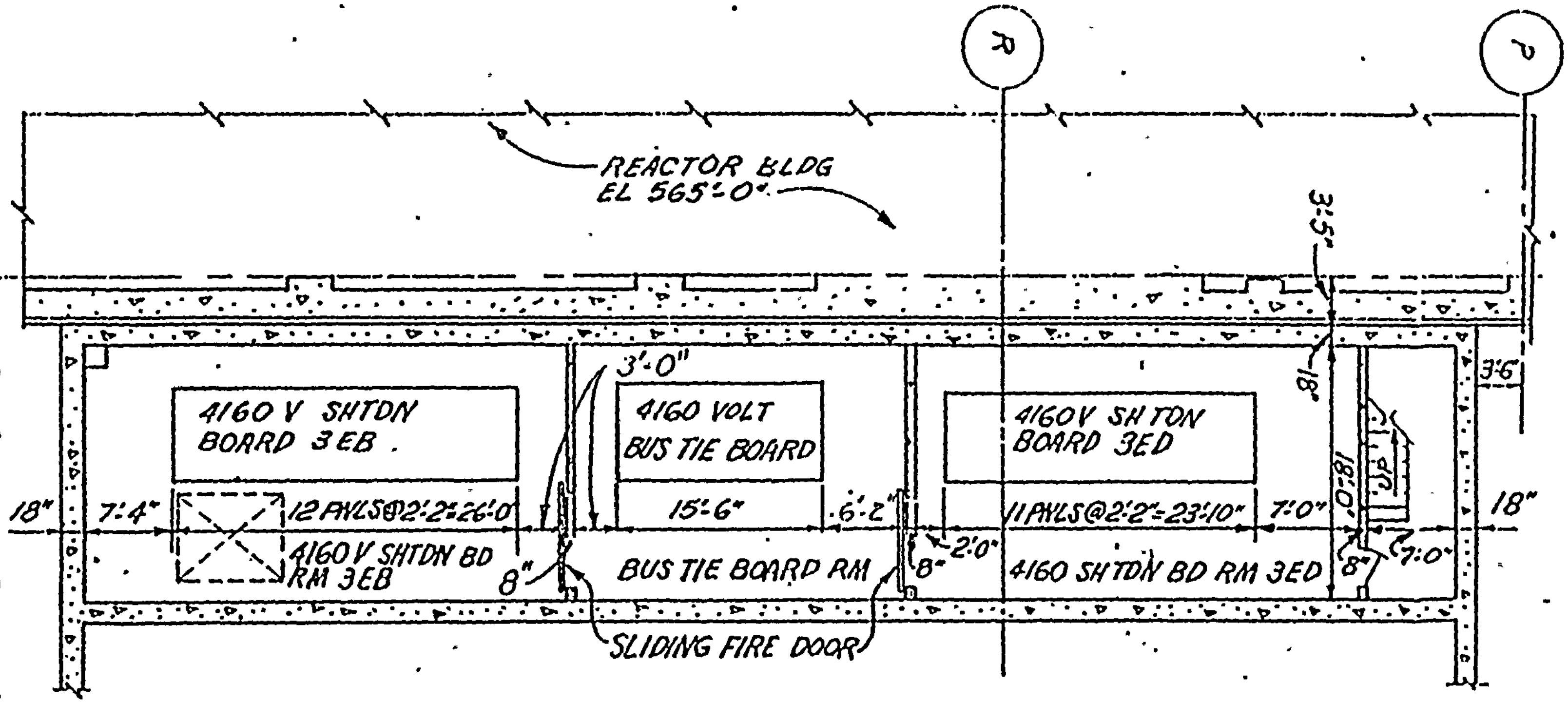
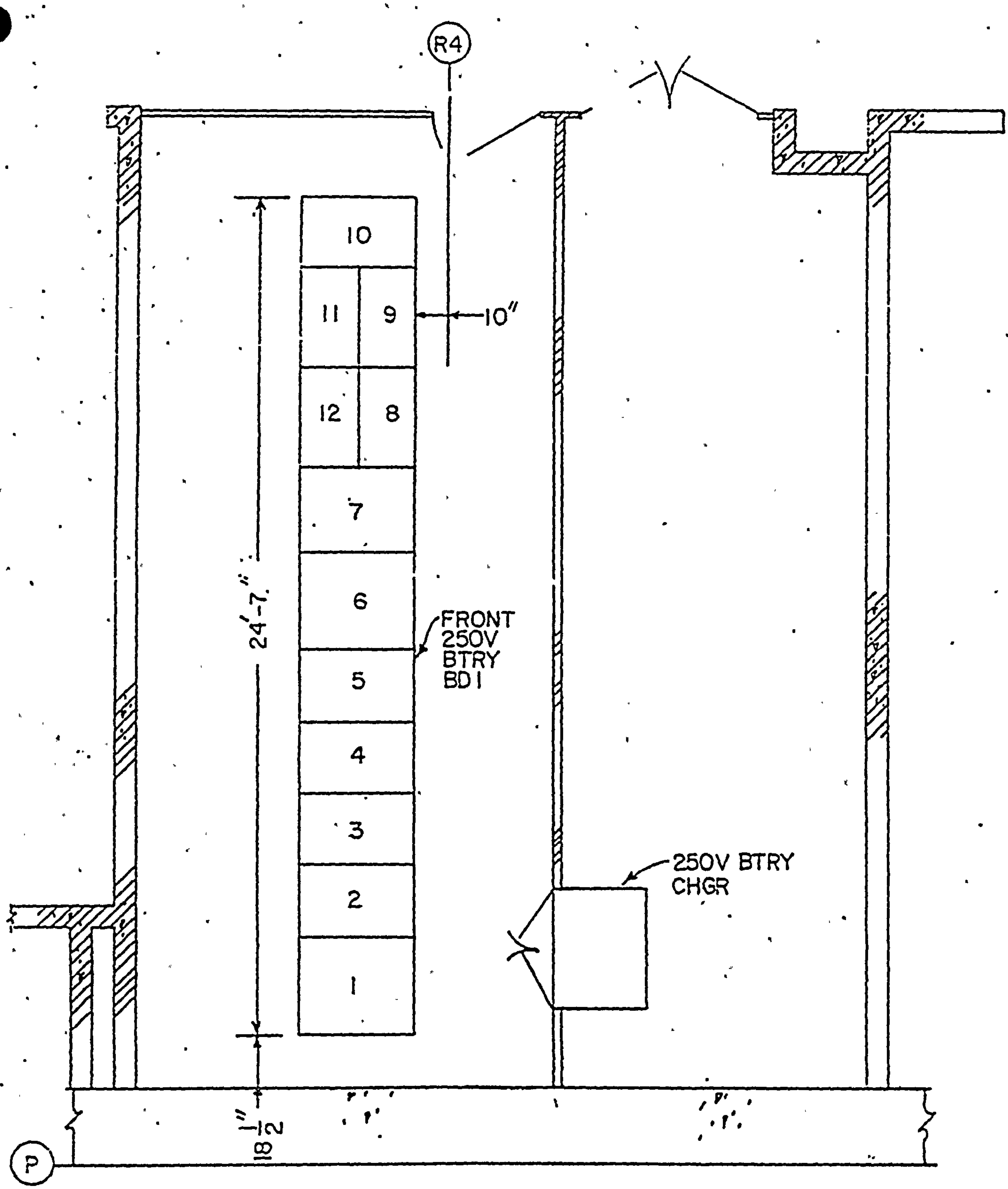



FIGURE I.j
BOARD ROOMS 3EA & 3EC
EL 583.5

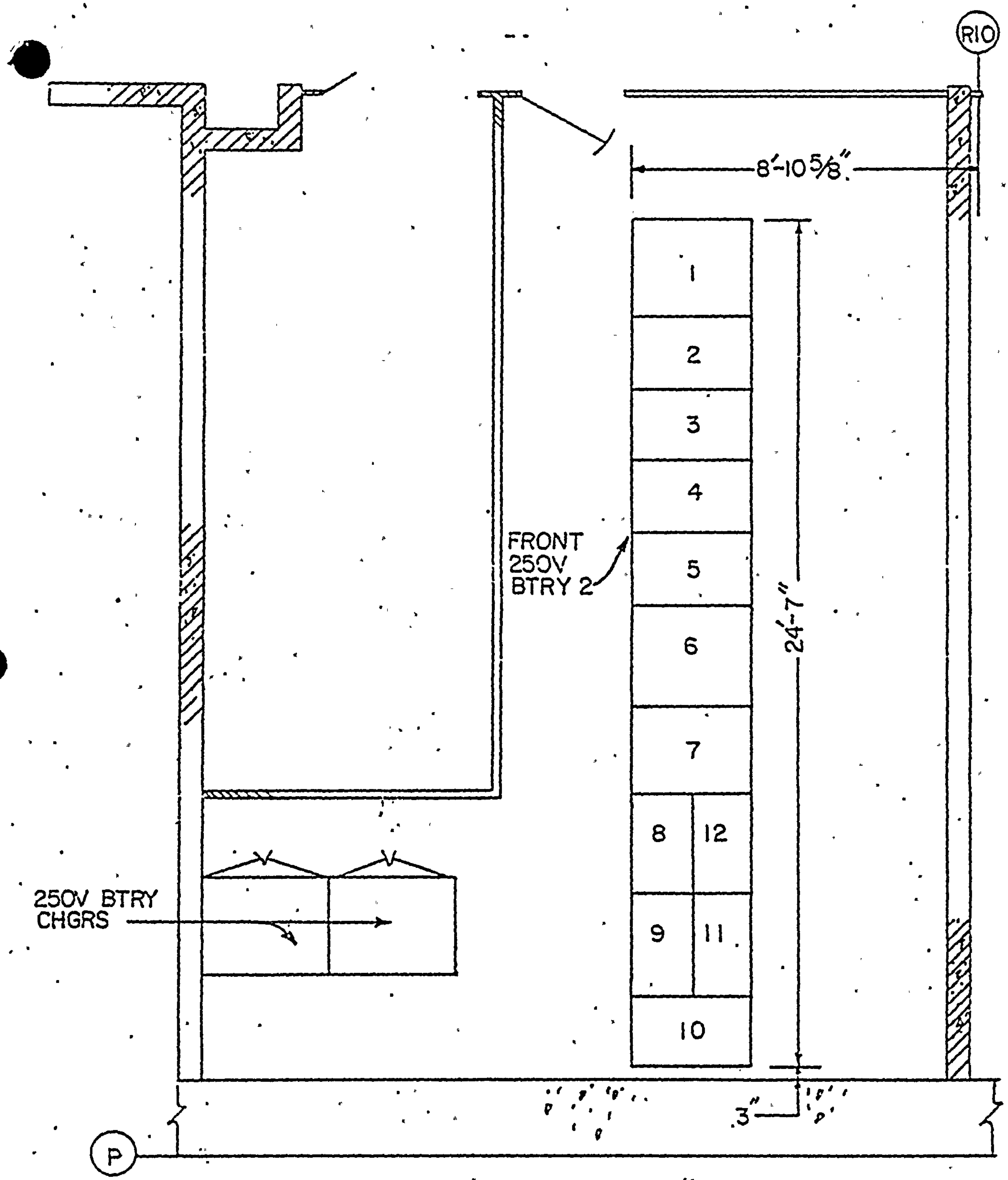



BOARD ROOMS 3EB & 3ED
EL 565.5
FIGURE I.K.

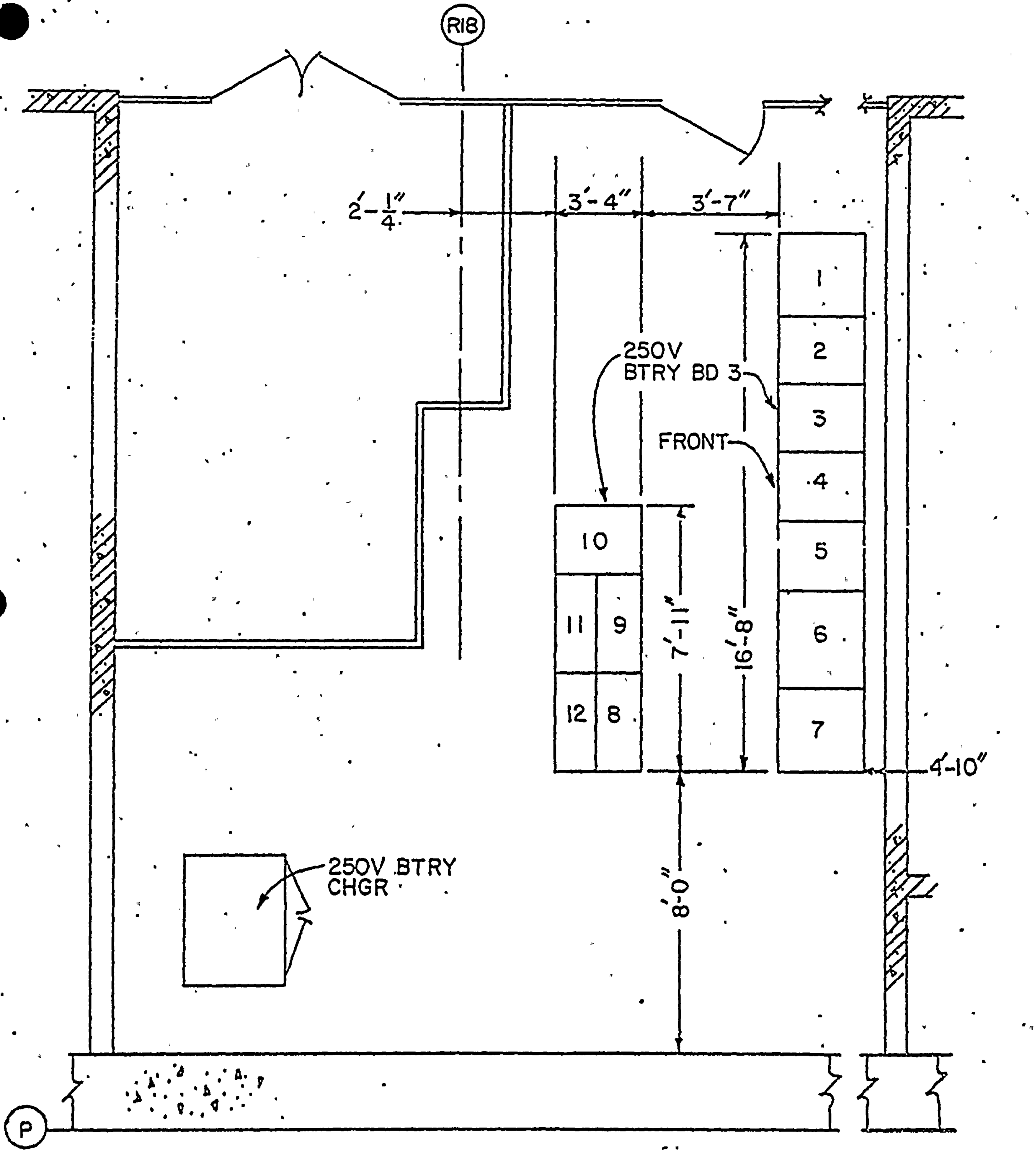



BATTERY BOARD ROOM 1
EL 593.0

FIGURE I.1




*BATTERY BOARD ROOM 2*
*EL 593.0*
*FIGURE I.m*




BATTERY BOARD ROOM 3
EL 593.0
FIGURE I.n

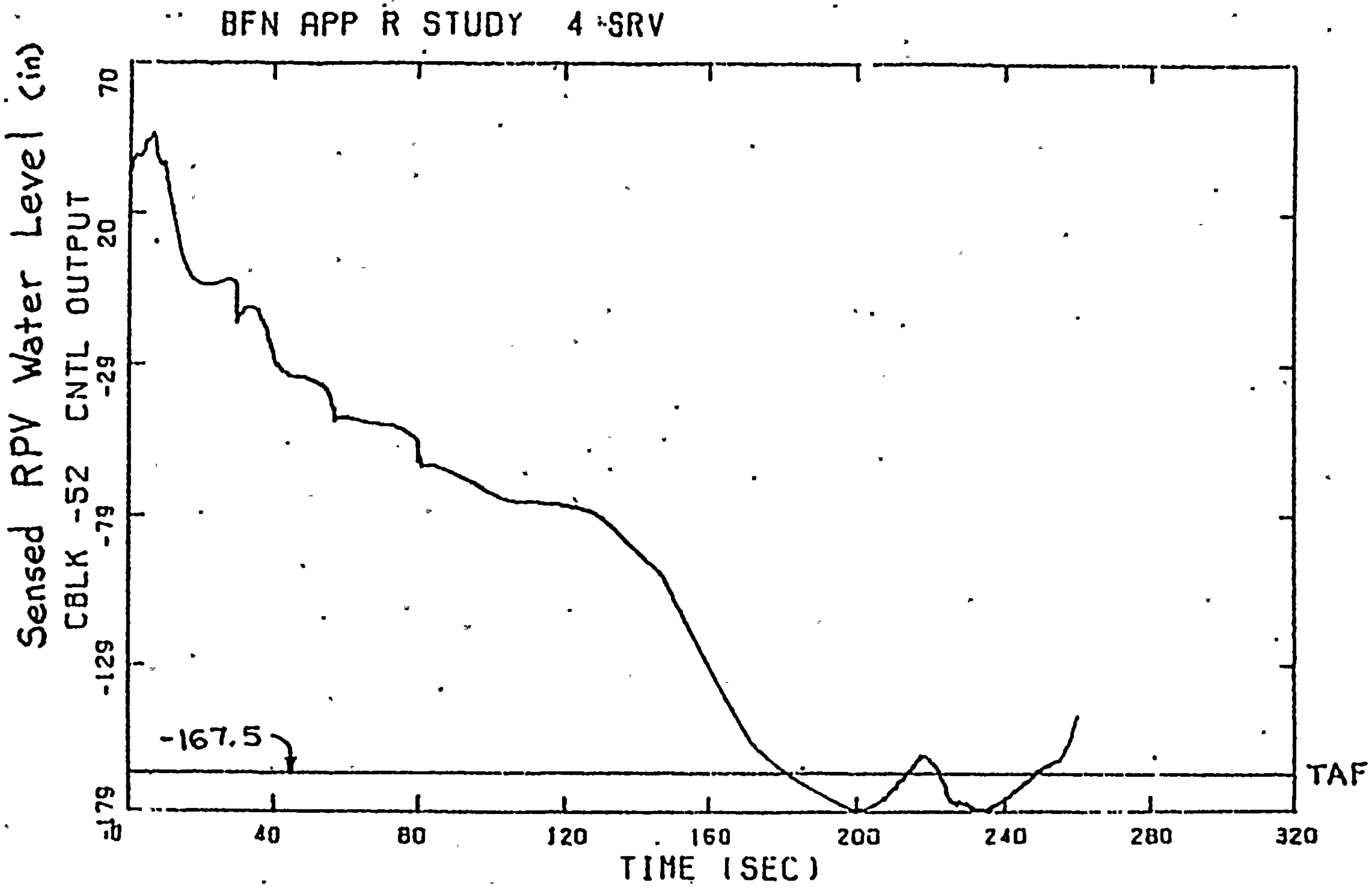



Figure II.A.2.a.(3)

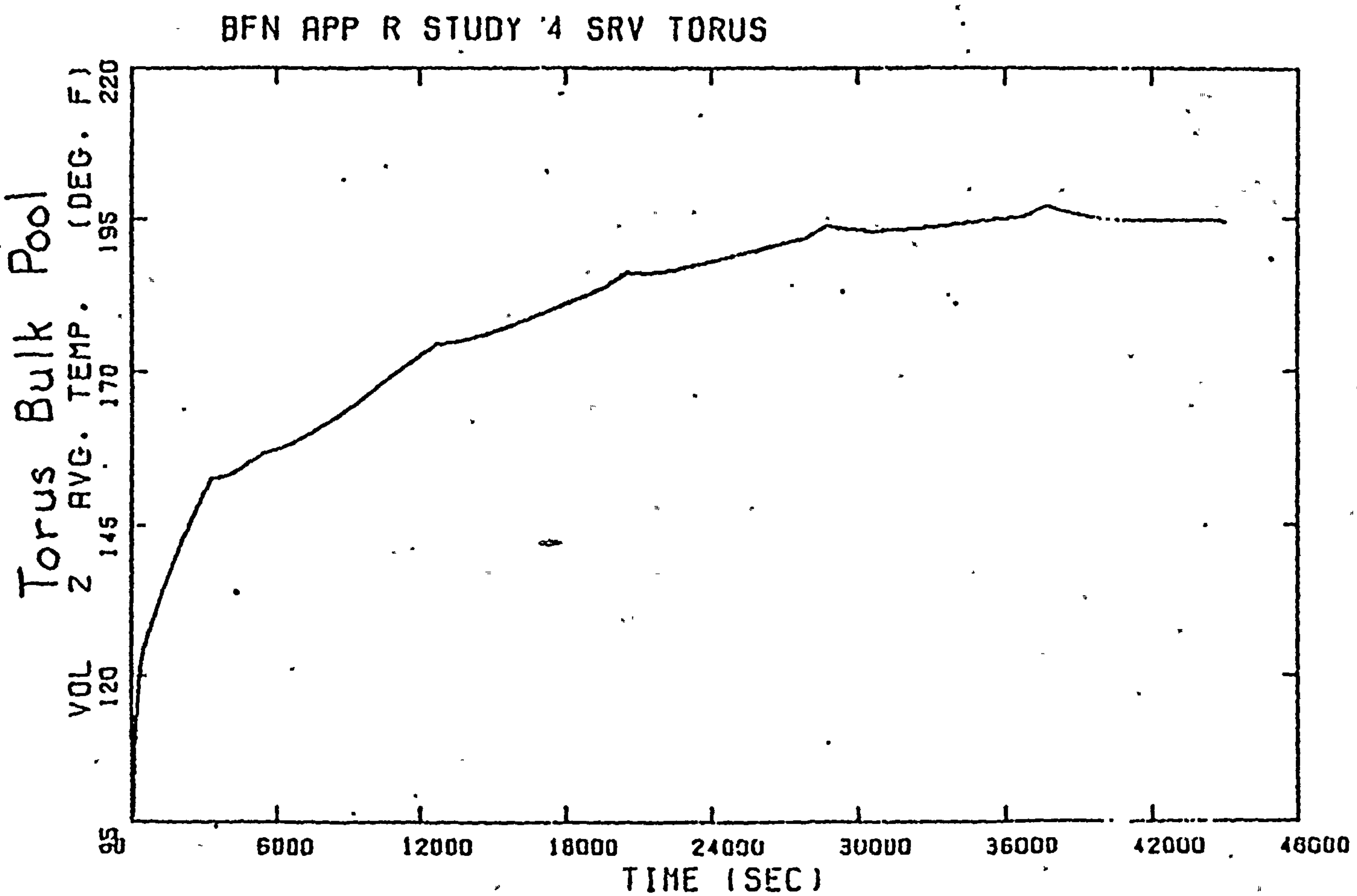



Figure II.B.5.a

TABLE II.A.1

Reactor Coolant System Integrity

| Equipment | Unit | Mode of Operation | Position |
|---|---|---|---|
| FCV-69-16 | 1,2,3 | Manual | Closed |
| FCV-69-17 | 1,2,3 | Manual | Closed |
| FCV-69-1 | 1,2,3 | Manual | Closed |
| FCV-69-2 | 1,2,3 | Manual | Closed |
| FCV-74-47 | 1,2,3 | Stay as is | Closed |
| FCV-74-48 | 1,2,3 | Stay as is | Closed |
| FCV-1-55 | 1,2,3 | Stay as is | Closed |
| FCV-1-56 | 1,2,3 | Stay as is | Closed |
| FCV-1-14 | 1,2,3 | Manual/Automatic[1] | Closed |
| FCV-1-15 | 1,2,3 | Manual/Automatic[1] | Closed |
| FCV-1-26 | 1,2,3 | Manual/Automatic[1] | Closed |
| FCV-1-27 | 1,2,3 | Manual/Automatic[1] | Closed |
| FCV-1-37 | 1,2,3 | Manual/Automatic[1] | Closed |
| FCV-1-38 | 1,2,3 | Manual/Automatic[1] | Closed |
| FCV-1-51 | 1,2,3 | Manual/Automatic[1] | Closed |
| FCV-1-52 | 1,2,3 | Manual/Automatic[1] | Closed |
| FCV-3-98 | 1,2,3 | Manual | Closed |
| FCV-3-99 | 1,2,3 | Manual | Closed |
| FCV-43-13 | 1,2,3 | Manual | Closed |
| FCV-43-14 | 1,2,3 | Manual | Closed |

Notes:

1. Valve must close automatically upon RPV low water for the RB and TB fire areas.

TABLE II.A.2.a

Reactor Pressure Vessel Water Inventory Control

S/R Valve Requirements

| Equipment | Unit | Mode of Operation | | Position |
|---|---|---|---|---|
| PCV-1-4 | 1,2,3 | Manual | Non-ADS | Operable |
| PCV-1-18 | 1,2 | Manual | Non-ADS | Operable |
| PCV-1-23 | 1,2,3 | Manual | Non-ADS | Operable |
| PCV-1-41 | 1,2 | Manual | Non-ADS | Operable |
| PCV-1-42 | 1,2,3 | Manual | Non-ADS | Operable |
| PCV-1-179 | 1,2,3 | Manual | Non-ADS | Operable |
| PCV-1-180 | 1,2,3 | Manual | Non-ADS | Operable |
| PCV-1-30 | 3 | Manual | Non-ADS | Operable |
| PCV-1-31 | 3 | Manual | Non-ADS | Operable |
| PCV-1-5 | 1,2,3 | Manual | ADS | Operable |
| PCV-1-19 | 1,2,3 | Manual | ADS | Operable |
| PCV-1-22 | 1,2,3 | Manual | ADS | Operable |
| PCV-1-30 | 1,2 | Manual | ADS | Operable |
| PCV-1-31 | 1,2 | Manual | ADS | Operable |
| PCV-1-34 | 1,2,3 | Manual | ADS | Operable |
| PCV-1-18 | 3 | Manual | ADS | Operable |
| PCV-1-41 | 3 | Manual | ADS | Operable |

TABLE II.A.2.b.(1)

Reactor Pressure Vessel Water Inventory Control

RHR Requirements

| Equipment | Unit | Mode of Operation | Sys. | Position |
|---|---|---|---|---|
| RHR Pump A or C | 2,3 | Manual | I | Running |
| RHR Pump Cooler A or C[1] | 2,3 | Automatic | I | Running |
| FCV-74-1 or 12[1] | 2,3 | Manual | I | Open |
| FCV-74-96 or 97[1] | 2,3 | Manual | I | Closed |
| FCV-74-7 | 2,3 | Manual | I | Open/Close |
| FCV-74-100 | 2,3 | Manual | I | Closed |
| FCV-74-60 or 61 | 2,3 | Manual | I | Closed |
| FCV-74-77 or 78 | 2,3 | Manual | I | Closed |
| FCV-78-61 or 62 | 2,3 | Manual | I | Closed |
| FCV-74-58 | 2,3 | Manual | I | Closed |
| FCV-74-59 | 2,3 | Manual | I | Closed |
| FCV-74-52 | 2,3 | Manual | I | Open |
| FCV-74-53 | 2,3 | Manual | I | Open |
| FCV-68-79 | 2,3 | Manual | I | Closed |
| RHR Pump B or D | 1 | Manual | II | Running |
| RHR Room Cooler B or D[1] | 1 | Automatic | II | Running |
| FCV-74-24 or 35[1] | 1 | Manual | II | Open |
| FCV-74-98 or 99[1,2] | 1 | Manual | II | Closed |
| FCV-74-30 | 1 | Manual | II | Open/Close |
| FCV-74-101 | 1 | Manual | II | Closed |
| FCV-74-74 or 75 | 1 | Manual | II | Closed |
| FCV-74-77 or 78 | 1 | Manual | II | Closed |
| FCV-78-61 or 62 | 1 | Manual | II | Closed |
| FCV-74-73 | 1 | Manual | II | Closed |
| FCV-74-66 | 1 | Manual | II | Open |
| FCV-74-67 | 1 | Manual | II | Open |
| FCV-68-3 | 1 | Manual | II | Closed |
| FCV-74-72 | 1 | Manual | II | Closed |

Notes:

1. The only piece of equipment required is the one associated with the operating pump. The equipment is listed respectfully (i.e. FCV-74-1 is required for pump A while FCV-74-12 is required for pump C).

2. Backup control is not required provided unit 2 has backup control for valves 96 and 97.

TABLE II.A.2.b.(2)

Reactor Pressure Vessel Water Inventory Control

RHR Requirements

| Equipment | Unit | Mode of Operation | Sys. | Position |
|---|---|---|---|---|
| RHR Pump A or C | 1,2,3 | Manual | I | Running |
| RHR Pump Cooler A or C[1] | 1,2,3 | Automatic | I | Running |
| FCV-74-1 or 12[1] | 1,2,3 | Manual | I | Open |
| FCV-74-96 or 97[1] | 2,3 | Manual | I | Closed |
| FCV-74-7 | 1,2,3 | Automatic | I | Open/Close |
| FCV-74-100 | 2,3 | Manual | I | Closed |
| FCV-74-60 | 1,2,3 | Manual | I | Closed |
| FCV-74-77 or 78 | 2,3 | Manual | I | Closed |
| FCV-78-61 or 62 | 2,3 | Manual | I | Closed |
| FCV-74-58 | 1,2,3 | Manual | I | Closed |
| FCV-74-59 | 1,2,3 | Manual | I | Closed |
| FCV-74-52 | 1,2,3 | Manual | I | Open |
| FCV-74-53 | 1,2,3 | Manual | I | Open |
| FCV-68-79 | 1,2,3 | Manual | I | Closed |
| RHR Pump B or D | 1,2,3 | Manual | II | Running |
| RHR Pump Cooler B or D[1] | 1,2,3 | Automatic | II | Running |
| FCV-74-24 or 35[1] | 1,2,3 | Manual | II | Open |
| FCV-74-98 or 99[1] | 1,2 | Manual | II | Closed |
| FCV-74-30 | 1,2,3 | Automatic | II | Open/Close |
| FCV-74-101 | 1,2 | Manual | II | Closed |
| FCV-74-74 | 1,2,3 | Manual | II | Closed |
| FCV-74-77 or 78 | 1 | Manual | II | Closed |
| FCV-78-61 or 62 | 1 | Manual | II | Closed |
| FCV-74-72 | 1,2,3 | Manual | II | Closed |
| FCV-74-73 | 1,2,3 | Manual | II | Closed |
| FCV-74-66 | 1,2,3 | Manual | II | Open |
| FCV-74-67 | 1,2,3 | Manual | II | Open |
| FCV-68-3 | 1,2,3 | Manual | II | Closed |

Notes:

1. The only piece of equipment required is the one associated with the operating pump. The equipment is listed respectfully (i.e. FCV-74-1 is required for pump A while FCV-74-12 is required for pump C).

TABLE II.A.2.b.(3)

Reactor Pressure Vessel Water Inventory Control

RHR Requirements

| Equipment | Unit | Mode of Operation | Sys. | Position |
|---|---|---|---|---|
| RHR Pump A and C | 1,2,3 | Automatic | I | Running |
| RHR Pump Cooler A and C | 1,2,3 | Automatic | I | Running |
| FCV-74-1 and 12 | 1,2,3 | Stay as is | I | Open |
| FCV-74-96 and 97 | 2,3 | Stay as is | I | Closed |
| FCV-74-7 | 1,2,3 | Automatic | I | Open/Close |
| FCV-74-100 | 2,3 | Stay as is | I | Closed |
| FCV-74-60 or 61 | 1,2,3 | Stay as is | I | Closed |
| FCV-74-77 or 78 | 2,3 | Stay as is | I | Closed |
| FCV-78-61 or 62 | 2,3 | Stay as is | I | Closed |
| FCV-74-58 | 1,2,3 | Stay as is | I | Closed |
| FCV-74-59 | 1,2,3 | Stay as is | I | Closed |
| FCV-74-52 | 1,2,3 | Stay as is | I | Open |
| FCV-74-53 | 1,2,3 | Automatic | I | Open |
| FCV-68-79 | 1,2,3 | Automatic | I | Closed |
| RHR Pump B and D | 1,2,3 | Automatic | II | Running |
| RHR Pump Cooler B and D | 1,2,3 | Automatic | II | Running |
| FCV-74-24 and 35 | 1,2,3 | Stay as is | II | Open |
| FCV-74-98 and 99 | 1,2 | Stay as is | II | Closed |
| FCV-74-30 | 1,2,3 | Automatic | II | Open/Close |
| FCV-74-101 | 1,2 | Stay as is | II | Closed |
| FCV-74-74 or 75 | 1,2,3 | Stay as is | II | Closed |
| FCV-74-77 or 78 | 1 | Stay as is | II | Closed |
| FCV-78-61 or 62 | 1 | Stay as is | II | Closed |
| FCV-74-72 | 1,2,3 | Stay as is | II | Closed |
| FCV-74-73 | 1,2,3 | Stay as is | II | Closed |
| FCV-74-66 | 1,2,3 | Stay as is | II | Open |
| FCV-74-67 | 1,2,3 | Automatic | II | Open |
| FCV-68-3 | 1,2,3 | Automatic | II | Closed |

TABLE II.A.2.c.(2)

Reactor Pressure Vessel Water Inventory Control

CS Requirements

| Equipment | Unit | Mode of Operation | Sys. | Position |
|---|---|---|---|---|
| CS Pump A and C | 1,2,3 | Automatic | I | Running |
| CS Room Cooler (A & C) | 1,2,3 | Automatic | I | Running |
| FCV-75-2 | 1,2,3 | Stay as is | I | Open |
| FCV-75-11 | 1,2,3 | Stay as is | I | Open |
| FCV-75-9 | 1,2,3 | Automatic | I | Open/Close |
| FCV-75-23 | 1,2,3 | Stay as is | I | Open |
| FCV-75-25 | 1,2,3 | Automatic | I | Open |
| FCV-75-22 | 1,2,3 | Stay as is | I | Closed |
| CS Pump B and D | 1,2,3 | Automatic | II | Running |
| CS Room Cooler (B & D) | 1,2,3 | Automatic | II | Running |
| FCV-75-30 | 1,2,3 | Stay as is | II | Open |
| FCV-75-39 | 1,2,3 | Stay as is | II | Open |
| FCV-75-37 | 1,2,3 | Automatic | II | Open/Close |
| FCV-75-51 | 1,2,3 | Stay as is | II | Open |
| FCV-75-53 | 1,2,3 | Automatic | II | Open |
| FCV-75-50 | 1,2,3 | Stay as is | II | Closed |

TABLE II.A.2.f

Reactor Pressure Vessel Water Inventory Control

EECW Requirements

| Equipment | Unit | Mode of Operation[1] | Hdr. | Position |
|---|---|---|---|---|
| RHRSW Pump A3 and C3 | 0 | Automatic | North | Running |
| FCV-67-13 | 0 | Stay as is | North | Open |
| FCV-67-17 | 1 | Stay as is | North | Open |
| FCV-67-21 | 2 | Stay as is | North | Open |
| FCV-67-25 | 3 | Stay as is | North | Open |
| RHRSW Pump B3 and D3 | 0 | Automatic | South | Running |
| FCV-67-14 | 0 | Stay as is | South | Open |
| FCV-67-18 | 1 | Stay as is | South | Open |
| FCV-67-22 | 2 | Stay as is | South | Open |
| FCV-67-26 | 3 | Stay as is | South | Open |

Notes:

1. For a CB fire, the mode of operation is manual for backup control.

TABLE II.A.3.b

Reactivity Control

CRDH Requirements

| Equipment | Unit | Mode of Operation | Position |
|---|---|---|---|
| FSV-85-35A | 1,2,3 | Automatic | Energized |
| FSV-85-70A | 1,2,3 | Automatic | Energized |
| FSV-85-35B | 1,2,3 | Automatic | Energized |
| FSV-85-70B | 1,2,3 | Automatic | Energized |

TABLE II.A.4

Vital Instrument Loops

1. <u>General Area Fire</u>

   <u>Reactor Vessel Level</u>

   LITS-3-46A and LI-3-46A

   or

   LITS-3-46B and LI-3-46B

   <u>Reactor Vessel Pressure</u>

   PT-3-207, PI-3-207, PX-3-207, and LM-3-206

   or

   PT-3-61, PX-3-61, PI-3-61, LM-3-60, and XS-3-53

2. <u>Control Bay Fire</u>

   <u>Reactor Vessel Level</u>

   LITS-3-58B and LI-3-58A

   <u>Reactor Vessel Pressure</u>

   PT-3-79, PX-3-79, and PI-3-79

TABLE II.B.5.a

Decay Heat Removal

RHR Requirements

| Equipment | Unit | Mode of Operation | Sys. | Position |
|---|---|---|---|---|
| RHR Pump A or C | 1,2,3 | Manual | I | Running |
| RHR Pump Cooler A or C[1] | 1,2,3 | Manual | I | Running |
| FCV-74-1 or 12[1] | 1,2,3 | Manual | I | Open |
| FCV-74-96 or 97[1] | 2,3 | Manual | I | Closed |
| FCV-74-7 | 1,2,3 | Manual | I | Open/Close |
| FCV-74-100 | 2,3 | Manual | I | Closed |
| FCV-74-60 | 1,2,3 | Manual | I | Closed |
| FCV-74-77 or 78 | 2,3 | Manual | I | Closed |
| FCV-78-61 or 62 | 2,3 | Manual | I | Closed |
| FCV-74-58 | 1,2,3 | Manual | I | Closed |
| FCV-74-59 | 1,2,3 | Manual | I | Open |
| FCV-74-52 or 53 | 1,2,3 | Manual | I | Closed |
| FCV-74-57 | 1,2,3 | Manual | I | Open |
| RHR Pump B or D | 1,2,3 | Manual | II | Running |
| RHR Pump Cooler B or D[1] | 1,2,3 | Manual | II | Running |
| FCV-74-24 or 35[1] | 1,2,3 | Manual | II | Open |
| FCV-74-98 or 99[1] | 1,2 | Manual | II | Closed |
| FCV-74-30 | 1,2,3 | Manual | II | Open/Close |
| FCV-74-101 | 1,2 | Manual | II | Closed |
| FCV-74-74 | 1,2,3 | Manual | II | Closed |
| FCV-74-77 or 78 | 1 | Manual | II | Closed |
| FCV-78-61 or 62 | 1 | Manual | II | Closed |
| FCV-74-73 | 1,2,3 | Manual | II | Open |
| FCV-74-66 or 67 | 1,2,3 | Manual | II | Closed |
| FCV-74-71 | 1,2,3 | Manual | II | Open |
| FCV-74-72 | 1,2,3 | Manual | II | Closed |

Notes:

1. The only piece of equipment required is the one associated with the operating pump. The equipment is listed respectfully (i.e. FCV-74-1 is required for pump A while FCV-74-12 is required for pump C).

TABLE II.B.5.b

Decay Heat Removal

RHRSW Requirements

| Equipment | Unit | Mode of Operation | Position |
|---|---|---|---|
| RHRSW Pump A2 | 0 | Manual | Running |
| RHRSW Pump A1 | 0 | Manual | Running |
| FCV-23-34 | 1,2,3 | Manual | Open |
| | | | |
| RHRSW Pump C2 | 0 | Manual | Running |
| RHRSW Pump C1 | 0 | Manual | Running |
| FCV-67-49 | 0 | Manual | Closed |
| FCV-23-40 | 1,2,3 | Manual | Open |
| | | | |
| RHRSW Pump B2 | 0 | Manual | Running |
| RHRSW Pump B1 | 0 | Manual | Running |
| FCV-23-46 | 1,2,3 | Manual | Open |
| FCV-23-57 | 2 | Manual | Closed |
| | | | |
| RHRSW Pump D2 | 0 | Manual | Running |
| RHRSW Pump D1 | 0 | Manual | Running |
| FCV-67-48 | 0 | Manual | Closed |
| FCV-23-52 | 1,2,3 | Manual | Open |
| FCV-23-57 | 1 | Manual | Closed |

TABLE II.B.6.a.(1)

Shutdown Control Area Environmental Control

HVAC Requirements

| Equipment | Unit[1] | Mode of Operation | Position |
|---|---|---|---|
| MCR AHU A | 1,2,3 | Manual | Running |
| FCO-31-81 | 1,2 | Manual | Open |
| FCO-31-104 | 3 | Manual | Open |
| Chilled $H_2O$ Circ Pump A | 1,2,3 | Manual | Running |
| Water Chiller A | 1,2,3 | Manual | Running |
| MCR AHU B | 1,2,3 | Manual | Running |
| FCO-31-82 | 1,2 | Manual | Open |
| FCO-31-105 | 3 | Manual | Open |
| Chilled $H_2O$ Circ Pump B | 1,2,3 | Manual | Running |
| Water Chiller B | 1,2,3 | Manual | Running |
| FCO-31-150B | 1,2 | Manual | Closed |
| FCO-31-150D | 3 | Manual | Closed |
| Emerg. Press. Fan A | 0 | Manual | Running |
| Board Room Sply Fan 1A | 0 | Manual | Running |
| FCO-31-77B | 0 | Manual | Open |
| FCO-31-151 | 0 | Manual | Open |
| Emerg. Press. Fan B | 0 | Manual | Running |
| Board Room Sply Fan 3A | 0 | Manual | Running |
| FCO-31-77F | 0 | Manual | Open |
| FCO-31-152 | 0 | Manual | Open |

NOTES:

1. Units 1 and 2 have common equipment (i.e. one piece of equipment is sufficient for both units).

TABLE II.B.6.a.(2)

Shutdown Control Area Environmental Control

HVAC Requirements

| Equipment | | Mode of Operation | Operating Pos. |
|---|---|---|---|
| Shtdn Bd A Emerg Cooling Unit | | Manual | Running |
| Shtdn Bd B Emerg Cooling Unit | | Manual | Running |
| Shtdn Bd C Emerg Cooling Unit | | Manual | Running |
| Shtdn Bd D Emerg Cooling Unit | | Manual | Running |
| Shtdn Bd E Emerg Cooling Unit | | Manual | Running |
| Shtdn Bd F Emerg Cooling Unit | | Manual | Running |
| AHU 3A-1 | | Manual | Running |
| AHU 3A-2 | | Manual | Running |
| Chilled Water Circ. Pump 3A-1 | | Manual | Running |
| Chilled Water Circ. Pump 3A-2 | | Manual | Running |
| Bd Rm Water Chiller 3A-1 | | Manual | Running |
| Bd Rm Water Chiller 3A-2 | | Manual | Running |
| FCO-31-110A | | Automatic | Closed |
| FCO-31-110B | A | Automatic | Open |
| FCO-31-110C | | Automatic | Closed |
| FCO-31-112A | | Automatic | Closed |
| FCO-31-112B | B | Automatic | Open |
| FCO-31-112C | | Automatic | Closed |
| FCO-31-116A | | Automatic | Closed |
| FCO-31-116B | C | Automatic | Open |
| FCO-31-116C | | Automatic | Closed |
| FCO-31-118A | | Automatic | Closed |
| FCO-31-118B | D | Automatic | Open |
| FCO-31-118C | | Automatic | Closed |
| FCO-31-121A | | Automatic | Closed |
| FCO-31-121B | E | Automatic | Open |
| FCO-31-121C | | Automatic | Closed |
| FCO-31-123A | | Automatic | Closed |
| FCO-31-123B | F | Automatic | Open |
| FCO-31-123C | | Automatic | Closed |

NOTE:

1. Dampers operate automatically due to operation of respective cooling unit.

TABLE II.C.2.a

Heat Removal and Inventory Control

RHR Requirements

| Equipment | Unit | Mode of Operation | Sys. | Position |
|---|---|---|---|---|
| RHR Pump A or C | 1,2,3 | Manual | I | Running |
| RHR Pump Cooler A or C[1] | 1,2,3 | Manual | I | Running |
| FCV-74-2 or 13[1] | 1,2,3 | Manual | I | Open |
| FCV-74-96 or 97[1] | 2,3 | Manual | I | Closed |
| FCV-74-1 | 1,2,3 | Manual | I | Closed |
| FCV-74-12 | 1,2,3 | Manual | I | Closed |
| FCV-74-47 | 1,2,3 | Manual | I | Open |
| FCV-74-48 | 1,2,3 | Manual | I | Open |
| FCV-74-7 | 1,2,3 | Manual | I | Open/Close |
| FCV-74-100 | 2,3 | Manual | I | Closed |
| FCV-74-60 or 61 | 1,2,3 | Manual | I | Closed |
| FCV-78-61 or 62 | 2,3 | Manual | I | Closed |
| FCV-74-58 | 1,2,3 | Manual | I | Closed |
| FCV-74-59 | 1,2,3 | Manual | I | Closed |
| FCV-74-52 | 1,2,3 | Manual | I | Open |
| FCV-74-53 | 1,2,3 | Manual | I | Open |
| FCV-68-79 | 1,2,3 | Manual | I | Closed |
| FCV-74-77 or 78 | 2,3 | Manual | I | Closed |
| RHR Pump B or D | 1,2,3 | Manual | II | Running |
| RHR Pump Cooler B or D[1] | 1,2,3 | Manual | II | Running |
| FCV-74-25 or 36[1] | 1,2,3 | Manual | II | Open |
| FCV-74-98 or 99[1] | 1,2 | Manual | II | Closed |
| FCV-74-24 | 1,2,3 | Manual | II | Closed |
| FCV-74-35 | 1,2,3 | Manual | II | Closed |
| FCV-74-47 | 1,2,3 | Manual | II | Open |
| FCV-74-48 | 1,2,3 | Manual | II | Open |
| FCV-74-30 | 1,2,3 | Manual | II | Open/Close |
| FCV-74-101 | 1,2 | Manual | II | Closed |
| FCV-74-74 or 75 | 1,2,3 | Manual | II | Closed |
| FCV-78-61 or 62 | 1 | Manual | II | Closed |
| FCV-74-77 or 78 | 1 | Manual | II | Closed |
| FCV-74-72 | 1,2,3 | Manual | II | Closed |
| FCV-74-73 | 1,2,3 | Manual | II | Closed |
| FCV-74-66 | 1,2,3 | Manual | II | Open |
| FCV-74-67 | 1,2,3 | Manual | II | Open |
| FCV-68-3 | 1,2,3 | Manual | II | Closed |

NOTES:

1. The only piece of equipment required is the one associated with the operating pump. The equipment is listed respectfully (i.e. FCV-74-1 is required for pump A while FCV-74-12 is required for pump C).

ATTACHMENT 3

ANALYSIS OF ASSOCIATED CIRCUITS OF CONCERN

## 1.0 SCOPE

The Attachment 2 functional criteria addresses the minimum system requirements of those functions necessary for achieving and maintaining a shutdown condition in event of a postulated fire. To determine if modifications are needed to comply with section III.G.2 of Appendix R, a reassessment was made of associated circuits of concern, whose fire-induced failures could affect the capability to shutdown. This reassessment was made to identify cables that are associated because they are not adequately isolated, and:

1. Have a common power source with required shutdown equipment, or
2. Could cause spurious operation of required shutdown equipment, or
3. Share a common enclosure with required shutdown cables.

The method used to perform the associated circuit analysis varies from the method given by NRC in the Generic Letter 81-12. However, the systematic approach described in this attachment demonstrates that the intent of Generic Letter 81-12 has been met.

## 2.0 DISCUSSION

Browns Ferry Nuclear Plant has five different voltage level groupings of raceway (conduit and cable tray) systems, namely: 4160 V, 480 V, control, medium-level signal, and low-level signal cables. The 4160 V, 480 V, and control groupings are divided into divisional and nondivisional raceway systems. The 4160-V raceways contain only 4160-V cables and are located at the top position of vertically stacked trays. The 480-V raceways have 480-V power cables, lighting cabinet feeders, and instrumentation and control power cables carrying 30 A or more.

Control level raceways contain alternating current and/or direct-current control cables of 250 V or less that carry less than 30 A and communication cables, such as for telephone circuits.

Medium-level signal and low-level signal trays contain only nondivisional cables and are located at or near the lowest level of stacked trays. Divisional medium-level signal cables are routed in conduit. Medium-level signal trays carry the following type cables: signal cables of digital input to and outputs from the computer other than thermocouples; instrument transmitters, recorders, and indicators; eccentricity and rotor detectors; RTD's, tachometers, and shielded annunciator cables used with solid-state equipment. Signal cables for thermocouples, strain gauges, vibration detectors, and thermal converters are nondivisional and are run in low-level signal raceways. These type cables are for very low power circuits used to convey information. Instrument control loop and related instrument signal cables operate in a range of 10 to 50 mA with power supply voltages up to 85 V dc. The annunciator circuits operate at approximately 1 mA, 140-V dc intermittent duty. The computer cables operate at 160 mV into a high impedance. Thermocouples, strain gauges, accelerometers, and resistance-type temperature detectors are low excitation voltage devices; cables from these devices operate at 15 V or less and carry negligible current. Thus, energy produced by electrical faults in the cables routed in medium-level signal and low-level signal trays is considered insignificant and is considered no challenge to shutdown capability.

A non-safety-related cable may be routed in a tray with safety-related cables, but once routed with one division of safety-related cables, it cannot cross over and be mixed with safety-related cables of the redundant division. The non-safety-related cables are the same type and have the same circuit protection and short circuit rating as the safety-related cables.

With respect to identifying associated circuits of concern, TVA has reviewed protection for power and control cables, and has determined that if a cable fault occurs, existing or proposed overcurrent protective devices will interrupt the fault before cable damage occurs. The fault will be cleared before autoignition temperature of the cable insulation is reached. One case was identified per unit where the load/feeder overcurrent protective devices are not adequately coordinated (see Analysis of Cables That Share a Common Power Source). Several cases were identified where existing cables that can share a common enclosure do not have adequate overcurrent protection; these cables require circuit modifications (see Analysis of Cables That Share a Common Enclosure).

Cables used for 4160-V circuits are shielded, 5-kV cables. The minimum size cable used for these circuits is 2/0 AWG. The 4160-V circuits are protected by both phase-to-phase overcurrent and ground fault protective devices. The phase-to-phase fault protection is instantaneous (no intentional delay). The ground fault devices are instantaneous in operation and are set to operate for ground fault currents from 5 to 20 A.

The 480-V cables are part of the 480-V ungrounded delta distribution system. Overcurrent protection is provided by molded case circuit breakers with an interrupting time of less than two cycles and by low-voltage power circuit breakers with interrupting times of less than four cycles if equipped with instantaneous trip devices, or up to 35 cycles if equipped with short time delay devices. In all cases, after circuit modifications are made to selected cables that share a common enclosure the protective device will clear a fault before the cable insulation reaches its auto-ignition temperature.

Control level cables are used to provide instrumentation and control power (below 30 A), to convey information, or to intermittently operate devices controlling power switching or conversion equipment. The 250-V dc control power circuit was determined to have the highest

available fault energy. Each polarity of this ungrounded 250-V dc circuit is protected by a fuse or circuit breaker sized to protect the cable from damage. Thus, a fault will be cleared by a protective device before the cable insulation's auto-ignition temperature is reached.

## 3.0 ANAYLSIS OF CABLES THAT SHARE A COMMON POWER SOURCE

Each safety-related and non-safety-related circuit that shares a common power source with required shutdown equipment was analyzed to ensure that the power source is or will be adequately protected from electrical faults by coordinated breakers, fuses, or similar devices. This analysis consisted of a review of the overcurrent protective devices for the 480-V switchgear which shares a common power source, to verify proper coordination of the load and feeder breakers. Coordination of protective devices for the 4160-V switchgear had been previously verified by formal review of protective relay setting instructions. In all cases, coordination exists between these breakers as designed. Each 4160 V and 480-V switchgear has a 250-V dc control bus. Since control level trays occupy a position below the power level trays, a postulated exposure fire could possibly cause a fault on the control cable for local control or process interlock. This fault could trip the control circuit's protective device for a given pump before its power feed cable becomes involved in the fire. Verification was made that each control circuit as designed was properly fused for this switchgear which shares a common power source with shutdown equipment.

The existing design of the 480-V motor control centers that share a common power source with required shutdown equipment, was determined to have proper coordination between the combination motor starter or circuit breaker for each load and the feeder breaker. Also, the control circuit for each load has its own control transformer and is adequately fused as designed.

Each circuit of the instrumentation and control power system that shares a common power source with required shutdown equipment was analyzed. For this analysis, it was assumed that a fault occurs at the point closest to the distribution panel where nonessential cables could be involved in a postulated fire, without also involving the required cables or the distribution panel itself. Except for one case per unit, the results of the analysis confirmed that the load/feeder overcurrent protective devices are adequately coordinated to ensure that instrument and control power is available to a minimum set of shutdown equipment for any postulated fire. This exception involves a control power load circuit of the unitized 250-V dc RMOV board 1A, 2A, and 3A.

## 4.0 ANALYSIS OF CABLES THAT CAN CAUSE SPURIOUS OPERATION OF EQUIPMENT

Spurious operation of equipment due to associated circuits will not jeopardize the shutdown capability because all equipment whose spurious operation could affect safe shutdown are included in the list of required equipment and will be separated or protected in accordance with section III.G.2 of Appendix R. Therefore, if a component does operate spuriously, its redundant counterpart is outside the fire's zone of influence and will not be affected.

## 5.0 ANALYSIS OF CABLES THAT SHARE A COMMON ENCLOSURE

At Browns Ferry nonessential cables can share a common enclosure (e.g., raceway, panel, junction) with required shutdown cables. An analysis was made of all switchgear, distribution panels and cabinets that could affect shutdown capability to determine if the load cables are adequately protected from damage by circuit breakers, fuses, or similar devices. Thus, only those cables that are not adequately protected become associated circuits of concern. From the analysis, several cases were identified for each unit where the protective device is inadequate to protect the load cable from possible damage during a faulted condition. Although these cables are not required for shutdown for a postulated fire, they can share a common enclosure with cables that are required for shutdown capability. These cables will be modified to provide adequate cable protection or separation.

In addition, exposed surfaces of cables in horiziontal and vertical cable trays have been coated with fire-retardant Flamemastic 71A or Flamemastic 77 in all areas outside primary containment that contain required safe shutdown circuits. The cable coatings coupled with compliance with section III.G.2 requirements provide adequate assurance that a fire can be detected and extinguished before it propagates betweeen redundant circuits over intervening cable trays. The open cable trays are the only common enclosures through which fire could possibly propagate between redundant shutdown circuits.

## 6.0 CONCLUSION

After the proposed circuit modifications described in Attachment 4 are made, there will be no associated circuits of concern. Thus, the cables necessary for achieving and maintaining shutdown conditions in the event of a postulated fire will comply with section III.G.2 of Appendix R.

ATTACHMENT 4

ELECTRICAL MODIFICATIONS AND REQUIRED ADMINISTRATIVE ACTIONS

## 1.0 SCOPE

The electrical modifications and administrative controls required to bring Browns Ferry into compliance with section III.G.2 are the subject of this attachment.

## 2.0 SAFE SHUTDOWN ANALYSIS RESULTS FOR THE REACTOR BUILDING/DIESEL GENERATOR AND TURBINE BUILDING/INTAKE PUMPING STATION FIRE AREAS

The following section outlines the results of the Reactor Buildings/Diesel Generators and the Turbine Buildings/Intake Pumping Station.

The tables are arranged to indicate all interactions between redundant equipment required for each function defined on the shutdown Logic Diagrams in Attachment 2 (figures I.a, I.b, and I.c). Each table has a sheet 0 which lists interactions between redundant components and a sheet 1 which provides details of each interaction identified on sheet 0. Sheet 1 also references a corrective action sheet for each identified interaction. Tables are not provided for the RHR, Auxiliary Power, HVAC, and Drywell Control Air Systems due to the complexity or simplicity of the identified interactions. However, corrective action descriptions are provided for all these systems. In addition, diagrams are provided for the Auxiliary Power System illustrating the required power arrangements necessary to meet the functional criteria.

| | FCV-69-2 | FCV-69-16 | FCV-69-17 | FCV-3-53 | FCV-74-48 | FCV-1-15 | FCV-1-27 | FCV-1-38 | FCV-1-52 | FCV-1-56 | FCV-43-13 | See Companion Drawing(s) Sheet Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FCV-69-1 | 1 | 2 | 2 | | | | | | | | | 1 |
| FCV-69-16 | 3 | | | | | | | | | | | 1 |
| FCV-69-17 | 3 | | | | | | | | | | | 1 |
| FCV-3-58 | | | | 4 | | | | | | | | 1 |
| FCV-74-47 | | | | | 5 | | | | | | | 1 |
| FCV-1-14 | | | | | | 6 | | | | | | 1 |
| FCV-1-26 | | | | | | | 7 | | | | | 1 |
| FCV-1-37 | | | | | | | | 8 | | | | 1 |
| FCV-1-51 | | | | | | | | | 9 | | | 1 |
| FCV-1-55 | | | | | | | | | | 10 | | 1 |
| FCV-43-14 | | | | | | | | | | | 11 | 1 |

SYMBOLS:

- ___ Interaction Not Considered
- NI ___ No Interaction

APPENDIX R
UNIT 1

REACTOR BUILDING
REACTOR COOLANT
SYSTEM INTEGRITY

BROWNS FERRY NUCLEAR PLANT

BFN 11-RB RCS-1
Sheet 0 R0

| II NUMBER | EQUIPMENT INVOLVED | CABLES INVOLVED | CABLE ROUTING SHEET NUMBER | TYPE OF INTERACTION | CORRECTIVE ACTION ① | SEE SHEET NUMBER ② | RESPONSIBLE ORGANIZATION ③ PREPARER REVIEWER |
|---|---|---|---|---|---|---|---|
| 1 | FCV-69-1<br>FCV-69-2 | 1PC303-I, 1PC303-I<br>1PC307-I<br>1PC516-II, 1PC517-II<br>1PC518-II | SET 1<br>Sheet 3 | Cable Tray<br>Cable Tray | E | J1 | Org: NEB Date: 5-14-82<br>Prep: O.G. Wallace<br>Review: [illegible] |
| 2 | FCV-69-1<br>FCV-69-16 & 17 | 1PC303-I, 1PC305-I<br>1V2173, 1V2183 | SET 1<br>Sheets 1-3 | Cable Tray<br>Cable Tray | E | J1 | Org: NEB Date: 5-14-82<br>Prep: O.G. Wallace<br>Review: [illegible] |
| 3 | FCV-69-2<br>FCV-69-16 & 17 | 1PC518-II<br>1V2170, 1V2171<br>1V2180, 1V2181 | SET 1<br>Sheet 3 | Cable Tray<br>Cable Tray | E | J1 | Org: NEB Date: 5-14-82<br>Prep: O.G. Wallace<br>Review: [illegible] |
| 4 | FCV-3-98<br>FCV-3-99 | No separation exists for these valves in the Reactor Building | SET 2<br>Sheets 1-3 | Cable Tray, Panel<br>Cable Tray, Panel | A, A, E | M1 | Org: TDP Date: 5-14-82<br>Prep: [illegible]<br>Review: [illegible] |
| 5 | FCV-74-47<br>FCV-74-48 | 1ES3683-II, 1ES3686-II<br>1ES3680-II<br>1ES713-I, 1ES713-I | SET 3<br>Sheets 2-3 | Cable Tray<br>Cable Tray | E | J2 | Org: EEB Date: [illegible]<br>Prep: [illegible]<br>Review: [illegible] |
| 6 | FCV-1-14<br>FCV-1-15 | All cables for these valves on Elev 593 in the RB | SET 5<br>Sheet 4 | Cable Tray, Panel<br>Cable Tray, Panel | A | M1 | Org: TDP Date: 5-14-82<br>Prep: [illegible]<br>Review: [illegible] |
| 7 | FCV-1-26<br>FCV-1-27 | All cables for these valves on Elev 593 in the RB | SET 6<br>Sheet 7 | Cable Tray, Panel<br>Cable Tray, Panel | A | M1 | Org: TDP Date: 5-14-82<br>Prep: [illegible]<br>Review: [illegible] |
| 8 | FCV-1-37<br>FCV-1-38 | All cables for these valves on Elev 593 in the RB | SET 7<br>Sheet 1 | Cable Tray, Panel<br>Cable Tray, Panel | A | M1 | Org: TDP Date: 5-14-82<br>Prep: [illegible]<br>Review: [illegible] |
| 9 | FCV-1-51<br>FCV-1-52 | All cables for these valves in the RB | SET 8<br>Sheet 1-3 | Cable Tray, Panel<br>Cable Tray, Panel | A | M1 | Org: TDP Date: 5-14-82<br>Prep: [illegible]<br>Review: [illegible] |
| 10 | FCV-1-55<br>FCV-1-56 | All cables for these valves in the RB | SET 9<br>Sheet 1-3 | Cable Tray<br>Cable Tray | A | M1 | Org: TDP Date: 5-14-82<br>Prep: [illegible]<br>Review: [illegible] |
| 11 | FCV-43-13<br>FCV-43-14 | All cables for these valves in the RB | SET 4<br>Sheet 2,3 | Cable Tray, Panel<br>Cable Tray, Panel | A | M1 | Org: TDP Date: 5-14-82<br>Prep: [illegible]<br>Review: [illegible] |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |

NOTES:

1. The corrective action to be taken for the interactions are generalized in the following manner:

   A. Reroute Involved Cable(s)

   B. Provide Fire Barrier

   C. Circuit Modification

   D. Provide Fire Suppression

   E. Analysis.

   The corrective actions can be any of the above actions or any combination thereof.

2. This is a reference to the description of the corrective action. The sheet number will be preceded by "M" if any corrective A, B, C, or D is used and by "J" if action "E" is used. Only one sheet number will be referenced. (i.e. If the corrective action involves both A and E an "M" will only be used and all corrective actions will be described on that sheet.)

3. The design project is responsible for the assignment of the responsible organization for the corrective action. The responsible organization is then responsible for the modification or justification description.

APPENDIX R
UNIT 1

REACTOR BUILDING
REACTOR COOLANT
SYSTEM INTEGRITY

BROWNS FERRY NUCLEAR PLANT

| | | |
|---|---|---|
| Date: 5-14-82 | Prep: E. Wallace | BFN-1I RB-RCS-1 |
| [illegible] | Review: [illegible] | Sheet 1 80 |

To meet the success criteria for the RWCU isolation valves, one path out of three must be operable. For the interactions described on sheet 1, at no place do all three paths come within 20 feet.

Therefore, no modification is required.

APPENDIX R

CORRECTIVE ACTION

PREPARED: [illegible signature]

REVIEWED: T.W. Barkalow

DATE: 6/2/82

The 480V reactor MOV board compartment 8C breaker will be "racked out" to prevent the spurious operation of the residual heat removal shutdown cooling suction isolation valve (FCV-74-48) . The "racked out" breaker is indicated by dashed lines on the attached auxiliary power schematic diagram (45N779-7). With the 480V reactor MOV board compartment 8C breaker "racked out," the possibility of a fire causing a spurious operation of the 250V dc breaker which feeds power to open valve FCV-74-47, and the insulation burn through of two power cables, one of which feeds the FCV-74-48 valve motor, with the subsequent touching of conductors in the proper phase sequence to open valve FCV-74-48 is too unlikely to occur to be considered.

APPENDIX R

CORRECTIVE ACTION

PREPARED: David [signature]

REVIEWED: JHBoehm

DATE: 6/18/82

To meet the requirements of Appendix R, the cables for FCV-3-98 and FCV-3-99 will be rerouted in conduit. All cables for FCV-1-14, FCV-1-15, FCV-1-26, FCV-1-27, FCV-1-37, FCV-1-38 that are presently routed on elevation 593 in the reactor building will be rerouted in conduit. All cables for valves FCV-1-51, FCV-1-52, FCV-1-55, FCV-1-56, FCV-43-13, and FCV-43-14 which are presently routed in the reactor building will be rerouted in conduit.

APPENDIX R

CORRECTIVE ACTION

PREPARED: J. A. King

REVIEWED: D. Bome

DATE: 6-17-82

BFN-IT-RB-RCS-I-MI

| | FCV-69-2 | FCV-69-16 | FCV-69-17 | FCV-3-55 | FCV-74-48 | FCV-1-15 | FCV-1-27 | FCV-1-38 | FCV-1-52 | FCV-1-56 | FCV-43-13 | See Companion Drawings Sheet Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FCV-69-1 | 1 | 2 | 2 | | | | | | | | | 1 |
| FCV-69-16 | 3,4 | | | | | | | | | | | 1 |
| FCV-69-17 | 3,4 | | | | | | | | | | | 1 |
| FCV-3-56 | | | | 5 | | | | | | | | 1 |
| FCV-74-47 | | | | | 6 | | | | | | | 1 |
| FCV-1-14 | | | | | | 7 | | | | | | 1 |
| FCV-1-26 | | | | | | | 8 | | | | | 1 |
| FCV-1-37 | | | | | | | | 9 | | | | 1 |
| FCV-1-51 | | | | | | | | | 10 | | | 1 |
| FCV-1-55 | | | | | | | | | | 11 | | 1 |
| FCV-43-14 | | | | | | | | | | | 12 | 1 |

SYMBOLS:

- ▧ - - - Interaction Not Considered
- NI - - - No Interaction

APPENDIX R
UNIT 2

REACTOR BUILDING
REACTOR COOLANT
SYSTEM INTEGRITY

BROWNS FERRY NUCLEAR PLANT

BFN-II RB RCS-2
Sheet 0 R0

| IT NUMBER | EQUIPMENT INVOLVED | CABLES INVOLVED | CABLE ROUTING SHEET NUMBER | TYPE OF INTERACTION | CORRECTIVE ACTION (1) | SEE SHEET NUMBER (2) | RESPONSIBLE ORGANIZATION PREPARER REVIEWER (3) |
|---|---|---|---|---|---|---|---|
| 1 | FCV-69-1<br>FCV-69-2 | 2PC303-I, 2PC305-I 2PC307-I<br>2PC516-II, 2PC517-II | SET 1<br>Sheet 7 | Cable Tray<br>Cable Tray | E | J1 | Org: NEB Date: 5/11/82<br>Prep: D.G. Waller<br>Review: [illegible] |
| 2 | FCV-69-1<br>FCV-69-16 & 17 | 2PC307-I<br>2V2170, 2V2171 2V2180, 2V2181 | SET 1<br>Sheet 7 | Cable Tray<br>Cable Tray | E | J1 | Org: NEB Date: 5/11/82<br>Prep: D.G. Waller<br>Review: [illegible] |
| 3 | FCV-69-2<br>FCV-69-16 & 17 | 2PC516-II, 2PC517-II 2PC518-II<br>2V2170, 2V2180 | SET 1<br>Sheet 7 | Cable Tray<br>Cable Tray | E | J1 | Org: NEB Date: 5/11/82<br>Prep: D.G. Waller<br>Review: [illegible] |
| 4 | FCV-69-2<br>FCV-69-16 & 17 | 2PC518-II<br>2V2170, 2V2171, 2V2173 2V2180, 2V2181, 2V2183 | SET 1<br>Sheet 7 | Cable Tray<br>Cable Tray | E | J1 | Org: NEB Date: 5/11/82<br>Prep: D.G. Waller<br>Review: [illegible] |
| 5 | FCV-3-98<br>FCV-3-99 | No separation exists for these valves in the Reactor Building | SET 2<br>Sheets 4-6 | Cable Tray, Panel<br>Cable Tray, Panel | A | M1 | Org: TDP Date: 5-19-83<br>Prep: J. King<br>Review: [illegible] |
| 6 | FCV-74-47<br>FCV-74-48 | 2ES3685-II, 2ES3686-II 2ES3690-II<br>2ES3713-I, 2ES3715-I 2ES3717-I | SET 3<br>Sheets 5-8 | Cable Tray<br>Cable Tray | E | J2 | Org: EEB Date: [illegible]<br>Prep: [illegible]<br>Review: [illegible] |
| 7 | FCV-1-14<br>FCV-1-15 | All cables for these valves on Elev 593 in the RB | SET 5<br>Sheet 9 | Cable Tray, Panel<br>Cable Tray, Panel | A | M1 | Org: TDP Date: 5-19-83<br>Prep: J. King<br>Review: [illegible] |
| 8 | FCV-1-26<br>FCV-1-27 | All cables for these valves on Elev 593 in these RB | SET 6<br>Sheet 8 | Cable Tray, Panel<br>Cable Tray, Panel | A | M1 | Org: TDP Date: 5-19-83<br>Prep: J. King<br>Review: [illegible] |
| 9 | FCV-1-37<br>FCV-1-38 | All cables for these valves on Elev 593 in the RB | SET 7<br>Sheet 5 | Cable Tray, Panel<br>Cable Tray, Panel | A | M1 | Org: TDP Date: 5-19-83<br>Prep: J. King<br>Review: [illegible] |
| 10 | FCV-1-51<br>FCV-1-52 | All cables for these valves in the RB | SET 8<br>Sheet 5-8 | Cable Tray, Panel<br>Cable Tray, Panel | A | M1 | Org: TDP Date: 5-19-83<br>Prep: J. King<br>Review: [illegible] |
| 11 | FCV-1-55<br>FCV-1-56 | All cables for these valves on Elev 593 in the RB | SET 9<br>Sheet 7 | Cable Tray<br>Cable Tray | A | M1 | Org: TDP Date: 5-19-83<br>Prep: J. King<br>Review: [illegible] |
| 12 | FCV-43-13<br>FCV-43-14 | All cables for these valves in the RB | SET 4<br>Sheet 5,6 | Cable Tray, Panel<br>Cable Tray, Panel | A | M1 | Org: TDP Date: 5-19-83<br>Prep: J. King<br>Review: [illegible] |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |

NOTES:

1. The corrective action to be taken for the interactions are generalized in the following manner:

   A. Rerout Involved Cable(s)

   B. Provide Fire Barrier

   C. Circuit Modification

   D. Provide Fire Suppression

   E. Analysis.

   The corrective actions can be any of the above actions or any combination thereof.

2. This is a reference to the description of the corrective action. The sheet number will be preceded by "M" if any corrective A, B, C, or D is used and by "J" if action "E" is used. Only one sheet number will be referenced. (i.e. If the corrective action involves both A and E an "M" will only be used and all corrective actions will be described on that sheet.)

3. The design project is responsible for the assignment of the responsible organization for the corrective action. The responsible organization is then responsible for the modification or justification description.

APPENDIX R
UNIT 2

REACTOR BUILDING
REACTOR COOLANT
SYSTEM INTEGRITY

BROWNS FERRY NUCLEAR PLANT

| | | |
|---|---|---|
| Date: 5-19-83<br>6-19-83 | Prep: D.G. Waller<br>Review: [illegible] | FPN-II FB-RCS-2<br>Sheet 1 R0 |

To meet the success criteria for the RWCU isolation valves, one path out of three must be operable. For the interactions described on sheet 1, at no place do all three paths come within 20 feet.

Therefore, no modification is required.

APPENDIX R

CORRECTIVE ACTION

PREPARED: D. A. Walker

REVIEWED: T. W. Barkalow

DATE: 6/2/82

The 480V reactor MOV board compartment 8C breaker will be "racked out" to prevent the spurious operation of the residual heat removal shutdown cooling suction isolation valve (FCV-74-48). The "racked out" breaker is indicated by dashed lines on the attached auxiliary power schematic diagram (45N779-7). With the 480V reactor MOV board compartment 8C breaker "racked out," the possibility of a fire causing a spurious operation of the 250V dc breaker which feeds power to open valve FCV-74-47, and the insulation burn through of two power cables, one of which feeds the FCV-74-48 valve motor, with the subsequent touching of conductors in the proper phase sequence to open valve FCV-74-48 is too unlikely to occur to be considered.

APPENDIX R

CORRECTIVE ACTION

PREPARED: David Fullen

REVIEWED: JH Boehme

DATE: 6/18/82

To meet the requirements of Appendix R, the cables for FCV-3-98 and FCV-3-99 will be rerouted in conduit. All cables for FCV-1-14, FCV-1-15, FCV-1-26, FCV-1-27, FCV-1-37, FCV-1-38 that are presently routed on elevation 593 in the reactor building will be rerouted in conduit. All cables for valves FCV-1-51, FCV-1-52, FCV-1-55, FCV-1-56, FCV-43-13, and FCV-43-14 which are presently routed in the reactor building will be rerouted in conduit.

APPENDIX R

CORRECTIVE ACTION

PREPARED: J. A. Krieg

REVIEWED: [illegible]

DATE: 6-17-82

| | FCV-69-2 | FCV-69-16 | FCV-69-17 | FCV-3-39 | FCV-74-48 | FCV-1-15 | FCV-1-27 | FCV-1-38 | FCV-1-52 | FCV-1-56 | FCV-43-13 | See Companion Drawings Sheet Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FCV-69-1 | 1 | 2,3 | 2,3 | | | | | | | | | 1 |
| FCV-69-16 | 4 | | | | | | | | | | | 1 |
| FCV-69-17 | 4 | | | | | | | | | | | 1 |
| FCV-3-58 | | | | 5 | | | | | | | | 1 |
| FCV-74-47 | | | | | 6 | | | | | | | 1 |
| FCV-1-14 | | | | | | 7 | | | | | | 1 |
| FCV-1-26 | | | | | | | 8 | | | | | 1 |
| FCV-1-37 | | | | | | | | 9 | | | | 1 |
| FCV-1-51 | | | | | | | | | 10 | | | 1 |
| FCV-1-55 | | | | | | | | | | 11 | | 1 |
| FCV-43-14 | | | | | | | | | | | 12 | 1 |

SYMBOLS:

---- Interaction Not Cov

NI. -- No Interaction

APPENDIX R
UNIT 3

REACTOR BUILDING
REACTOR COOLANT
SYSTEM INTEGRITY

BROWNS FERRY NUCLEAR PLA

BFN-II-R8 RC
Sheet 0 R

| IT NUMBER | EQUIPMENT INVOLVED | CABLES INVOLVED | CABLE ROUTING SHEET NUMBER | TYPE OF INTERACTION | CORRECTIVE ACTION ① | SEE SHEET NUMBER ② | RESPONSIBLE ORGANIZATION ③ PREPARER REVIEWER |
|---|---|---|---|---|---|---|---|
| 1 | FCV-69-1<br>FCV-69-2 | 3PC305-I, 3PC365-I 3PC307-I<br>3PC316-II, 3PC317-II 3PC218-II | SET 1<br>Sheet 11 | Cable Tray<br>Cable Tray | E | J1 | Org: NEB Date: 5/14/81<br>Prep: D.G. Walker<br>Review: [illegible] |
| 2 | FCV-69-1<br>FCV-69-16 & 17 | 3PC305-I, 3PC305-I<br>3V2170, 3V2180 | SET 1<br>Sheet 5 | Cable Tray<br>Cable Tray | E | J1 | Org: NEB Date: 5/14/81<br>Prep: D.G. Walker<br>Review: [illegible] |
| 3 | FCV-69-1<br>FCV-69-16 & 17 | 3PC307-I<br>3V2170, 3V2171, 3V2174 3V2180, 3V2181, 3V2184 | SET 1<br>Sheet 11 | Cable Tray<br>Cable Tray | E | J1 | Org: NEB Date: 5/14/81<br>Prep: D.G. Walker<br>Review: [illegible] |
| 4 | FCV-69-2<br>FCV-69-16 & 17 | 3PC510-II<br>3V2171, 3V2173 3V2183 | SET 1<br>Sheet 11 | Cable Tray<br>Cable Tray | E | J1 | Org: NEB Date: 5/14/81<br>Prep: D.G. Walker<br>Review: [illegible] |
| 5 | FCV-3-98<br>FCV-3-99 | No separation exists for these valves in the Reactor Building | SET 2<br>Sheets 7-9 | Cable Tray, Panel<br>Cable Tray, Panel | A | M1 | Org: TDP Date: 5-14-81<br>Prep: [illegible]<br>Review: [illegible] |
| 6 | FCV-74-47<br>FCV-74-48 | 3ES3685-II, 3ES3686-II 3ES3688-II<br>3ES713-I, 3ES715-I 3ES717-I | SET 3<br>Sheets 9-12 | Cable Tray<br>Cable Tray | E | J2 | Org: EEB Date: 5-14-81<br>Prep: [illegible]<br>Review: [illegible] |
| 7 | FCV-1-14<br>FCV-1-15 | All cables for these valves on Elev 593 in the RB | SET 5<br>Sheet 13 | Cable Tray, Panel<br>Cable Tray, Panel | A | M1 | Org: TDP Date: 5-14-81<br>Prep: [illegible]<br>Review: [illegible] |
| 8 | FCV-1-26<br>FCV-1-27 | All cables for these valves on Elev 593 in the RB | SET 6<br>Sheet 9 | Cable Tray, Panel<br>Cable Tray, Panel | A | M1 | Org: TDP Date: 5-14-81<br>Prep: [illegible]<br>Review: [illegible] |
| 9 | FCV-1-37<br>FCV-1-38 | All cables for these valves on Elev 593 in the RB | SET 7<br>Sheet 10 | Cable Tray, Panel<br>Cable Tray, Panel | A | M1 | Org: TDP Date: 5-14-81<br>Prep: [illegible]<br>Review: [illegible] |
| 10 | FCV-1-51<br>FCV-1-52 | All cables for these valves on Elev 593 in the RB | SET 8<br>Sheet 11 | Cable Tray, Panel<br>Cable Tray, Panel | A | M1 | Org: TDP Date: 5-14-81<br>Prep: [illegible]<br>Review: [illegible] |
| 11 | FCV-1-55<br>FCV-1-56 | All cables for these valves on Elev 593 in the RB | SET 9<br>Sheet 11 | Cable Tray<br>Cable Tray | A | M1 | Org: TDP Date: 5-14-81<br>Prep: [illegible]<br>Review: [illegible] |
| 12 | FCV-43-13<br>FCV-43-14 | All cables for these valves in the RB | SET 4<br>Sheets 8,9 | Cable Tray, Panel<br>Cable Tray, Panel | A | M1 | Org: TDP Date: 5-14-81<br>Prep: [illegible]<br>Review: [illegible] |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |

NOTES:

1. The corrective action to be taken for the interactions are generalized in the following manner:

   A. Reroute Involved Cable(s)

   B. Provide Fire Barrier

   C. Circuit Modification

   D. Provide Fire Suppression

   E. Analysis.

   The corrective actions can be any of the above actions or any combination thereof.

2. This is a reference to the description of the corrective action. The sheet number will be preceded by "M" if any corrective A, B, C, or D is used and by "J" if action "E" is used. Only one sheet number will be referenced. (i.e. If the corrective action involves both A and E an "M" will only be used and all corrective actions will be described on that sheet.)

3. The design project is responsible for the assignment of the responsible organization for the corrective action. The responsible organization is then responsible for the modification or justification description.

| APPENDIX R UNIT 3 |
|---|
| REACTOR BUILDING REACTOR COOLANT SYSTEM INTEGRITY |
| BROWNS FERRY NUCLEAR PLANT |

| Date: 5-14-81 | Prep: [illegible] | BFN 3-RB-RCS-3 |
|---|---|---|
| [illegible] | Review: [illegible] | Sheet 1 80 |

To meet the success criteria for the RWCU isolation valves, one path out of three must be operable. For the interactions described on sheet 1, at no place do all three paths come within 20 feet.

Therefore, no modification is required.

APPENDIX R

CORRECTIVE ACTION

PREPARED: D. A. Walker

REVIEWED: T. W. Barbalow

DATE: 6/2/82

The 480V reactor MOV board compartment 8C breaker will be "racked out" to prevent the spurious operation of the residual heat removal shutdown cooling suction isolation valve (FCV-74-48) . The "racked out" breaker is indicated by dashed lines on the attached auxiliary power schematic diagram (45N779-7). With the 480V reactor MOV board compartment 8C breaker "racked out," the possibility of a fire causing a spurious operation of the 250V dc breaker which feeds power to open valve FCV-74-47, and the insulation burn through of two power cables, one of which feeds the FCV-74-48 valve motor, with the subsequent touching of conductors in the proper phase sequence to open valve FCV-74-48 is too unlikely to occur to be considered.

APPENDIX R

CORRECTIVE ACTION

PREPARED: David Fuller

REVIEWED: JH Boehms

DATE: 6/18/82

To meet the requirements of Appendix R, the cables for FCV-3-98 and FCV-3-99 will be rerouted in conduit. All cables for FCV-1-14, FCV-1-51, FCV-1-26, FCV-1-27, FCV-1-37, FCV-1-38 that are presently routed on elevation 593 in the reactor building will be rerouted in conduit. All cables for valves FCV-1-51, FCV-1-52, FCV-1-55, FCV-1-56, FCV-43-13, and FCV-43-14 which are presently routed in the reactor building will be rerouted in conduit.

APPENDIX R

CORRECTIVE ACTION

PREPARED: J. A. Krieg

REVIEWED: D Boone

DATE: 6-17-82

| | FCV-69-2 | FCV-69-16 | FCV-69-17 | FCV-3-55 | FCV-74-48 | FCV-1-15 | FCV-1-27 | FCV-1-38 | FCV-1-52 | FCV-1-56 | FCV-43-13 | See Companion Drawing Sheet Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FCV-69-1 | NI | NI | NI | | | | | | | | | |
| FCV-69-16 | NI | | | | | | | | | | | |
| FCV-69-17 | NI | | | | | | | | | | | |
| FCV-3-58 | | | | NI | | | | | | | | |
| FCV-74-47 | | | | | NI | | | | | | | |
| FCV-1-14 | | | | | | NI | | | | | | |
| FCV-1-26 | | | | | | | NI | | | | | |
| FCV-1-37 | | | | | | | | NI | | | | |
| FCV-1-51 | | | | | | | | | NI | | | |
| FCV-1-55 | | | | | | | | | | NI | | |
| FCV-43-14 | | | | | | | | | | | NI | |

SYMBOLS:

- ▧ ---- Interaction Not Considered
- NI ---- No Interaction

APPENDIX R
UNIT 1

TURBINE BUILDING
REACTOR COOLANT
SYSTEM INTEGRITY

BROWNS FERRY NUCLEAR PLANT

BFN 11-TB-RCS-1
Sheet 0 R0

| | FCV-69-2 | FCV-69-16 | FCV-69-17 | FCV-3-99 | FCV-74-48 | FCV-1-15 | FCV-1-27 | FCV-1-38 | FCV-1-52 | FCV-1-56 | FCV-43-13 | See Companion Drawings Sheet Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FCV-69-1 | NI | NI | NI | | | | | | | | | |
| FCV-69-16 | NI | | | | | | | | | | | |
| FCV-69-17 | NI | | | | | | | | | | | |
| FCV 3-98 | | | | NI | | | | | | | | |
| FCV-74-47 | | | | | NI | | | | | | | |
| FCV-1-14 | | | | | | NI | | | | | | |
| FCV-1-26 | | | | | | | NI | | | | | |
| FCV-1-37 | | | | | | | | NI | | | | |
| FCV-1-51 | | | | | | | | | NI | | | |
| FCV-1-55 | | | | | | | | | | NI | | |
| FCV-43-14 | | | | | | | | | | | NI | |

SYMBOLS:

▨ — Interaction Not Concerned

NI — No Interaction

APPENDIX R
UNIT 2

TURBINE BUILDING
REACTOR COOLANT
SYSTEM INTEGRITY

BROWNS FERRY NUCLEAR PLANT

Date 5-19-86 [illegible] | Prep. [illegible] | BFN-II TB RCS-2
[illegible] | Reviewed [illegible] | Sheet 1.0 R0

| | FCV-69-2 | FCV-69-16 | FCV-69-17 | FCV-3-99 | FCV-74-48 | FCV-1-15 | FCV-1-27 | FCV-1-38 | FCV-1-52 | FCV-1-56 | FCV-43-13 | See Companion Drawing(s) Sheet Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FCV-69-1 | NI | NI | NI | | | | | | | | | |
| FCV-69-16 | NI | | | | | | | | | | | |
| FCV-69-17 | NI | | | | | | | | | | | |
| FCV 3-98 | | | | NI | | | | | | | | |
| FCV-74-47 | | | | | NI | | | | | | | |
| FCV 1-14 | | | | | | NI | | | | | | |
| FCV 1-26 | | | | | | | NI | | | | | |
| FCV 1-37 | | | | | | | | NI | | | | |
| FCV 1-51 | | | | | | | | | NI | | | |
| FCV 1-55 | | | | | | | | | | NI | | |
| FCV 43-14 | | | | | | | | | | | NI | |

SYMBOLS:

▨ - - - Interaction Not Considered

NI - - No Interaction

APPENDIX R
UNIT 3

TURBINE BUILDING
REACTOR COOLANT
SYSTEM INTEGRITY

BROWNS FERRY NUCLEAR PLANT

BFN-11-TB-RCS-3 Sheet O RO

| UNIT 1 | PCV-1-5 | PCV-1-19 | PCV-1-22 | PCV-1-30 | PCV-1-31 | PCV-1-34 | See Companion Drawing(s) Sheet Number |
|---|---|---|---|---|---|---|---|
| PCV-1-4 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| PCV-1-18 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| PCV-1-23 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| PCV-1-41 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| PCV-1-42 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| PCV-1-179 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| PCV-1-180 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

| UNIT 3 | PCV-1-5 | PCV-1-18 | PCV-1-19 | PCV-1-22 | PCV-1-34 | PCV-1-41 | See Companion Drawing(s) Sheet Number |
|---|---|---|---|---|---|---|---|
| PCV-1-4 | 3 | 3 | 3 | 3 | 3 | 3 | 1 |
| PCV-1-23 | 3 | 3 | 3 | 3 | 3 | 3 | 1 |
| PCV-1-30 | 3 | 3 | 3 | 3 | 3 | 3 | 1 |
| PCV-1-31 | 3 | 3 | 3 | 3 | 3 | 3 | 1 |
| PCV-1-42 | 3 | 3 | 3 | 3 | 3 | 3 | 1 |
| PCV-1-179 | 3 | 3 | 3 | 3 | 3 | 3 | 1 |
| PCV-1-180 | 3 | 3 | 3 | 3 | 3 | 3 | 1 |

| UNIT 2 | PCV-1-5 | PCV-1-19 | PCV-1-22 | PCV-1-30 | PCV-1-31 | PCV-1-34 | See Companion Drawing(s) Sheet Number |
|---|---|---|---|---|---|---|---|
| PCV-1-4 | 2 | 2 | 2 | 2 | 2 | 2 | 1 |
| PCV-1-18 | 2 | 2 | 2 | 2 | 2 | 2 | 1 |
| PCV-1-23 | 2 | 2 | 2 | 2 | 2 | 2 | 1 |
| PCV-1-41 | 2 | 2 | 2 | 2 | 2 | 2 | 1 |
| PCV-1-42 | 2 | 2 | 2 | 2 | 2 | 2 | 1 |
| PCV-1-179 | 2 | 2 | 2 | 2 | 2 | 2 | 1 |
| PCV-1-180 | 2 | 2 | 2 | 2 | 2 | 2 | 1 |

SYMBOLS:

NI - - - No Interaction

APPENDIX R
UNITS 1-3
REACTOR BUILDING
RPV WATER INVENTORY CONT
S/R VALVE CONTROL
BROWNS FERRY NUCLEAR PLANT

BFN-1T-RB-SRV-0 Sheet 0 R0

| IT NUMBER | EQUIPMENT INVOLVED | CABLES INVOLVED | CABLE ROUTING SHEET NUMBER | TYPE OF INTERACTION | CORRECTIVE ACTION ① | SEE SHEET NUMBER ② | RESPONSIBLE ORGANIZATION PREPARER REVIEWER ③ |
|---|---|---|---|---|---|---|---|
| 1. | All S/R Valves for UNIT 1 | All Reactor Bldg Cables Involving S/R Valves | SET 10 Sheets 1-9 | Panel<br>Panel | A, B | M1 | Org: TDP Date: 5-14-84<br>Prep: [illegible]<br>Review: [illegible] |
| 2 | All S/R Valves for UNIT 2. | All Reactor Bldg Cables Involving S/R Valves | SET 10 22, Sheets 10-15 | Panel<br>Panel | A, B | M2 | Org: TDP Date: 5-14-84<br>Prep: [illegible]<br>Review: [illegible] |
| 3 | All S/R Valves for UNIT 3 | All Reactor Bldg Cables Involving S/R Valves | SET 10 16-17 Sheets 22 | Panel<br>Panel | A, B | M3 | Org: TDP Date: 5-14-82<br>Prep: [illegible]<br>Review: [illegible] |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |

NOTES:

1. The corrective action to be taken for the interactions are generalized in the following manner:

   A. Rerout Involved Cable(s)

   B. Provide Fire Barrier

   C. Circuit Modification

   D. Provide Fire Suppression

   E. Analysis.

   The corrective actions can be any of the above actions or any combination thereof.

2. This is a reference to the description of the corrective action. The sheet number will be preceded by "M" if any corrective A, B, C, or D is used and by "J" if action "E" is used. Only one sheet number will be referenced. (i.e. If the corrective action involves both A and E an "M" will only be used and all corrective action will be described on that sheet.)

3. The design project is responsible for the assignment of the responsible organization for the corrective actions. The responsible organization is then responsible for the modification or justification description.

APPENDIX R
UNITS 1-3

REACTOR BUILDING
RPV WATER INVENTORY CONT
S/R VALVE CONTROL

BROWNS FERRY NUCLEAR PLANT

| | | |
|---|---|---|
| Date: 5-14-84<br>[illegible] | Prep: [illegible]<br>Review: [illegible] | BFN-11-RB-SRV-0<br>Sheet 1 R0 |

To meet the requirements of Appendix R, all cables required for the safety/relief valves which are routed in the reactor building will be rerouted in conduit and wrapped with a fire barrier to preclude any damage to the cables which could cause spurious actuation.

APPENDIX R

CORRECTIVE ACTION

PREPARED: J. A. King

REVIEWED: V. D. Boone

DATE: 6-17-82

To meet the requirements of Appendix R, all cables required for the safety/relief valves which are routed in the reactor building will be rerouted in conduit and wrapped with a fire barrier to preclude any damage to the cables which could cause spurious actuation..

APPENDIX R

CORRECTIVE ACTION

PREPARED: J. A. Krieg

REVIEWED: H Boone

DATE: 6-17-82

BFN-IT-RB-SRV-O-M2

To meet the requirements of Appendix R, all cables required for the safety/relief valves which are routed in the reactor building will be rerouted in conduit and wrapped with a fire barrier to preclude any damage to the cables which could cause spurious actuation.

APPENDIX R

CORRECTIVE ACTION

PREPARED: J. A. King

REVIEWED: D Boone

DATE: 6-17-82

BFN-IT-RB-SRV-O-M3

| UNIT 1 | PCV-1-5 | PCV-1-19 | PCV-1-22 | PCV-1-30 | PCV-1-31 | PCV-1-34 | See Companion Drawing(s) Sheet Number |
|---|---|---|---|---|---|---|---|
| PCV-1-4 | NI | NI | NI | NI | NI | NI | |
| PCV-1-18 | NI | NI | NI | NI | NI | NI | |
| PCV-1-23 | NI | NI | NI | NI | NI | NI | |
| PCV-1-41 | NI | NI | NI | NI | NI | NI | |
| PCV-1-42 | NI | NI | NI | NI | NI | NI | |
| PCV-1-179 | NI | NI | NI | NI | NI | NI | |
| PCV-1-180 | NI | NI | NI | NI | NI | NI | |

| UNIT 3 | PCV-1-5 | PCV-1-18 | PCV-1-19 | PCV-1-22 | PCV-1-34 | PCV-1-41 | See Companion Drawing(s) Sheet Number |
|---|---|---|---|---|---|---|---|
| PCV-1-4 | NI | NI | NI | NI | NI | NI | |
| PCV-1-23 | NI | NI | NI | NI | NI | NI | |
| PCV-1-30 | NI | NI | NI | NI | NI | NI | |
| PCV-1-31 | NI | NI | NI | NI | NI | NI | |
| PCV-1-42 | NI | NI | NI | NI | NI | NI | |
| PCV-1-179 | NI | NI | NI | NI | NI | NI | |
| PCV-1-180 | NI | NI | NI | NI | NI | NI | |

| UNIT 2 | PCV-1-5 | PCV-1-19 | PCV-1-22 | PCV-1-30 | PCV-1-31 | PCV-1-34 | See Companion Drawing(s) Sheet Number |
|---|---|---|---|---|---|---|---|
| PCV-1-4 | NI | NI | NI | NI | NI | NI | |
| PCV-1-18 | NI | NI | NI | NI | NI | NI | |
| PCV-1-23 | NI | NI | NI | NI | NI | NI | |
| PCV-1-41 | NI | NI | NI | NI | NI | NI | |
| PCV-1-42 | NI | NI | NI | NI | NI | NI | |
| PCV-1-179 | NI | NI | NI | NI | NI | NI | |
| PCV-1-180 | NI | NI | NI | NI | NI | NI | |

SYMBOLS:

NI - - - No Interaction

APPENDIX R
UNITS 1-3
TURBINE BUILDING
RPV WATER INVENTORY CONT
S/R VALVE CONTROL
BROWNS FERRY NUCLEAR PLANT
Date: 5-11-87 6-11-87
Dwn: [illegible]
Rvwr: [illegible]
BFN-IT TB SRV O
Sheet O R0

The following modifications are required to ensure the RHR system will meet the Functional Criteria:

1. Route all power cables in the Reactor Building (RB) required for the equipment given in table II.A.2.b.(1) in conduit and provide a one hour fire barrier for each conduit.

2. All cables located in the RB involved in the back-up control circuitry for the above equipment are also required to be routed in conduit and provided with a one hour fire barrier.

3. All cables required for the redundant RHR System (System I for unit 1; System II for units 2 and 3) are to be re-routed where they will meet the separation requirements of Appendix R between the cables and the active equipment for the system required in step 1 above (see table below for active equipment).

4. The RHR pump back-up control switch will be revised as shown in the attached drawing to allow bypass of the position switch on the RHR drain valve. See attached schematic for exact change.

By making the above corrective actions, one RHR system will be available for any RB fire.

Active Equipment Table

| Unit 1 | Unit 2 | Unit 3 |
|---|---|---|
| RHR Pump B | RHR Pump C | RHR Pump C |
| FCV-74-30 | FCV-74-7 | FCV-74-7 |
| FCV-74-67 | FCV-74-53 | FCV-74-53 |
| RHR Pump Room Cooler B | RHR Pump Room Cooler C | RHR Pump Room Cooler C |
| MG Set 1EN | MG Set 2DN | MG Set 3DN |
| 480-V RMOV Bd 1E | 480-V RMOV Bd 2D | 480-V RMOV Bd 3D |
| 4-kV/480-V xfmr TS1B | 4-kV/480-V xfmr TS2A | 4-kV/480-V xfmr TS3E |

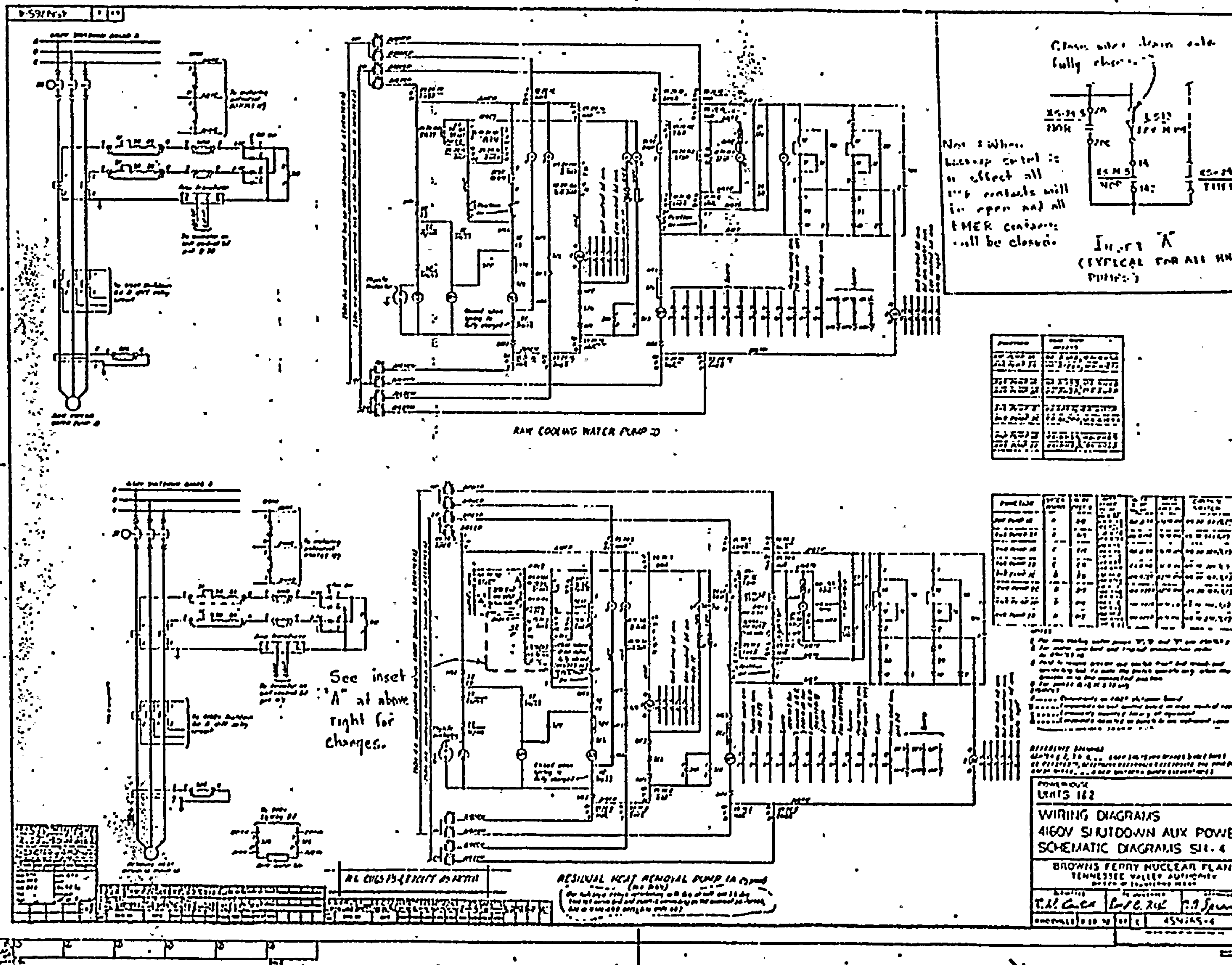
APPENDIX R

CORRECTIVE ACTION

PREPARED: D. A. Walker

REVIEWED: T. W. Batchelor

DATE: 6/14/82



RAW COOLING WATER PUMP 2D
See inset "A" at above right for changes.
Insert "A"
(TYPICAL FOR ALL RHR
PUMPS)
and all
will be closed.
UNITS 1&2
WIRING DIAGRAMS
4160V SHUTDOWN AUX POWE
SCHEMATIC DIAGRAMS SH-4
BROWNS FERRY NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
RESIDUAL HEAT REMOVAL PUMP 1A

| | RHRSW Pump B3 | RHRSW Pump D3 | FCV-67-14 | FCV-67-18 | FCV-67-22 | FCV-67-26 | See Companion Drawing(s) Sheet Number |
|---|---|---|---|---|---|---|---|
| RHRSW Pump A3 | NI | NI | NI | NI | NI | 1 | 1 |
| RHRSW Pump C3 | NI | NI | NI | NI | NI | 2 | 1 |
| FCV-67-13 | NI | NI | 3 | 4 | NI | NI | 1 |
| FCV-67-17 | NI | NI | 5 | 6 | NI | NI | 1 |
| FCV-67-21 | 7 | 8 | NI | NI | 9 | NI | 1 |
| FCV-67-25 | NI | NI | NI | NI | NI | 10 | 1 |

SYMBOLS:

NI.......No Interaction

APPENDIX R
UNITS 1-3

REACTOR BUILDING
ESSENTIAL EQUIP COOLING
EECW SYSTEM

BROWNS FERRY NUCLEAR PLANT

| | | |
|---|---|---|
| Date 5-N-91 [illegible] | Prep. [illegible] / Review [illegible] | BFN-II RB-EECW-0 Sheet 0 R0 |

| IT NUMBER | EQUIPMENT INVOLVED | CABLES INVOLVED | CABLE ROUTING SHEET NUMBER | [illegible] OF INTERACTION | CORRECTIVE ACTION (1) | SEE SHEET NUMBER (2) | RESPONSIBLE ORGANIZATION PREPARER REVIEWER (3) |
|---|---|---|---|---|---|---|---|
| 1 | RHRSW Pump A3<br>FCV-67-26 | 3ES1581-I<br>1ES2915-II, 3ES2916-II<br>3ES2911-II, 3ES2912-II | SET 12<br>Sheet 13 | Cable Tray<br>Cable Tray | E | M1 | Org: NEB Date: 5-11-82<br>Prep: D.A. Walley<br>Reviewer: [illegible] |
| 2 | RHRSW Pump C3<br>FCV-67-26 | 3E1591-I<br>3ES2915-II, 3ES2916-II<br>3ES2911-II, 3ES2912-II | SET 12<br>Sheet 13 | Cable Tray<br>Cable Tray | E | M1 | Org: NEB Date: 5-11-82<br>Prep: D.A. Walley<br>Reviewer: [illegible] |
| 3 | FCV-67-13<br>FCV-67-14 | ES753-I<br>ES3256-II | SET 12<br>Sheet 7 | Cable Tray<br>Cable Tray | A, E | M1 | Org: NEB Date: 5-11-82<br>Prep: D.A. Walley<br>Reviewer: [illegible] |
| 4 | FCV-67-13<br>FCV-67-18 | ES753-I<br>1ES2975-II, 1ES2976-II | SET 12<br>Sheet 7 | Cable Tray<br>Cable Tray | A, E | M1 | Org: NEB Date: 5-14-82<br>Prep: D.A. Walley<br>Reviewer: [illegible] |
| 5 | FCV-67-17<br>FCV-67-14 | 1ES415-I, 1ES416-I<br>1ES418-I<br>ES3256-II | SET 12<br>Sheet 7 | Cable Tray<br>Cable Tray | E | M1 | Org: NEB Date: 5-11-82<br>Prep: D.A. Walley<br>Reviewer: [illegible] |
| 6 | FCV-67-17<br>FCV-67-18 | 1ES415-I, 1ES416-I<br>1ES418-I<br>1ES2975-II, 1ES2976-II<br>1ES2978-II | SET 12<br>Sheet 7-8 | Cable Tray<br>Cable Tray | E | M1 | Org: NEB Date: 5-11-82<br>Prep: D.A. Walley<br>Reviewer: [illegible] |
| 7 | FCV-67-21<br>RHRSW Pump B3 | 2ES415-I, 2ES416-I<br>2ES417-I, 2ES480-I<br>ES2510-II, ES2515-II<br>ES2511-II, ES2584-II | SET 12<br>Sheet 15 | Cable Tray<br>Cable Tray | E | M1 | Org: NEB Date: 5-11-82<br>Prep: D.A. Walley<br>Reviewer: [illegible] |
| 8 | FCV-67-21<br>RHRSW Pump D3 | 2ES415-I, 2ES416-I<br>2ES417-I, 2ES480-I<br>ES2602-II, ES2604-II<br>ES2609-II | SET 12<br>Sheet 15 | Cable Tray<br>Cable Tray | E | M1 | Org: NEB Date: 5-11-82<br>Prep: D.A. Walley<br>Reviewer: [illegible] |
| 9 | FCV-67-21<br>FCV-67-22 | 2ES415-I, 2ES417-I, [illegible]<br>2ES418-I, 2ES480-I<br>2ES2975, 2ES2976, 2ES2977<br>2ES2978, 2ES2979-II | SET 12<br>Sheet 11, 15 | Cable Tray<br>Cable Tray | E | M1 | Org: NEB Date: 5-14-82<br>Prep: D.A. Walley<br>Reviewer: [illegible] |
| 10 | FCV-67-25<br>FCV-67-26 | 3ES415, 3ES416, 3ES417<br>3ES418, 3ES480-I<br>3ES2915, 3ES2916, 3ES2917<br>3ES2918, 3ES2919-II | SET 12<br>Sheet 13, 16 | Cable Tray<br>Cable Tray | E | M1 | Org: NEB Date: 5-11-82<br>Prep: D.A. Walley<br>Reviewer: [illegible] |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |

NOTES:

1. The corrective action to be taken for the interactions are generalized in the following manner:

   A. Reroute Involved Cable(s)

   B. Provide Fire Barrier

   C. Circuit Modification

   D. Provide Fire Suppression

   E. Analysis.

   The corrective actions can be any of the above actions or any combination thereof.

2. This is a reference to the description of the corrective action. The sheet number will be preceded by "M" if any corrective A, B, C, or D is used and by "J" if action "E" is used. Only one sheet number will be referenced. (i.e. If the corrective action involves both A and E an "M" will only be used and all corrective actions will be described on that sheet.)

3. The design project is responsible for the assignment of the responsible organization for the corrective action. The responsible organization is then responsible for the modification or justification description.

APPENDIX R
UNITS 1-3

REACTOR BUILDING
ESSENTIAL EQUIP COOLING
EECW SYSTEM

BROWNS FERRY NUCLEAR PLANT

| | | |
|---|---|---|
| Date: 5-11-82<br>[illegible] | Prep: D.A. Walley<br>Review: [illegible] | BFN 11-83 EECW-0<br>Sheet 1 R0 |

To meet the success criteria for one EECW System, both pumps on that system must be operable and no more than one valve in the system may be closed.

Therefore, the success criteria for both EECW systems would not be met if any one of the following situations occur :

| Failure | System I | System II |
|---|---|---|
| 1. | One Pump fail | One Pump fail |
| 2. | 2 Valves closed | One Pump fail |
| 3. | One Pump fail | 2 Valves closed |
| 4. | 2 Valves closed | 2 Valves closed |

Situation 1 does not occur as examining sheet 0 shows that there are no interactions between system I pumps (A3,C3) and system II pumps (B3,D3). Situations 2 and 3 do not occur as one system's pumps interact with only one of the other system's valves. Situation 4 does occur due to interactions 3-6 all being within the same area. Therefore, cable ES753-I will be relocated to assure the success criteria is met.

APPENDIX R

CORRECTIVE ACTION

PREPARED: D. A. Walker

REVIEWED: T. N. Barkalow

DATE: 5/20/82

| | RHRSW Pump B3 | RHRSW Pump D3 | FCV-67-14 | FCV-67-18 | FCV-67-22 | FCV-67-26 | See Companion Drawing(s) Sheet Number |
|---|---|---|---|---|---|---|---|
| RHRSW Pump A3 | 1 | 2 | NI | NI | NI | NI | 1 |
| RHRSW Pump C3 | 3 | 4 | NI | NI | NI | NI | 1 |
| FCV-67-13 | NI | NI | NI | NI | NI | NI | |
| FCV-67-17 | NI | NI | NI | NI | NI | NI | |
| FCV-67-21 | NI | NI | NI | NI | NI | NI | |
| FCV-67-25 | NI | NI | NI | NI | NI | NI | |

SYMBOLS:

NI ---- No Interaction

APPENDIX R
UNITS 1-3

TURBINE BUILDING
ESSENTIAL EQUIP COOLING
EECW SYSTEM

BROWNS FERRY NUCLEAR PLANT

| | | |
|---|---|---|
| Date 5-N-87 [illegible] | Prep. D.A. Walker [illegible] Rev. [illegible] | REV 11 TO EECW-0 Sheet O 80 |

| IT NUMBER | EQUIPMENT INVOLVED | CABLES INVOLVED | CABLE ROUTING SHEET NUMBER | PE OF INTERACTION | CORRECTIVE ACTION ① | SEE SHEET NUMBER ② | RESPONSIBLE ORGANIZATION ③ PREPARER REVIEWER |
|---|---|---|---|---|---|---|---|
| 1 | RHRSW Pump A3<br>RHRSW Pump B3 | 3ES1380-I, 3ES1382-I<br>ES2575-II, ES2578-II | SET 12<br>Sheet 1-6 | Conduit<br>Cable Tray | B | M1 | Org: EEB Date: 5/14/8<br>Prep: D.L. Leckie<br>Review: C.H. Sudduth |
| 2 | RHRSW Pump A3<br>RHRSW Pump D3 | 3ES1380-I, 3ES1382-I<br>ES2600-II, ES2603-II | SET 12<br>Sheet 1-6 | Conduit<br>Cable Tray | B | M1 | Org: EEB Date: 5/14/82<br>Prep: D.L. Leckie<br>Review: C.H. Sudduth |
| 3 | RHRSW Pump C3<br>RHRSW Pump B3 | 3ES1390-I, 3ES1392-I<br>ES2575-II, ES2578-II | SET 12<br>Sheet 1-6 | Conduit<br>Cable Tray | B | M1 | Org: EEB Date: 5/14/82<br>Prep: D.L. Leckie<br>Review: C.H. Sudduth |
| 4 | RHRSW Pump C3<br>RHRSW Pump D3 | 3ES1390-I, 3ES1392-I<br>ES2600-II, ES2603-II | SET 12<br>Sheet 1-6 | Conduit<br>Cable Tray | B | M1 | Org: EEB Date: 5/14/82<br>Prep: D.L. Leckie<br>Review: C.H. Sudduth |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |

NOTES:

1. The corrective action to be taken for the interactions are generalized in the following manner:

   A. Reroute Involved Cable(s)

   B. Provide Fire Barrier

   C. Circuit Modification

   D. Provide Fire Suppression

   E. Analysis.

   The corrective actions can be any of the above actions or any combination thereof.

2. This is a reference to the description of the corrective action. The sheet number will be preceded by "M" if any corrective A, B, C, or D is used and by "J" if action "E" is used. Only one sheet number will be referenced. (i.e. If the corrective action involves both A and E an "M" will only be used and all corrective actions will be described on that sheet.)

3. The design project is responsible for the assignment of the responsible organization for the corrective actions. The responsible organization is then responsible for the modification or justification description.

APPENDIX R
UNIT

TURBINE BUILDING
ESSENTIAL EQUIP COOLING
EECW SYSTEM

BROWNS FERRY NUCLEAR PLANT

Date 5-17-81 | Prep. [illegible] | Review [illegible] | BFN II-TB-EECWO | Sheet 1 | R0

This modification involves wrapping the division I conduits (listed below) containing cables shown on BFN-IT-TB-EECW-0, sheet 1, for RHRSW pumps A3 and C3 with a one-hour fire-rated barrier in the intake pumping station, where 20-foot separation or a three-hour fire-rated barrier does not exist between redundant division II cable trays for RHRSW pumps B3 and D3.

Conduits: 3ES1580-I
3ES1582-I
3ES1590-I
3ES1592-I
ES86-I
ES82-I
ES81-I
ES87-I

APPENDIX R

CORRECTIVE ACTION

PREPARED: T.E. Barnett, Jr.

REVIEWED: D. J. Jecker

DATE: 6/18/82

| RPS CHANNEL | RPS CHANNEL | RPV Low Water Level (LIS-3-203C) A2 | RPV Low Water Level (LIS-3-203D) B2 | RPV High Pressure (PIS-3-22C) A2 | RPV High Pressure (PIS-3-22D) B2 | MSIV Closure (ZS-1-37) A2 | MSIV Closure (ZS-1-38) A2 | MSIV Closure (ZS-1-51) A2 | MSIV Closure (ZS-1-52) B2 | MSIV Closure (ZS-1-26) B2 | MSIV Closure (ZS-1-27) B2 | MSIV Closure (ZS-1-51) B2 | MSIV Closure (ZS-1-52) B2 | FSV-85-35B | FSV-85-70B | See Companion Drawing Sheet Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RPV Low Water Level (LIS-3-203A) | A1 | 1 | | | | | | | | | | | | | | 1 |
| RPV Low Water Level (LIS-3-203B) | B1 | | 2 | | | | | | | | | | | | | 1 |
| RPV High Pressure (PIS-3-22A) | A1 | | | 3 | | | | | | | | | | | | 1 |
| RPV High Pressure (PIS-3-22B) | B1 | | | | 4 | | | | | | | | | | | 1 |
| MSIV Closure (FS-1-14) | A1 | | | | | 5 | 5 | 5 | 5 | | | | | | | 1 |
| MSIV Closure (FS-1-15) | A1 | | | | | 5 | 5 | 5 | 5 | | | | | | | 1 |
| MSIV Closure (FS-1-26) | A1 | | | | | 5 | 5 | 5 | 5 | | | | | | | 1 |
| MSIV Closure (FS-1-27) | A1 | | | | | 5 | 5 | 5 | 5 | | | | | | | 1 |
| MSIV Closure (FS-1-14) | B1 | | | | | | | | | 6 | 6 | 6 | 6 | | | 1 |
| MSIV Closure (FS-1-15) | B1 | | | | | | | | | 6 | 6 | 6 | 6 | | | 1 |
| MSIV Closure (FS-1-37) | B1 | | | | | | | | | 6 | 6 | 6 | 6 | | | 1 |
| MSIV Closure (FS-1-38) | B1 | | | | | | | | | 6 | 6 | 6 | 6 | | | 1 |
| FSV-85-35A | | | | | | | | | | | | | | 7 | 7 | 1 |
| FSV-85-70A | | | | | | | | | | | | | | 7 | 7 | 1 |

SYMBOLS:

▧ ..... Interaction Not Considered

NI ..... No Interaction

APPENDIX R
UNIT 1
REACTOR BUILDING
REACTIVITY CONTROL
RPS & CRD SYSTEM

BROWNS FERRY NUCLEAR PLANT

Date: 6-27-81 | Prep: [illegible] | WR II-RI RC-1
6-7-82 | Review: [illegible] | Sheet [illegible] BD

| IT NUMBER | EQUIPMENT INVOLVED | CABLES INVOLVED | CABLE ROUTING SHEET NUMBER | TYPE OF INTERACTION | CORRECTIVE ACTION ① | SEE SHEET NUMBER ② | RESPONSIBLE ORGANIZATION PREPARER REVIEWER ③ |
|---|---|---|---|---|---|---|---|
| 1 | LIS-3-203A<br>LIS-3-203C | IRP20-IA<br>IRP94-IIA, IRP95-IIA | SET 13<br>Sheet 10 | Conduit<br>Conduit | B | M1 | Orgn: EEB Date: 5/17/8[illegible]<br>Prep: T.E. Burritt<br>Review: [signature] |
| 2 | LIS-3-203B<br>LIS-3-203D | IRP257-IB<br>IRP319-IIB, IRP320-IIB | SET 13<br>Sheet 10 | Conduit<br>Conduit | B | M1 | Orgn: EEB Date: 5/17/8[illegible]<br>Prep: T.E. Burritt<br>Review: [signature] |
| 3 | PIS-3-22A<br>PIS-3-22C | IRP20-IA<br>IRP94-IIA, IRP95-IIA | SET 13<br>Sheet 10 | Conduit<br>Conduit | B | M1 | Orgn: EEB Date: 5/17/8[illegible]<br>Prep: T.E. Burritt<br>Review: [signature] |
| 4 | PIS-3-22B<br>PIS-3-22D | IRP257-IB<br>IRP319-IIB, IRP320-IIB | SET 13<br>Sheet 10 | Conduit<br>Conduit | B | M1 | Orgn: EEB Date: 5/17/81<br>Prep: T.E. Burritt<br>Review: [signature] |
| 5 | A1 Limit Switches<br>A2 Limit Switches | All cables in the RB. | SET 13<br>Sheets 2,3,13 | Conduit<br>Conduit | E | J1 | Orgn: NEB Date: 5-21-82<br>Prep: W.O. Walden<br>Review: Tom Batchelor |
| 6 | B1 Limit Switches<br>B2 Limit Switches | All cables in the RB. | SET 13<br>Sheets 2,3,13 | Conduit<br>Conduit | E | J1 | Orgn: NEB Date: 5-21-81<br>Prep: W.O. Walden<br>Review: Tom Batchelor |
| 7 | FSV-85-35A, & -70A<br>FSV-85-35D, & -70D | IRP201-IIIA, IRP206-IIIA<br>IRP419-IIIB, IRP423-IIIB | SET 14<br>Sheets 1,2 | Conduit<br>Conduit | B | M2 | Orgn: EEB Date: 5/17/8[illegible]<br>Prep: T.E. Burritt<br>Review: [signature] |
| 8 | Scram signal from RPS to CRD System | All cables in the RB. | SET 13<br>Sheet 1 | Redundancies are in same conduit. | E | J2 | Orgn: EEB Date: [illegible]<br>Prep: [signature]<br>Review: [signature] |
| | | | | | | | Orgn: Date:<br>Prep:<br>Review: |
| | | | | | | | Orgn: Date:<br>Prep:<br>Review: |
| | | | | | | | Orgn: Date:<br>Prep:<br>Review: |
| | | | | | | | Orgn: Date:<br>Prep:<br>Review: |
| | | | | | | | Orgn: Date:<br>Prep:<br>Review: |
| | | | | | | | Orgn: Date:<br>Prep:<br>Review: |
| | | | | | | | Orgn: Date:<br>Prep:<br>Review: |
| | | | | | | | Orgn: Date:<br>Prep:<br>Review: |
| | | | | | | | Orgn: Date:<br>Prep:<br>Review: |
| | | | | | | | Orgn: Date:<br>Prep:<br>Review: |
| | | | | | | | Orgn: Date:<br>Prep:<br>Review: |
| | | | | | | | Orgn: Date:<br>Prep:<br>Review: |

NOTES:

1. The corrective action to be taken for the interactions are generalized in the following manner:

   A. Reroute Involved Cable(s)

   B. Provide Fire Barrier

   C. Circuit Modification

   D. Provide Fire Suppression

   E. Analysis.

   The corrective actions can be any of the above actions or any combination thereof.

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3. The design project is responsible for the assignment of the responsible organization for the corrective actions. The responsible organization is then responsible for the modification or justification description.

APPENDIX R
UNIT 1

REACTOR BUILDING
REACTIVITY CONTROL
RPS & CRD SYSTEM

BROWNS FERRY NUCLEAR PLANT

| | | |
|---|---|---|
| Date: 5-21-81 [signature] | Prep: [signature]<br>Review: [signature] | FFN-1119-RC-1<br>Sheet 1 R0 |

This equipment and its associated cables are not required by the final functional criteria.

Therefore, no further consideration is required.

APPENDIX R

CORRECTIVE ACTION

PREPARED: D. A. Walker

REVIEWED: T. W. Barkalow

DATE: 6/2/82

BFN-IT-RB-RC-1-J1

In order to show compliance with the Appendix R criteria for required circuits whose failure to operate could adversely affect shutdown capability, justification is provided below for (A) not requiring separation of the power supply cables to Reactor Protection System (RPS) logic and (B) not requiring separation of the cables from the RPS logic panels to the Hydraulic Control Units (HCUS) of the Control Rod Drive (CRD) system:

For A and B above, the following design requirements are essential to the justification analysis:

1. All wiring for the RPS outside of the enclosures in the control room is run in rigid metallic conduits used for no other wiring (refer to section 7.2.3.10 of the BFNP FSAR).

2. The RPS and CRD HCUS are fail safe (scram is initiated) on loss of power.

3. The CRD HCUS require control air to pull control rods.

4. Since the RPS sensors are routed separately, the logic will function for all but the control bay fires.

5. Scram time is less than 3.5 seconds for 90 percent insertion of control rods.

6. The power supply cables from the RPS logic panels to the HCUS are routed in separate conduit from the power return cables.

For A above there are four failure modes for the logic power supply cables; they are:

1. Ground short,

2. Hot short,

3. Open circuit,

4. Line short.

APPENDIX R

CORRECTIVE ACTION

PREPARED: Edward + Bradley

REVIEWED: Larry M Begley

DATE: 6/18/82

Both the ground short and line short will trip the cables' circuit breaker which will initiate a scram on loss of power. The open circuit failure mode will also initiate a scram on loss of power. The hot short failure mode can only impose another RPS power supply on the failed power supply cable; therefore, the logic circuit is still protected from damage by qualified trips of the power supply and will function to disconnect power to the CRD HCU's, thus inducing a scram.

For B above the cables from the RPS logic panels to the HCUS provide power to the scram valves in the HCUS. This power is removed to cause the HCUS to insert the rods. If these subject cables are involved in a fire, they will degrade while the conduit is still intact. Because of this degradation, they will either open circuit or short to the conduit, either of which will remove power to the HCUS, causing insertion of the affected control rods.

Refer to figure 1, attached, for a block diagram level representation of the power supply cable connections to the RPS logic and of the RPS logic cable connections to the HCUS.

APPENDIX R

CORRECTIVE ACTION

PREPARED: Edward L Bradley

REVIEWED: Larry M. Begley

DATE: 6/18/82

This modification involves wrapping the division I conduits (listed below) containing cables for LIS-3-203A, LIS-3-203B, PIS-3-22A, and PIS-3-22B shown on BFN-IT-RB-RC-1, sheet 1, with a one-hour fire-rated barrier in the unit 1 reactor building, where 20-foot separation or a three-hour fire-rated barrier does not exist between division II conduits containing cables for LIS-3-203C, LIS-3-203D, PIS-3-22C, and PIS-3-22D, respectively.

Conduits: 1RP52-IA
1RP53-IA
1RP54-IA
1RP277-IB
1RP278-IB
1RP290-IB

APPENDIX R

CORRECTIVE ACTION

PREPARED: T.E. Barnett, Jr.

REVIEWED: D. L. Leckie

DATE: 6/18/82

This modification involves wrapping either the conduits (listed below) for FSV-85-35A and FSV-85-70A or for FSV-85-35B and FSV-85-70B shown on BFN-IT-RB-RC-1, sheet 1, in the unit 1 reactor building where 20-foot separation or a three-hour fire-rated barrier does not exist between the conduits to be wrapped and panel 25-25C or panel 25-25D.

Conduits to be wrapped will be determined by field survey (e.g., ease of wrapping).

| Conduits for FSV-85-35A and FSV-85-70A: | Conduits for FSV-85-35B and FSV-85-70B: |
|---|---|
| 1RP222-IIIA | 1RP437-IIIB |
| 1RP215-IIIA | 1RP429-IIIB |
| 1RP207-IIIA | 1RP419-IIIB |
| 1RP206-IIIA | 1RP423-IIIB |

APPENDIX R

CORRECTIVE ACTION

PREPARED: T.E. Barnett, Jr.

REVIEWED: D. O. Peckil

DATE: 6/18/82

| RPS CHANNEL | RPS CHANNEL | RPV Low Water Level (LIS-3-203A) A2 | RPV Low Water Level (LIS-3-203B) B2 | RPV High Pressure (PIS-3-22A) A2 | RPV High Pressure (PIS-3-22B) B2 | MSIV Closure (ZS-1-37) A2 | MSIV Closure (ZS-1-38) A2 | MSIV Closure (ZS-1-51) A2 | MSIV Closure (ZS-1-52) A2 | MSIV Closure (ZS-1-26) B2 | MSIV Closure (ZS-1-27) B2 | MSIV Closure (ZS-1-51) B2 | MSIV Closure (ZS-1-52) B2 | FSV-85-35B | FSV-85-70B | See Companion Drawing(s) Sheet Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RPV Low Water Level (LIS-3-203A) | A1 | 1 | | | | | | | | | | | | | | 1 |
| RPV Low Water Level (LIS-3-203B) | B1 | | 2 | | | | | | | | | | | | | 1 |
| RPV High Pressure (PIS-3-22A) | A1 | | | 3 | | | | | | | | | | | | 1 |
| RPV High Pressure (PIS-3-22B) | B1 | | | | 4 | | | | | | | | | | | 1 |
| MSIV Closure (ZS-1-14) | A1 | | | | | 5 | 5 | 5 | 5 | | | | | | | 1 |
| MSIV Closure (ZS-1-15) | A1 | | | | | 5 | 5 | 5 | 5 | | | | | | | 1 |
| MSIV Closure (ZS-1-26) | A1 | | | | | 5 | 5 | 5 | 5 | | | | | | | 1 |
| MSIV Closure (ZS-1-27) | A1 | | | | | 5 | 5 | 5 | 5 | | | | | | | 1 |
| MSIV Closure (ZS-1-14) | B1 | | | | | | | | | 6 | 6 | 6 | 6 | | | 1 |
| MSIV Closure (ZS-1-15) | B1 | | | | | | | | | 6 | 6 | 6 | 6 | | | 1 |
| MSIV Closure (ZS-1-37) | B1 | | | | | | | | | 6 | 6 | 6 | 6 | | | 1 |
| MSIV Closure (ZS-1-38) | B1 | | | | | | | | | 6 | 6 | 6 | 6 | | | 1 |
| FSV-85-35A | | | | | | | | | | | | | | 7 | 7 | 1 |
| FSV-85-70A | | | | | | | | | | | | | | 7 | 7 | 1 |

SYMBOLS:

⊠ ---- Interaction Not Considered

NI ---- No Interaction

APPENDIX R
UNIT 2

REACTOR BUILDING
REACTIVITY CONTROL
RPS & CRD SYSTEM

BROWNS FERRY NUCLEAR PLANT

Date: 5-27-85 | BFN 2 RB-RC-2 | Sheet 10 of 80

| IT NUMBER | EQUIPMENT INVOLVED | CABLES INVOLVED | CABLE ROUTING SHEET NUMBER | TYPE OF INTERACTION | CORRECTIVE ACTION (1) | SEE. SHEET NUMBER (2) | RESPONSIBLE ORGANIZATION (3) PREPARER REVIEWER |
|---|---|---|---|---|---|---|---|
| 1 | LIS-3-203A<br>LIS-3-203C | 2RP20-IA<br>2RP94-IIA | SET 13<br>Sheet 15 | Conduit<br>Conduit | B | M1 | Org: EEB Date: [illegible]<br>Prep: T.E. Barnett<br>Review: [illegible] |
| 2 | LIS-3-203B<br>LIS-3-203D | 2RP257-IB<br>2RP319-IIB | SET 13<br>Sheet 15 | Conduit<br>Conduit | B | M1 | Org: EEB Date: [illegible]<br>Prep: T.E. Barnett<br>Review: [illegible] |
| 3 | PIS-3-22A<br>PIS-3-22C | 2RP20-IA<br>2RP94-IIA | SET 13<br>Sheet 15 | Conduit<br>Conduit | B | M1 | Org: EEB Date: [illegible]<br>Prep: T.E. Barnett<br>Review: [illegible] |
| 4 | PIS-3-22B<br>PIS-3-22D | 2RP257-IB<br>2RP319-IIB | SET 13<br>Sheet 15 | Conduit<br>Conduit | B | M1 | Org: EEB Date: [illegible]<br>Prep: T.E. Barnett<br>Review: [illegible] |
| 5 | A1 Limit Switches<br>A2 Limit Switches | All cables in the RB. | SET 13<br>Sheets 4,5,14,15 | Conduit<br>Conduit | E | J1 | Org: NEB Date: 5-[illegible]<br>Prep: O.O. Walker<br>Review: [illegible] |
| 6 | B1 Limit Switches<br>B2 Limit Switches | All cables in the RB. | SET 13<br>Sheets 4,5,14,15 | Conduit<br>Conduit | E | J1 | Org: NEB Date: 5-22-[illegible]<br>Prep: O.O. Walker<br>Review: [illegible] |
| 7 | FSY-85-35A, [illegible]-71A<br>FSY-85-35B, [illegible]-70B | 2RP206-IIIA, 2RP207-IIIA<br>2RP419-IIIB, 2RP423-IIIB | SET 14<br>Sheets 3,4 | Conduit<br>Conduit | B | M2 | Org: EEB Date: [illegible]<br>Prep: T.E. Barnett<br>Review: [illegible] |
| 8 | Scram signal from RPS to CRD System | All cables in the RB. | SET 13<br>Sheet 1 | Redundancies are in same conduit | E | J2 | Org: EEB Date: [illegible]<br>Prep: [illegible]<br>Review: [illegible] |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |

NOTES:

1. The corrective action to be taken for the interactions are generalized in the following manner:

   A. Rerout Involved Cable(s)

   B. Provide Fire Barrier

   C. Circuit Modification

   D. Provide Fire Suppression

   E. Analysis.

   The corrective actions can be any of the above actions or any combination thereof.

2. This is a reference to the description of the corrective action. The sheet number will be preceded by "M" if any corrective A, B, C, or D is used and by "J" if action "E" is used. Only one sheet number will be referenced. (i.e. If the corrective action involves both A and E an "M" will only be used and all corrective action will be described on that sheet.)

3. The design project is responsible for the assignment of the responsible organization for the corrective action. The responsible organization is then responsible for the modification or justification description.

APPENDIX R
UNIT 2

REACTOR BUILDING
REACTIVITY CONTROL
RPS & CRD SYSTEM

BROWNS FERRY NUCLEAR PLANT

| Date: 5-21-87 [illegible] | Prep: [illegible]<br>Review: [illegible] | BFN-IT-RB-RC-2<br>Sheet 1 R0 |
|---|---|---|

BFN-I-RB-RC-2-J1

This equipment and its associated cables are not required by the final functional criteria.

Therefore, no further consideration is required.

APPENDIX R

CORRECTIVE ACTION

PREPARED: R. A. Wallin

REVIEWED: T. W. Barkalow

DATE: 6/2/82

BFN-IT-RB-RC-2-J1

In order to show compliance with the Appendix R criteria for required circuits whose failure to operate could adversely affect shutdown capability, justification is provided below for (A) not requiring separation of the power supply cables to Reactor Protection System (RPS) logic and (B) not requiring separation of the cables from the RPS logic panels to the Hydraulic Control Units (HCUS) of the Control Rod Drive (CRD) system.

For A and B above, the following design requirements are essential to the justification analysis:

1. All wiring for the RPS outside of the enclosures in the control room is run in rigid metallic conduits used for no other wiring (refer to section 7.2.3.10 of the BFNP FSAR).

2. The RPS and CRD HCUS are fail safe (scram is initiated) on loss of power.

3. The CRD HCUS require control air to pull control rods.

4. Since the RPS sensors are routed separately, the logic will function for all but the control bay fires.

5. Scram time is less than 3.5 seconds for 90 percent insertion of control rods.

6. The power supply cables from the RPS logic panels to the HCUS are routed in separate conduit from the power return cables.

For A above there are four failure modes for the logic power supply cables; they are:

1. Ground short,

2. Hot short,

3. Open circuit,

4. Line short.

APPENDIX R

CORRECTIVE ACTION

PREPARED: Edward J Bradley

REVIEWED: Larry M. Begley

DATE: 6/18/82

Both the ground short and line short will trip the cables' circuit breaker which will initiate a scram on loss of power. The open circuit failure mode will also initiate a scram on loss of power. The hot short failure mode can only impose another RPS power supply on the failed power supply cable; therefore, the logic circuit is still protected from damage by qualified trips of the power supply and will function to disconnect power to the CRD HCU's, thus inducing a scram.

For B above the cables from the RPS logic panels to the HCUS provide power to the scram valves in the HCUS. This power is removed to cause the HCUS to insert the rods. If these subject cables are involved in a fire, they will degrade while the conduit is still intact. Because of this degradation, they will either open circuit or short to the conduit, either of which will remove power to the HCUS, causing insertion of the affected control rods.

Refer to figure 1, attached, for a block diagram level representation of the power supply cable connections to the RPS logic and of the RPS logic cable connections to the HCUS.

APPENDIX R

CORRECTIVE ACTION

PREPARED: Edward L Bradley

REVIEWED: Larry M Begley

DATE: 6/18/82

This modification involves wrapping the division I conduits (listed below) containing cables for LIS-3-203A, LIS-3-203B, PIS-3-22A, and PIS-3-22B shown on BFN-IT-RB-RC-2, sheet 1, with a one-hour fire-rated barrier in the unit 2 reactor building, where 20-foot separation or a three-hour fire-rated barrier does not exist between division II conduits containing cables for LIS-3-203C, LIS-3-203D, PIS-3-22C, and PIS-3-22D, respectively.

Conduits: 2RP52-IA
2RP53-IA
2RP54-IA
2RP277-IB
2RP278-IB
2RP290-IB

APPENDIX R

CORRECTIVE ACTION

PREPARED: T.E. Barnett, Jr.

REVIEWED: D. G. Seckie

DATE: 6/18/82

This modification involves wrapping either the conduits (listed below) for FSV-85-35A and FSV-85-70A or FSV-85-35B and FSV-85-70B shown on BFN-IT-RB-RC-1, sheet 1, in the unit 2 reactor building where 20-foot separation or a three-hour fire-rated barrier does not exist between the conduits to be wrapped and panel 25-25C or panel 25-25D.

Conduits to be wrapped will be determined by field survey (e.g., ease of wrapping).

| Conduits for FSV-85-35A and FSV-85-70A: | Conduits for FSV-85-35B and FSV-85-70B: |
| --- | --- |
| 2RP206-IIIA | 2RP419-IIIB |
| 2RP222-IIIA | 2RP437-IIIB |
| 2RP215-IIIA | 2RP429-IIIB |
| 2RP207-IIIA | 2RP423-IIIB |

APPENDIX R

CORRECTIVE ACTION

PREPARED: T. E. Barnett, Jr.

REVIEWED: D. O. Geeki

DATE: 6/18/82

| RPS CHANNEL | RPS CHANNEL | RPV Low Water Level (LIS-3-203C) A2 | RPV Low Water Level (LIS-3-203D) B2 | RPV High Pressure (PIS-3-22C) A2 | RPV High Pressure (PIS-3-22D) B2 | MSIV Closure (ZS-1-37) A2 | MSIV Closure (ZS-1-38) A2 | MSIV Closure (ZS-1-51) A2 | MSIV Closure (ZS-1-52) A2 | MSIV Closure (ZS-1-26) B2 | MSIV Closure (ZS-1-27) B2 | MSIV Closure (ZS-1-51) B2 | MSIV Closure (ZS-1-52) B2 | FSV-85-35B | FSV-85-70B | See Companion Drawing Sheet Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RPV Low Water Level (LIS-3-203A) | A1 | 1 | | | | | | | | | | | | | | 1 |
| RPV Low Water Level (LIS-3-203B) | B1 | | 2 | | | | | | | | | | | | | 1 |
| RPV High Pressure (PIS-3-22A) | A1 | | | 3 | | | | | | | | | | | | 1 |
| RPV High Pressure (PIS-3-22B) | B1 | | | | 4 | | | | | | | | | | | 1 |
| MSIV Closure (ZS-1-14) | A1 | | | | | 5 | 5 | 5 | 5 | | | | | | | 1 |
| MSIV Closure (ZS-1-15) | A1 | | | | | 5 | 5 | 5 | 5 | | | | | | | 1 |
| MSIV Closure (ZS-1-26) | A1 | | | | | 5 | 5 | 5 | 5 | | | | | | | 1 |
| MSIV Closure (ZS-1-27) | A1 | | | | | 5 | 5 | 5 | 5 | | | | | | | 1 |
| MSIV Closure (ZS-1-14) | B1 | | | | | | | | | 6 | 6 | 6 | 6 | | | 1 |
| MSIV Closure (ZS-1-15) | B1 | | | | | | | | | 6 | 6 | 6 | 6 | | | 1 |
| MSIV Closure (ZS-1-37) | B1 | | | | | | | | | 6 | 6 | 6 | 6 | | | 1 |
| MSIV Closure (ZS-1-38) | B1 | | | | | | | | | 6 | 6 | 6 | 6 | | | 1 |
| FSV-85-35A | | | | | | | | | | | | | | 7 | 7 | 1 |
| FSV-85-70A | | | | | | | | | | | | | | 7 | 7 | 1 |

SYMBOLS:

▨ ..... Interaction Not Considered

NI ..... No Interaction

APPENDIX R
UNIT 3

REACTOR BUILDING
REACTIVITY CONTROL
RPS & CRD SYSTEM

BROWNS FERRY NUCLEAR PLANT

| | | |
|---|---|---|
| Dated 5-27-81 | Prep. [illegible] | BFN 3I-RT-RC-3 |
| [illegible] | Reviewed [illegible] | Sheet 10 80 |

| II NUMBER | EQUIPMENT INVOLVED | CABLES INVOLVED | CABLE ROUTING SHEET NUMBER | INTERACTION | CORRECTIVE ACTION (1) | SEE SHEET NUMBER (2) | RESPONSIBLE ORGANIZATION (3) PREPARER REVIEWER |
|---|---|---|---|---|---|---|---|
| 1 | LIS-3-203A | 3RP20-IA | SET 13 | Conduit | B | M1 | Org: EEB Date: 5/26/[illegible] Prep: F.E. Barnett Reviewer: [illegible] |
| | LIS-3-203C | 3RP94-IIA | Sheet 12 | Conduit | | | |
| 2 | LIS-3-203B | 3RP257-IB | SET 13 | Conduit | B | M1 | Org: EEB Date: [illegible] Prep: F.E. Barnett Reviewer: [illegible] |
| | LIS-3-203D | 3RP319-IIB | Sheet 12 | Conduit | | | |
| 3 | PIS-3-22A | 3RP20-IA | SET 13 | Conduit | B | M1 | Org: EEB Date: 5/27/82 Prep: F.E. Barnett Reviewer: [illegible] |
| | PIS-3-22C | 3RP94-IIA | Sheet 12 | Conduit | | | |
| 4 | PIS-3-22B | 3RP257-IB | SET 13 | Conduit | B | M1 | Org: EEB Date: [illegible] Prep: F.E. Barnett Reviewer: [illegible] |
| | PIS-3-22D | 3RP319-IIB | Sheet 12 | Conduit | | | |
| 5 | A1 Limit Switches | All cables in the RB. | SET 13 Sheets 7,8,9,17 | Conduit | E | J1 | Org: NEB Date: 5-27-82 Prep: D.O. Walker Reviewer: [illegible] |
| | A2 Limit Switches | | | Conduit | | | |
| 6 | B1 Limit Switches | All cables in the RB. | SET 13 Sheets 7,8,9,17 | Conduit | E | J1 | Org: NEB Date: 5-27-82 Prep: D.O. Walker Reviewer: [illegible] |
| | B2 Limit Switches | | | Conduit | | | |
| 7 | FSV-85-35A, 8-70A | 3RP206-IIIA, 3RP207-IIIA | SET 14 | Conduit | B | M2 | Org: EEB Date: 5/27/82 Prep: F.E. Barnett Reviewer: [illegible] |
| | FSV-85-35B, 8-70B | 3RP419-IIIB, 3RP423-IIIB | Sheets 5,6 | Conduit | | | |
| 8 | Scram Signal from RPS to CRD System | All cables in the RB. | SET 13 Sheet 1 | Redundancies are in same Conduit | E | J2 | Org: EEB Date: [illegible] Prep: [illegible] Reviewer: [illegible] |
| | | | | | | | Org: Date: Prep: Reviewer: |
| | | | | | | | Org: Date: Prep: Reviewer: |
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NOTES:

1. The corrective action to be taken for the interactions are generalized in the following manner:

   A. Reroute Involved Cable(s)

   B. Provide Fire Barrier

   C. Circuit Modification

   D. Provide Fire Suppression

   E. Analysis.

   The corrective actions can be any of the above actions or any combination thereof.

2. This is a reference to the description of the corrective action. The sheet number will be preceded by "M" if any corrective A, B, C, or D is used and by "J" if action "E" is used. Only one sheet number will be referenced. (i.e. If the corrective action involves both A and E an "M" will only be used and all corrective actions will be described on that sheet.)

3. The design project is responsible for the assignment of the responsible organization for the corrective action. The responsible organization is then responsible for the modification or justification description.

APPENDIX R
UNIT 3

REACTOR BUILDING
REACTIVITY CONTROL
RPS & CRD SYSTEM

BROWNS FERRY NUCLEAR PLANT

Date: 5-27-82, 6-17-82 | Prep: [illegible] Reviewer: [illegible] | BFN-11-FD-RC-3 Sheet 1 R0

This equipment and its associated cables are not required by the final functional criteria.

Therefore, no further consideration is required.

APPENDIX R

CORRECTIVE ACTION

PREPARED: [signature]

REVIEWED: T. W. Barhalow

DATE: 6/2/82

In order to show compliance with the Appendix R criteria for required circuits whose failure to operate could adversely affect shutdown capability, justification is provided below for (A) not requiring separation of the power supply cables to Reactor Protection System (RPS) logic and (B) not requiring separation of the cables from the RPS logic panels to the Hydraulic Control Units (HCUS) of the Control Rod Drive (CRD) system.

For A and B above, the following design requirements are essential to the justification analysis:

1. All wiring for the RPS outside of the enclosures in the control room is run in rigid metallic conduits used for no other wiring (refer to section 7.2.3.10 of the BFNP FSAR).

2. The RPS and CRD HCUS are fail safe (scram is initiated) on loss of power.

3. The CRD HCUS require control air to pull control rods.

4. Since the RPS sensors are routed separately, the logic will function for all but the control bay fires.

5. Scram time is less than 3.5 seconds for 90 percent insertion of control rods.

6. The power supply cables from the RPS logic panels to the HCUS are routed in separate conduit from the power return cables.

For A above there are four failure modes for the logic power supply cables; they are:

1. Ground short,
2. Hot short,
3. Open circuit,
4. Line short.

APPENDIX R

CORRECTIVE ACTION

PREPARED: Edward L Bradley
REVIEWED: Larry M Begley
DATE: 6/18/82

Both the ground short and line short will trip the cables' circuit breaker which will initiate a scram on loss of power. The open circuit failure mode will also initiate a scram on loss of power. The hot short failure mode can only impose another RPS power supply on the failed power supply cable; therefore, the logic circuit is still protected from damage by qualified trips of the power supply and will function to disconnect power to the CRD HCU's, thus inducing a scram.

For B above the cables from the RPS logic panels to the HCUS provide power to the scram valves in the HCUS. This power is removed to cause the HCUS to insert the rods. If these subject cables are involved in a fire, they will degrade while the conduit is still intact. Because of this degradation, they will either open circuit or short to the conduit, either of which will remove power to the HCUS, causing insertion of the affected control rods.

Refer to figure 1, attached, for a block diagram level representation of the power supply cable connections to the RPS logic and of the RPS logic cable connections to the HCUS.

APPENDIX R

CORRECTIVE ACTION

PREPARED: Edward L Bradley

REVIEWED: Larry M. Begley

DATE: 6/18/82

BFN-IT-RB-RC-3-M1

This modification involves wrapping the division I conduits (listed below) containing cables for LIS-3-203A, LIS-3-203B, PIS-3-22A, and PIS-3-22B shown on BFN-IT-RB-RC-3, sheet 1, with a one-hour fire-rated barrier in the unit 3 reactor building, where 20-foot separation or a three-hour fire-rated barrier does not exist between division II conduits containing cables for LIS-3-203C, LIS-3-203D, PIS-3-22C, and PIS-3-22D, respectively.

Conduits: 3RP52-IA
3RP53-IA
3RP54-IA
3RP277-IB
3RP278-IB
3RP290-IB

APPENDIX R

CORRECTIVE ACTION

PREPARED: T. E. Barnett, Jr.

REVIEWED: D. G. Peckie

DATE: 6/18/82



BFN-IT-RB-RC-3-M1

This modification involves wrapping either the conduits (listed below) for FSV-85-35A and FSV-85-70A or FSV-85-35B and FSV-85-70B shown on BFN-IT-RB-RC-1, sheet 1, in the unit 3 reactor building where 20-foot separation or a three-hour fire-rated barrier does not exist between the conduits to be wrapped and panel 25-25C or panel 25-25D.

Conduits to be wrapped will be determined by field survey (e.g., ease of wrapping).

| Conduits for FSV-85-35A and FSV-85-70A: | Conduits for FSV-85-35B and FSV-85-70B: |
|---|---|
| 3RP206-IIIA | 3RP419-IIIB |
| 3RP222-IIIA | 3RP437-IIIB |
| 3RP215-IIIA | 3RP429-IIIB |
| 3RP207-IIIA | 3RP423-IIIB |

APPENDIX R

CORRECTIVE ACTION

PREPARED: T. E. Barnett, Jr.

REVIEWED: D. J. Jeckie

DATE: 6/18/82

Failure Modes Analysis for the RPS System

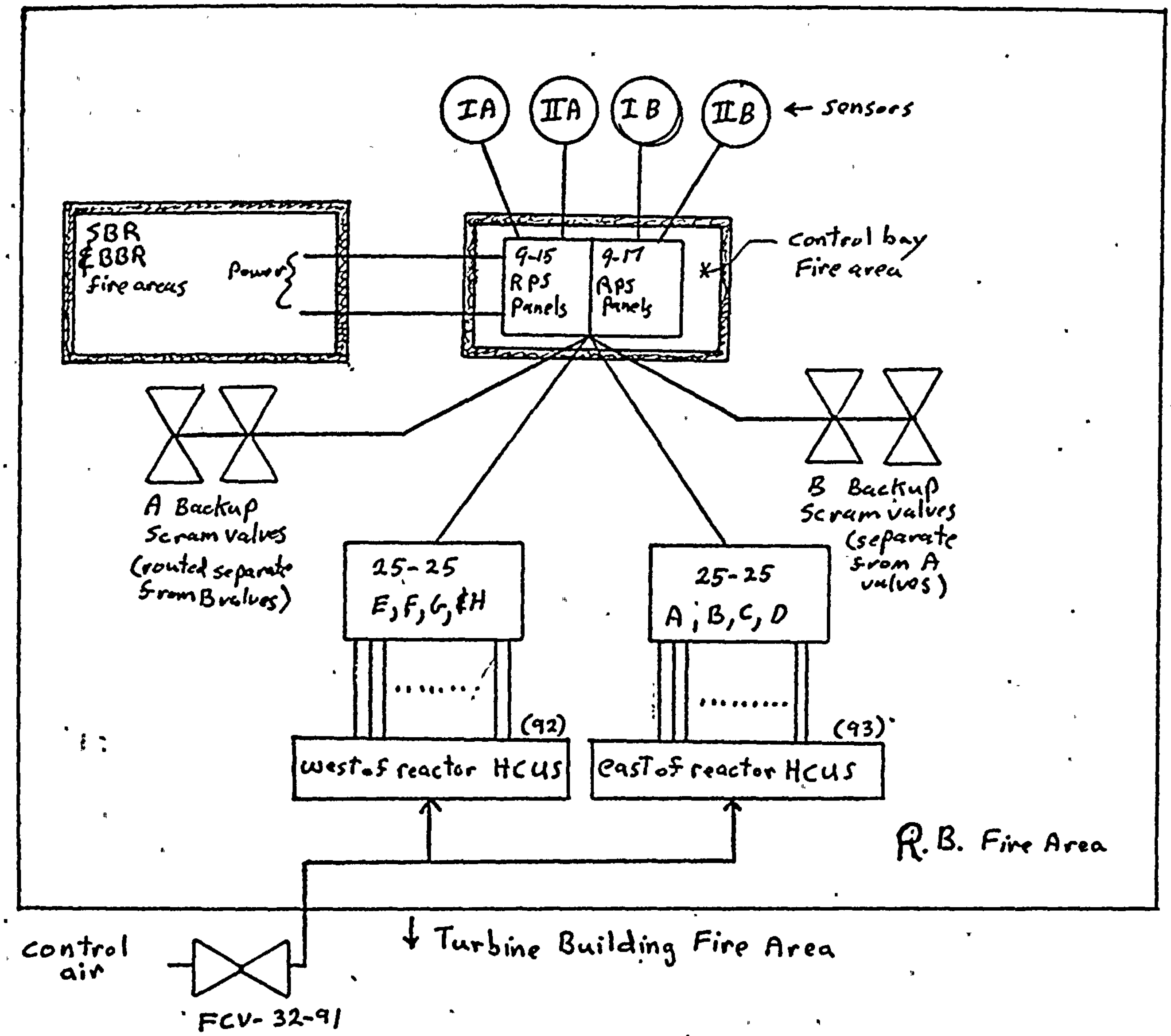


Figure 1

RPS Block Diagram

Scram = (IA + IIA) (IB + IIB)

BFN-IT-RB-RC-1,2,3-32

| RPS CHANNEL | RPS CHANNEL | RPV Low Water Level (LIS-3-203C) | RPV Low Water Level (LIS-3-203D) | RPV High Pressure (PIS-3-22C) | RPV High Pressure (PIS-3-22D) | MSIV Closure (ZS-1-37) | MSIV Closure (ZS-1-38) | MSIV Closure (ZS-1-51) | MSIV Closure (ZS-1-52) | MSIV Closure (ZS-1-26) | MSIV Closure (ZS-1-27) | MSIV Closure (ZS-1-51) | MSIV Closure (ZS-1-52) | FSV-85-35B | FSV-85-70B | See Companion Drawing(s) Sheet Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | A2 | B2 | A2 | B2 | A2 | A2 | A2 | A2 | B2 | B2 | B2 | B2 | | | |
| RPV Low Water Level (LIS-3-203A) | A1 | NI | | | | | | | | | | | | | | |
| RPV Low Water Level (LIS-3-203B) | B1 | | NI | | | | | | | | | | | | | |
| RPV High Pressure (PIS-3-22A) | A1 | | | NI | | | | | | | | | | | | |
| RPV High Pressure (PIS-3-22B) | B1 | | | | NI | | | | | | | | | | | |
| MSIV Closure (ZS-1-14) | A1 | | | | | NI | NI | NI | NI | | | | | | | |
| MSIV Closure (ZS-1-15) | A1 | | | | | NI | NI | NI | NI | | | | | | | |
| MSIV Closure (ZS-1-26) | A1 | | | | | NI | NI | NI | NI | | | | | | | |
| MSIV Closure (ZS-1-27) | A1 | | | | | NI | NI | NI | NI | | | | | | | |
| MSIV Closure (ZS-1-14) | B1 | | | | | | | | | NI | NI | NI | NI | | | |
| MSIV Closure (ZS-1-15) | B1 | | | | | | | | | NI | NI | NI | NI | | | |
| MSIV Closure (ZS-1-37) | B1 | | | | | | | | | NI | NI | NI | NI | | | |
| MSIV Closure (ZS-1-38) | B1 | | | | | | | | | NI | NI | NI | NI | | | |
| FSV-85-35A | | | | | | | | | | | | | | NI | NI | |
| FSV-85-70A | | | | | | | | | | | | | | NI | NI | |

SYMBOLS:

(hatched) ---- Interaction Not Considered

NI ---- No Interaction

APPENDIX R
UNIT 1

TURBINE BUILDING
REACTIVITY CONTROL
RPS & CRD SYSTEM

BROWNS FERRY NUCLEAR PLANT

Date: 5-27-81
6-24-81

BFN-11-TR RC-1
Sheet 0 — R0

| RPS CHANNEL | | RPV Low Water Level (LIS-3-203C) | RPV Low Water Level (LIS-3-203D) | RPV High Pressure (PIS-3-22C) | RPV High Pressure (PIS-3-22D) | MSIV Closure (ZS-1-37) | MSIV Closure (ZS-1-38) | MSIV Closure (ZS-1-51) | MSIV Closure (ZS-1-52) | MSIV Closure (ZS-1-26) | MSIV Closure (ZS-1-27) | MSIV Closure (ZS-1-51) | MSIV Closure (ZS-1-52) | FSV-85-35B | FSV-85-70B | See Companion Drawing(s) Sheet Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | RPS CHANNEL | A2 | B2 | A2 | B2 | A2 | A2 | A2 | A2 | B2 | B2 | B2 | B2 | | | |
| RPV Low Water Level (LIS-3-203A) | A1 | NI | | | | | | | | | | | | | | |
| RPV Low Water Level (LIS-3-203B) | B1 | | NI | | | | | | | | | | | | | |
| RPV High Pressure (PIS-3-22A) | A1 | | | NI | | | | | | | | | | | | |
| RPV High Pressure (PIS-3-22B) | B1 | | | | NI | | | | | | | | | | | |
| MSIV Closure (ZS-1-14) | A1 | | | | | NI | NI | NI | NI | | | | | | | |
| MSIV Closure (ZS-1-15) | A1 | | | | | NI | NI | NI | NI | | | | | | | |
| MSIV Closure (ZS-1-26) | A1 | | | | | NI | NI | NI | NI | | | | | | | |
| MSIV Closure (ZS-1-27) | A1 | | | | | NI | NI | NI | NI | | | | | | | |
| MSIV Closure (ZS-1-14) | B1 | | | | | | | | | NI | NI | NI | NI | | | |
| MSIV Closure (ZS-1-15) | B1 | | | | | | | | | NI | NI | NI | NI | | | |
| MSIV Closure (ZS-1-37) | B1 | | | | | | | | | NI | NI | NI | NI | | | |
| MSIV Closure (ZS-1-38) | B1 | | | | | | | | | NI | NI | NI | NI | | | |
| FSV-85-35A | | | | | | | | | | | | | | NI | NI | |
| FSV-85-70A | | | | | | | | | | | | | | NI | NI | |

SYMBOLS:

(hatched) ..... Interaction Not Considered

NI ..... No Interaction

APPENDIX R
UNIT 2

TURBINE BUILDING
REACTIVITY CONTROL
RPS & CRD SYSTEM

BROWNS FERRY NUCLEAR PLANT

Date: 5-27-81 6-14-83 | Drawn: [illegible] Revised: [illegible] | [illegible] II-TB-RC-2 Sheet 0 80

| RPS CHANNEL | RPS CHANNEL | RPV Low Water Level (LIS-3-203A) | RPV Low Water Level (LIS-3-203B) | RPV High Pressure (PIS-3-22A) | RPV High Pressure (PIS-3-22B) | MSIV Closure (PS-1-37) | MSIV Closure (PS-1-38) | MSIV Closure (PS-1-51) | MSIV Closure (PS-1-52) | MSIV Closure (PS-1-26) | MSIV Closure (PS-1-27) | MSIV Closure (PS-1-51) | MSIV Closure (PS-1-52) | FSV-85-35B | FSV-85-70B | See Companion Drawing Sheet Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | A2 | B2 | A2 | B2 | A2 | A2 | A2 | A2 | B2 | B2 | B2 | B2 | | | |
| RPV Low Water Level (LIS-3-203A) | A1 | NI | | | | | | | | | | | | | | |
| RPV Low Water Level LIS-3-203B | B1 | | NI | | | | | | | | | | | | | |
| RPV High Pressure (PIS-3-22A) | A1 | | | NI | | | | | | | | | | | | |
| RPV High Pressure (PIS-3-22B) | B1 | | | | NI | | | | | | | | | | | |
| MSIV Closure (PS-1-14) | A1 | | | | | NI | NI | NI | NI | | | | | | | |
| MSIV Closure (PS-1-15) | A1 | | | | | NI | NI | NI | NI | | | | | | | |
| MSIV Closure (PS-1-26) | A1 | | | | | NI | NI | NI | NI | | | | | | | |
| MSIV Closure (PS-1-27) | A1 | | | | | NI | NI | NI | NI | | | | | | | |
| MSIV Closure (PS-1-14) | B1 | | | | | | | | | NI | NI | NI | NI | | | |
| MSIV Closure (PS-1-15) | B1 | | | | | | | | | NI | NI | NI | NI | | | |
| MSIV Closure (PS-1-37) | B1 | | | | | | | | | NI | NI | NI | NI | | | |
| MSIV Closure (PS-1-38) | B1 | | | | | | | | | NI | NI | NI | NI | | | |
| FSV-85-35A | | | | | | | | | | | | | | NI | NI | |
| FSV-85-70A | | | | | | | | | | | | | | NI | NI | |

SYMBOLS:

▨ ..... Interaction Not Considered

NI ..... No Interaction

APPENDIX R
UNIT 3

TURBINE BUILDING
REACTIVITY CONTROL
RPS & CRD SYSTEM

BROWNS FERRY NUCLEAR PLANT

| Date 5-17-86 6-23-86 | From L.C.W. 3/4.. Reviewed ... | PFM 11-TB-RC-3 Sheet 0 ... R0 |
|---|---|---|

| | LITS-3-46B | LI-3-46B | PX-3-61 | PT-3-61 | PI-3-61 | LM-3-60 | XS-3-53 | TE-64-55F | TM-64-55A | TIS-64-55 | XS-64-55A | See Companion Drawing(s) Sheet Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LITS-3-46A | NI | NI | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | |
| LI-3-46A | NI | 1 | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | 1 |
| PX-3-207 | ※ | ※ | NI | NI | NI | NI | NI | ※ | ※ | ※ | ※ | |
| PT-3-207 | ※ | ※ | NI | 2 | NI | NI | NI | ※ | ※ | ※ | ※ | 1 |
| PI-3-207 | ※ | ※ | NI | NI | NI | NI | NI | ※ | ※ | ※ | ※ | |
| LM-3-206 | ※ | ※ | NI | NI | NI | NI | NI | ※ | ※ | ※ | ※ | |
| TE-64-55E | ※ | ※ | ※ | ※ | ※ | ※ | ※ | 3 | NI | NI | NI | 1 |
| TM-64-55B | ※ | ※ | ※ | ※ | ※ | ※ | ※ | NI | NI | NI | NI | |
| TI-64-55A | ※ | ※ | ※ | ※ | ※ | ※ | ※ | NI | NI | NI | NI | |
| XS-64-55B | ※ | ※ | ※ | ※ | ※ | ※ | ※ | NI | NI | NI | NI | |
| XS-64-55C | ※ | ※ | ※ | ※ | ※ | ※ | ※ | NI | NI | NI | NI | |

SYMBOLS:

※ ---- Interaction Not Considered

NI ---- No Interaction

APPENDIX R
UNIT 1

REACTOR BUILDING
PROCESS VARIABLE
INSTRUMENTATION

BROWNS FERRY NUCLEAR PLANT

| | | |
|---|---|---|
| Date: 5-27-[illegible] | [illegible] | BFN-IT-RB-PVI-1 |
| | | Sheet 0 R0 |

| IT NUMBER | EQUIPMENT INVOLVED | CABLES INVOLVED | CABLE ROUTING SHEET NUMBER | TY. OF INTERACTION | CORRECTIVE ACTION (1) | SEE SHEET NUMBER (2) | RESPONSIBLE ORGANIZATION PREPARER REVIEWER (3) |
|---|---|---|---|---|---|---|---|
| 1 | LI-3-46A<br>LI-3-46B | IR1070, IR1071-<br>IR1072, IR1073 | SET 15<br>Sheet 6 | Cable Tray.<br>Cable Tray: | A | M1 | Orig: TDP Date: 5-27-81<br>Prep: [illegible]<br>Review: [illegible] |
| 2 | PT-3-207<br>PT-3-61 | IR933<br>IR937 | SET 15<br>Sheet 6 | Cable Tray<br>Cable Tray | A | M1 | Orig: TDP Date: 5-27-81<br>Prep: [illegible]<br>Review: [illegible] |
| 3 | TE-64-55E<br>TE-64-55F | All cables inside the RB. | SET 15<br>Sheets 1-6 | Cable Tray, Cond<br>Cable Tray, Cond | E | J1 | Orig: NEB Date: 5-27-81<br>Prep: D.A. Walker<br>Review: [illegible] |
| | | | | | | | Orig: Date:<br>Prep:<br>Review: |
| | | | | | | | Orig: Date:<br>Prep:<br>Review: |
| | | | | | | | Orig: Date:<br>Prep:<br>Review: |
| | | | | | | | Orig: Date:<br>Prep:<br>Review: |
| | | | | | | | Orig: Date:<br>Prep:<br>Review: |
| | | | | | | | Orig: Date:<br>Prep:<br>Review: |
| | | | | | | | Orig: Date:<br>Prep:<br>Review: |
| | | | | | | | Orig: Date:<br>Prep:<br>Review: |
| | | | | | | | Orig: Date:<br>Prep:<br>Review: |
| | | | | | | | Orig: Date:<br>Prep:<br>Review: |
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| | | | | | | | Orig: Date:<br>Prep:<br>Review: |
| | | | | | | | Orig: Date:<br>Prep:<br>Review: |
| | | | | | | | Orig: Date:<br>Prep:<br>Review: |
| | | | | | | | Orig: Date:<br>Prep:<br>Review: |
| | | | | | | | Orig: Date:<br>Prep:<br>Review: |

NOTES:

1. The corrective action to be taken for the interactions are generalized in the following manner:

   A. Reroute Involved Cable(s)

   B. Provide Fire Barrier

   C. Circuit Modification

   D. Provide Fire Suppression

   E. Analysis.

   The corrective actions can be any of the above actions or any combination thereof.

2. This is a reference to the description of the corrective action. The sheet number will be preceded by "M" if any corrective A, B, C, or D is used and by "J" if action "E" is used. Only one sheet number will be referenced. (i.e. If the corrective action involves both A and E an "M" will only be used and all corrective actions will be described on that sheet.)

3. The design project is responsible for the assignment of the responsible organization for the corrective actions. The responsible organization is then responsible for the modification or justification description.

APPENDIX R
UNIT 1

REACTOR BUILDING
PROCESS VARIABLE
INSTRUMENTATION

BROWNS FERRY NUCLEAR PLANT

| | | |
|---|---|---|
| Date: 5-27-81<br>[illegible] | Prep: D.A. Walker<br>Review: [illegible] | BFN-II RB-PVI-1<br>Sheet 1 R0 |

This equipment and its associated cables are not required by the final functional criteria.

Therefore, no further consideration is required.

APPENDIX R

CORRECTIVE ACTION

PREPARED: D. A. Walker

REVIEWED: T. N. Barkalow

DATE: 6/2/82

To meet the separations requirements of Appendix R for unit 1, cables 1R1070, 1R1071, and 1R933 will be rerouted in conduit.

APPENDIX R

CORRECTIVE ACTION

PREPARED: J. A. Krieg

REVIEWED: Dexter Boone

DATE: 6-17-82

| | LITS-3-46B | LI-3-46B | PX-3-61 | PT-3-61 | PI-3-61 | LM-3-60 | XS-3-53 | TE-64-55F | TM-64-55A | TIS-64-55 | XS-64-55A | See Companion Drawing(s) Sheet Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LITS-3-46A | NI | NI | | | | | | | | | | |
| LI-3-46A | NI | NI | | | | | | | | | | |
| PX-3-207 | | | NI | NI | NI | NI | NI | | | | | |
| PT-3-207 | | | NI | 1 | NI | NI | NI | | | | | 1 |
| PI-3-207 | | | NI | NI | NI | NI | NI | | | | | |
| LM-3-206 | | | NI | NI | NI | NI | NI | | | | | |
| TE-64-55E | | | | | | | | NI | NI | NI | NI | |
| TM-64-55B | | | | | | | | NI | 2 | NI | NI | 1 |
| TI-64-55A | | | | | | | | NI | NI | NI | NI | |
| XS-64-55B | | | | | | | | NI | NI | NI | NI | |
| XS-64-55C | | | | | | | | NI | NI | NI | NI | |

SYMBOLS:

▨ ---- Interaction Not Consd

NI ---- No Interaction

APPENDIX R
UNIT 2

REACTOR BUILDING
PROCESS VARIABLE
INSTRUMENTATION

BROWNS FERRY NUCLEAR PLANT

BFN-IT-RB-PVI-2
Sheet 0 R0

| IT NUMBER | EQUIPMENT INVOLVED | CABLES INVOLVED | CABLE ROUTING SHEET NUMBER | TYPE OF INTERACTION | CORRECTIVE ACTION (1) | SEE SHEET NUMBER (2) | RESPONSIBLE ORGANIZATION PREPARER REVIEWER (3) |
|---|---|---|---|---|---|---|---|
| 1 | PT-3-207<br>PT-3-61 | 2R933<br>2R937 | SET 15<br>Sheet 12 | Cable Tray<br>Cable Tray | A | M1 | Org: TDP Date: 5-27-81<br>Prep: [illegible]<br>Review: [illegible] |
| 2 | TE-64-55E<br>TE-64-55F | All cables inside the RB. | SET 15<br>Sheets 8, 12 | Cable Tray<br>Cable Tray | E | J1 | Org: NEB Date: 5-21-81<br>Prep: D.A. Walley<br>Review: [illegible] |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |

NOTES:

1. The corrective action to be taken for the interactions are generalized in the following manner:

   A. Rerout Involved Cable(s)

   B. Provide Fire Barrier

   C. Circuit Modification.

   D. Provide Fire Suppression

   E. Analysis.

   The corrective actions can be any of the above actions or any combination thereof.

2. This is a reference to the description of the corrective action. The sheet number will be preceded by "M" if any corrective A, B, C, or D is used and by "J" if action "E" is used. Only one sheet number will be referenced. (i.e. If the corrective action involves both A and E an "M" will only be used and all corrective action will be described on that sheet.)

3. The design project is responsible for the assignment of the responsible organization for the corrective action. The responsible organization is then responsible for the modification or justification description.

APPENDIX R
UNIT 2

REACTOR BUILDING PROCESS VARIABLE INSTRUMENTATION

BROWNS FERRY NUCLEAR PLANT

Date: 5-27-81 6-4-81 | Prep: D.A. Walley Review: [illegible] | BFN-II-RB-PVI-2 Sheet 1 R0

This equipment and its associated cables are not required by the final functional criteria.

Therefore, no further consideration is required.

APPENDIX R

CORRECTIVE ACTION

PREPARED: D. A. Walden

REVIEWED: T. W. Barkalow

DATE: 6/2/82

To meet the separations requirements of Appendix R for unit 2, cable 2R937 will be rerouted in conduit.

APPENDIX R

CORRECTIVE ACTION

PREPARED: J. A. King

REVIEWED: Dexter Boone

DATE: 6-17-82

| | LITS-3-46B | LI-3-46B | PX-3-61 | PT-3-61 | PI-3-61 | LM-3-60 | XS-3-53 | TE-64-55F | TM-64-55A | TIS-64-55 | XS-64-55A | See Companion Drawing (3) Sheet Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LITS-3-46A | NI | NI | | | | | | | | | | |
| LI-3-46A | NI | NI | | | | | | | | | | |
| PX-3-207 | | | NI | NI | NI | NI | NI | | | | | |
| PT-3-207 | | | NI | NI | NI | NI | NI | | | | | |
| PI-3-207 | | | NI | NI | NI | NI | NI | | | | | |
| LM-3-206 | | | NI | NI | NI | NI | NI | | | | | |
| TE-64-55E | | | | | | | | NI | NI | NI | NI | |
| TM-64-55B | | | | | | | | NI | 1 | NI | NI | 1 |
| TI-64-55A | | | | | | | | NI | NI | NI | NI | |
| XS-64-55B | | | | | | | | NI | NI | NI | NI | |
| XS-64-55C | | | | | | | | NI | NI | NI | NI | |

SYMBOLS:

⊠ ---- Interaction Not Consd

NI ---- No Interaction

APPENDIX R
UNIT 3

REACTOR BUILDING
PROCESS VARIABLE
INSTRUMENTATION

BROWNS FERRY NUCLEAR PLANT

| | | |
|---|---|---|
| Date: 5-77-8[illegible] | [illegible] | BFN-IT-RB-PVI-3 |
| [illegible] | [illegible] | Sheet 0 R0 |

| II NUMBER | EQUIPMENT INVOLVED | CABLES INVOLVED | CABLE ROUTING SHEET NUMBER | TYPE OF INTERACTION | CORRECTIVE ACTION (1) | SEE SHEET NUMBER (2) | RESPONSIBLE ORGANIZATION (3) PREPARER REVIEWER |
|---|---|---|---|---|---|---|---|
| 1 | TE-64-55E<br>TE-64-55F | All cables in the RB. | SET 15 Sheets 14, 17 | Cable Tray<br>Cable Tray | E | J1 | Orig NED Date 5-27-91<br>Prep D.O. Walker<br>Review [illegible] |
| | | | | | | | Orig Date<br>Prep<br>Review |
| | | | | | | | Orig Date<br>Prep<br>Review |
| | | | | | | | Orig Date<br>Prep<br>Review |
| | | | | | | | Orig Date<br>Prep<br>Review |
| | | | | | | | Orig Date<br>Prep<br>Review |
| | | | | | | | Orig Date<br>Prep<br>Review |
| | | | | | | | Orig Date<br>Prep<br>Review |
| | | | | | | | Orig Date<br>Prep<br>Review |
| | | | | | | | Orig Date<br>Prep<br>Review |
| | | | | | | | Orig Date<br>Prep<br>Review |
| | | | | | | | Orig Date<br>Prep<br>Review |
| | | | | | | | Orig Date<br>Prep<br>Review |
| | | | | | | | Orig Date<br>Prep<br>Review |
| | | | | | | | Orig Date<br>Prep<br>Review |
| | | | | | | | Orig Date<br>Prep<br>Review |
| | | | | | | | Orig Date<br>Prep<br>Review |
| | | | | | | | Orig Date<br>Prep<br>Review |
| | | | | | | | Orig Date<br>Prep<br>Review |

NOTES:

1. The corrective action to be taken for the interactions are generalized in the following manner:

   A. Reroute Involved Cable(s)

   B. Provide Fire Barrier

   C. Circuit Modification

   D. Provide Fire Suppression

   E. Analysis.

   The corrective actions can be any of the above actions or any combination thereof.

2. This is a reference to the description of the corrective action. The sheet number will be preceded by "M" if any corrective A, B, C, or D is used and by "J" if action "E" is used. Only one sheet number will be referenced. (i.e. If the corrective action involves both A and E an "M" will only be used and all corrective action will be described on that sheet.)

3. The design project is responsible for the assignment of the responsible organization for the corrective actions. The responsible organization is then responsible for the modification or justification description.

APPENDIX R
UNIT 3

REACTOR BUILDING
PROCESS VARIABLE
INSTRUMENTATION

BROWNS FERRY NUCLEAR PLANT

| | | |
|---|---|---|
| Date 5-27-91<br>6-[illegible] | Prep D.O. Walker<br>Review [illegible] | DFN-II-RB-PVI-3<br>Sheet 1 R0 |

This equipment and its associated cables are not required by the final functional criteria.

Therefore, no further consideration is required.

APPENDIX R

CORRECTIVE ACTION

PREPARED: D. A. Walker

REVIEWED: T. N. Barkalow

DATE: 6/2/82

To meet the requirements of Appendix R, cables ES3912-II, ES3795, ES3796, ES3913, ES3914, ES1400-I, ES1293, ES1401, ES1294, and ES1402 will be rerouted in conduit as necessary to provide the required separation between the control bay and cabling to water chillers A and B. Cables ES1240-I and ES3740-II will be rerouted in conduit as necessary to provide the required separation between the control bay and cabling to water chillers 3A and 3B.

APPENDIX R

CORRECTIVE ACTION

PREPARED: J. A. King

REVIEWED: Wyder Boons

DATE: 6-17-82

| | LITS-3-46B | LI-3-46B | PX-3-61 | PT-3-61 | PI-3-61 | LM-3-60 | XS-3-53 | TE-64-55F | TM-64-55A | TIS-64-55 | XS-64-55A | See Companion Drawing(s) Sheet Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LITS-3-46A | NI | NI | | | | | | | | | | |
| LI-3-46A | NI | NI | | | | | | | | | | |
| PX-3-207 | | | NI | NI | NI | NI | NI | | | | | |
| PT-3-207 | | | NI | NI | NI | NI | NI | | | | | |
| PI-3-207 | | | NI | NI | NI | NI | NI | | | | | |
| LM-3-206 | | | NI | NI | NI | NI | NI | | | | | |
| TE-64-55E | | | | | | | | NI | NI | NI | NI | |
| TM-64-55B | | | | | | | | NI | NI | NI | NI | |
| TI-64-55A | | | | | | | | NI | NI | NI | NI | |
| XS-64-55B | | | | | | | | NI | NI | NI | NI | |
| XS-64-55C | | | | | | | | NI | NI | NI | NI | |

SYMBOLS:
⊠ ---- Interaction Not Considered
NI ---- No Interaction

APPENDIX R
UNIT 1
TURBINE BUILDING PROCESS VARIABLE INSTRUMENTATION
BROWNS FERRY NUCLEAR PLANT
Date [illegible] | [illegible] | [illegible]-IT-TB-PVI-1 Sheet 0 R0

| | LITS-3-46B | LI-3-46B | PX-3-61 | PT-3-61 | PI-3-61 | LM-3-60 | XS-3-53 | TE-64-55F | TM-64-55A | TIS-64-55 | XS-64-55A | See Companion Drawing(s) Sheet Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LITS-3-46A | NI | NI | | | | | | | | | | |
| LI-3-46A | NI | NI | | | | | | | | | | |
| PX-3-207 | | | NI | NI | NI | NI | NI | | | | | |
| PT-3-207 | | | NI | NI | NI | NI | NI | | | | | |
| PI-3-207 | | | NI | NI | NI | NI | NI | | | | | |
| LM-3-206 | | | NI | NI | NI | NI | NI | | | | | |
| TE-64-55E | | | | | | | | NI | NI | NI | NI | |
| TM-64-55B | | | | | | | | NI | NI | NI | NI | |
| TI-64-55A | | | | | | | | NI | NI | NI | NI | |
| XS-64-55B | | | | | | | | NI | NI | NI | NI | |
| XS-64-55C | | | | | | | | NI | NI | NI | NI | |

SYMBOLS:
#---- Interaction Not Considered
NI---- No Interaction

APPENDIX R
UNIT 2

TURBINE BUILDING
PROCESS VARIABLE
INSTRUMENTATION

BROWNS FERRY NUCLEAR PLANT

| | | |
|---|---|---|
| Date: 5-17-85 | Drawn: [illegible] | BFN-II-TB-PVI-2 |
| [illegible] | Revised: [illegible] | Sheet 0 RO |

| | LITS-3-46B | LI-3-46B | PX-3-61 | PT-3-61 | PI-3-61 | LM-3-60 | XS-3-53 | TE-64-55F | TM-64-55A | TIS-64-55 | XS-64-55A | See Companion Drawing & Sheet Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LITS-3-46A | NI | NI | | | | | | | | | | |
| LI-3-46A | NI | NI | | | | | | | | | | |
| PX-3-207 | | | NI | NI | NI | NI | NI | | | | | |
| PT-3-207 | | | NI | NI | NI | NI | NI | | | | | |
| PI-3-207 | | | NI | NI | NI | NI | NI | | | | | |
| LM-3-206 | | | NI | NI | NI | NI | NI | | | | | |
| TE-64-55E | | | | | | | | NI | NI | NI | NI | |
| TM-64-55B | | | | | | | | NI | NI | NI | NI | |
| TI-64-55A | | | | | | | | NI | NI | NI | NI | |
| XS-64-55B | | | | | | | | NI | NI | NI | NI | |
| XS-64-55C | | | | | | | | NI | NI | NI | NI | |

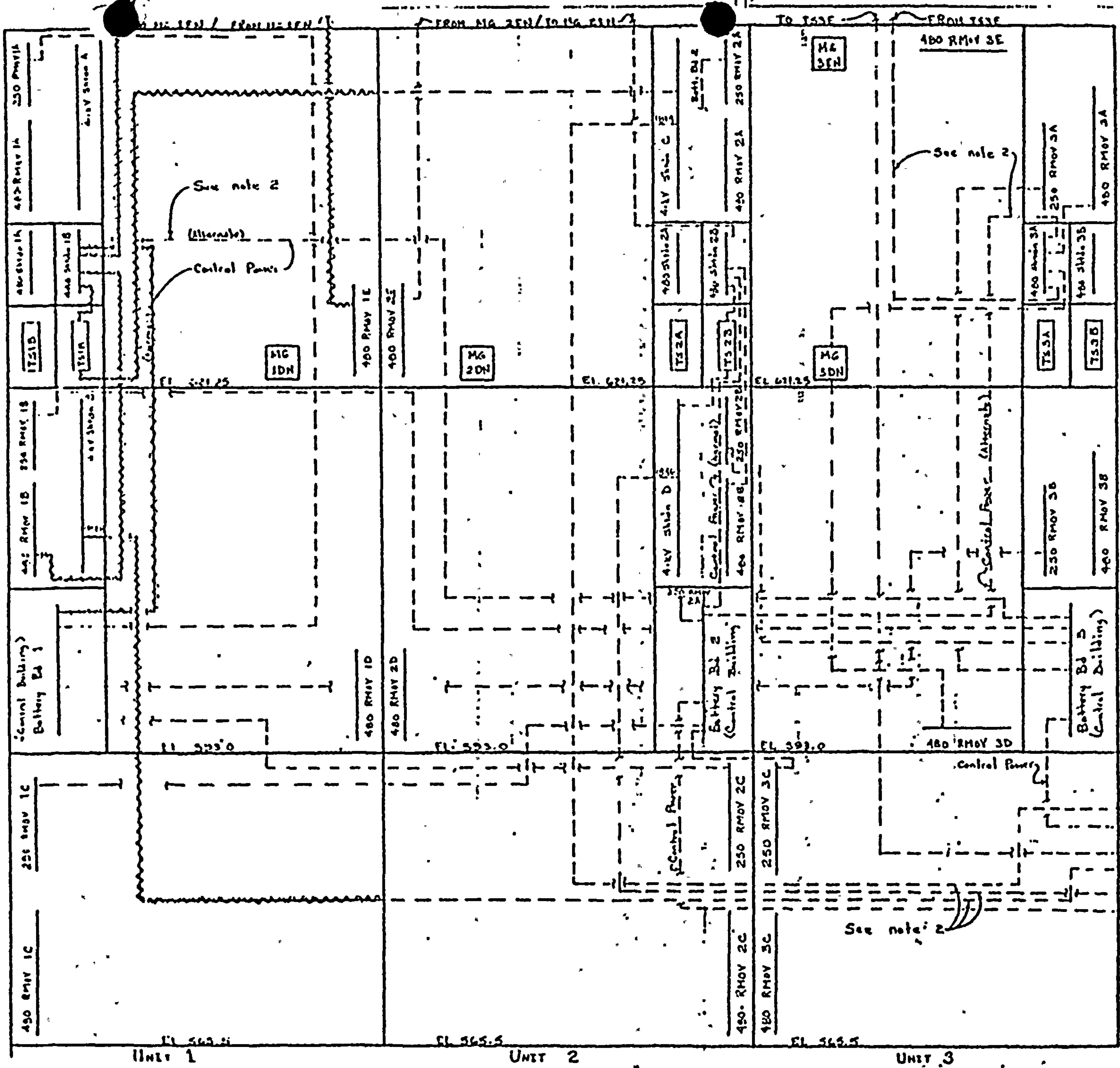
SYMBOLS:
⊠---- Interaction Not Considered
NI---- No Interaction

APPENDIX R
UNIT 3

TURBINE BUILDING
PROCESS VARIABLE
INSTRUMENTATION

BROWNS FERRY NUCLEAR PLANT

Date 5-19-[illegible] [illegible] | [illegible] | BFN IT-TB-PVI-3 Sheet 0 R0




NOTES:

1. Conduits shown with fire barriers are the corrective actions required to ensure adequate power is available for a fire in unit one reactor building.

2. If normal shutdown path is lost, manual action is required to align this connection for the assumed shutdown path.

SYMBOLS:

~~~~ ----- Conduit with Fire Barrier

--- ----- Cable

APPENDIX R
UNIT 1 FIRE

REACTOR BUILDING AUXILIARY POWER SYSTEM

BROWNS FERRY NUCLEAR PLANT

| | | |
|---|---|---|
| DATE: 6-2-82 | Prep: O.C. Jolly<br>Approved: C.V. Dutchaker | BFN-IT-RB APS-1<br>Sheet 0 R0 |
~~~~

Manual transfers in conjunction with wrapping of conduits shown symbolically on BFN-IT-RB-APS-1 and listed below to provide a one-hour fire-rated barrier within the unit 1 reactor building to ensure adequate power is available to supply electrical boards required for shutdown equipment in the event of a unit 1 reactor building fire.

Conduits: 1ES3930-II
1ES3925-II
PP629-II
1PL451-II
*1B92-IE
PP465-IB
PP466-IB

*This conduit number is subject to change dependent on rerouting from cable tray system.

APPENDIX R

CORRECTIVE ACTION

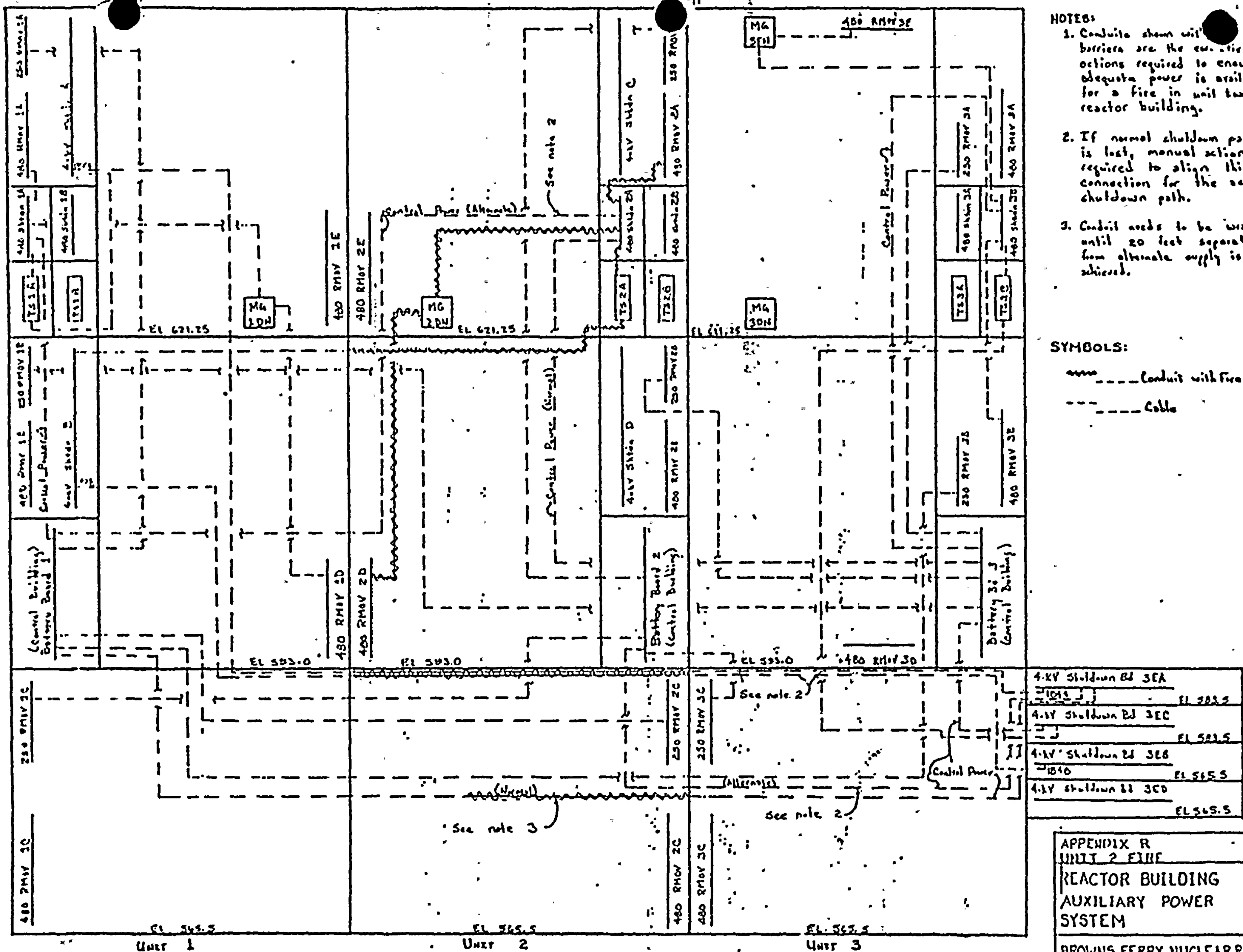
PREPARED: T.E. Barnett, Jr.

REVIEWED: D. P. Leckie

DATE: 6/18/82



BFN-IT-RB-APS-1-M1




NOTES:

1. Conduits shown with barriers are the corrective actions required to ensure adequate power is available for a fire in unit two reactor building.
2. If normal shutdown path is lost, manual action is required to align this connection for the assumed shutdown path.
3. Conduit needs to be wrapped until 20 feet separation from alternate supply is achieved.

SYMBOLS:

~~~~---- Conduit with Fire Barrier

------- Cable

APPENDIX R
UNIT 2 FIRE

REACTOR BUILDING
AUXILIARY POWER
SYSTEM

BROWNS FERRY NUCLEAR PLANT

Date: 6-5-92 | Prep: [signature] Reviewed: [signature] | BFN-2T-RB-APS-2 Sheet 0 R0
~~~~

Manual transfers in conjunction with wrapping of conduits shown symbolically on BFN-IT-RB-APS-2 and listed below to provide a one-hour fire-rated barrier within the unit 2 reactor building to ensure adequate power is available to supply electrical boards required for shutdown equipment in the event of a unit 2 reactor building fire.

Conduits:
PP465-IB
PP466-IB
PP459-IA
PP460-IA
**3B180-IE
2ES310-I
*PP633-I
2ES320-I
2PL450-I

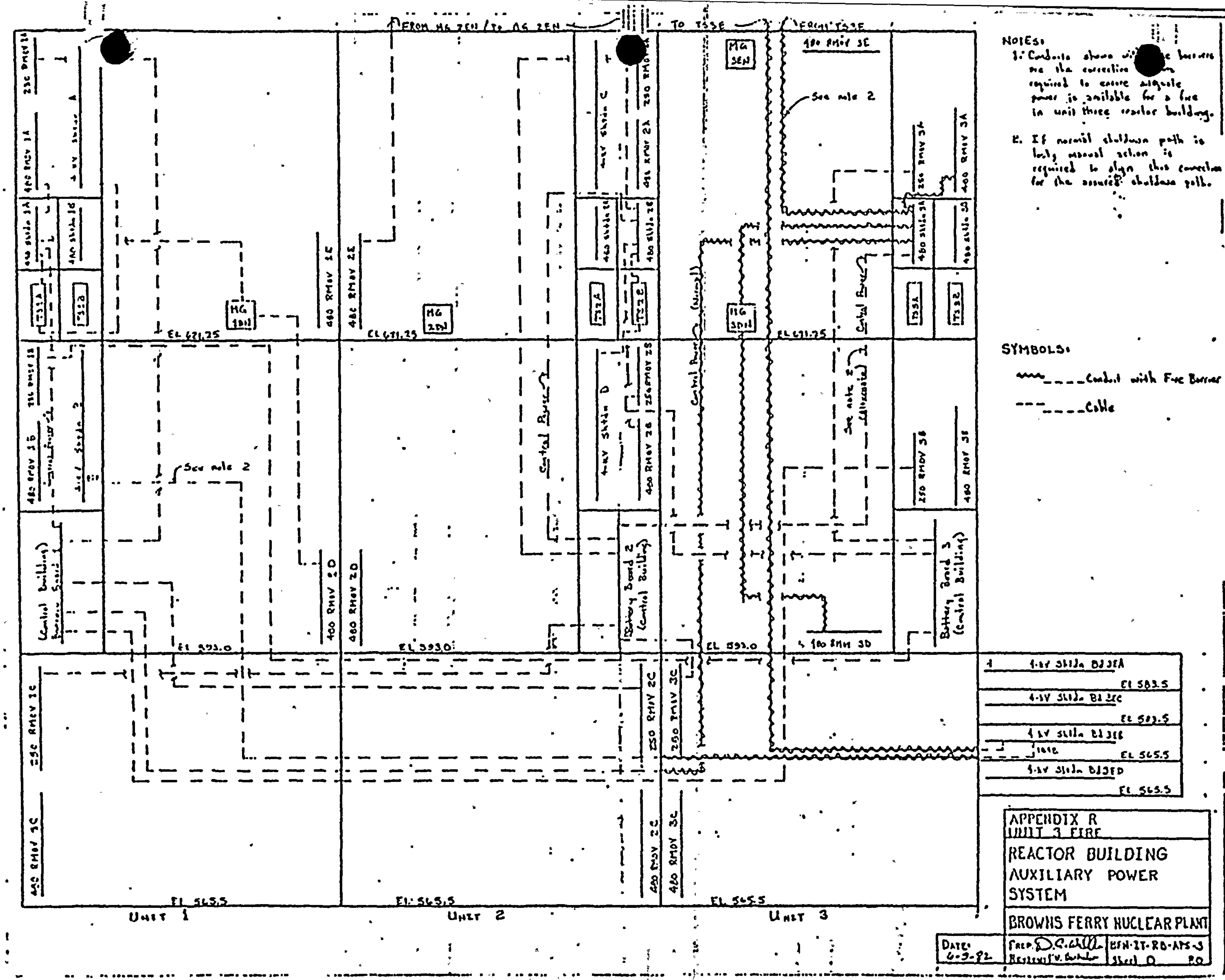
*This conduit number is subject to change dependent on rerouting from cable tray system.

**This conduit only has to be wrapped until it attains a 20-foot separation distance from the alternate control power feeder to 4-kV shutdown board 3EA.

APPENDIX R

CORRECTIVE ACTION

PREPARED: T. E. Barnett, Jr.
REVIEWED: D. A. Geckie
DATE: 6/10/82


FROM MG 2EN / TO MG 2EN
TO TS3E
FROM TS3E
NOTES:
SYMBOLS:
Conduit with Fire Barrier
Cable
See note 2
EL 621.25
EL 593.0
EL 565.5
Unit 1
Unit 2
Unit 3
APPENDIX R
UNIT 3 FIRE
REACTOR BUILDING
AUXILIARY POWER
SYSTEM
BROWNS FERRY NUCLEAR PLANT
DATE:
6-9-82

Manual transfers in conjunction with wrapping of conduits shown symbolically on BFN-IT-RB-APS-3 and listed below to provide a one-hour fire-rated barrier within the unit 3 reactor building to ensure adequate power is available to supply electrical boards required for shutdown equipment in the event of a unit 3 reactor building fire.

Conduits: *3B88-IE
3ES310-I
3ES320-I
3PL450-I
PP465-IB
PP466-IB
PP643-IE
PP644-IE
3PP733-I

*This conduit number is subject to change dependent on rerouting from cable tray system.

APPENDIX R

CORRECTIVE ACTION

PREPARED: T. E. Barnett, Jr.
REVIEWED: D. L. Leckie
DATE: 6/18/82

| | RHRSW Pump A1 | RHRSW Pump A2 | RHRSW Pump C1 | RHRSW Pump C2 | RHRSW Pump B1 | RHRSW Pump B2 | RHRSW Pump D1 | RHRSW Pump D2 | See Companion Drawing Sheet Number |
|---|---|---|---|---|---|---|---|---|---|
| RHRSW Pump A1 | | 1 | 2 | 3 | NI | NI | NI | NI | 1 |
| RHRSW Pump A2 | 1 | | 4 | 5 | NI | NI | NI | NI | 1 |
| RHRSW Pump C1 | 2 | 4 | | 6 | NI | NI | NI | NI | 1 |
| RHRSW Pump C2 | 3 | 5 | 6 | | NI | NI | NI | NI | 1 |
| RHRSW Pump B1 | NI | NI | NI | NI | | NI | 7 | NI | 1 |
| RHRSW Pump B2 | NI | NI | NI | NI | NI | | NI | 8 | 1 |
| RHRSW Pump D1 | NI | NI | NI | NI | 7 | NI | | NI | 1 |
| RHRSW Pump D2 | NI | NI | NI | NI | NI | 8 | NI | | 1 |

SYMBOLS:

▩ ..... Interaction Not Considered

NI ..... No Interaction

APPENDIX R
UNITS 1:3

REACTOR BUILDING
DECAY HEAT REMOVAL
RHRSW SYSTEM

BROWNS FERRY NUCLEAR PLANT

| | | |
|---|---|---|
| DATE: 6-9-82<br>6-14-82 | [illegible] | BFN-3T-RB-RHRSW<br>Sheet 0 R0 |

| IT NUMBER | EQUIPMENT INVOLVED | CABLES INVOLVED | CABLE ROUTING SHEET NUMBER | OF INTERACTION | CORRECTIVE ACTION ① | SEE SHEET NUMBER ② | RESPONSIBLE ORGANIZATION ③ PREPARER REVIEWER |
|---|---|---|---|---|---|---|---|
| 1 | RHRSW Pump A1 | E575-I, E579-I | SET 17 | Cable Tray | E | M1 | Org: NEB Date: 6-9-82 Prep: D.A. Walker Review: T.V. [illegible] |
| | RHRSW Pump A2 | E588-I, E592-I | Sheets 1,8 | Cable Tray | | | |
| 2 | RHRSW Pump A1 | E575-I | SET 17 | Cable Tray | E | M1 | Org: NEB Date: 6-9-82 Prep: D.A. Walker Review: T.V. [illegible] |
| | RHRSW Pump C1 | E5100-I, E5104-I | Sheets 1,8 | Cable Tray | | | |
| 3 | RHRSW Pump A1 | E575-I | SET 17 | Cable Tray | A, E | M1 | Org: NEB Date: 6-9-82 Prep: D.A. Walker Review: T.V. [illegible] |
| | RHRSW Pump C2 | E5113-I, E5117-I | Sheets 1,8 | Cable Tray | | | |
| 4 | RHRSW Pump A2 | E588-I | SET 17 | Cable Tray | E | M1 | Org: NEB Date: 6-9-82 Prep: D.A. Walker Review: T.V. [illegible] |
| | RHRSW Pump C1 | E5100-I, E5104-I | Sheets 1,8 | Cable Tray | | | |
| 5 | RHRSW Pump A2 | E588-I | SET 17 | Cable Tray | A, E | M1 | Org: NEB Date: 6-9-82 Prep: D.A. Walker Review: T.V. [illegible] |
| | RHRSW Pump C2 | E5113-I, E5117-I | Sheets 1,8 | Cable Tray | | | |
| 6 | RHRSW Pump C1 | E5100-I, E5104-I | SET 17 | Cable Tray | A, E | M1 | Org: NEB Date: 6-9-82 Prep: D.A. Walker Review: T.V. [illegible] |
| | RHRSW Pump C2 | E5113-I, E5117-I | Sheets 1,8 | Cable Tray | | | |
| 7 | RHRSW Pump B1 | 3ES4080-II | SET 17 | Conduit | E | M1 | Org: NEB Date: 6-9-82 Prep: D.A. Walker Review: T.V. [illegible] |
| | RHRSW Pump D1 | 3ES4090-II | Sheet | Conduit | | | |
| 8 | RHRSW Pump B2 | ES2588-II | SET 17 | Cable Tray | E | M1 | Org: NEB Date: 6-9-82 Prep: D.A. Walker Review: T.V. [illegible] |
| | RHRSW Pump D2 | ES2613-II | Sheet 2 | Cable Tray | | | |
| | | | | | | | Org: Date: Prep: Review: |
| | | | | | | | Org: Date: Prep: Review: |
| | | | | | | | Org: Date: Prep: Review: |
| | | | | | | | Org: Date: Prep: Review: |
| | | | | | | | Org: Date: Prep: Review: |
| | | | | | | | Org: Date: Prep: Review: |
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| | | | | | | | Org: Date: Prep: Review: |
| | | | | | | | Org: Date: Prep: Review: |
| | | | | | | | Org: Date: Prep: Review: |

NOTES:

1. The corrective action to be taken for the interactions are generalized in the following manner:

   A. Reroute Involved Cable(s)

   B. Provide Fire Barrier

   C. Circuit Modification

   D. Provide Fire Suppression

   E. Analysis.

   The corrective actions can be any of the above actions or any combination thereof.

2. This is a reference to the description of the corrective action. The sheet number will be preceded by "M" if any corrective A, B, C, or D is used and by "J" if action "E" is used. Only one sheet number will be referenced. (i.e. If the corrective action involves both A and E an "M" will only be used and all corrective actions will be described on that sheet.)

3. The design project is responsible for the assignment of the responsible organization for the corrective actions. The responsible organization is then responsible for the modification or justification description.

APPENDIX R
UNITS 1-3
REACTOR BUILDING
DECAY HEAT REMOVAL
RHRSW SYSTEM

BROWNS FERRY NUCLEAR PLANT

| | | |
|---|---|---|
| Date: 6-9-82 6-9-82 | Prep: D.A. Walker Review: [illegible] | BFN II-RB-RHRSW-0 Sheet 1 R0 |

Section II.B.5.b.(1) of the Functional Criteria requires that one RHRSW pump be operable for each RHR pump. In the RB, three separate RHR pumps are being relied upon (i.e. 1B, 2D, 3C for unit 1 fire; 1A, 2C, 3B for unit 2 fire; and 1A, 2D, 3C for unit 3 fire). Sheet 0 indicates this criteria could only be defeated where A and C RHRSW pumps have interactions.

Therefore, by rerouting cables for the RHRSW Pump C2 (ES113-I and ES117-I) to meet Appendix R separation requirements in the RB fire area, the criteria will be met.

APPENDIX R

CORRECTIVE ACTION

PREPARED: D. A. Waller

REVIEWED: T. W. Barkalow

DATE: 6/14/82

BFN-IT-RB-RHRSW-0-M1

| | RHRSW Pump A1 | RHRSW Pump A2 | RHRSW Pump C1 | RHRSW Pump C2 | RHRSW Pump B1 | RHRSW Pump B2 | RHRSW Pump D1 | RHRSW Pump D2 | See Companion Drawing Sheet Number |
|---|---|---|---|---|---|---|---|---|---|
| RHRSW Pump A1 | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| RHRSW Pump A2 | 1 | | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| RHRSW Pump C1 | 1 | 1 | | 1 | 1 | 1 | 1 | 1 | 1 |
| RHRSW Pump C2 | 1 | 1 | 1 | | 1 | 1 | 1 | 1 | 1 |
| RHRSW Pump B1 | 1 | 1 | 1 | 1 | | 1 | 1 | 1 | 1 |
| RHRSW Pump B2 | 1 | 1 | 1 | 1 | 1 | | 1 | 1 | 1 |
| RHRSW Pump D1 | 1 | 1 | 1 | 1 | 1 | 1 | | 1 | 1 |
| RHRSW Pump D2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | 1 |

SYMBOLS:

⊠ ---- Intersection Not Considered

NI ---- No Intersection

APPENDIX R
UNITS 1-3

TURBINE BUILDING
DECAY HEAT REMOVAL
RHRSW SYSTEM

BROWNS FERRY NUCLEAR PLANT

| | | |
|---|---|---|
| DATE: 6-9-82<br>6-14-82 | PREP'D: [illegible]<br>REVIEWED: [illegible] | BFN-IT-TB-RHRSW<br>Sheet 0 R0 |

| IT NUMBER | EQUIPMENT INVOLVED | CABLES INVOLVED | CABLE ROUTING SHEET NUMBER | TYPE OF INTERACTION | CORRECTIVE ACTION ① | SEE SHEET NUMBER ② | RESPONSIBLE ORGANIZATION PREPARER REVIEWER ③ |
|---|---|---|---|---|---|---|---|
| 1 | RHRSW Pump A1<br>RHRSW Pump A2 | ES75-I<br>ES88-I | SET 17<br>Sheet 4 | Conduit | B | M1 | Org: EEB Date: 6-9-82<br>Prep: [illegible]<br>Review: [illegible] |
| 1 | RHRSW Pump C1<br>RHRSW Pump C2 | ES100-I<br>ES113-I | SET 17<br>sheet 4 | Conduit | B | M1 | Org: EEB Date: 6-9-82<br>Prep: [illegible]<br>Review: [illegible] |
| 1 | RHRSW Pump B1<br>RHRSW Pump B2 | 3ES4080-II<br>ES2588-II | SET 17<br>sheet 4 | Cable Tray | B | M1 | Org: EEB Date: 6-9-82<br>Prep: [illegible]<br>Review: [illegible] |
| 1 | RHRSW Pump D1<br>RHRSW Pump D2 | 3ES4090-II<br>ES2613-II | SET 17<br>sheet 4 | Cable Tray | B | M1 | Org: EEB Date: 6-9-82<br>Prep: [illegible]<br>Review: [illegible] |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |
| | | | | | | | Org: Date:<br>Prep:<br>Review: |

NOTES:

1. The corrective action to be taken for the interactions are generalized in the following manner:

   A. Reroute Involved Cable(s)

   B. Provide Fire Barrier

   C. Circuit Modification

   D. Provide Fire Suppression

   E. Analysis.

   The corrective actions can be any of the above actions or any combination thereof.

2. This is a reference to the description of the corrective action. The sheet number will be preceded by "M" if any corrective A, B, C, or D is used and by "J" if action "E" is used. Only one sheet number will be referenced. (i.e. If the corrective action involves both A and E an "M" will only be used and all corrective actions will be described on that sheet.)

3. The design project is responsible for the assignment of the responsible organization for the corrective action. The responsible organization is then responsible for the modification or justification description.

APPENDIX R
UNITS 1-3

TURBINE BUILDING
DECAY HEAT REMOVAL
RHRSW SYSTEM

BROWNS FERRY NUCLEAR PLANT

| | | |
|---|---|---|
| Date: 6-9-82<br>6-10-82 | Prep: [illegible]<br>Review: [illegible] | BFN-II-TB-RHRSW-0<br>Sheet 1 B |

The Drywell Control Air System will be modified to provide a means of a longterm air supply to the S/R valves. This modification is in the design study stage due to previous safety concerns.

APPENDIX R

CORRECTIVE ACTION

PREPARED: D. A. Walker

REVIEWED: T. W. Barkalow

DATE: 6/14/82

## 3.0 SAFE SHUTDOWN ANALYSIS RESULTS FOR THE SHUTDOWN BOARD ROOM, BATTERY BOARD ROOM, AND CONTROL BUILDING FIRE AREAS

Each Shutdown Board Room (SBR), Battery Board Room (BBR), and the Control Building are considered as separate fire areas in the Functional Criteria (FC). Each of the areas has been analyzed to ensure a minimum amount of equipment will remain available for the fire areas defined in the FC. The results are indicated in the attached tables with corrective actions identified where deficiencies were found. The following criteria was used in the analysis for the respective areas.

### 3.1 SBRs and BBRs

Each piece of equipment was reviewed to determine the affects a fire would have on the function of the equipment for that specific fire area. The following abbreviations were used to indicate the effects on the equipment:

EFD - Equipment Function Defeated - The required function of the equipment for that specific fire area cannot be accomplished.

NPS - Normal Power Supply Lost - One of the normal power supplies (e.g. logic power, control power, equipment power) required for the equipment to perform its function for that specific fire area is affected. However, a manual transfer to an alternate power supply is available.

Once all effects were identified, each piece of equipment was then reviewed to see if the FC was met with the following additional considerations for the RHR system:

The RHR system requirements are satisfied provided the flow path integrity for each RHR system in use (see table) is assured.

SBRs RHR Pump Operation

| SBR | Unit 1 | Unit | Unit 3 |
|---|---|---|---|
| A1 | B,D | C | B,D |
| A2 | B,D | C | B,D |
| B | A | B | B,D |
| C1 | D | A,C | A,C |
| C2 | A,C | D | A,C |
| D | B | A | C,B,D |
| E1 | A,C | B,D | A,C,B |
| E2 | A,C | B,D | B,D |
| F | A,C | C | A |
| 3EA | A,C | B,D | C,B,D |
| 3EB | A,C | B,D | A,B,D |
| 3EC | A,C | B,D | A,C,D |
| 3ED | A,C | B,D | A,C,B |

3.2 CB

If adequate back-up control isolation (BCI) from the CB fire area is provided for the equipment required, the FC is met.

3.3 The type of corrective actions required to provide BCI or meet the functional criteria are coded as follows:

a. Reroute involved cable(s).
b. Provide fire barrier.
c. Circuit modification.
d. Provide fire suppression.
e. Analyze.

The corrective actions sheets correspond to identified interactions from the tables.

SBRs, BBRs, and CB Analysis 1 - 14 APR-SBR-BBR-CB-0

Reactor Coolant System Integrity

DJW May 27, 1982

MC 5/27/82

| | | Shutdown Board Rooms | | | | | | | | | | | | | Batt. Bd. Rms. | | | BCT | Is Criteria Met | | | Corrective Action | | | See | Sht. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EQUIPMENT | UNIT | A1 | A2 | B | C1 | C2 | D | E1 | E2 | F | 3EA | 3EB | 3EC | 3ED | 1 | 2 | 3 | Adeq. | SBR | BBR | CB | SBR | BBR | CR | ORG | No. |
| | 1 | | | | | | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| FCV-69-16 | 2 | | | | | | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | 3 | | | | | | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | 1 | | | | | | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| FCV-69-17 | 2 | | | | | | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | 3 | | | | | | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | 1 | NPS | EFD | | | | | | | | | | | | | | | N/A | Yes | Yes | Yes | | | | | |
| FCV-69-1 | 2 | | | NPS | | EFD | | | | | | | | | | | | N/A | Yes | Yes | Yes | | | | | |
| | 3 | | | | | | | | EFD | | NPS | | | | | | | N/A | Yes | Yes | Yes | | | | | |
| | 1 | | | EFD | | | | | | | | | | | | | NPS | N/A | Yes | Yes | Yes | | | | | |
| FCV-69-2 | 2 | | | | | | EFD | | | | | | | | | | NPS | N/A | Yes | Yes | Yes | | | | | |
| | 3 | | | | | | | | | EFD | | | | | NPS | | | N/A | Yes | Yes | Yes | | | | | |
| | 1 | | | EFD | | | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| FCV-74-47 | 2 | | | | | | EFD | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | 3 | | | | | | | | | EFD | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | 1 | | EFD | | | | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| FCV-74-48 | 2 | | | | | EFD | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | 3 | | | | | | | | EFD | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | 1 | | EFD | | | | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| FCV-1-55 | 2 | | | | | EFD | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | 3 | | | | | | | | EFD | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | 1 | | | EFD | | | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| FCV-1-56 | 2 | | | | | | EFD | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | 3 | | | | | | | | | EFD | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | 1 | EFD | | | | | | | | | | | | | | | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| FCV-3-98 | 2 | | | | EFD | | | | | | | | | | | | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| | 3 | | | | | | | EFD | | | | | | | | | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| | 1 | EFD | | | | | | | | | | | | | | | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| FCV-3-99 | 2 | | | | EFD | | | | | | | | | | | | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| | 3 | | | | | | | EFD | | | | | | | | | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| | 1 | EFD | | | | | | | | | | | | | | | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| FCV-1-14 | 2 | | | | EFD | | | | | | | | | | | | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| | 3 | | | | | | | EFD | | | | | | | | | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| | 1 | EFD | | | | | | | | | | | | | | | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| FCV-1-15 | 2 | | | | EFD | | | | | | | | | | | | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| | 3 | | | | | | | EFD | | | | | | | | | | Yes | No | Yes | Yes | A | | | EEB | M1 |

SBRs, BBRs, and CB Analysis ... 2 ... 14 ... APR-SBR-BBR-CB-0

Reactor Coolant System Integrity

DJW May 27, 1982

MP 5/27/82

| EQUIPMENT | UNIT | Shutdown Board Rooms A1 | A2 | B | C1 | C2 | D | E1 | E2 | F | 3EA | 3EB | 3EC | 3ED | Batt. Bd. Rms. 1 | 2 | 3 | OCI Adeq. | Is Criteria Met SBR | BBR | CB | Corrective Action SBR | BBR | CB | Sec ORG | Sht No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | EED | | | | | | | | | | | | | | | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| FCV-1-26 | 2 | | | | EED | | | | | | | | | | | | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| | 3 | | | | | | | EED | | | | | | | | | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| | 1 | EED | | | | | | | | | | | | | | | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| FCV-1-27 | 2 | | | | EED | | | | | | | | | | | | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| | 3 | | | | | | | EED | | | | | | | | | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| | 1 | EED | | | | | | | | | | | | | | | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| FCV-1-37 | 2 | | | | EED | | | | | | | | | | | | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| | 3 | | | | | | | EED | | | | | | | | | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| | 1 | EED | | | | | | | | | | | | | | | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| FCV-1-38 | 2 | | | | EED | | | | | | | | | | | | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| | 3 | | | | | | | EED | | | | | | | | | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| | 1 | EED | | | | | | | | | | | | | | | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| FCV-1-51 | 2 | | | | EED | | | | | | | | | | | | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| | 3 | | | | | | | EED | | | | | | | | | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| | 1 | EED | | | | | | | | | | | | | | | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| FCV-1-52 | 2 | | | | EED | | | | | | | | | | | | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| | 3 | | | | | | | EED | | | | | | | | | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| | 1 | EED | | | | | | | | | | | | | | | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| FCV-43-13 | 2 | | | | EED | | | | | | | | | | | | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| | 3 | | | | | | | EED | | | | | | | | | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| | 1 | EED | | | | | | | | | | | | | | | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| FCV-43-14 | 2 | | | | EED | | | | | | | | | | | | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| | 3 | | | | | | | EED | | | | | | | | | | Yes | No | Yes | Yes | A | | | EEB | M1 |

SBRs, BBRs, and CB Analysis 3 of 14 APR-SBR-BBR-CB-0

RPY - Water Inventory Control

DAW May 27, 1982

CP 5/27/82

| EQUIPMENT | UNIT | Shutdown Board Rooms A1 | A2 | B | C1 | C2 | D | E1 | E2 | F | 3EA | 3EB | 3EC | 3ED | Batt. Bd. Rms. 1 | 2 | 3 | UCI Adeq | Is Criteria Met SBR | BBR | CB | Corrective Action SBR | BBR | CB | Res ORG | Sht. No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PCY-1-4 | 1 | EFD | EFD | | | | | | | | | | | | MPS | | | No | No | Yes | No | A | | C | EEB | M1 |
| | 2 | | | | EFD | EFD | | | | | | | | | | MPS | | No | No | Yes | No | A | | C | EEB | M1 |
| | 3 | | | | | | | EFD | EFD | | | | | | | | MPS | No | No | Yes | No | A | | C | EEB | M1 |
| PCY-1-18 | 1 | EFD | | EFD | | | | | | | | | | | | | MPS | No | No | Yes | No | A | | C | EEB | M1 |
| | 2 | | | | EFD | | EFD | | | | | | | | | | MPS | No | No | Yes | No | A | | C | EEB | M1 |
| | 3 | | | | | | | EFD | | EFD | | | | | MPS | | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| PCY-1-23 | 1 | EFD | | | | | | | | | | | | | | MPS | | No | No | Yes | No | A | | C | EEB | M1 |
| | 2 | | | | EFD | | | | | | | | | | MPS | | | No | No | Yes | No | A | | C | EEB | M1 |
| | 3 | | | | | | | EFD | | | | | | | | MPS | | No | No | Yes | No | A | | C | EEB | M1 |
| PCY-1-11 | 1 | EFD | EFD | | | | | | | | | | | | MPS | | | No | No | Yes | No | A | | C | EEB | M1 |
| | 2 | | | | EFD | EFD | | | | | | | | | | MPS | | No | No | Yes | No | A | | C | EEB | M1 |
| | 3 | | | | | | | EFD | | | | | | | | | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| PCY-1-12 | 1 | EFD | | EFD | | | | | | | | | | | | | MPS | No | No | Yes | No | A | | C | EEB | M1 |
| | 2 | | | | EFD | | EFD | | | | | | | | | | MPS | No | No | Yes | No | A | | C | EEB | M1 |
| | 3 | | | | | | | EFD | | EFD | | | | | MPS | | | No | No | Yes | No | A | | C | EEB | M1 |
| PCY-1-179 | 1 | EFD | | EFD | | | | | | | | | | | | | MPS | No | No | Yes | No | A | | C | EEB | M1 |
| | 2 | | | | EFD | | EFD | | | | | | | | | | MPS | No | No | Yes | No | A | | C | EEB | M1 |
| | 3 | | | | | | | EFD | | EFD | | | | | MPS | | | No | No | Yes | No | A | | C | EEB | M1 |
| PCY-1-100 | 1 | EFD | | | | | | | | | | | | | | MPS | | No | No | Yes | No | A | | C | EEB | M1 |
| | 2 | | | | EFD | | | | | | | | | | MPS | | | No | No | Yes | No | A | | C | EEB | M1 |
| | 3 | | | | | | | EFD | EFD | | | | | | | | MPS | No | No | Yes | No | A | | C | EEB | M1 |
| PCY-1-5 | 1 | EFD | | | | | | | | | | | | | | MPS | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| | 2 | | | | EFD | | | | | | | | | | MPS | | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| | 3 | | | | | | | EFD | | | | | | | | MPS | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| PCY-1-19 | 1 | EFD | | EFD | | | | | | | | | | | | | MPS | Yes | No | Yes | Yes | A | | | EEB | M1 |
| | 2 | | | | EFD | | EFD | | | | | | | | | | MPS | Yes | No | Yes | Yes | A | | | EEB | M1 |
| | 3 | | | | | | | EFD | | EFD | | | | | MPS | | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| PCY-1-22 | 1 | EFD | | | | | | | | | | | | | | | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| | 2 | | | | EFD | | | | | | | | | | | | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| | 3 | | | | | | | EFD | | | | | | | | | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| PCY-1-30 | 1 | EFD | | | | | | | | | | | | | | | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| | 2 | | | | EFD | | | | | | | | | | | | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| | 3 | | | | | | | EFD | EFD | | | | | | | | MPS | No | No | Yes | No | A | | C | EEB | M1 |
| PCY-1-31 | 1 | EFD | | EFD | | | | | | | | | | | | | MPS | Yes | No | Yes | Yes | A | | | EEB | M1 |
| | 2 | | | | EFD | | EFD | | | | | | | | | | MPS | Yes | No | Yes | Yes | A | | | EEB | M1 |
| | 3 | | | | | | | EFD | | EFD | | | | | MPS | | | No | No | Yes | No | A | | C | EEB | M1 |

SBRs, BBRs, and CB Analysis 4 14 APR-SBR-BBR-CB-0

RPV Water Inventory Control

DAW May 27, 1982

MC 5/27/83

| EQUIPMENT | UNIT | Shutdown Board Rooms A1 | A2 | B | C1 | C2 | D | E1 | E2 | F | 3EA | 3EB | 3EC | 3ED | Batt. Bd. Rms. 1 | 2 | 3 | UCT Adeq | Is C SBR | Unit BBR | Met CB | Corrective SBR | Corrective BBR | Action CB | Sec ORG | Sht. No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FCV-1-31 | 1 | EED | | | | | | | | | | | | | | NPS | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| | 2 | | | | EED | | | | | | | | | | NPS | | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| | 3 | | | | | | | EED | | | | | | | | NPS | | Yes | No | Yes | Yes | A | | | EEB | M1 |
| RHR Pump A | 1 | EED | EED | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 2 | EED | EED | | | EED | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | 3 | | | | | | | | EED | | EED | | | | NPS | | | Yes | Yes | Yes | Yes | | | | | |
| RHR Pump C | 1 | | EED | EED | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 2 | | | EED | | EED | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | 3 | | | | | | | | EED | | | EED | | | | | | Yes | Yes | Yes | Yes | | | | | |
| FCV-74-1 | 1 | | EED | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 2 | | | | | EED | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | 3 | | | | | | | | EED | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| FCV-74-2 | 1 | | EED | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 2 | | | | | EED | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | 3 | | | | | | | | EFD | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| FCV-74-7 | 1 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 2 | | | | | | | | | | | | | | | | | No | Yes | Yes | No | | | C | EEB | M2 |
| | 3 | | | | | | | | | | | | | | | | | No | Yes | Yes | No | | | C | EEB | M2 |
| FCV-74-12 | 1 | | EFD | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 2 | | | | | EED | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | 3 | | | | | | | | EED | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| FCV-74-13 | 1 | | EED | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 2 | | | | | EED | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | 3 | | | | | | | | EED | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| FCV-74-52 | 1 | | EED | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 2 | | | | | EED | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | 3 | | | | | | | | EED | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| FCV-74-53 | 1 | | | EFD | | | | | | | | | | | | | NPS | N/A | No | Yes | N/A | C | | | EEB | M3 |
| | 2 | | | | | | EED | | | | | | | | | | NPS | Yes | No | Yes | Yes | C | | | EEB | M3 |
| | 3 | | | | | | | | | EED | | | | | NPS | | | Yes | No | Yes | Yes | C | | | EEB | M3 |
| FCV-74-60 | 1 | | EED | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 2 | | | | | EED | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | 3 | | | | | | | | EED | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |

SBRs, BBRs, and CB Analysis 5 14 APR-SBR-BBR-CB-0

RPV Water Inventory Control

DLW May 27, 1982

5/27/82

| EQUIPMENT | | UNIT | A1 | A2 | B | C1 | C2 | D | E1 | E2 | F | 3EA | 3EB | 3EC | 3ED | Ball Bd Rms 1 | 2 | 3 | UCI Adeq | Is Criteria Met SBR | BBR | CB | Corrective Action SBR | BBR | CB | Res ORG | Sht No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | | LFD | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| FCV-74-61 | | 2 | | | | | EFD | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | | 3 | | | | | | | | EED | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | | 1 | | LFD | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| FCV-74-57 | | 2 | | | | | LED | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | | 3 | | | | | | | | EED | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | | 1 | | EFD | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| FCV-74-58 | | 2 | | | | | EFD | | | | | | | | | | | | No | Yes | Yes | No | | | C | EEB | M2 |
| | | 3 | | | | | | | | EED | | | | | | | | | No | Yes | Yes | No | | | C | EEB | M2 |
| | | 1 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| FCV-74-59 | | 2 | | | | | | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | | 3 | | | | | | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | | | | | | | | | | | | | | | | | | | N/A | N/A | N/A | N/A | | | | | |
| FCV-74-96 | | 2 | | | EFD | | | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | | 3 | | | | | | EED | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | | | | | | | | | | | | | | | | | | | N/A | N/A | N/A | N/A | | | | | |
| FCV-74-97 | | 2 | | | | | | LFD | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | | 3 | | | | | | | | | EED | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | | | | | | | | | | | | | | | | | | | N/A | N/A | N/A | N/A | | | | | |
| FCV-74-100 | | 2 | | | LFD | | | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | | 3 | | | | | | | | | EED | | | | | | | | Yes | No | Yes | Yes | E | | | MEB | J1 |
| | | 1 | | | LFD | | | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| FCV-74-77 | | 2 | | | | | | LFD | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | | 3 | | | | | | | | | EED | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | | 1 | | EFD | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| FCV-74-78 | | 2 | | | | | EED | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | | 3 | | | | | | | | EFD | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | | 1 | | | LFD | LFD | LED | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| RHR Pump | B | 2 | | | | EFD | LLD | EFD | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | | 3 | | | | | | | | | EFD | | | EFD | | | | NPS | N/A | Yes | Yes | N/A | | | | | |
| | | 1 | | | LFD | | | LLD | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| RHR Pump | D | 2 | | | | | | LLD | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | | 3 | | | | | | | | | EFD | | | | EFD | | NPS | | N/A | Yes | Yes | N/A | | | | | |
| | | 1 | | | LLD | | | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| FCV-74-24 | | 2 | | | | | | LLD | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | | 3 | | | | | | | | | LED | | | | | | | | N/A | Yes | Yes | N/A | | | | | |

SBRs, BBRs, and CB Analysis 6 14 APR-SBR-BBR-CB-0

RPV Water Inventory Control

DAW May 27, 1982

5/27/82

| EQUIPMENT | UNIT | Shutdown Board Rooms A1 | A2 | B | C1 | C2 | D | E1 | E2 | F | 3EA | 3EB | 3EC | 3ED | Batt Bd. Rms. 1 | 2 | 3 | DCI Alig | Is Criteria Met SBB | BBR | CB | Cancel SBB | Yes BBR | Action CB | Sec ORG | Sht No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | | | EFD | | | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| FCV-74-25 | 2 | | | | | | EFD | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 3 | | | | | | | | | EFD | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 1 | | | | | | | | | | | | | | | | | No | Yes | Yes | No | | | C | EER | 112 |
| FCV-74-30 | 2 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 3 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 1 | | | EFD | | | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| FCV-74-35 | 2 | | | | | | EFD | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 3 | | | | | | | | | EFD | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 1 | | | EFD | | | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| FCV-74-36 | 2 | | | | | | EFD | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 3 | | | | | | | | | EFD | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 1 | | | EFD | | | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| FCV-74-66 | 2 | | | | | | EFD | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 3 | | | | | | | | | EFD | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 1 | | EFD | | | | | | | | | | | | HPS | | | Yes | No | Yes | Yes | C | | | EER | 112 |
| FCV-74-67 | 2 | | | | | EFD | | | | | | | | | | HPS | | N/A | No | Yes | N/A | C | | | EER | 112 |
| | 3 | | | | | | | | EFD | | | | | | | | HPS | N/A | No | Yes | N/A | C | | | EER | 112 |
| | 1 | | | EFD | | | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| FCV-74-71 | 2 | | | | | | EFD | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 3 | | | | | | | | | EFD | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 1 | | | EFD | | | | | | | | | | | | | | No | Yes | Yes | No | | | C | EER | 112 |
| FCV-74-72 | 2 | | | | | | EFD | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 3 | | | | | | | | | EFD | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 1 | | | | | | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| FCV-74-73 | 2 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 3 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 1 | | | EFD | | | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| FCV-74-74 | 2 | | | | | | EFD | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 3 | | | | | | | | | EFD | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 1 | | | EFD | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| FCV-74-75 | 2 | | | | | | EFD | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 3 | | | | | | | | | EFD | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 1 | | | EFD | | | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| FCV-74-98 | 2 | | | | | | EFD | | | | | | | | | | | No | Yes | Yes | Yes | | | | | |
| | | | | | | | | | | | | | | | | | | N/A | N/A | N/A | N/A | | | | | |

SBRs, BBRs, and CB Analysis 7.14 APB-SBB-BBB-CB-0

RPV Water Inventory Control

DAW May 27, 1982

5/27/82

| EQUIPMENT | UNIT | Shutdown Board Rooms A1 | A2 | B | C1 | C2 | D | E1 | E2 | F | 3EA | 3EB | 3EC | 3ED | Batt. Bd. Rms. 1 | 2 | 3 | SCI Adeq. | In Criteria SBR | BBB | Met CB | Corrective SBB | BBR | Optim CB | Sec ORG | Sht. No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FCV 74-99 | 1 | | | | | | LFD | | | | | | | | | | | No | Yes | Yes | Yes | | | | | |
| | 2 | | | | | | | | | EFD | | | | | | | | No | Yes | Yes | Yes | | | | | |
| | | | | | | | | | | | | | | | | | | N/A | N/A | N/A | N/A | | | | | |
| FCV 74-101 | 1 | | | EFD | | | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | 2 | | | | | | | | | EFD | | | | | | | | Yes | No | Yes | Yes | C | | | NEC | J1 |
| | | | | | | | | | | | | | | | | | | N/A | N/A | N/A | N/A | | | | | |
| FCV 68-3 | 1 | | | | | | | | | | | | | | | | | No | Yes | Yes | No | | | C | CEC | M2 |
| | 2 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 3 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| FCV 68-79 | 1 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 2 | | | | | | | | | | | | | | | | | No | Yes | Yes | No | | | C | CEC | M2 |
| | 3 | | | | | | | | | | | | | | | | | No | Yes | Yes | No | | | C | CEC | M2 |
| RHR Room Cooler A | 1 | NPS | EFD | | | | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | 2 | | | NPS | | EFD | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | 3 | | | | | | | | EFD | | NPS | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| RHR Room Cooler C | 1 | NPS | EFD | | | | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | 2 | | | NPS | | EFD | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | 3 | | | | | | | | EFD | | NPS | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| RHR Room Cooler B | 1 | | | EFD | NPS | NPS | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | 2 | | | | | | EFD | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | 3 | | | | | | | | | EFD | | | NPS | | | | | Yes | Yes | Yes | Yes | | | | | |
| RHR Room Cooler D | 1 | | | EFD | NPS | NPS | | | | | | | | | | | | Yes | No | Yes | Yes | E | | | NEC | J2 |
| | 2 | | | | | | EFD | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | 3 | | | | | | | | | EFD | | | NPS | | | | | Yes | Yes | Yes | Yes | | | | | |
| Core Spray Pump A | 1 | EFD | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| | 2 | | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| | 3 | | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| Core Spray Pump C | 1 | | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| | 2 | | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| | 3 | | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| FCV 75 2 | 1 | | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| | 2 | | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| | 3 | | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |

SBRs, BBRs, and CB Analysis 8 of 14 APR-SBR-BBR-CB-0

RPV Water Inventory Control

ODW May 27, 1982

[illegible] 5/27/82

| Equipment | Unit | Shutdown Board Rooms A1 | A2 | B | C1 | C2 | D | E1 | E2 | F | 3EA | 3EB | 3EC | 3ED | Batt. Bd. Rms. 1 | 2 | 3 | BCT Adeq. | Is Cable in SBR | BBR | CB | Corrective Action SBR | BBR | CB | Sec ORG | Sht. No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FCV-75-11 | 1 | | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| | 2 | | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| | 3 | | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| FCV-75-9 | 1 | ETD | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| | 2 | | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| | 3 | | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| FCV-75-23 | 1 | | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| | 2 | | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| | 3 | | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| FCV-75-25 | 1 | ETD | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| | 2 | | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| | 3 | | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| FCV-75-22 | 1 | | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| | 2 | | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| | 3 | | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| CS Room Cooler (A/C) | 1 | ETD | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| | 2 | | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| | 3 | | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| CS Pump B | 1 | | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| | 2 | | | | ETD | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| | 3 | | | | | | | ETD | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| CS Pump D | 1 | | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| | 2 | | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| | 3 | | | | | | | ETD | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| FCV-75-30 | 1 | | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| | 2 | | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| | 3 | | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| FCV-75-39 | 1 | | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| | 2 | | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| | 3 | | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| FCV-75-37 | 1 | | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| | 2 | | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| | 3 | | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| FCV-75-51 | 1 | | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| | 2 | | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| | 3 | | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |

SBRs, BBRs, and CB Analysis 9 of 14 APR-SBR-BBR-CB-0

RPV Water Inventory Control

DNW May 27, 1982

DC 5/27/82

| EQUIPMENT | | UNIT | Shutdown Board Rooms A1 | A2 | B | C1 | C2 | D | E1 | E2 | F | 3EA | 3EB | 3EC | 3ED | Batt Bd Rms 1 | 2 | 3 | DCT Adeq | Is C SBR | Is BBR | Mct CB | Corrective Action SBR | BBR | CB | Sec ORG | SM No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| FCY-75-53 | | 2 | | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| | | 3 | | | | | | | EFD | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| | | 1 | | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| FCY 75-50 | | 2 | | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| | | 3 | | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| | | 1 | | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| CS Rm Cooler | (B&D) | 2 | | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| | | 3 | | | | | | | | | | | | | | | | | N/A | Yes | N/A | N/A | | | | | |
| RHR SW Pump | A3 | 0 | | | | | | | | | | EED | | | | HPS | | | Yes | Yes | Yes | Yes | | | | | |
| RHR SW Pump | C3 | 0 | | | | | | | | | | | EED | | | | | | Yes | Yes | Yes | Yes | | | | | |
| FCY-67-13 | | 0 | | | | | | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| FCY-67-17 | | 1 | | | | | | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| FCY-67-21 | | 2 | | | | | | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| FCY-67-25 | | 3 | | | | | | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| RHR SW Pump | B3 | 0 | | | | EED | EED | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| RHR SW Pump | D3 | 0 | | | | | | EFD | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| FCY-67-14 | | 0 | | | | | | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| FCY 67-18 | | 1 | | | EED | | | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| FCY-67-22 | | 2 | | | | | | EFD | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| FCY-67-26 | | 3 | | | | | | | | | EED | | | | | | | | Yes | Yes | Yes | Yes | | | | | |

SBRs, BBRs, and CB Analysis 10 14 APR-SBR-BBB-CB-0

Decay Heat Removal

Dbw May 27, 1982

RC 5/27/82

| EQUIPMENT | UNIT | A1 | A2 | B | C1 | C2 | D | E1 | E2 | F | 3EA | 3EB | 3EC | 3ED | Batt Bd. Rms. 1 | 2 | 3 | BCT Adeq. | Is SBR | Criteria BBR | Met CB | Corrective SBR | BBR | Action CB | Sec ORG | Sht. No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RHR SW Pump A2 | 0 | EFD | EFD | | | | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| RHR SW Pump A1 | 0 | EFD | EFD | | | | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | 1 | EFD | EFD | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| FCV-23-34 | 2 | EFD | EFD | NPS | | EFD | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | 3 | EFD | EFD | | | | | | EFD | | NPS | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| RHR SW Pump C2 | 0 | | | EFD | | | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| RHR SW Pump C1 | 0 | | | EFD | | | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| FCV-67-49 | 0 | | | | | | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | 1 | NPS | EFD | EFD | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| FCV-23-40 | 2 | | | EFD | | EFD | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | 3 | | | EFD | | | | | EFD | | NPS | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| RHR SW Pump B2 | 0 | | | | EFD | EFD | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| RHR SW Pump B1 | 0 | | | | | | | | | | | | EFD | | | | NPS | Yes | Yes | Yes | Yes | | | | | |
| | 1 | | | EFD | NPS | NPS | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| FCV-23-46 | 2 | | | | | | EFD | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 3 | | | | | | | | | EFD | | | NPS | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 1 | | | EFD | | | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| FCV-23-57 | 2 | | | | | | | | | EFD | | | | | | | | Yes | No | Yes | Yes | E | | | NEB | 31 |
| RHR SW Pump D2 | 0 | | | | | | EFD | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| RHR SW Pump D1 | 0 | | | | | | | | | | | | | EFD | | NPS | | Yes | Yes | Yes | Yes | | | | | |
| FCV-67-48 | 0 | | | | | | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | 1 | | | EFD | NPS | NPS | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| FCV-23-52 | 2 | | | | | | EFD | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 3 | | | | | | | | | EFD | | | NPS | | | | | N/A | Yes | Yes | N/A | | | | | |

SBRs, BBRs, and CB Analysis ... 11 ... 14 APR-SBR-BBR-CB-0

Shutdown Area Environmental Control

DAW May 27, 1982

Checked ... 5/27/82

| EQUIPMENT | UNIT | Shutdown Board Rooms A1 | A2 | B | C1 | C2 | D | E1 | E2 | F | 3EA | 3EB | 3EC | 3ED | Batt. Bd. Rms. 1 | 2 | 3 | USI Adeq. | In Cable SBR | Verif. BBR | Mat. CB | Corrective Action SBR | BBR | CB | Resp ORG | Sht. No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MCR AHU A | 1,2 | NPS | NPS | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| MCR AHU A | 3 | NPS | NPS | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| Bd. Rm. Sply. Fan 1A | 0 | NPS | NPS | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| FCO-31-77B | 0 | NPS | NPS | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| Emer. Press. Fan A | 0 | NPS | NPS | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| FCO-31-151 | 0 | NPS | NPS | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| FCO-31-81 | 1,2 | NPS | NPS | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| FCO-31-101 | 3 | NPS | NPS | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| FCO-31-150B | 1,2 | | | | | | | | | | | | | | NPS | | | N/A | Yes | No | N/A | | E | | NEB | J3 |
| FCO-31-150D | 3 | | | | | | | | | | | | | | NPS | | | N/A | Yes | No | N/A | | E | | NEB | J3 |
| Chilled $H_2O$ Circ Pmp A | 1,2 | NPS | NPS | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| Water Chiller A | 1,2 | NPS | NPS | | | | | | | | | | | | | | NPS | N/A | Yes | Yes | N/A | | | | | |
| Chilled $H_2O$ Circ Pmp 3A | 3 | NPS | NPS | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| Water Chiller 3A | 3 | | | | | | | | | | NPS | | | | NPS | | | N/A | Yes | Yes | N/A | | | | | |
| MCR AHU B | 1,2 | | | | | | | | | | | | NPS | | | | | N/A | Yes | Yes | N/A | | | | | |
| MCR AHU B | 3 | | | | | | | | | | | | NPS | | | | | N/A | Yes | Yes | N/A | | | | | |
| Bd. Rm. Sply. Fan 3A | 0 | | | | | | | | | | | | NPS | | | | | N/A | Yes | Yes | N/A | | | | | |
| FCO-31-77F | 0 | | | | | | | | | | | | NPS | | | | | N/A | Yes | Yes | N/A | | | | | |
| Emer. Press. Fan B | 0 | | | | | | | | | | | | NPS | | | | | N/A | Yes | Yes | N/A | | | | | |
| FCO-31-152 | 0 | | | | | | | | | | | | NPS | | | | | N/A | Yes | Yes | N/A | | | | | |
| FCO-31-82 | 1,2 | | | | | | | | | | | | NPS | | | | | N/A | Yes | Yes | N/A | | | | | |
| FCO-31-105 | 3 | | | | | | | | | | | | NPS | | | | | N/A | Yes | Yes | N/A | | | | | |
| Chilled $H_2O$ Circ Pmp B | 1,2 | | | | | | | | | | | | NPS | | | | | N/A | Yes | Yes | N/A | | | | | |
| Water Chiller B | 1,2 | | | | NPS | NPS | | | | | | | | | NPS | | | N/A | Yes | Yes | N/A | | | | | |
| Chilled $H_2O$ Circ Pmp 3B | 3 | | | | | | | | | | | | NPS | | | | | N/A | Yes | Yes | N/A | | | | | |
| Water Chiller 3B | 3 | | | | | | | | | | | | NPS | | | | NPS | N/A | Yes | Yes | N/A | | | | | |

SBRs, BBRs, and CB Analysis 11a of 14 BPR-SBR-BBR-CB-0

Shutdown Area Environmental Control

Computed DAW Date May 27, 1982

Checked [illegible] Date 5/27/82

| EQUIPMENT | UNIT | A1 | A2 | B | C1 | C2 | D | E1 | E2 | F | 3EA | 3EB | 3EC | 3ED | Batt. Bd. Rms. 1 | 2 | 3 | BCT Adeq. | I&C SBB | Elect. BBR | Mech. CB | Corrective Action SBR | BBR | CB | Sec. ORG | Sht. No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Shld. Bd. A Emer. Unit | | | | | | | | | | | | | | | | | | Yes | N/A | N/A | Yes | | | | | |
| Shld. Bd. B Emer. Unit | | | | | | | | | | | | | | | | | | Yes | N/A | N/A | Yes | | | | | |
| Shld. Bd. C Emer. Unit | | | | | | | | | | | | | | | | | | Yes | N/A | N/A | Yes | | | | | |
| Shld. Bd. D Emer. Unit | | | | | | | | | | | | | | | | | | Yes | N/A | N/A | Yes | | | | | |
| Shld. Bd. E Emer. Unit | | | | | | | | | | | | | | | | | | Yes | N/A | N/A | Yes | | | | | |
| Shld. Bd. F Emer. Unit | | | | | | | | | | | | | | | | | | Yes | N/A | N/A | Yes | | | | | |
| AHU-3A-1 | | | | | | | | | | | | | | | | | | Yes | N/A | N/A | Yes | | | | | |
| AHU-3A-2 | | | | | | | | | | | | | | | | | | Yes | N/A | N/A | Yes | | | | | |
| Chilled $H_2O$ Circ. Pmp 3A-1 | | | | | | | | | | | | | | | | | | Yes | N/A | N/A | Yes | | | | | |
| Chilled $H_2O$ Circ. Pmp 3A-2 | | | | | | | | | | | | | | | | | | Yes | N/A | N/A | Yes | | | | | |
| Bd. Rm. Water Chiller 3A-1 | | | | | | | | | | | | | | | | | | Yes | N/A | N/A | Yes | | | | | |
| Bd. Rm. Water Chiller 3A-2 | | | | | | | | | | | | | | | | | | Yes | N/A | N/A | Yes | | | | | |
| FCO-31-110A | | | | | | | | | | | | | | | | | | Yes | N/A | N/A | Yes | | | | | |
| FCO-31-110B | | | | | | | | | | | | | | | | | | Yes | N/A | N/A | Yes | | | | | |
| FCO-31-110C | | | | | | | | | | | | | | | | | | Yes | N/A | N/A | Yes | | | | | |
| FCO-31-112A | | | | | | | | | | | | | | | | | | Yes | N/A | N/A | Yes | | | | | |
| FCO-31-112B | | | | | | | | | | | | | | | | | | Yes | N/A | N/A | Yes | | | | | |
| FCO-31-112C | | | | | | | | | | | | | | | | | | Yes | N/A | N/A | Yes | | | | | |
| FCO-31-116A | | | | | | | | | | | | | | | | | | Yes | N/A | N/A | Yes | | | | | |
| FCO-31-116B | | | | | | | | | | | | | | | | | | Yes | N/A | N/A | Yes | | | | | |
| FCO-31-116C | | | | | | | | | | | | | | | | | | Yes | N/A | N/A | Yes | | | | | |
| FCO-31-118A | | | | | | | | | | | | | | | | | | Yes | N/A | N/A | Yes | | | | | |
| FCO-31-118B | | | | | | | | | | | | | | | | | | Yes | N/A | N/A | Yes | | | | | |
| FCO-31-118C | | | | | | | | | | | | | | | | | | Yes | N/A | N/A | Yes | | | | | |
| FCO-31-121A | | | | | | | | | | | | | | | | | | Yes | N/A | N/A | Yes | | | | | |
| FCO-31-121B | | | | | | | | | | | | | | | | | | Yes | N/A | N/A | Yes | | | | | |
| FCO-31-121C | | | | | | | | | | | | | | | | | | Yes | N/A | N/A | Yes | | | | | |
| FCO-31-123A | | | | | | | | | | | | | | | | | | Yes | N/A | N/A | Yes | | | | | |
| FCO-31-123B | | | | | | | | | | | | | | | | | | Yes | N/A | N/A | Yes | | | | | |
| FCO-31-123C | | | | | | | | | | | | | | | | | | Yes | N/A | N/A | Yes | | | | | |

SBRs, BBRs, and CB Analysis 12 14 APR-SBR-BBR-CB-Q

Event Monitoring

Date May 27, 1982

Checked 5/27/82

| EQUIPMENT | UNIT | Shutdown Board Rooms A1 | A2 | B | C1 | C2 | D | E1 | E2 | F | 3EA | 3EB | 3EC | 3ED | Batt. Bd. Rms. 1 | 2 | 3 | BCI Alarm | Is SBR | Critical BBR | Met CB | Corrective SBR | BBR | Action CB | Resp. ORG | Sht. No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| LIS-3-16A | 2 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 3 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 1 | NPS | NPS | | | | | | | | | | | | NPS | | | N/A | No | No | N/A | E | E | | NEB | J2 |
| LI-3-16A | 2 | | | NPS | | | | | | | | | | | | NPS | | N/A | No | No | N/A | E | E | | NEB | J3 |
| | 3 | | | | | | | | | | NPS | | | | | | NPS | N/A | No | No | N/A | E | E | | NEB | J3 |
| | 1 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| LIS-3-16B | 2 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 3 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 1 | NPS | NPS | | | | | | | | | | | | NPS | | | N/A | No | No | N/A | E | E | | NEB | J3 |
| LI-3-16B | 2 | | | NPS | | | | | | | | | | | | NPS | | N/A | No | No | N/A | E | E | | NEB | J3 |
| | 3 | | | | | | | | | | NPS | | | | | | NPS | N/A | No | No | N/A | E | E | | NEB | J3 |
| | 1 | | | | | | | | | | | | | | NPS | | | N/A | Yes | No | N/A | | E | | NEB | J3 |
| PX-3-207 | 2 | | | | | | | | | | | | | | | NPS | | N/A | Yes | No | N/A | | E | | NEB | J3 |
| | 3 | | | | | | | | | | | | | | | | NPS | N/A | Yes | No | N/A | | E | | NEB | J3 |
| | 1 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| PT-3-207 | 2 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 3 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 1 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| PI-3-207 | 2 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 3 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 1 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| LM-3-206 | 2 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 3 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 1 | NPS | NPS | | | | | | | | | | | | NPS | | | N/A | Yes | No | N/A | | E | | NEB | J3 |
| PX-3-41 | 2 | | | NPS | | | | | | | | | | | | NPS | | N/A | Yes | No | N/A | | E | | NEB | J3 |
| | 3 | | | | | | | | | | NPS | | | | | | NPS | N/A | Yes | No | N/A | | E | | NEB | J3 |
| | 1 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| PT-3-41 | 2 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 3 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 1 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| PI-3-41 | 2 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 3 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 1 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| LI-3-100 | 2 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 3 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |

SBRs, BBRs, and CB Analysis 13 — 14 APB-SBR-BBR-CB-0

Event Monitoring

DMW May 27, 1982

3/27/82

| Equipment | Unit | Shutdown Board Rooms A1 | A2 | B | C1 | C2 | D | E1 | E2 | F | 3EA | 3EB | 3EC | 3ED | Batt. Bd. Rms. 1 | 2 | 3 | BCT Ades | Is SBR | Criteria BBR | Met CB | Cause SBR | Live BBR | Action CB | See ORG | Sht No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| XS-3-53 | 2 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 3 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 1 | | | | | | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| TE-64-55E | 2 | | | | | | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | 3 | | | | | | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | 1 | | | | NPS | NPS | | | | | | | | | NPS | | | N/A | No | No | N/A | E | E | | NEB | J1 |
| TM-64-55D | 2 | | | | | | NPS | | | | | | | | | NPS | | N/A | No | No | N/A | E | E | | NEB | J1 |
| | 3 | | | | | | | | | | | | NPS | | | | NPS | N/A | No | No | N/A | E | E | | NEB | J1 |
| | 1 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| TI-64-55A | 2 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 3 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 1 | | | | | | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| XS-64-55B | 2 | | | | | | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | 3 | | | | | | | | | | | | | | | | | Yes | Yes | Yes | Yes | | | | | |
| | 1 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| XS-64-55C | 2 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 3 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 1 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| TE-64-55F | 2 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 3 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 1 | | | | NPS | NPS | | | | | | | | | NPS | | | N/A | No | No | N/A | E | E | | NEB | J1 |
| TM-64-55A | 2 | | | | | | NPS | | | | | | | | | NCS | | N/A | No | No | N/A | E | E | | NEB | J1 |
| | 3 | | | | | | | | | | | | NPS | | | | NPS | N/A | No | No | N/A | E | E | | NEB | J1 |
| | 1 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| TIS-64-55 | 2 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 3 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 1 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| XS-64-55A | 2 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 3 | | | | | | | | | | | | | | | | | N/A | Yes | Yes | N/A | | | | | |
| | 1 | | | | | | | | | | | | | | | | | No | N/A | N/A | No | | | A | IDC | M1 |
| LITS-3-58B | 2 | | | | | | | | | | | | | | | | | No | N/A | N/A | No | | | A | IDC | M1 |
| | 3 | | | | | | | | | | | | | | | | | No | N/A | N/A | No | | | A | IDC | M1 |
| | 1 | | | | | | | | | | | | | | | | | No | N/A | N/A | No | | | A | IDC | M1 |
| LI-3-58A | 2 | | | | | | | | | | | | | | | | | No | N/A | N/A | No | | | A | IDC | M1 |
| | 3 | | | | | | | | | | | | | | | | | No | N/A | N/A | No | | | A | IDC | M1 |

SBRs, BBRs, and CB. Analysis 14 11 APR-SBR-B[illegible]-CB-0

Event Monitoring

DAW May 27, 1982
5/ /82

| | | Shutdown Board Rooms | | | | | | | | | | | | | Batt Rd Rms | | | DCI | Ia-C | Basis | Mel. | Corr | Lic | Action | Sec | Sht |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EQUIPMENT | UNIT | A1 | A2 | B | C1 | C2 | D | E1 | E2 | F | 3EA | 3EB | 3EC | 3ED | 1 | 2 | 3 | Adq | SBR | BBR | CB | SBR | BBR | CD | ORG | No. |
| | 1 | | | | | | | | | | | | | | | | | No | N/A | N/A | No | | | A | TDC | M1 |
| PX-3-7D | 2 | | | | | | | | | | | | | | | | | No | N/A | N/A | No | | | A | TDC | M1 |
| | 3 | | | | | | | | | | | | | | | | | No | N/A | N/A | No | | | A | TDC | M1 |
| | 1 | | | | | | | | | | | | | | | | | No | N/A | N/A | No | | | A | TDC | M1 |
| PI-3-79 | 2 | | | | | | | | | | | | | | | | | No | N/A | N/A | No | | | A | TDC | M1 |
| | 3 | | | | | | | | | | | | | | | | | No | N/A | N/A | No | | | A | TDC | M1 |
| | 1 | | | | | | | | | | | | | | | | | Yes | N/A | N/A | Yes | | | | | |
| TI-64-55B | 2 | | | | | | | | | | | | | | | | | Yes | N/A | N/A | Yes | | | | | |
| | 3 | | | | | | | | | | | | | | | | | Yes | N/A | N/A | Yes | | | | | |
| | 1 | | EFD | | | | | | | | | | | | | | | N/A | Yes | Yes | Yes | | | | | |
| FCV-78-62 | 2 | | | | | EFD | | | | | | | | | | | | No | Yes | Yes | No | | | C | EEB | M2 |
| | 3 | | | | | | | | EFD | | | | | | | | | No | Yes | Yes | No | | | C | EEB | M2 |
| | 1 | | | EFD | | | | | | | | | | | | | | No | Yes | Yes | No | | | C | EEB | M2 |
| FCV-78-61 | 2 | | | | | | EFD | | | | | | | | | | | N/A | Yes | Yes | Yes | | | | | |
| | 3 | | | | | | | | | EFD | | | | | | | | N/A | Yes | Yes | Yes | | | | | |

In Shutdown Board Room F, the possibility exists that valves FCV-74-100, FCV-74-101, and valve FCV-23-57 all could spuriously open. This would defeat the flow path integrity for system II (B & D pumps) of RHR in Unit 2 and the flow path inegrity for system I (A & C pumps) of RHR in Unit 3.

The corrective actions are to rack out the breaker for valve FCV-23-57 and to require that the RHR system II of Unit 2 remain in standby condition to provide adequate flow path integrity for Unit 3 RHR system I.

A schematic of the valve's power and control circuit is attached.

APPENDIX R

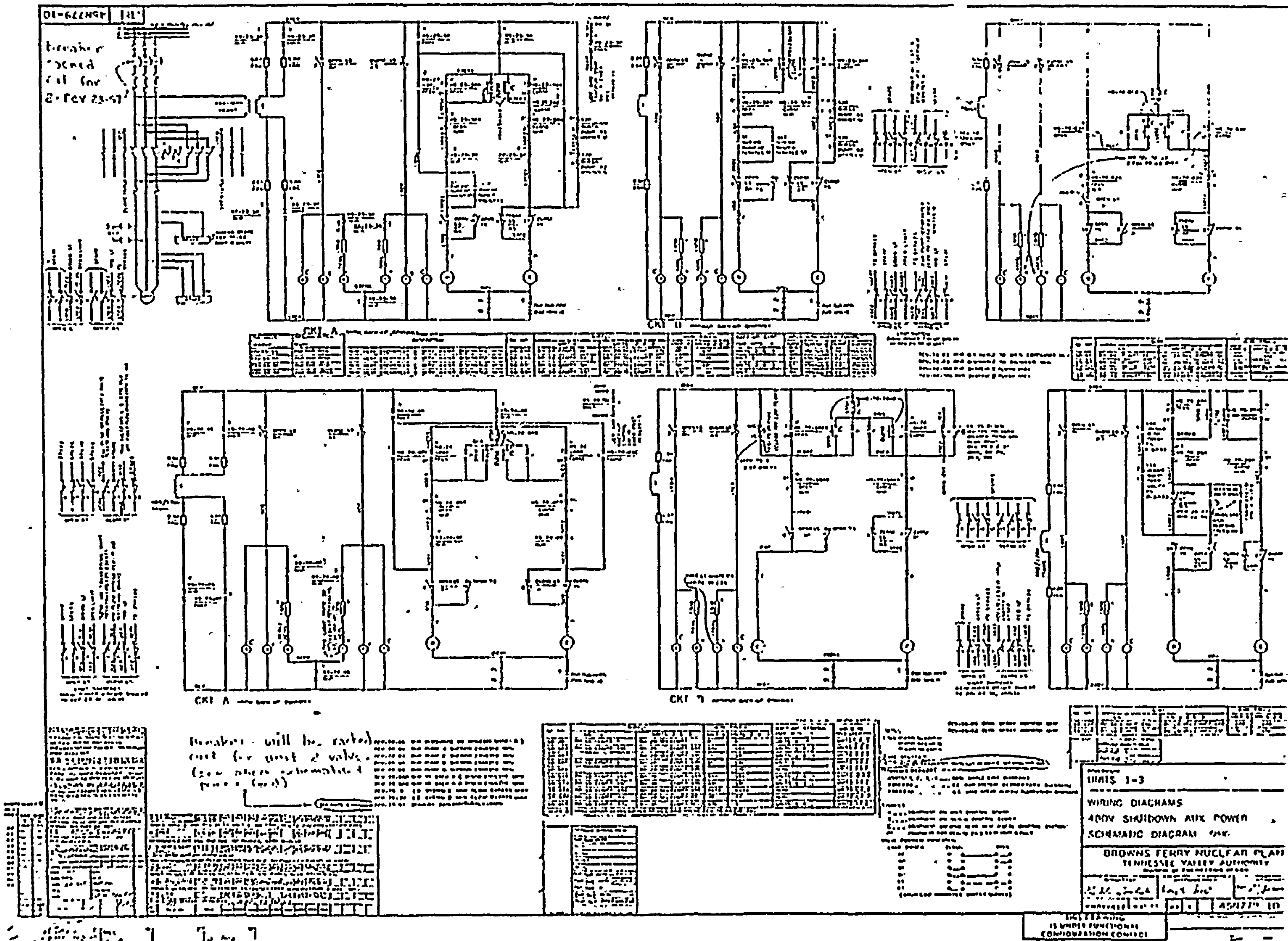
CORRECTIVE ACTION

PREPARED: D. A. Walker

REVIEWED: T. N. Barkalow

DATE: 6/2/82

APR-SBR-BBR-CB-0-J1


CKT A
CKT B
CKT A
CKT B
UNITS 1-3
WIRING DIAGRAMS
400V SHUTDOWN AUX POWER
SCHEMATIC DIAGRAM
BROWNS FERRY NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY

For a fire in Shutdown Board Room C1 area, the D RHR pump is required to operate in Unit 1. The normal power supply to the RHR pump D cooler is 480-V Reactor MOV board 1B which is normally powered from 4-kV Shutdown board C. This power may not be available due to the fire, therefore a manual transfer may be required to provide alternate power to 480-V Reactor MOV board 1B.

APPENDIX R

CORRECTIVE ACTION

PREPARED: D. A. Wallin

REVIEWED: T. W. Barkalow

DATE: 6/2/82

APR-SBR-BBR-CB-0-J2

For a fire in Shutdown Board Room A, B and 3EA and all Battery Board Rooms, the possibility exists that all required I & C power may be lost. Therefore, a manual transfer may be required at panel 9-9 cabinet 2 to provide adequate I & C power.

APPENDIX R

CORRECTIVE ACTION

PREPARED: D. A. Walker

REVIEWED: T. W. Barbralow

DATE: 6/2/82

This equipment and its associated cables are not required by the final functional criteria.

Therefore, no further consideration is required.

APPENDIX R

CORRECTIVE ACTION

PREPARED: [illegible signature]

REVIEWED: T. N. Barkalow

DATE: 6/2/82

In order to meet the Appendix R criteria for required circuits whose spurious operation could adversely affect shutdown capability, and also to ensure the operability of the reactor pressure vessel isolation system, an additional backup control panel, located in a fire area separate from backup control panel 25-32 and from the control building fire area is required.

In addition to the new panel above, new manual controls, as marked on attached General Electric drawing 730E929, sheets 1, 3, 4, and 5 are required to ensure that the manual safety relief valves do not operate spuriously. These controls will be located on the new panel.

The Automatic Depressurization System (ADS) safety relief valves already have adequate control isolation.

APPENDIX R

CORRECTIVE ACTION

PREPARED: Edward J Bradley

REVIEWED: Larry M Begley

DATE: 6/18/82

In order to meet the Appendix R criteria for required circuits whose failure to operate could adversely affect shutdown capability, backup control with isolation from the Control Building Fire Area shall be provided for the following valves:

| | |
|---|---|
| FCV 74-7 | Units 2 and 3 |
| FCV 74-58 | Units 2 and 3 |
| FCV 74-30 | Unit 1 |
| FCV 74-72 | Unit 1 |
| FCV 68-3 | Unit 1 |
| FCV 68-79 | Units 2 and 3 |
| FCV 78-61 | Unit 1 |
| FCV 78-62 | Units 2 and 3 |

The location for these control and isolation devices is at each valve's motor control center at the 480-volt MOV boards.

The control circuit changes described above are as marked on attached drawings 45N779-6, 9, 11, and 21; 730E920-1, 5, 8.

APPENDIX R

CORRECTIVE ACTION

PREPARED: Edward J Bradley

REVIEWED: Larry M Rigley

DATE: 6-18-82

In order to meet the Appendix R criteria for required circuits whose failure to operate could adversely affect shutdown capability, the changes described below are required for the Low Pressure Coolant Injection (LPCI) system injection valves to ensure that either valve can be opened manually even in case of a single fire affecting the train of logic controlling it:

1. They shall be enabled by a low pressure permissive signal from either train of RHR logic.
2. That portion of logic in each train of logic that develops the low pressure permissive signal shall be isolated by fuse from the remainder of the circuit.
3. The routing of the cables for the redundant power supplies to the above logic trains shall be in accordance with Appendix R separations criteria.
4. The sensor which provides the low pressure permissive signals to each train of logic and their connections to this logic shall be separated in accordance with Appendix R criteria.

The changes described above are marked on attached drawings 45N779-22; 730E930-2, -3, -4; 730E920-6, -9 and -11.

APPENDIX R

CORRECTIVE ACTION

PREPARED: Edward J Bradley

REVIEWED: Larry M. Begley

DATE: 6/18/82

To meet the requirements of Appendix R, cables 1M13, 2M3, 2M7, 3M3, 3M7, and 1M12 will be rerouted in conduit such that they will not pass through the control building fire area.

APPENDIX R

CORRECTIVE ACTION

PREPARED: J. A. Krieg

REVIEWED: D Boone

DATE: 6-17-82

APR-SBR-BBR-CB-O-M4

## 4.0 ASSOCIATED CIRCUIT CORRECTIVE ACTIONS

The associated circuit analysis discussed in Attachment 3 concluded that certain modifications were required to ensure safe shutdown capabilities in the event of a postulated fire. The following section contains corrective actions sheets that identify the required modifications. Schematic drawings are also included when applicable.

Due to inadequately sized cable protective device, a fire-induced fault in the following cable has the potential to impair unit safe shutdown capability. To alleviate this situation, the cable for this circuit and its protective device will be replaced as indicated below, and as marked on the referenced schematic.

| Cable Number | Existing Cable Size | Replacement Cable Size | Existing Bkr/Fuse Rating | Replacement Bkr/Fuse Rating | Power Source | Reference Schematic |
|---|---|---|---|---|---|---|
| 1RM700 | #14, AWG | #12,AWG | 40A, Breaker | 20A, Breaker | 120V ac Unit 1 Preferred, Bkr. No. 1107 | 45W777-22R5 |

APPENDIX R

CORRECTIVE ACTION

PREPARED: J. L. Hutson

REVIEWED: C E Brush

DATE: 6-19-82

Due to inadequately sized cable protective device, a fire-induced fault in the following cable has the potential to impair unit safe shutdown capability. To alleviate this situation, the cable for this circuit will be replaced as indicated below, and as marked on the referenced schematic.

| Cable Number | Existing Cable Size | Replacement Cable Size | Power Source | Reference Schematic |
|---|---|---|---|---|
| 2RM700 | #14, AWG | #12, AWG | 120V ac Unit 2 Preferred, Bkr. No. 1178 | 45W777-22R5 |

APPENDIX R

CORRECTIVE ACTION

PREPARED: J. W. Hutson

REVIEWED: C E Brush

DATE: 6-19-82

Due to inadequately sized cable protective device, a fire-induced fault in the following cable has the potential to impair unit safe shutdown capability. To alleviate this situation, the cable for this circuit will be replaced as indicated below, and as marked on the referenced schematic.

| Cable Number | Existing Cable Size | Replacement Cable Size | Power Source | Reference Schematic |
|---|---|---|---|---|
| 3RM700 | #14, AWG | #12, AWG | 120V ac Unit 3 Preferred, Bkr. No. 1108 | 45W777-22R5 |

APPENDIX R

CORRECTIVE ACTION

PREPARED: J. W. Hutson

REVIEWED: C E Brush

DATE: 6-19-82



BFN-IT-BBR-AC-3-M2

Some power circuit cables have enough available fault current to raise conductors to the cable auto-ignition temperature before a fault could be cleared. Cables from motor control centers in the control building that are not protected and that can share a common enclosure with cables that are required for shutdown capability are listed by MCC.

| Control Bay Vent Board A | | | | Control Bay Vent Board B | | | |
|---|---|---|---|---|---|---|---|
| Cable ID | Compt | Cable ID | Compt | Cable ID | Compt | Cable ID | Compt |
| MS1 | 1B1 | ES1310-I | 5F | PL1106 | 2D | ES3810-II | 6A |
| PL1125 | 1C | ES1288-I | 6A | ES3700-II | 2E | MS2 | 6B |
| ES1300-I | 2E | ES1225-I | 6D | PL1183 | 3A | ES3825-II | 6C |
| ES1350-I | 2F | ES1325-I | 6F | PL1196 | 3B | PL1163 | 6E |
| PL1100 | 3E | PL1189 | 7B1 | ES3850 | 3C | ES3725-II | R2D |
| PL1175 | 5B | ES1316-I | 7C | PL1138 | 3E | | |
| PL1115 | 5C | PL1150 | 7E | ES3788-II | 5D | | |
| | | ES1200-I | R1C | | | | |

Corrective action is to install fuses in the power circuits with clearing characteristics fast enough to ensure that faulted cables do not reach auto-ignition temperature. See the attached sketch.

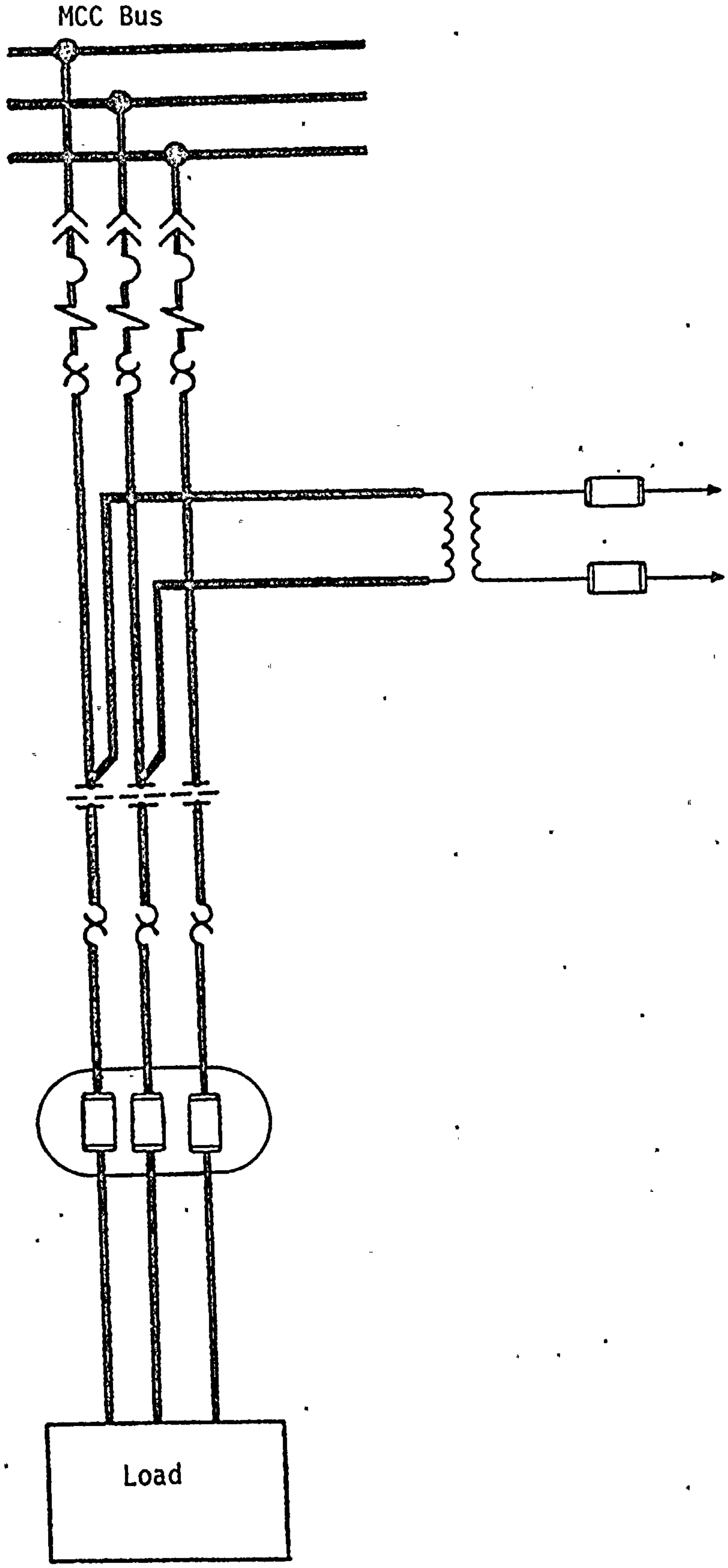
APPENDIX R

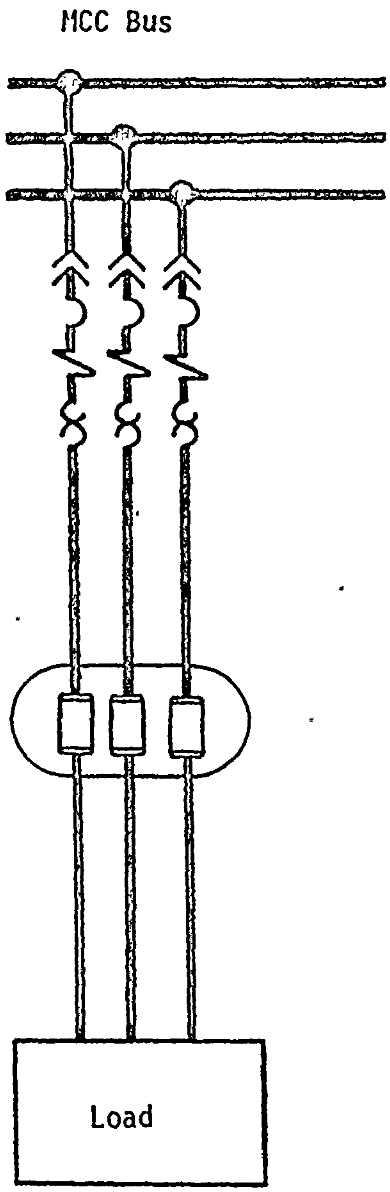
CORRECTIVE ACTION

PREPARED: Larry N. Hagaman

REVIEWED: Turner J. Howard

DATE: 6-21-82


MCC Bus
Load


MCC Bus
Load

Due to inadequately sized cable protective device, a fire-induced fault in the following cable has the potential to impair unit safe shutdown capability. To alleviate this situation, the protective device for the circuit of each cable will be replaced as indicated below, and as marked on the referenced schematic.

| Cable Number | Existing Bkr/Fuse Rating | Replacement Bkr/Fuse Rating | Power Source | Reference Schematic |
|---|---|---|---|---|
| FE700 | 20 A Breaker | 15 A Breaker | 120V AC Panel 9-9 Cabinet 2, Bkr 231 | 45W643-3R2 |
| ES563-I | 20 A Breaker | 15 A Breaker | 120V AC Panel 9-9 Cabinet 2, Bkr 218 | 45N779-18R7 |
| A551 | 20 A Breaker | 15 A Breaker | 120V AC Panel 9-9 Cabinet 3, Bkr 318 | 45N771-6R5 |
| PL916 | 20 A Breaker | 15 A Breaker | 120V AC Panel 9-9 Cabinet 5, Bkr 510 | 45N769-3R7 |
| IV2329 | 20 A Breaker | 15 A Breaker | 120V AC Panel 9-9 Cabinet 5, Bkr 501 | 45N614-9R18 |
| 1PC560-II<br>1PC561-II<br>1PC562-II<br>1PC479-II<br>1PC477-II | 20 A Breaker | 15 A Breaker | 120V AC Panel 9-9 Cabinet 3, Bkr 316 | 45N614-9R18<br>45W777-21R4 |

APPENDIX R

CORRECTIVE ACTION

PREPARED: J. W. Lemore

REVIEWED: Charles Jackson

DATE: 6-19-82



BFN-IT-CB-AC-1-M1

The cables listed below are not adequately protected by the existing overcurrent protective devices. Therefore, a fire-induced fault on any of these cables has the potential to impair unit safe shutdown capability. To alleviate this situation, additional protective devices will be added as indicated below and as marked on the referenced drawings.

| Cable Number | Existing Bkr/Fuse Rating | Additional Bkr/Fuse Rating | Power Source | Reference Schematic |
|---|---|---|---|---|
| 1A1185, 1A1240<br>1A1233 | 20 A<br>Breaker | 10 A<br>Fuse | 48V DC on Panel 9-9<br>Breaker 131 | 45N620-12R9 |
| 1V1705, 1V1554<br>1V1581, 1V1700<br>1V1708 | 20 A<br>Breaker | 15 A<br>Fuse | 120V AC I&C<br>Bus A, Bkr 219 | 45N614-2R10 |
| 1V1706, 1V1707<br>1V1608, 1V1709<br>1V1634 | 20 A<br>Breaker | 15 A<br>Fuse | 120V AC I&C<br>Bus B, Bkr 319 | 45N614-3R11 |
| 1LT140, 1LT143<br>1LT141, 1LT40<br>1LT10, 1LT20<br>1LT274, 1LT297<br>1LT8, 1LT70<br>1LT18, LT75 | 20 A<br>Breaker | 15 A<br>Fuse | Panel 9-9 Cab 5<br>120/240V AC<br>Nonpreferred bus | 55N2701-1R9<br>55N2701-2R8 |

APPENDIX R

CORRECTIVE ACTION

PREPARED: J. A. Hutson

REVIEWED: C. E. Brush

DATE: 6-19-82

062170.14

| Cable Number | Existing Bkr/Fuse Rating | Additional Bkr/Fuse Rating | Power Source | Reference Schematic |
|---|---|---|---|---|
| R223<br>R224 | 20 A<br>Breaker | 15 A<br>Fuse | 120V AC I&C Bus B<br>PNL 9-9, Bkr 305 | 45N614-7R6 |
| R149<br>3A2913 | 20 A<br>Breaker | 15 A<br>Fuse | 120V AC I&C Bus A<br>PNL 9-9, Bkr 205 | 45N614-7R6 |

APPENDIX R

CORRECTIVE ACTION

PREPARED: J. D. Hutson

REVIEWED: C E Brush

DATE: 6-19-82

062170.14

BFN-IT-CB-AC-1-M2
Sheet 2 of 2

Due to inadequately sized cable protective device, a fire-induced fault in the following cable has the potential to impair unit safe shutdown capability. To alleviate this situation, the protective device for the circuit of each cable will be replaced as indicated below, and as marked on the referenced schematic.

| Cable Number | Existing Bkr/Fuse Rating | Replacement Bkr/Fuse Rating | Power Source | Reference Schematic |
|---|---|---|---|---|
| 2PC560-II<br>2PC561-II<br>2PC562-II<br>2PC479-II<br>2PC477-II | 20 A Breaker | 15 A Breaker | 120V AC Panel 9-9 Cabinet 3, Bkr 316 | 45N614-9R18<br>45W777-21R4 |
| 2V2329 | 20 A Breaker | 15 A Breaker | 120V AC Panel 9-9 Cabinet 5, Bkr 501 | 45N614-9R18 |

APPENDIX R

CORRECTIVE ACTION

PREPARED: J. W. Seamore

REVIEWED: Charles Jackson

DATE: 6-19-82

The cables listed below are not adequately protected by the existing overcurrent protective devices. Therefore, a fire-induced fault on any of these cables has the potential to impair unit safe shutdown capability. To alleviate this situation, additional protective devices will be added as indicated below and as marked on the referenced drawings.

| Cable Number | Existing Bkr/Fuse Rating | Additional Bkr/Fuse Rating | Power Source | Reference Schematic |
|---|---|---|---|---|
| 2V1705, 2V1554<br>2V1581, 2V1700<br>2V1708 | 20 A<br>Breaker | 15 A<br>Fuse | 120V AC I&C<br>Bus A, Bkr 219 | 45N614-2R10 |
| 2V1706, 2V1707<br>2V1608, 2V1709<br>2V1634 | 20 A<br>Breaker | 15 A<br>Fuse | 120V AC I&C<br>Bus B, Bkr 319 | 45N614-3R11 |
| 2LT140, 2LT40<br>2LT20, 2LT10<br>2LT141, 2LT274<br>2LT297, 2LT8<br>2LT70, 2LT18<br>2LT134 | 20 A<br>Breaker | 15 A<br>Fuse | Panel 9-9 Cab 5<br>120/240V AC<br>Nonpreferred bus | 55N2701-1R9<br>55N2701-2R8 |

APPENDIX R

CORRECTIVE ACTION

PREPARED: J. S. Hutson

REVIEWED: C E Brush

DATE: 6-19-82

Due to inadequately sized cable protective device, a fire-induced fault in the following cable has the potential to impair unit safe shutdown capability. To alleviate this situation, the protective device for the circuit of each cable will be replaced as indicated below, and as marked on the referenced schematic.

| Cable Number | Existing Bkr/Fuse Rating | Replacement Bkr/Fuse Rating | Power Source | Reference Schematic |
|---|---|---|---|---|
| 3PC560-II<br>3PC561-II<br>3PC562-II<br>3PC479-II<br>3PC477-II | 20 A<br>Breaker | 15 A<br>Breaker | 120V AC Panel 9-9<br>Cabinet 3, Bkr 316 | 45N614-9R18<br>45W777-21R4 |
| 3V2329 | 20 A<br>Breaker | 15 A<br>Breaker | 120V AC Panel 9-9<br>Cabinet 5, Bkr 501 | 45N614-9R18 |

APPENDIX R

CORRECTIVE ACTION

PREPARED: J. W. Semore

REVIEWED: Charles Jackson

DATE: 6-19-82

The cables listed below are not adequately protected by the existing overcurrent protective devices. Therefore, a fire-induced fault on any of these cables has the potential to impair unit safe shutdown capability. To alleviate this situation, additional protective devices will be added as indicated below and as marked on the referenced drawings.

| Cable Number | Existing Bkr/Fuse Rating | Additional Bkr/Fuse Rating | Power Source | Reference Schematic |
|---|---|---|---|---|
| 3V1705, 3V1554 3V1581, 3V1700 3V1708 | 20 A Breaker | 15 A Fuse | 120V AC I&C Bus A, Bkr 219 | 45N614-2R10 |
| 3V1706, 3V1707 3V1608, 3V1709 3V1634 | 20 A Breaker | 15 A Fuse | 120V AC I&C Bus B, Bkr 319 | 45N614-3R11 |
| 3LT140, 3LT20 3LT10, 3LT274 3LT297, 3LT18 3LT8 | 20 A Breaker | 15 A Fuse | Panel 9-9 Cab 5 120/240V AC Nonpreferred bus | 55N2701-2R8 55N2701-3R4 |

APPENDIX R

CORRECTIVE ACTION

PREPARED: J. D. Hutson

REVIEWED: C E Brush

DATE: 6-19-82

The analysis of associated circuits has identified certain control power circuits which are required, in the event of a reactor building fire, to ensure trip capability of 4160 and 480-volt switchgear throughout the plant. Modification of these circuits will ensure that we will have no associated circuits off these boards in common enclosures.

This modification involves rerouting and/or wrapping the conduits containing these cables (listed below) with a one-hour fire-rated barrier to ensure circuit integrity in the event of a reactor building fire.

| Cable | From | To |
|---|---|---|
| 1B19 | 250V Battery Board 3 | 250V DC Turbine Building Distribution Board 1 (Alternate Supply) |
| 3B18 | 250V Battery Board 3 | 250V DC Turbine Building Distribution Board 3 (Normal Supply) |
| B76 | 250V Battery Board 1 | 4160V Bus Tie Board (Normal Supply) |
| B77 | 250V Battery Board 2 | 4160V Bus Tie Board (Alternate Supply) |

APPENDIX R

CORRECTIVE ACTION

PREPARED: T.E. Barnett, Jr.

REVIEWED: D. J. Leckie

DATE: 6/18/82

Some power circuits from 480-volt motor control centers and 240-volt lighting boards have enough available fault current to raise conductors to the cable auto-ignitiion temperature before a fault could be cleared. Cables that are not protected and that can share a common enclosure with cables that are required for shutdown capability are listed in Table BFN-IT-RB-AC-0-M2.

Corrective action is to install fuses in the power circuits with clearing characteristics fast enough to ensure that faulted cables do not reach auto-ignition temperature. See attached sketches.

APPENDIX R

CORRECTIVE ACTION

PREPARED: Larry N. Hagaman

REVIEWED: David [illegible]

DATE: 6/21/82

Table BFN-IT-RB-AC-O-M2

## 480V Diesel Auxiliary Board A

| Cable No. | Compt | Cable No. | Compt |
|---|---|---|---|
| PL2400 | 2A | PL2490 | 7C |
| PL2455 | 2B | PL2380 | 7D |
| PL2300 | 2C | PL2415 | 7F |
| PL2470 | 2D | ES620-I | 8A |
| PL1275 | 2F | ES731-I | 8B |
| ES600-I | 3A | PL4550 | 8D |
| PL2363 | 3B | PL4575 | 8F |
| PL2325 | 3C | PL2750 | 8F |
| ES711-I | 3D | ES630-I | 9A |
| ES640-I | 3E | ES741-I | 9B |
| PL2710 | 3F | PL2775 | 9F |
| ES610-1 | 4A | ES309-I | 10A |
| PL2367 | 4B | ES350-I | 10F1 |
| PL2332 | 4C | ES363-I | 10F2 |
| ES721-1 | 4D | ES250-I | 11A |
| ES647-1 | 4E | | |
| PL2725 | 4F | | |
| PL2551 | 5A | | |
| PL2600 | 5C | | |
| PL2650 | 5E | | |

APPENDIX R

CORRECTIVE ACTION

PREPARED: Larry N. Hagaman

REVIEWED: David [illegible]

DATE: 6/21/82

480V Diesel Auxiliary Board B

| Cable No. | Compt | Cable No. | Compt |
|---|---|---|---|
| ES3130-II | 3A | PL2500 | 7C |
| PL2375 | 3B | PL2390 | 7D |
| PL2350 | 3C | FE699 | 7F1 |
| ES3244-II | 3D | ES3110-II | 8A |
| ES3147-II | 3E | ES3222-II | 8B |
| PL2777 | 3F | PL2727 | 8F |
| PL2407 | 2A | ES3100-II | 9A |
| PL2314 | 2B | ES3211-II | 9B |
| PL2307 | 2C | PL2712 | 9F |
| PL2357 | 2D | ES2809-II | 10A |
| ES3120-II | 4A | ES2850-II | 10F1 |
| PL2371 | 4B | ES2863-II | 10F2 |
| PL2340 | 4C | ES2750-II | 11A |
| ES3233-II | 4D | PL2425 | 12A |
| ES3140-II | 4E | PL2694 | 12B |
| PL2752 | 4F | | |
| PL2576 | 5A | | |
| PL2625 | 5C | | |
| PL2675 | 5E | | |

APPENDIX R

CORRECTIVE ACTION

PREPARED: Larry N. Hagaman

REVIEWED: David Lanka

DATE: 6/21/82

Table BFN-IT-RB-AC-O-M2

240V.Lighting Board 1A

| Cable No. | Compt |
|---|---|
| 2D3 | LD-4 |
| 3D2 | P275 |
| 3D4 | P276 |
| 2D4 | P278 |
| 3D3 | P280 |

240 Lighting Board 2A

| Cable No. | Compt |
|---|---|
| P283 | 2D3 |
| P288 | 2D4 |

240V Lighting Board 3A

| Cable No. | Compt |
|---|---|
| P291 | 3D3 |
| P292 | 3D4 |
| P294 | 2D3 |
| P295 | 2D4 |

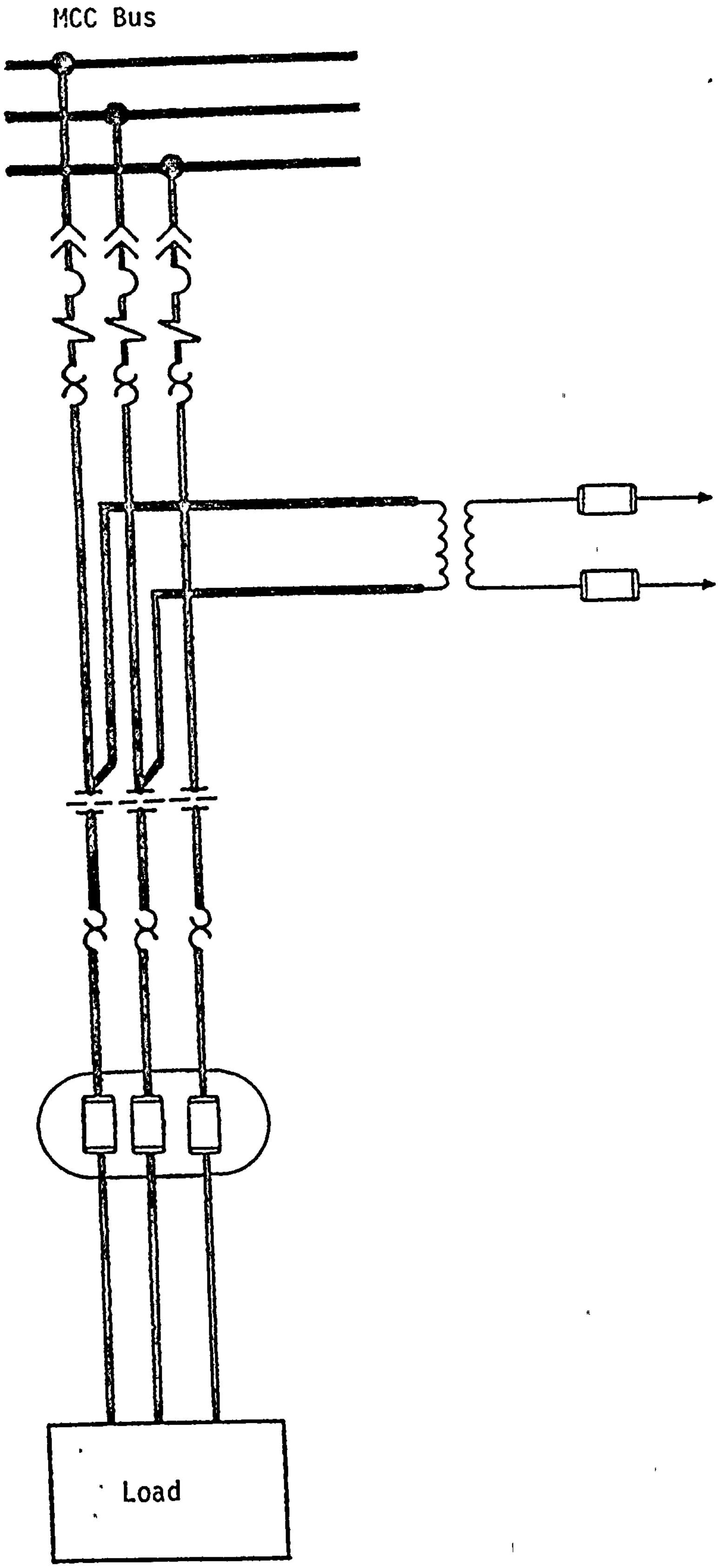
APPENDIX R

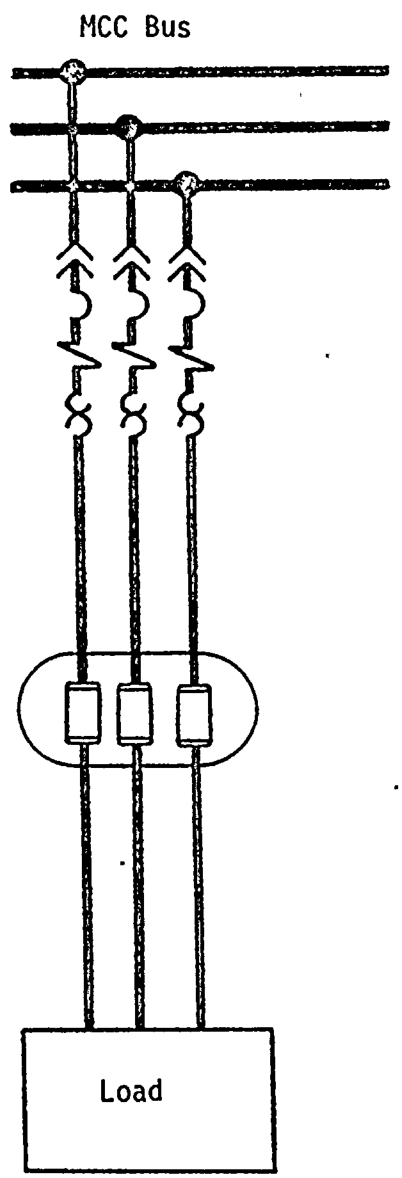
CORRECTIVE ACTION

PREPARED: Dale Walker

REVIEWED: Walt [illegible]

DATE: 6/21/82


MCC Bus
Load


MCC Bus
Load

Some power circuits from 480-volt motor control centers have enough available fault current to raise conductors to the cable auto ignition temperature before a fault could be cleared. Cables that are not protected and that can share a common enclosure with cables that are required for shutdown capability are listed in table BFN-IT-RB-AC-1-M1.

Corrective action is to install fuses in the power circuits with clearing characteristics fast enough to ensure that faulted cables do not reach auto-ignition temperature. See attached sketches.

APPENDIX R

CORRECTIVE ACTION

PREPARED: Larry N. Hagaman

REVIEWED: [illegible]

DATE: 6/21/82

480V Reactor MOV Bd 1C

| Cable No. | Compt |
|---|---|
| 1PL2060 | 1C |
| ES152-I | 3A |
| 1V2110 | 3B |
| 1V2100 | 3C |
| 1V2122 | 3E |
| 1PL585 | 4A |
| PLR2000 | 4B |
| 1V2130 | 4E |
| 1V2460 | 5B |
| 1V2308 | 5C |
| 1PL2215 | 5E |
| 1V2465 | 6B |
| 1V2317 | 6C |
| 1V2508 | 6E |
| PLR2012 | 7A |
| 1V2300 | 7B |
| 1V2160 | 7E |
| 1V1950 | 8B |
| 1V2150 | 8E |
| 1V2500 | 9B |
| 1V2516 | 9E |
| 1PL2225 | 11C |
| 1ES300-I | R6B |
| 1ES462-I | R6E |
| 1ES2962-II | R8A |
| 1ES2925-II | R8E |

480V Reactor Bldg Vent Bd 1B

| Cable No. | Compt |
|---|---|
| 1PL912 | 1D2 |
| 1PL900 | 2A |
| 1PL5175 | 2B |
| 1PL875 | 2C |
| 1PL935 | 2D2 |
| 1PL5140 | 3A |
| PLR1975 | 6A |
| 1PL5118 | 6B |
| 1PL5110 | 6C |
| 1PL1190 | 9A |
| 1PL906 | 10A |
| 1PL5180 | 10B |
| 1PL5200 | 10C |
| 1PL953 | 10D2 |
| 1PL5135 | 11C |
| 1PL972 | 11D2 |
| PL1326 | 12A |
| PL1327 | 12A |

480V Reactor Bldg Vent Bd 1A

| Cable No. | Compt |
|---|---|
| 1PL1383 | 1A1 |
| 1PL1010 | 4B |
| 1PL1017 | 8B |
| 1PL1375 | 8E |
| 1PL1390 | 11A1 |

APPENDIX R

CORRECTIVE ACTION

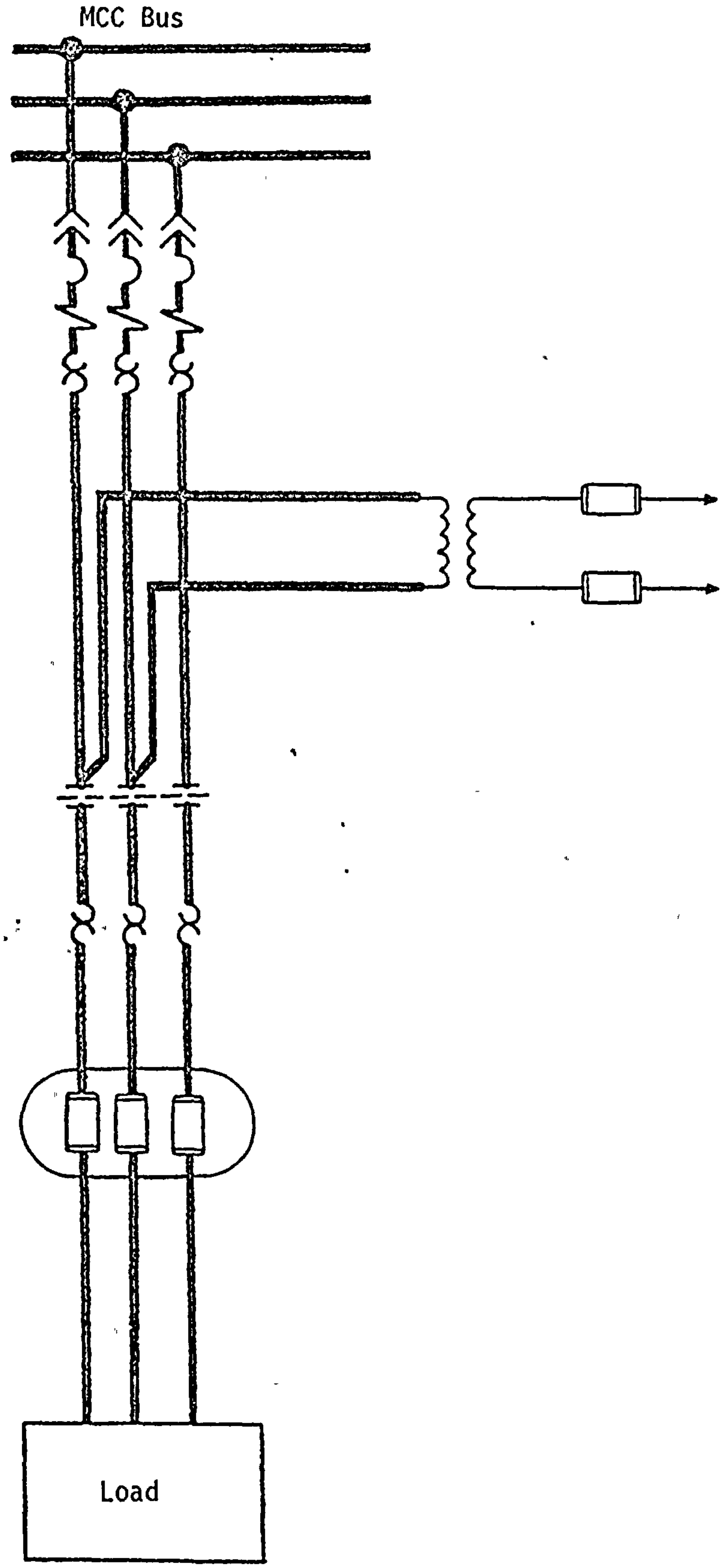
PREPARED: Larry N Hagaman

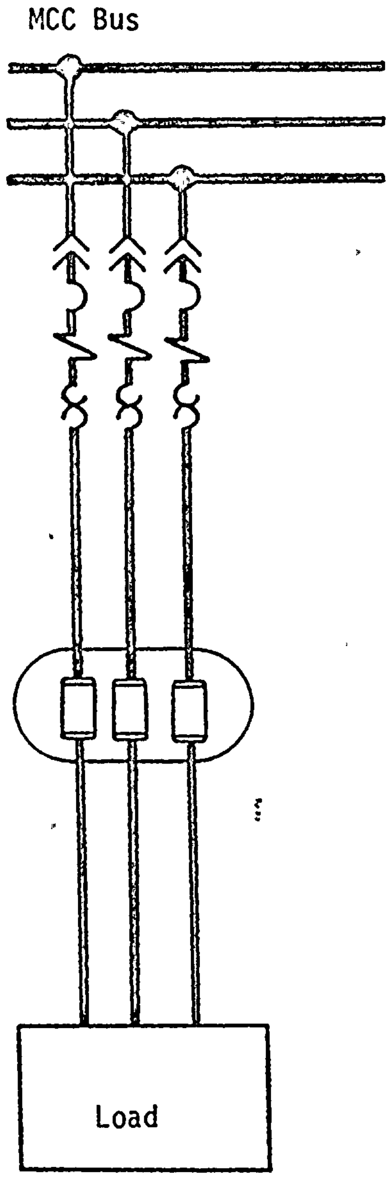
REVIEWED: [signature]

DATE: 6-21-82



Table BFN-IT-RB-AC-1-M1


MCC Bus
Load


MCC Bus
Load

Some power circuits from 480-volt motor control centers have enough available fault current to raise conductors to the cable auto ignition temperature before a fault could be cleared. Cables that are not protected and that can share a common enclosure with cables that are required for shutdown capability are listed in table BFN-IT-RB-AC-2-M2.

Corrective action is to install fuses in the power circuits with clearing characteristics fast enough to ensure that faulted cables do not reach auto-ignition temperature. See attached sketches.

APPENDIX R

CORRECTIVE ACTION

PREPARED: Larry N. Hagaman

REVIEWED: [signature]

DATE: 6/21/82

BFN-IT-RB-AC-2-M1

| 480V Reactor MOV Bd 2C Cable No. | Compt |
|---|---|
| 2PL2060 | 1C |
| 2V2100 | 3C |
| 2V2122 | 3E |
| 2PL585 | 4A |
| PLR2025 | 4B |
| 2V2130 | 4E |
| 2V2460 | 5B |
| 2V2308 | 5C |
| 2PL2215 | 5E |
| 2V2465 | 6B |
| 2V2317 | 6C |
| 2V2508 | 6E |
| PLR2037 | 7A |
| 2V2300 | 7B |
| 2V2160 | 7E |
| 2V1950 | 8B |
| 2V2150 | 8E |
| 2V2500 | 9B |
| 2V2516 | 9E |
| 2V2110 | 11C |
| 2ES300-I | R6A |
| 2ES462-I | R6E |
| 2ES2962-II | R8B |
| 2ES2925-II | R8E |
| 2PL2225 | R11A |

| 480V Reactor Bldg Vent Bd 2B Cable No. | Compt |
|---|---|
| 2PL900 | 1A |
| 2PL5175 | 1B |
| 2PL875 | 1C |
| 2PL5140 | 2A |
| PLR1981 | 5A |
| 2PL5118 | 5B |
| 2PL5110 | 5C |
| 2PL906 | 9A |
| 2PL5180 | 9B |
| 2PL5135 | 9C |
| PL482 | 10A1 |
| 2PL1118 | 10C2 |
| 2PL1115 | 10D |
| 2PL1110 | 10E |
| PL495 | 10F |

| 480V Reactor Bldg Vent Bd 2A Cable No. | Compt |
|---|---|
| 2PL1383 | 1A1 |
| 2PL1375 | 8E |
| 2PL1390 | 11A1 |

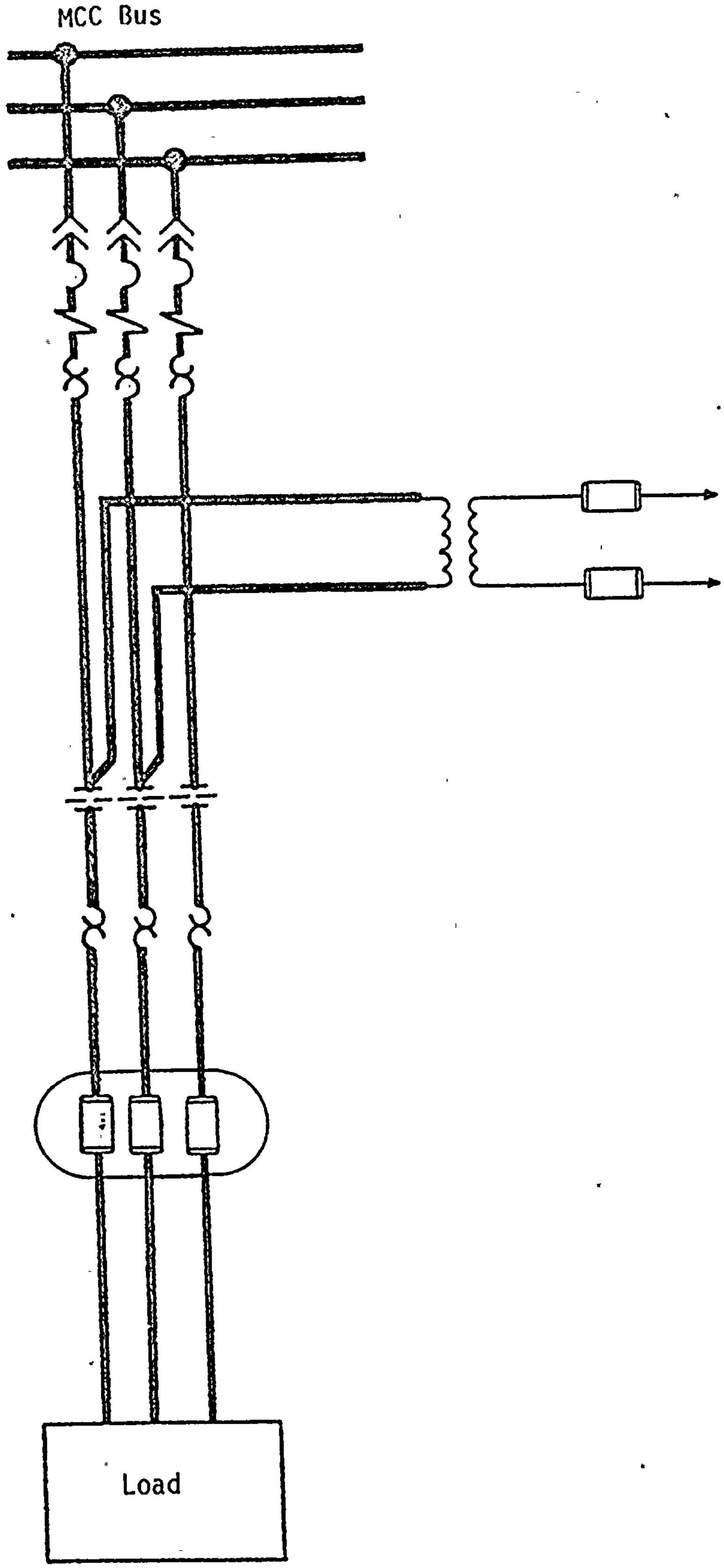
APPENDIX R

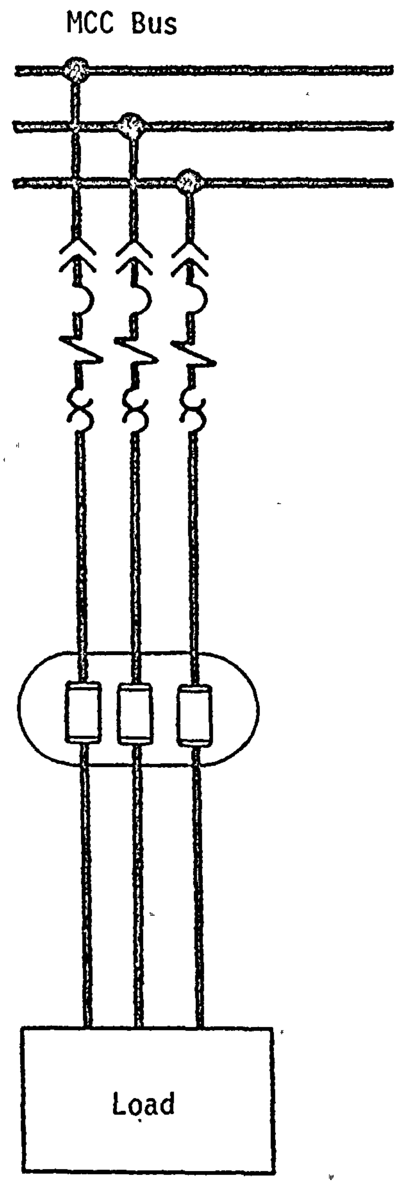
CORRECTIVE ACTION

PREPARED: Larry N. Hagaman

REVIEWED: W H Edw

DATE: 6/21/82


MCC Bus
Load


MCC Bus
Load

Some power circuits from 480-volt motor control centers have enough available fault current to raise conductors to the cable auto ignition temperature before a fault could be cleared. Cables that are not protected and that can share a common enclosure with cables that are required for shutdown capability are listed in table BFN-IT-RB-AC-3-M1.

Corrective action is to install fuses in the power circuits with clearing characteristics fast enough to ensure that faulted cables do not reach auto-ignition temperature. See attached sketches.

APPENDIX R

CORRECTIVE ACTION

PREPARED: Larry N. Hagaman

REVIEWED: Turner J. Howard

DATE: 6-21-82

| 480V Reactor MOV Bd 3C Cable No. | Compt |
|---|---|
| 3PL2060 | 1C |
| 3V2100 | 3C |
| 3V2122 | 3E |
| 3PL585 | 4A |
| PLR2050 | 4B |
| 3V2130 | 4E |
| 3V2460 | 5B |
| 3V2308 | 5C |
| 3PL2215 | 5E |
| 3V2465 | 6B |
| 3V2317 | 6C |
| 3V2508 | 6E |
| PLR2062 | 7A |
| 3V2300 | 7B |
| 3V2160 | 7E |
| 3V1950 | 8B |
| 3V2150 | 8E |
| 3V2500 | 9B |
| 3V2516 | 9E |
| 3ES425-I | R6A |
| 3ES462-I | R6E |
| 3ES2962-II | R8B |
| 3ES2925-II | R8E |
| 3PL2225 | R11A |
| 3PL3780-IE | R11B |

| 480V Diesel Auxiliary Bd 3EA Cable No. | Compt |
|---|---|
| 3PL1840 | 2A |
| 3ES2200-I | 2B1 |
| 3PL1975 | 2B2 |
| 3ES2328-I | 2C1 |
| 3PL1880 | 2E1 |
| 3PL1884 | 2E2 |
| 3PL1800 | 3A |
| 3PL861 | 3B |
| 3PL1860 | 3C |
| 3PL1970 | 4A |
| 3PL1980 | 4B1 |
| 3PL1983 | 4B2 |
| 3ES2336-I | 4C1 |
| 3PL1820 | 5A |
| 3ES2205-I | 5B1 |
| 3ES2140-I | 5E |
| 3ES2150-I | 6A |
| 3ES2160-I | 6C |
| 3ES2170-I | 6E |
| 3ES2220-I | 7A |
| 3ES2230-I | 7B |
| 3ES2240-I | 7C |
| 3ES2250-I | 7D |
| 3PL1888 | 7E1 |
| 3PL1892 | 7E2 |

| 480V Diesel Auxiliary Bd 3EB Cable No. | Compt |
|---|---|
| 3PL1850 | 2A |
| 3ES4700-II | 2B |
| 3PL1976 | 2C1 |
| 3PL1886 | 2E1 |
| 3PL1882 | 2E2 |
| 3PL1810 | 3A |
| 3PL1863 | 3B |
| 3PL1862 | 3C |
| 3PL1989 | 4B1 |
| 3PL1986 | 4B2 |
| 3PL1977 | 4C1 |
| 3ES4705-II | 5B1 |
| 3ES2516-II | 5C |
| 3ES4650-II | 5E |
| 3ES4640-II | 6A |
| 3ES4670-II | 6C |
| 3ES4660-II | 6E |
| 3ES4730-II | 7A |
| 3ES4740-II | 7B |
| 3ES4750-II | 7C |
| 3ES4720-II | 7D |

APPENDIX R

CORRECTIVE ACTION

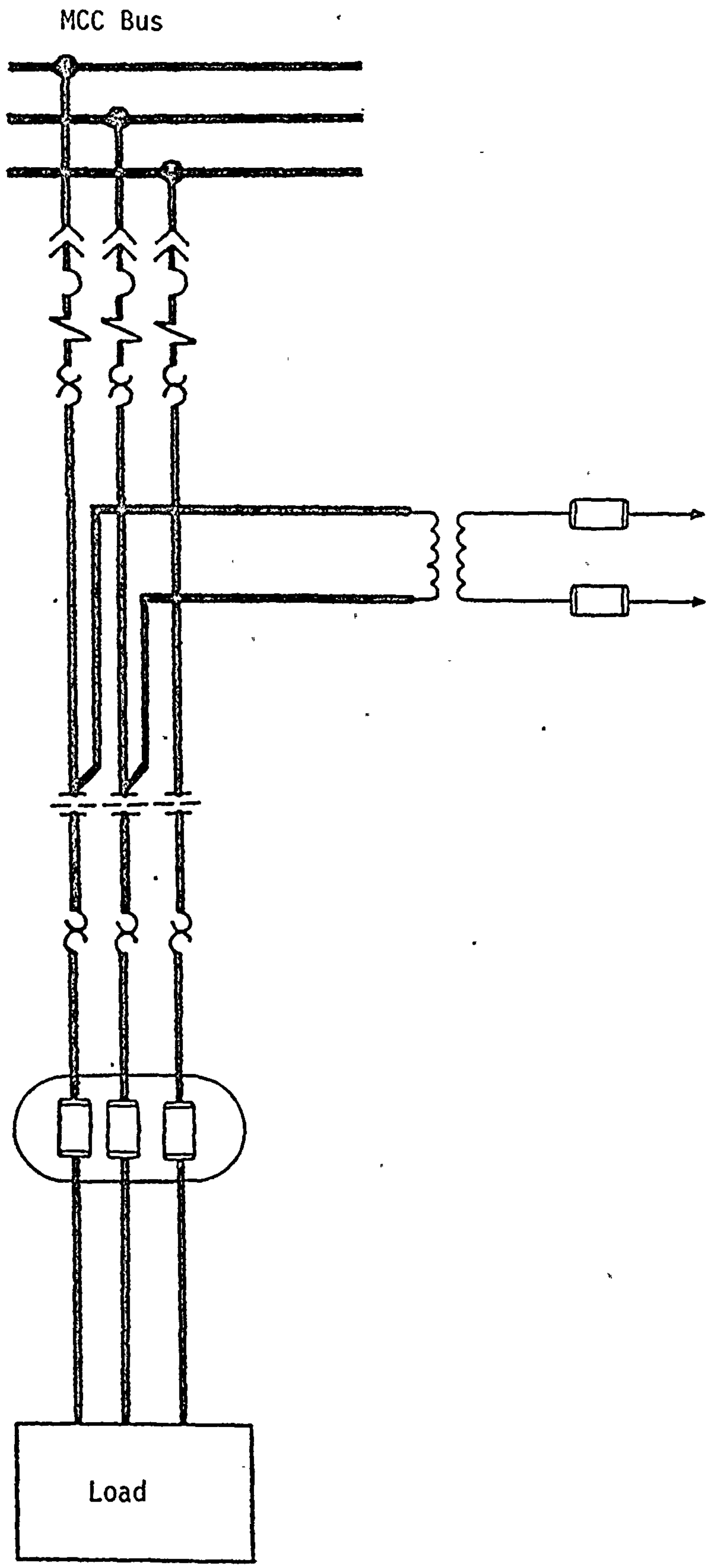
PREPARED: Larry N. Hagaman

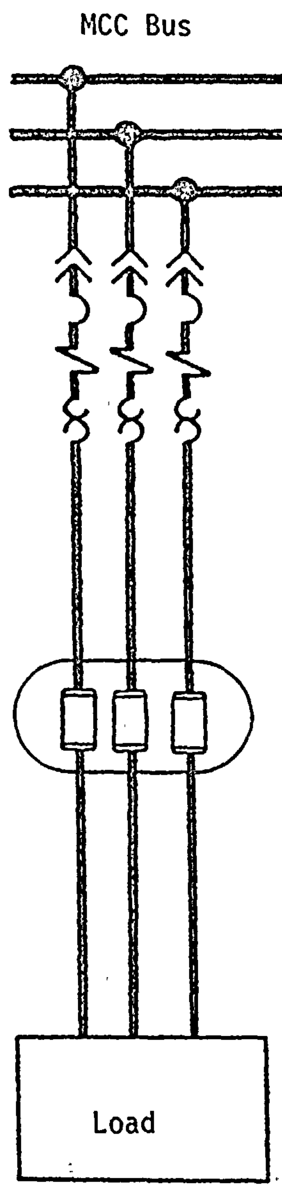
REVIEWED: Turner [illegible] David [illegible]

DATE: 6-21-82



Table BFN-IT-RB-AC-3-M1


MCC Bus
Load


MCC Bus
Load

The fire-induced failure of the 250-volt dc control power supply cables 1ES2819-II and 1ES2813-II on 250V dc reactor MOV board 1A, compartment 7A, for the HPCI pump discharge valve FCV-73-44 could affect the unit safe shutdown capability due to the lack of coordination between the affected load and feeder breakers:

Corrective Action:

The magnetic trip setting of the affected load breaker will be adjusted to a lower setting to provide proper protective device coordination. (Refer to the attached marked copy of GE time-current curve 158B8127, sheet 2, typical for all three units.)

APPENDIX R

CORRECTIVE ACTION

PREPARED: J. W. Semore

REVIEWED: JRoop

DATE: 21 June 1982

Due to inadequately sized cable protective device, a fire-induced fault in the following cable has the potential to impair unit safe shutdown capability. To alleviate this situation, the protective device will be replaced in the circuit of each cable as indicated below, and as marked on the referenced schematic.

| Cable Number | Existing Bkr/Fuse Rating | Replacement Bkr/Fuse Rating | Power Source | Reference Schematic |
|---|---|---|---|---|
| 1ES4460-II | 100 A Breaker | 40 A Breaker | 250V DC RMOV Bd 1A, Bkr 1B1 | 45W763-8R3 |
| 1ES1960-I | 100 A Breaker | 40 A Breaker | 250V DC RMOV Bd 1B, Bkr 8B1 | 45W763-7R3 |
| 1ES1350-I | 40 A Breaker | 30 A Breaker | 250V DC RMOV Bd 1C, Bkr 3D | 45N714-5R7 |
| 1ES1339-I | 40 A Breaker | 30 A Breaker | 250V DC RMOV Bd 1C, Bkr 7B | 45N714-6R6 |

APPENDIX R

CORRECTIVE ACTION

PREPARED: J. W. Lemore

REVIEWED: J. W. Hutson

DATE: 6-19-82

Some power circuit cables from 480-volt motor control centers in the shutdown board rooms have enough available fault current to raise conductors to the cable auto-ignition temperature before a fault could be cleared. Cables that are not protected and that can share a common enclosure with cables that are required for shutdown capability are listed by MCC:

**Reactor MOV Board 1A**

| Cable No. | Compt | Cable No. | Compt |
|---|---|---|---|
| PL1210 | 1A | 1RP1365A | 13A |
| 1PL2014 | 1D | 1PC700-I | 13C |
| 1PL2052 | 2B | 1PL2051 | 16B |
| 1PL2275 | 5A | B510 | 16C1 |
| 1V2235 | 6E | 1ES1428-I | 17E |
| 1ES1125-I | 7E | 1PL2425 | R9A |
| 1PL2325 | 8B | 1PL2450 | R9B |
| 1PL442 | 9B1 | 1PL2430 | R9D-1 |
| 1V2781-IE | 9B2 | 1ES1450-I | R9D-2 |
| 1V2788-IE | 9D | | |
| 1V2800-IE | 9E | | |
| 1PL2200 | 11A | | |
| ES825-I | 11C | | |
| ES833-I | 11D | | |

**Reactor MOV Board 1B**

| Cable No. | Compt | Cable No. | Compt |
|---|---|---|---|
| 1PL2350 | 1A | ES3333-II | 15E |
| PLR2018 | 1B | ES3900-II | 17A |
| ES3325-II | 3F | B518 | 17B-1 |
| IV2475 | 5A | 1PC504-II | 17E |
| 1V2450 | 6A | 1PL2300 | 18A |
| 1PL2040 | 6C-1 | PLR2006 | 18B |
| 1PL2250 | 7A | 1PL2210 | 18D |
| 1ES4450-II | 8A | 1PL2025 & 6 | 18E-2 |
| 1ES3680-II | 8C | 1PL2460 | R9B |
| 1V2831-IE | 9B | | |
| 1V2838-IE | 9D | | |
| 1V2850-IE | 9E | | |
| 1PC710-II | 11A | | |
| 1V2244 | 12E | | |
| 1ES2900-II | 13A | | |
| 1ES3700-II | 13E | | |
| 1RP1390-B | 14C-1 | | |

Corrective action is to install fuses in the power circuits with clearing characteristics fast enough to ensure that faulted cables do not reach auto-ignition temperature. See attached sketches.

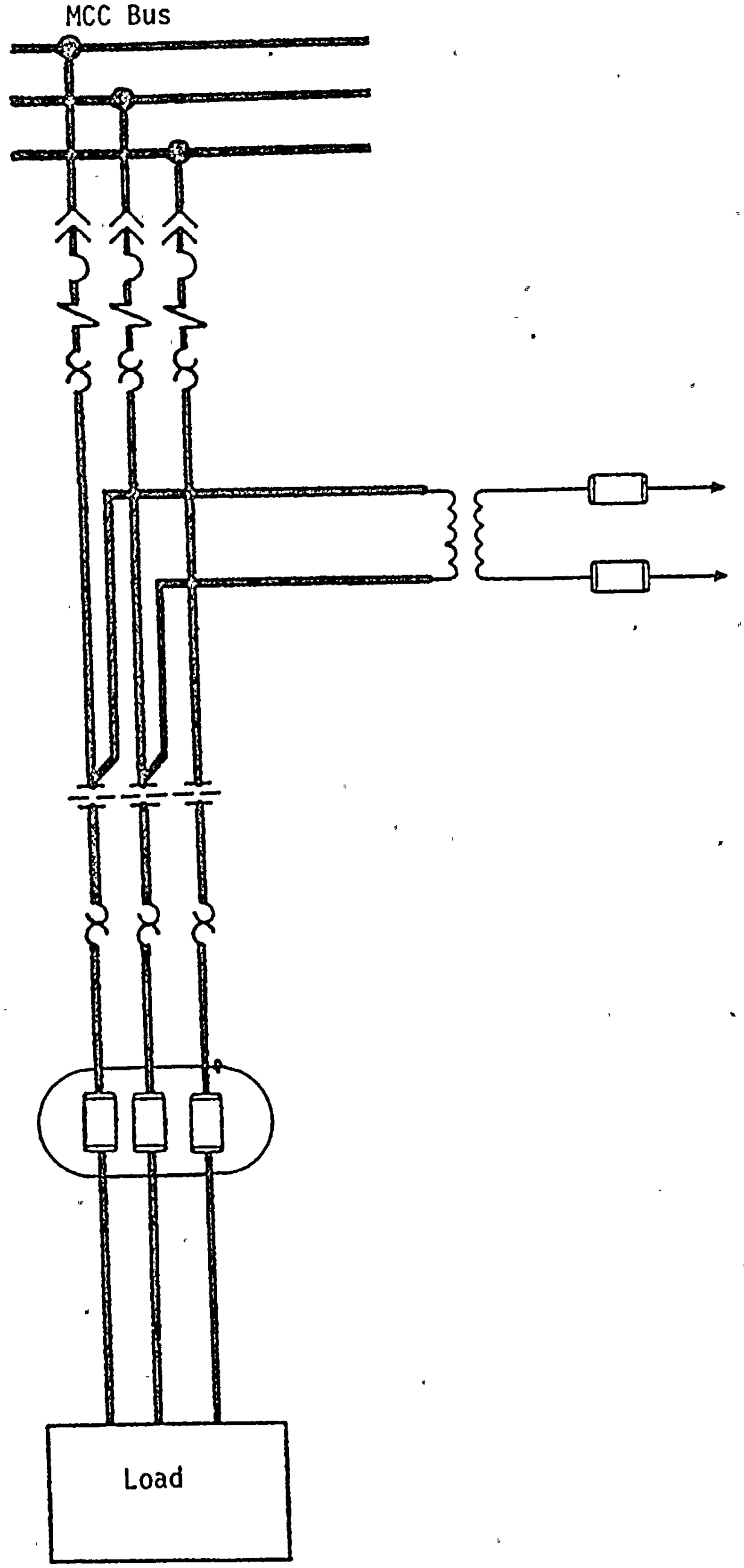
APPENDIX R

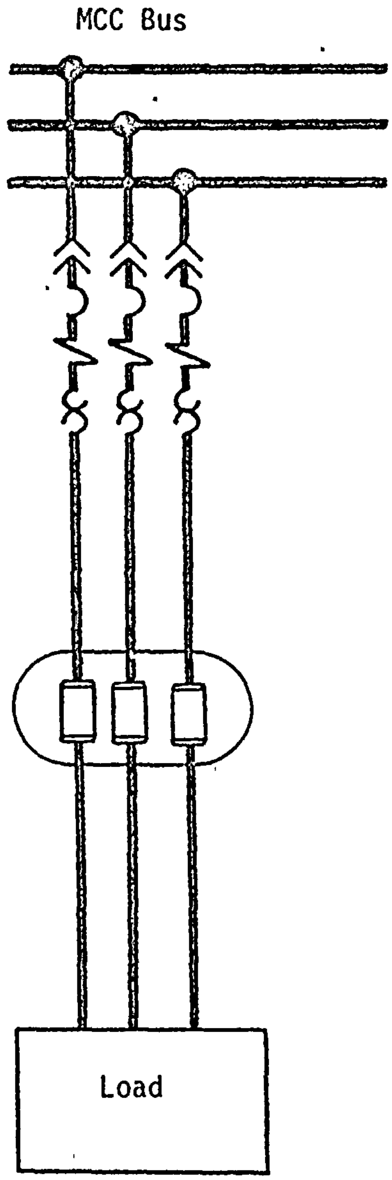
CORRECTIVE ACTION

PREPARED: Larry N. Hagaman

REVIEWED: Turner J. Howard

DATE: 6-21-82


MCC Bus
Load


MCC Bus
Load

The fire-induced failure of the 250-volt dc control power supply cables 2ES2819-II and 2ES2813-II on 250V dc reactor MOV board 2A, compartment 7A, for the HPCI pump discharge valve FCV-73-44 could affect the unit safe shutdown capability due to the lack of coordination between the affected load and feeder breakers:

Corrective Action:

The magnetic trip setting of the affected load breaker will be adjusted to a lower setting to provide proper protective device coordination. (Reference attached marked copy of GE time-current curve 158B8127, sheet 2, typical for all three units.)

APPENDIX R

CORRECTIVE ACTION

PREPARED: J. W. Lemore

REVIEWED: J Roop

DATE: 21 June 1982

Due to inadequately sized cable protective device, a fire-induced fault in the following cable has the potential to impair unit safe shutdown capability. To alleviate this situation, the protective device will be replaced in the circuit of each cable as indicated below, and as marked on the referenced schematic.

| Cable Number | Existing Bkr/Fuse Rating | Replacement Bkr/Fuse Rating | Power Source | Reference Schematic |
|---|---|---|---|---|
| 2ES4460-II | 100 A Breaker | 40 A Breaker | 250V DC RMOV Bd 2A, Bkr 1B1 | 45W763-10R3 |
| 2ES1960-I | 100 A Breaker | 40 A Breaker | 250V DC RMOV Bd 2B, Bkr 8B1 | 45W763-9R2 |
| 2ES1350-I | 40 A Breaker | 30 A Breaker | 250V DC RMOV Bd 2C, Bkr 3D | 45N714-5R7 |
| 2ES1339-I | 40 A Breaker | 30 A Breaker | 250V DC RMOV Bd 2C, Bkr 7B | 45N714-6R6 |
| 2ES1371-I | 30 A Breaker | 20 A Breaker | 250V DC RMOV Bd 2C, Bkr 4B | 45N714-5R7 |

APPENDIX R

CORRECTIVE ACTION

PREPARED: J. W. Semore

REVIEWED: G. D. Hutson

DATE: 6-19-82

Some power circuit cables from 480-volt motor control centers in the shutdown board rooms have enough available fault current to raise conductors to the cable auto-ignition temperature before a fault could be cleared. Cables that are not protected and that can share a common enclosure with cables that are required for shutdown capability are listed by MCC:

Reactor MOV Board 2A

| Cable No. | Compt | Cable No. | Compt |
|---|---|---|---|
| PL1225 | 1A | 2ES428-I | 17E |
| 2PL2014,5,&6 | 1D | 2ES1450-I | 19A |
| 2PL2275 | 4E | ES829-I | R9A |
| B514 | 5A | ES837-I | R9B |
| 2PL2325 | 5E | 2PL2430 | R9C1 |
| 2V2235 | 6E | 2PL2425 | R9C2 |
| 2PC700-I | 7B | 2PL2450 | R9E |
| 2ES1125-I | 7E | 2PC1001-I | R10F |
| 2PL442 | 9B1 | | |
| 2V2781-IE | 9B2 | | |
| 2V2788-IE | 9D | | |
| 2V2800-IE | 9E | | |
| 2PL2200 | 11A | | |

Reactor MOV Board 2B

| Cable No. | Compt | Cable No. | Compt |
|---|---|---|---|
| 2PL2350 | 1A | 2PL2210 | 11B |
| PLR2043 | 1B | 2PL2250 | 11D |
| 2ES2900-II | 1C | 2ES3700-II | 12A |
| B522 | 4C | 2ES4365-II | 13A |
| 2V2475 | 5A | 2RP1390-B | 14C-1 |
| 2V2450 | 6A | ES3887-II | 17A |
| 2PL2040 | 6C-1 | 2PC504-II | 17B |
| 2V2244 | 7A | 2PL2300 | 18A |
| 2ES3680-II | 8C | PLR2031 | 18B |
| 2V2831-IE | 9B2 | 2ES4450-II | 18D |
| 2V2838-IE | 9D | 2PL2025 & 6 | 18E |
| 2V2850-IE | 9E | 2PL2435 | R9A |
| ES3329-II | 10C | 2PL2460 | R9B |
| ES3337-II | 10D | 2PC1003-II | R10F |
| 2PC710-II | 11A | | |

Corrective action is to install fuses in the power circuits with clearing characteristics fast enough to ensure that faulted cables do not reach auto-ignition temperature. See attached sketches.

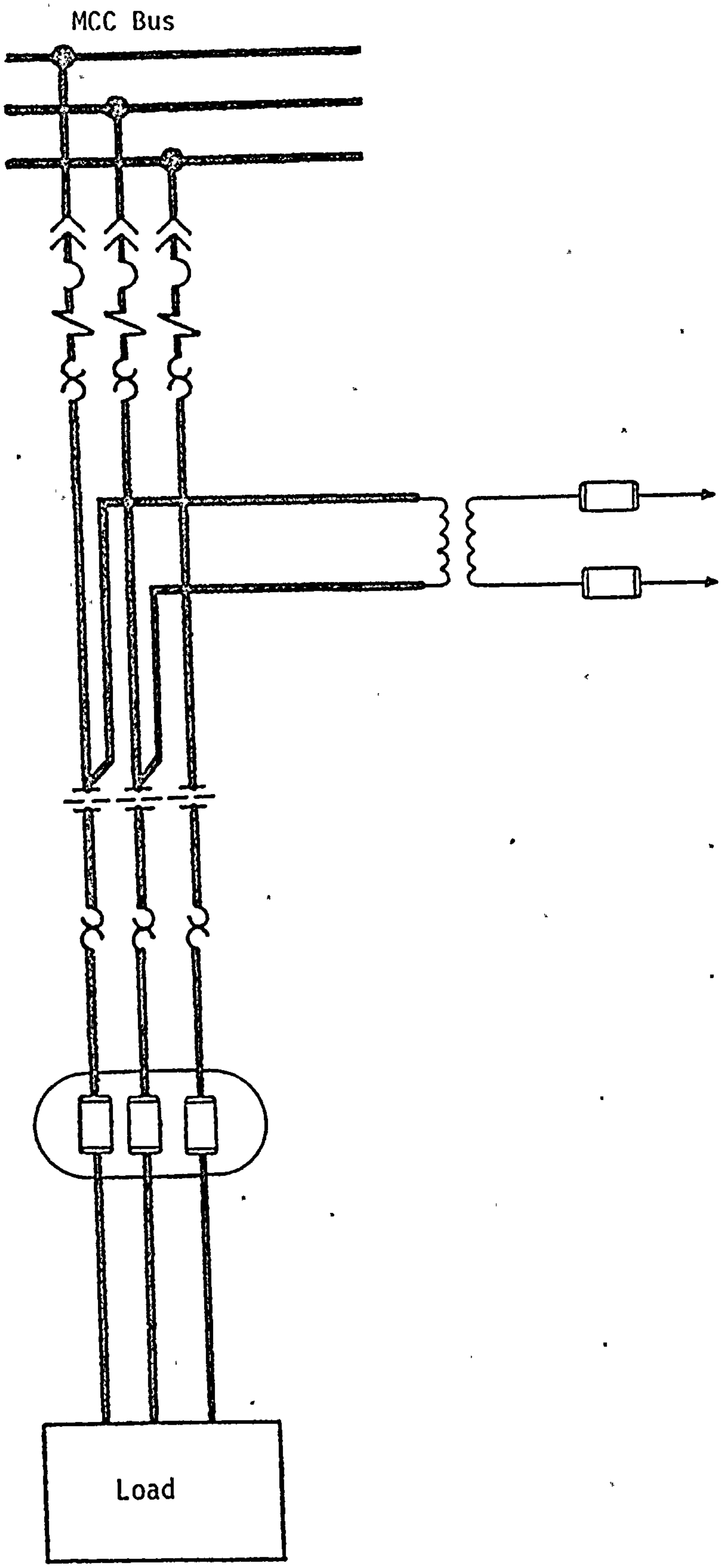
APPENDIX R

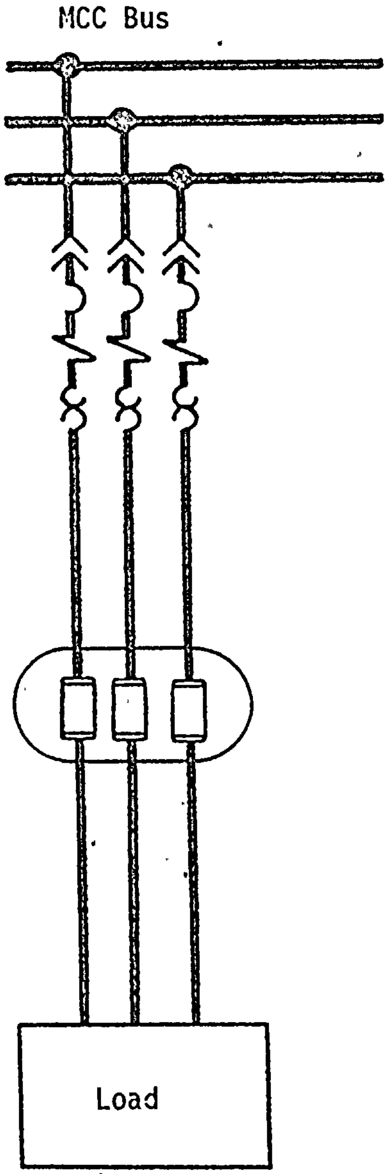
CORRECTIVE ACTION

PREPARED: Larry N. Hagaman

REVIEWED: Turner J. Howard

DATE: 6-21-82


MCC Bus
Load


MCC Bus
Load

The fire-induced failure of the 250-volt dc control power supply cables 3ES2819-II and 3ES2813-II on 250V dc reactor MOV board 3A, compartment 7A, for the HPCI pump discharge valve FCV-73-44 could affect the unit safe shutdown capability due to the lack of coordination between the affected load and feeder breakers:

Corrective Action:

The magnetic trip setting of the affected load breaker will be adjusted to a lower setting to provide proper protective device coordination. (Refer to the attached marked copy of GE time-current curve 158B8127, sheet 2, typical for all three units.)

APPENDIX R

CORRECTIVE ACTION

PREPARED: J. W. Semore

REVIEWED: JKoop

DATE: 21 June 1982

Due to inadequately sized cable protective device, a fire-induced fault in the following cable has the potential to impair unit safe shutdown capability. To alleviate this situation, the protective device will be replaced in the circuit of each cable as indicated below, and as marked on the referenced schematic.

| Cable Number | Existing Bkr/Fuse Rating | Replacement Bkr/Fuse Rating | Power Source | Reference Schematic |
|---|---|---|---|---|
| 3ES4460-II | 100 A Breaker | 40 A Breaker | 250V DC RMOV Bd 3A, Bkr 1B1 | 45W763-12R2 |
| 3ES1960-I | 100 A Breaker | 40 A Breaker | 250V DC RMOV Bd 3B, Bkr 8B1 | 45W763-11R2 |
| 3ES1350-I | 40 A Breaker | 30 A Breaker | 250V DC RMOV Bd 3C, Bkr 3D | 45N714-5R7 |
| 3ES1339-I | 40 A Breaker | 30 A Breaker | 250V DC RMOV Bd 3C, Bkr 7B | 45N714-6R6 |
| 3ES1371-I | 30 A Breaker | 20 A Breaker | 250V DC RMOV Bd 3C, Bkr 4B | 45N714-5R7 |

APPENDIX R

CORRECTIVE ACTION

PREPARED: J. W. Lemoine

REVIEWED: J. D. Hutson

DATE: 6-19-82

Some power circuit cables from 480-volt motor control centers in the shutdown board rooms have enough available fault current to raise conductors to the cable auto-ignition temperature before a fault could be cleared. Cables that are not protected and that can share a common enclosure with cables that are required for shutdown capability are listed by MCC:

**Reactor MOV Board 3A**

| Cable No. | Compt | Cable No. | Compt |
|---|---|---|---|
| PL1237 | 1A | 3ES2291-I | R9B1 |
| 3PL2014,15,16 | 1D | 3ES2292-I | R9B2 |
| 3PL2275 | 4E | 3ES2286-I | R9F |
| 3V2800-IE | 5B | 3PC1001-I | R10F |
| 3PL2325 | 5E | | |
| 3V2235 | 6E | | |
| 3PL2052 | 7A | | |
| 3PC700-I | 7B | | |
| 3ES1125-I | 7E | | |
| 3V2788-IE | 9B | | |
| 3V2781-IE | 9C | | |
| 3PL442 | 9E-1 | | |
| 3PL2200 | 11A | | |
| 3ES1428-I | 17E | | |
| 3ES1450-I | 19A | | |

**Reactor MOV Board 3B**

| Cable No. | Compt | Cable No. | Compt |
|---|---|---|---|
| 3PL2350 | 1A | 3ES4782-II | R9D |
| PLR2068 | 1B | 3ES4786-II | R9F |
| 3ES2900-II | 1C | 3PC1003-II | R10F |
| ES2652-II | 4C | 3PL2210 | 11B |
| 3V2475 | 5A | 3PL2250 | 11D |
| 3V2450 | 6A | 3ES3700-II | 12A |
| 3PL2040 | 6C-1 | 3ES4365-II | 13A |
| 3V2244 | 7A | ES1387-I | 17A |
| 3ES3680-II | 8C | 3PC504-II | 17B |
| 3V2831-IE | 9B-2 | 3PL2300 | 18A |
| 3V2838-IE | 9D | PLR2056 | 18B |
| 3V2850-IE | 9E | 3PL2025 & 6 | 18E |
| 3ES4450-II | 10A | 3PC710-II | 11A |
| 3ES4791-II | R9B-1 | | |
| 3ES4792-II | R9B-2 | | |

Corrective action is to install fuses in the power circuits with clearing characteristics fast enough to ensure that faulted cables do not reach auto-ignition temperature. See attached sketches.

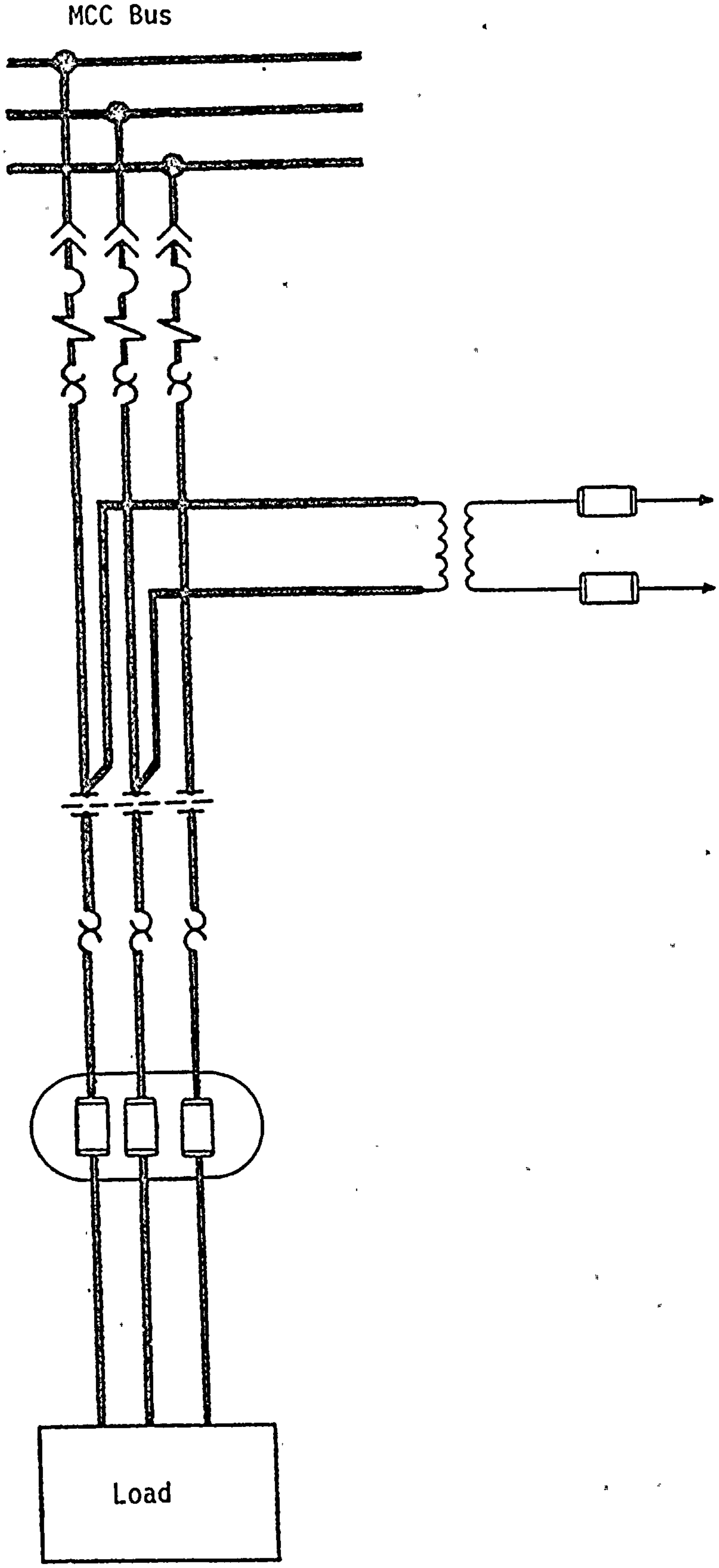
## APPENDIX R

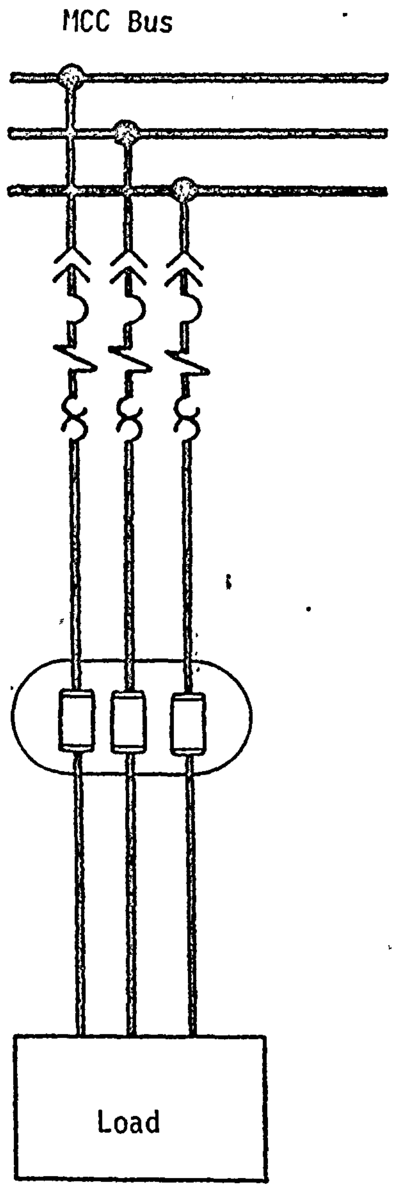
## CORRECTIVE ACTION

PREPARED: Larry N. Hagaman

REVIEWED: Thomas J. Howard

DATE: 6-21-82


MCC Bus
Load


MCC Bus
Load

Cable 1PL881 from 480-volt auxiliary boiler board (MCC) and cable 3PL4871 from 480-volt condensate demineralizer board 3 (MCC) can share a common enclosure with cables that are required for shutdown capability and have available fault current high enough to raise conductor temperature to the auto-ignition level before a fault could be cleared..

Corrective action is to install fuses in the power circuit with clearing characteristics fast enough to ensure that faulted cables do not reach auto-ignition temperature. See the attached sketch.

Cable PL232 from 480-volt common board 3 (swgr) can share a common enclosure with cables that are required for shutdown capability and has available fault current high enough to raise conductor temperature to its auto-ignition level before a fault would be cleared by its non-instantaneous circuit breaker.

Corrective action is to move the cable to a circuit breaker with an instantaneous trip element installed in an adjacent compartment.

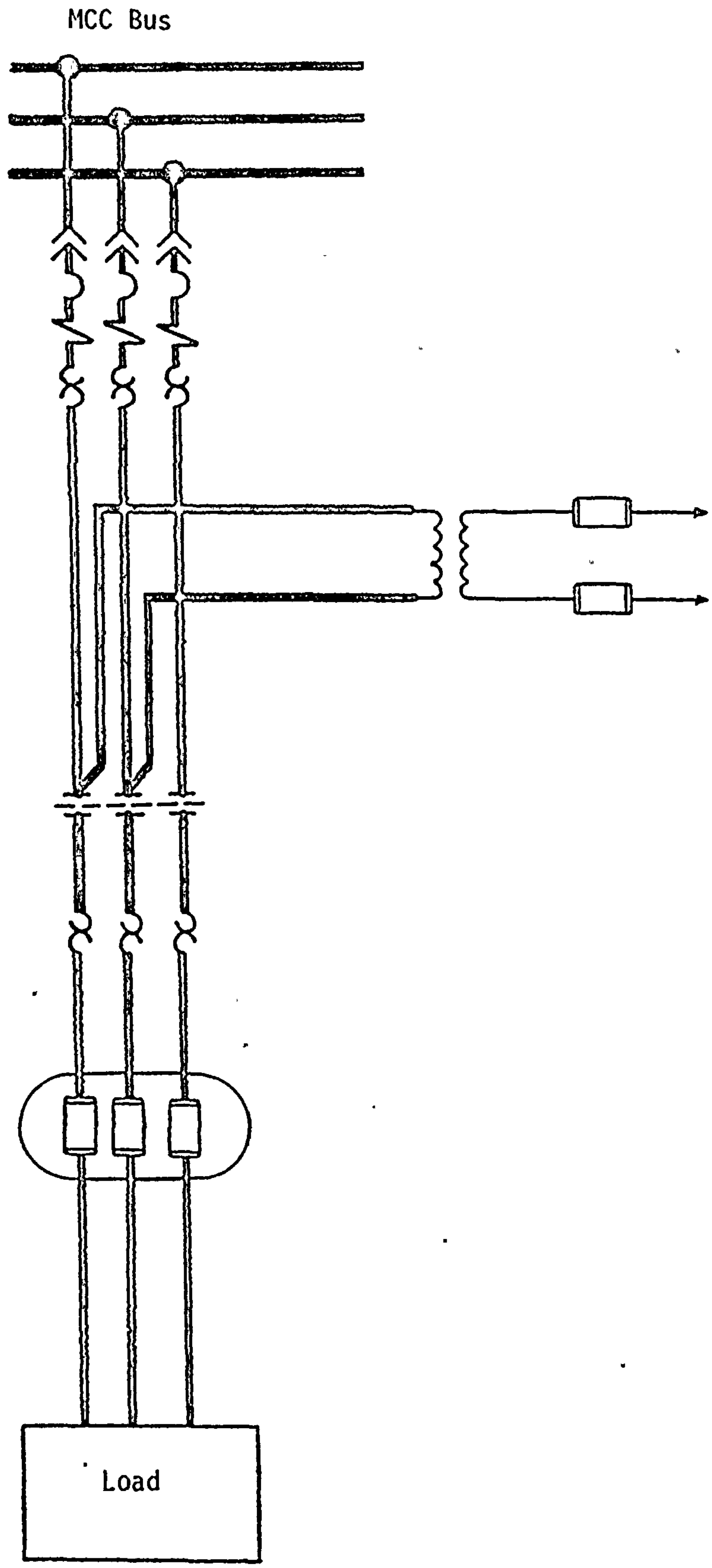
APPENDIX R

CORRECTIVE ACTION

PREPARED: Dick Walker

REVIEWED: Willis L. Nelms Jr.

DATE: 6/21/82


MCC Bus
Load

A postulated fire could involve both the 4160-volt cables (1PP400, 1PP401, and 1PP402) supplying power to reactor recirculation pump 1A motor-generator set and protective relaying control cables (1PP431 and 1PP450) for the power circuit. If the fire faulted the control circuit first, causing the dc control circuit fuse to clear, protection for the 4160-volt circuit would be lost and a fault to that circuit could not be cleared. This possible problem also exists for the power circuit to reactor recirculation pump 1B motor-generator set (4160-volt power cables 1PP525, 1PP526, and 1PP527, and control circuit cables 1PP432 and 1PP575).

The corrective action is to place a coordinating fuse (6 ampere) downstream of the main circuit fuse (35 ampere) in the negative polarity of the protective relaying circuits. Since the control power of the circuits in question is ungrounded, this will isolate the control cables as required for proper circuit operation. (Reference attached marked copy of schematic drawing No. 45N763-6 with changes circled).

APPENDIX R

CORRECTIVE ACTION

PREPARED: Mallory D Williams

REVIEWED: James C Truslove

DATE: 6/18/82

A postulated fire could involve both the 4160-volt cables (2PP400, 2PP401, and 2PP402) supplying power to reactor recirculation pump 2A motor-generator set and protective relaying control cables (2PP430 and 2PP450) for the power circuit. If the fire faulted the control circuit first, causing the dc control circuit fuse to clear, protection for the 4160-volt circuit would be lost and a fault to that circuit could not be cleared. This possible problem also exists for the power circuit to reactor recirculation pump 2B motor-generator set (4160-volt power cables 2PP525, 2PP526, and 2PP527, and control circuit cables 2PP431 and 2PP575).

The corrective action is to place a coordinating fuse (6 ampere) downstream of the main circuit fuse (35 ampere) in the negative polarity of the protective relaying circuits. Since the control power of the circuits in question is ungrounded, this will isolate the control cables as required for proper circuit operation. (Reference attached marked copy of schematic drawing No. 45N763-6 with changes circled).

APPENDIX R

CORRECTIVE ACTION

PREPARED: Bradley D Williams

REVIEWED: James C Truelove

DATE: 6/18/82

A postulated fire could involve both the 4160-volt cables (3PP400, 3PP401, and 3PP402) supplying power to reactor recirculation pump 3A motor-generator set and protective relaying control cables (3PP569 and 3PP450) for the power circuit. If the fire faulted the control circuit first, causing the dc control circuit fuse to clear, protection for the 4160-volt circuit would be lost and a fault to that circuit could not be cleared. This possible problem also exists for the power circuit to reactor recirculation pump 3B motor-generator set (4160-volt power cables 3PP525, 3PP526, and 3PP527, and control circuit cables 3PP568 and 3PP575).

The corrective action is to place a coordinating fuse (6 ampere) downstream of the main circuit fuse (35 ampere) in the negative polarity of the protective relaying circuits. Since the control power of the circuits in question is ungrounded, this will isolate the control cables as required for proper circuit operation. (Reference attached marked copy of schematic drawing No. 45N763-6 with changes circled).

APPENDIX R

CORRECTIVE ACTION

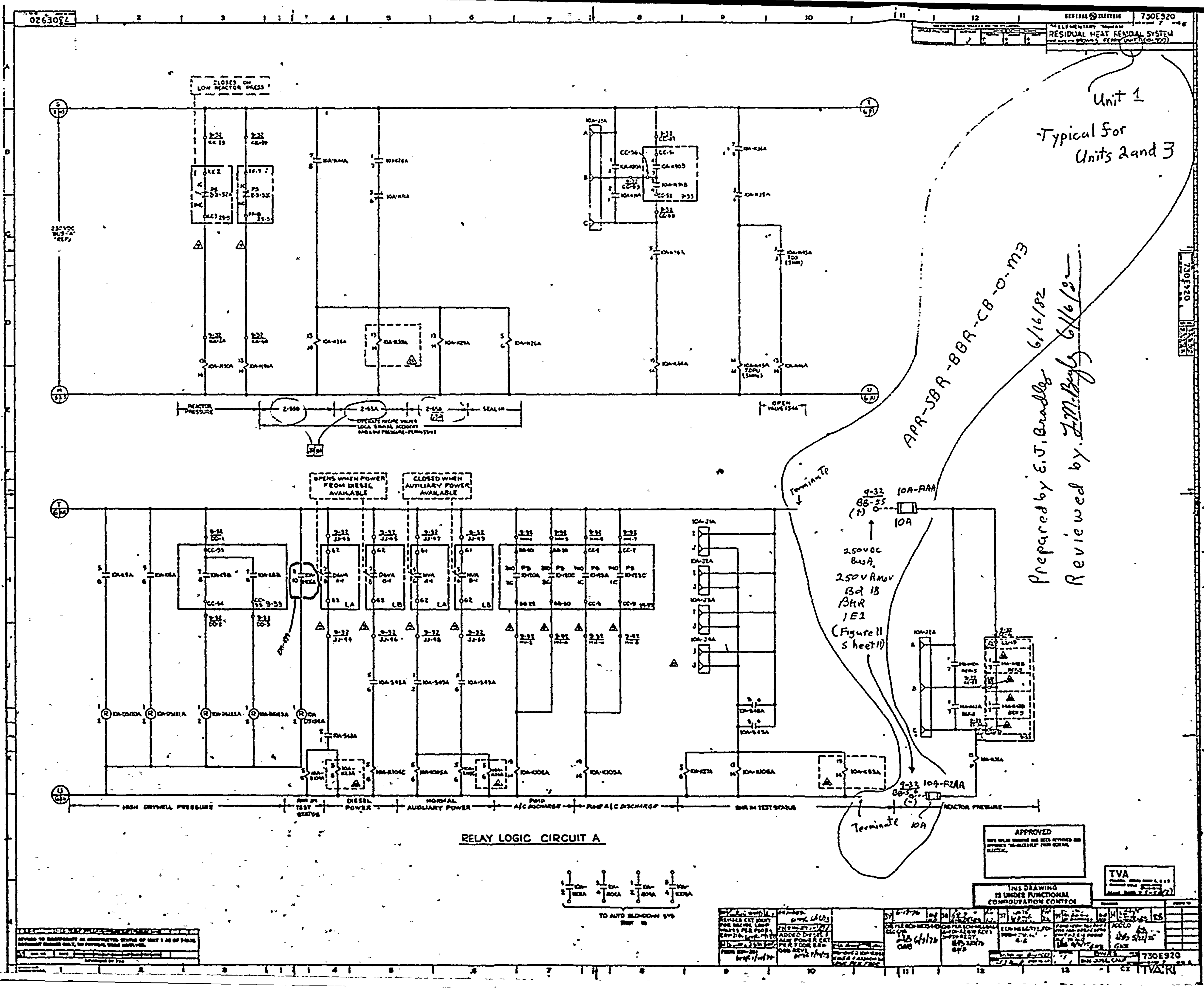
PREPARED: Bradley D Williams

REVIEWED: James C Truelove

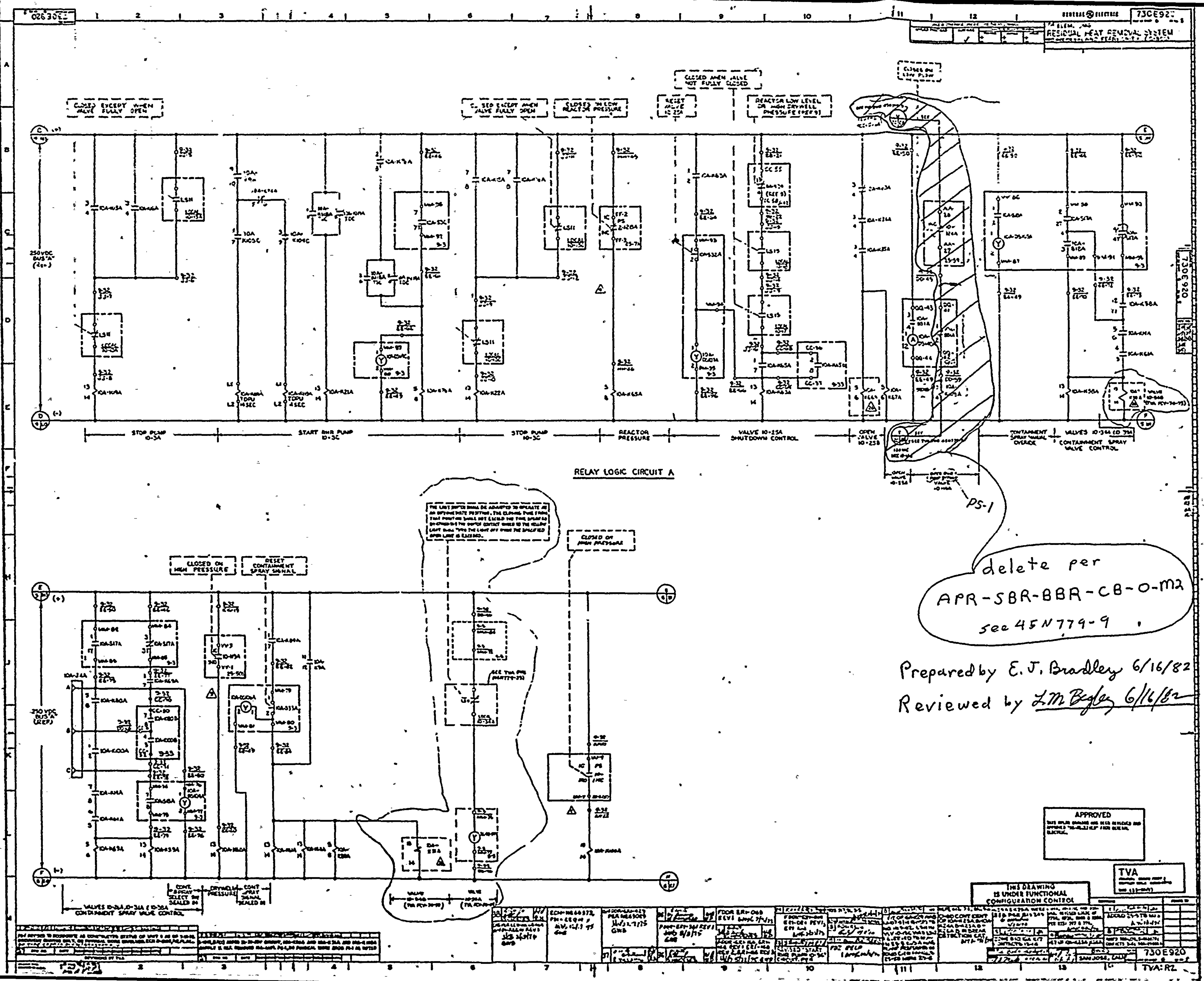
DATE: 6/18/82



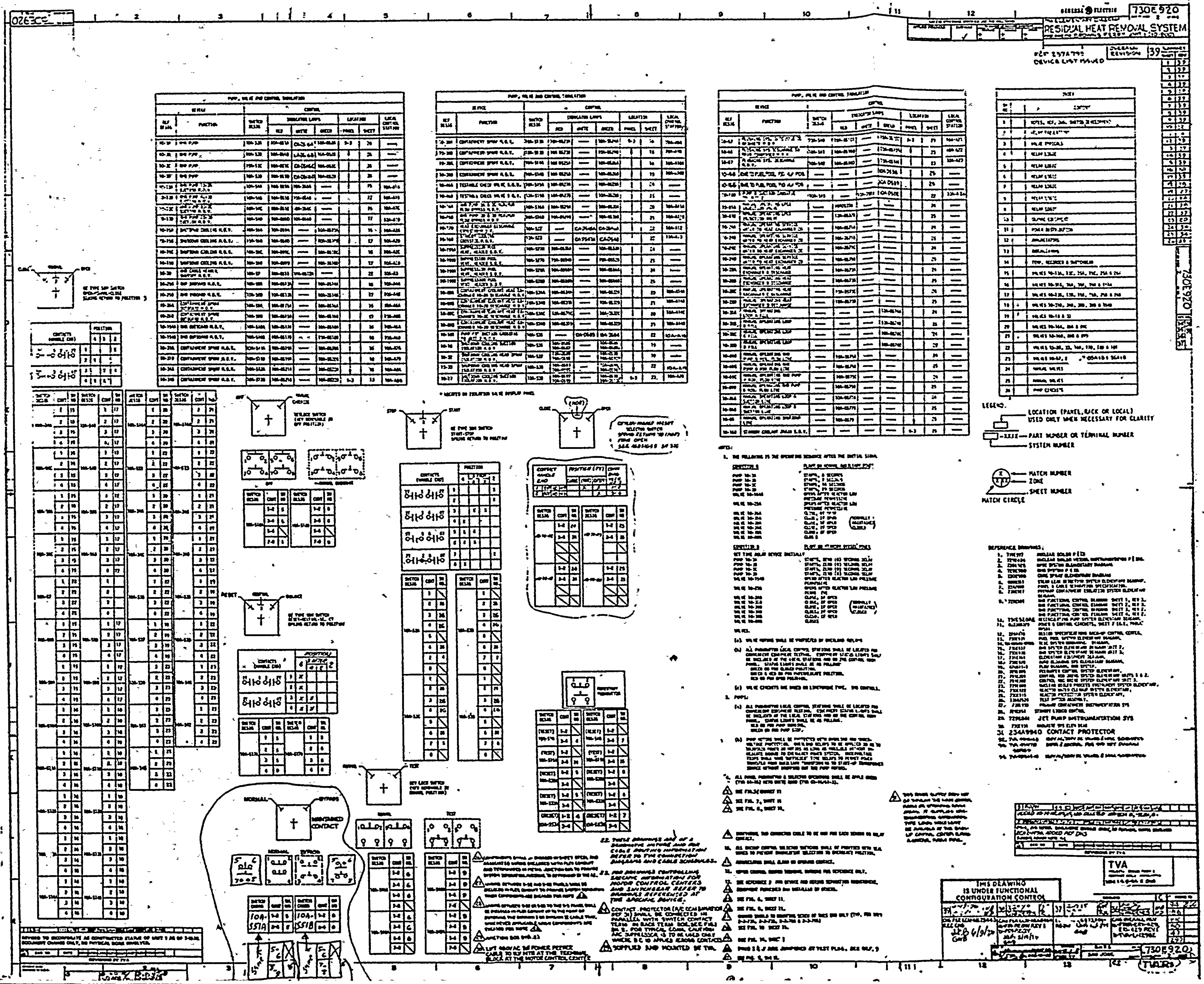
BFN-IT-TB-AC-3-M1

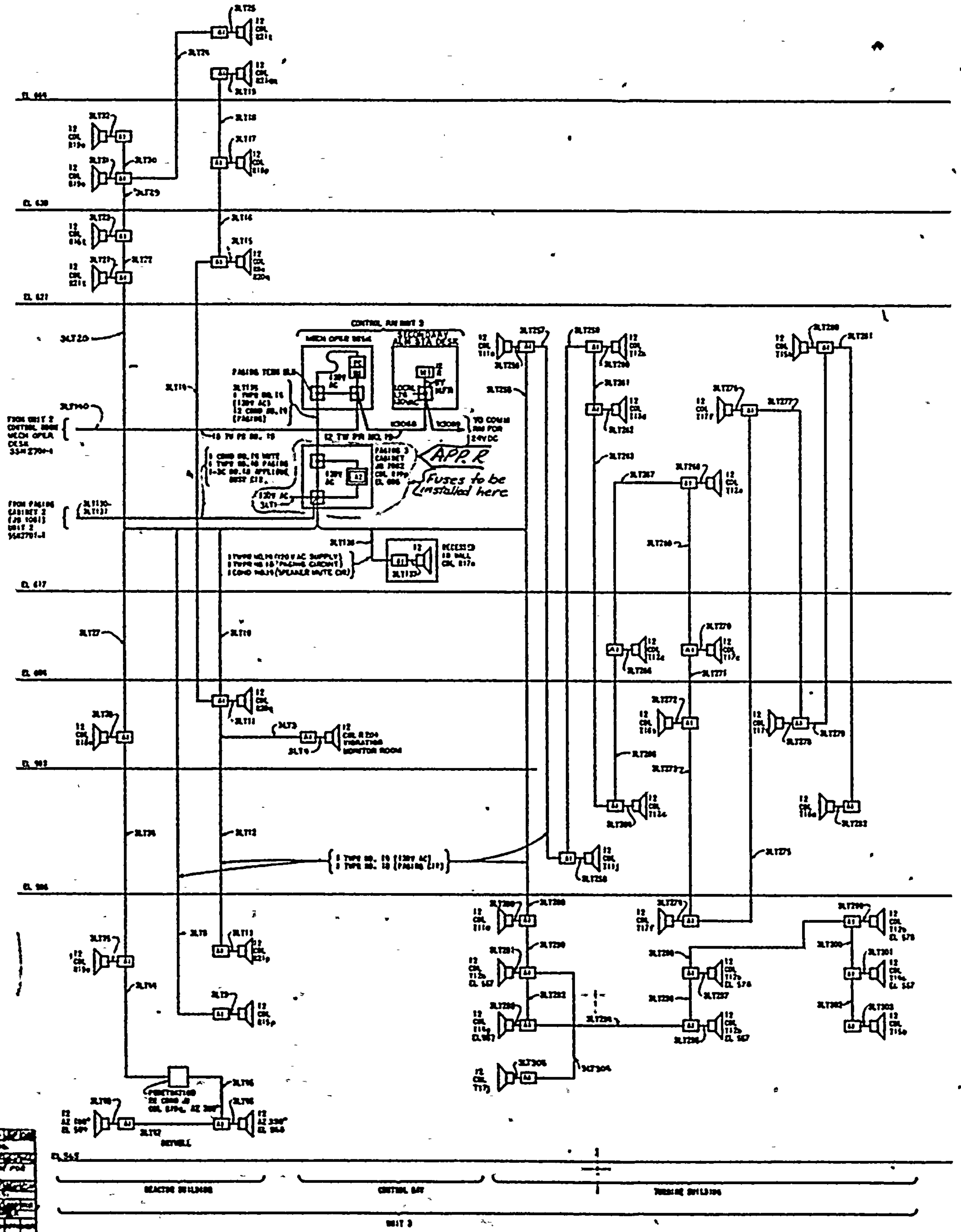


GENERAL ELECTRIC
730E920
ELEMENTARY DIAGRAM
RESIDUAL HEAT REMOVAL SYSTEM
02630
CLOSES ON LOW REACTOR PRESS
250VDC
REACTOR PRESSURE
SEAL IN
OPENS WHEN POWER FROM DIESEL AVAILABLE
CLOSED WHEN AUXILIARY POWER AVAILABLE
HIGH DRYWELL PRESSURE
RHR IN TEST STATUS
DIESEL POWER
NORMAL AUXILIARY POWER
PUMP A/C DISCHARGE
REACTOR PRESSURE
RELAY LOGIC CIRCUIT A
TO AUTO BLOWDOWN SYS
APPROVED
TVA
THIS DRAWING IS UNDER FUNCTIONAL CONFIGURATION CONTROL
Unit 1
Typical for Units 2and 3
APR-SBR-BBR-CB-O-M3
Prepared by E.J. Bradley 6/16/82
Reviewed by 6/16/82
Terminate
9-32 BB-55 (+)
10A-FAA
10A
250VDC Bus A
250V Rmov Bd 1B BKR 1E1
(Figure 11 Sheet 11)
9-33 BB-56 (-)
10A-F2AA
Terminate
10A



730E920
RESIDUAL HEAT REMOVAL SYSTEM
RELAY LOGIC CIRCUIT A
CLOSED EXCEPT WHEN VALVE FULLY OPEN
CLOSES ON LOW REACTOR PRESSURE
CLOSED WHEN VALVE NOT FULLY CLOSED
RESET VALVE 10-25A
REACTOR LOW LEVEL OR HIGH DRYWELL PRESSURE
CLOSES ON LOW FLOW
250 VDC BUS "A"
STOP PUMP 10-3A
START RHR PUMP 10-3C
STOP PUMP 10-3C
REACTOR PRESSURE
VALVE 10-25A SHUTDOWN CONTROL
OPEN VALVE 10-25B
CONTAINMENT SPRAY MANUAL OVERRIDE
VALVES 10-34A (10-39A) CONTAINMENT SPRAY VALVE CONTROL
CLOSED ON HIGH PRESSURE
RESET CONTAINMENT SPRAY SIGNAL
CLOSED ON HIGH PRESSURE
250 VDC BUS "A" (REF)
VALVES 10-34A (10-38A CONTAINMENT SPRAY VALVE CONTROL
CONT SPRAY SELECT SIG SEALED IN
DRYWELL PRESSURE
CONT SPRAY SIGNAL SEALED IN
PS-1
delete per
APR-SBR-BBR-CB-0-M2
see 45N779-9
Prepared by E. J. Bradley 6/16/82
Reviewed by LM Begley 6/16/82
APPROVED
TVA
THIS DRAWING IS UNDER FUNCTIONAL CONFIGURATION CONTROL
730E920


730E920
RESIDUAL HEAT REMOVAL SYSTEM
DEVICE LIST ISSUED
OVERALL REVISION 39
LEGEND.
LOCATION (PANEL, RACK OR LOCAL) USED ONLY WHEN NECESSARY FOR CLARITY
-XXXX — PART NUMBER OR TERMINAL NUMBER
SYSTEM NUMBER
MATCH NUMBER
ZONE
SHEET NUMBER
MATCH CIRCLE
REFERENCE DRAWINGS:
JET PUMP INSTRUMENTATION SYS
234A9940 CONTACT PROTECTOR
CONTACT PROTECTOR (R/C COMBINATION) SHALL BE CONNECTED IN PARALLEL WITH SWITCH CONTACT
SUPPLIED AND MOUNTED BY TVA.
LIFT 480VAC 3Ø POWER FEEDER CABLE TO XLP WITH AT THE TERMINAL BLOCK AT THE MOTOR CONTROL CENTER
NORMAL
BYPASS
MAINTAINED CONTACT
RESET
START
STOP
CLOSE
OPEN
TEST
10A-S51A
10A-S51B
THIS DRAWING IS UNDER FUNCTIONAL CONFIGURATION CONTROL
TVA
730E920
TVARs




NOTE: FOR GENERAL NOTES AND A LIST OF SYMBOLS SEE 55N2701-02

POWERHOUSE
UNITS 1-3

COMMUNICATIONS
INTERCOM & PAGING SYSTEM
SINGLE LINE

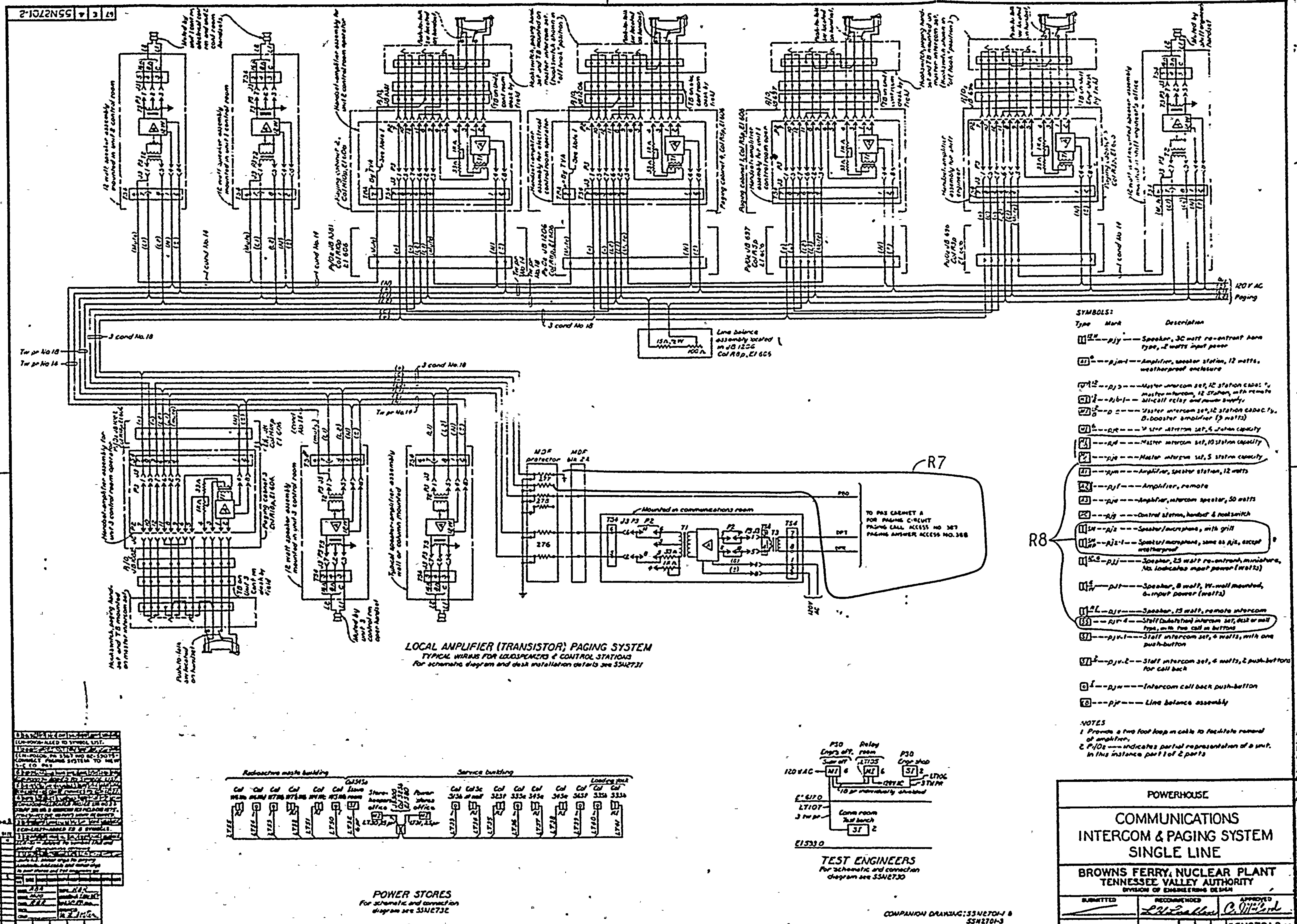
BROWNS FERRY NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN

| INSPECTED AND APPROVED FOR ISSUE | SUBMITTED | RECOMMENDED | APPROVED |
|---|---|---|---|
| H.C. Russell | W.M. Foster | L.H. Fullbright | John E. Whaley |
| DESIGN PROJECT MANAGER | KNOXVILLE 1-21-74 | 67 1 4 | 55N2701-3 |

THIS DRAWING IS UNDER FUNCTIONAL CONFIGURATION CONTROL

ECN-858

55N2701-3




POWERHOUSE

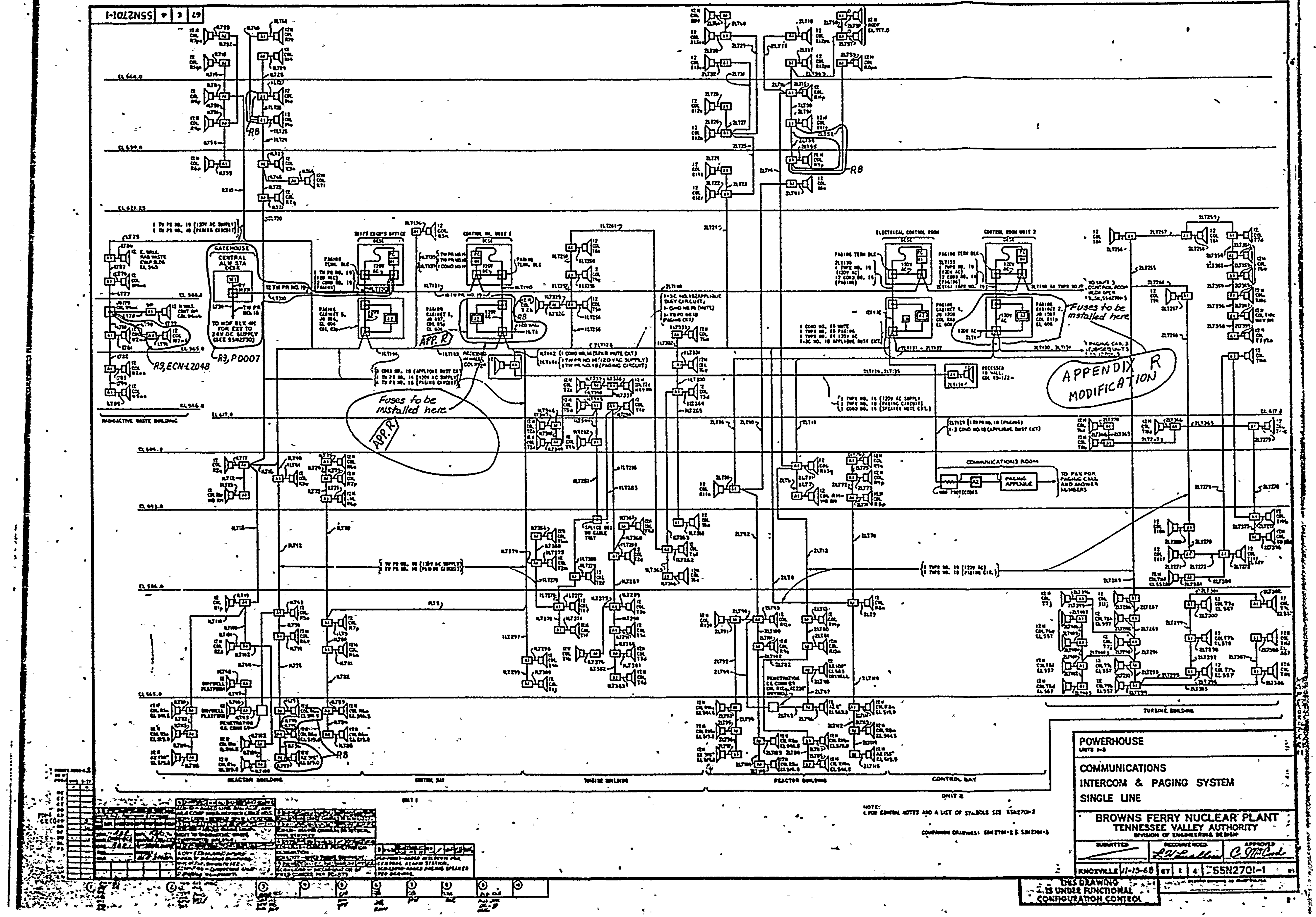
COMMUNICATIONS
INTERCOM & PAGING SYSTEM
SINGLE LINE

BROWNS FERRY NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN

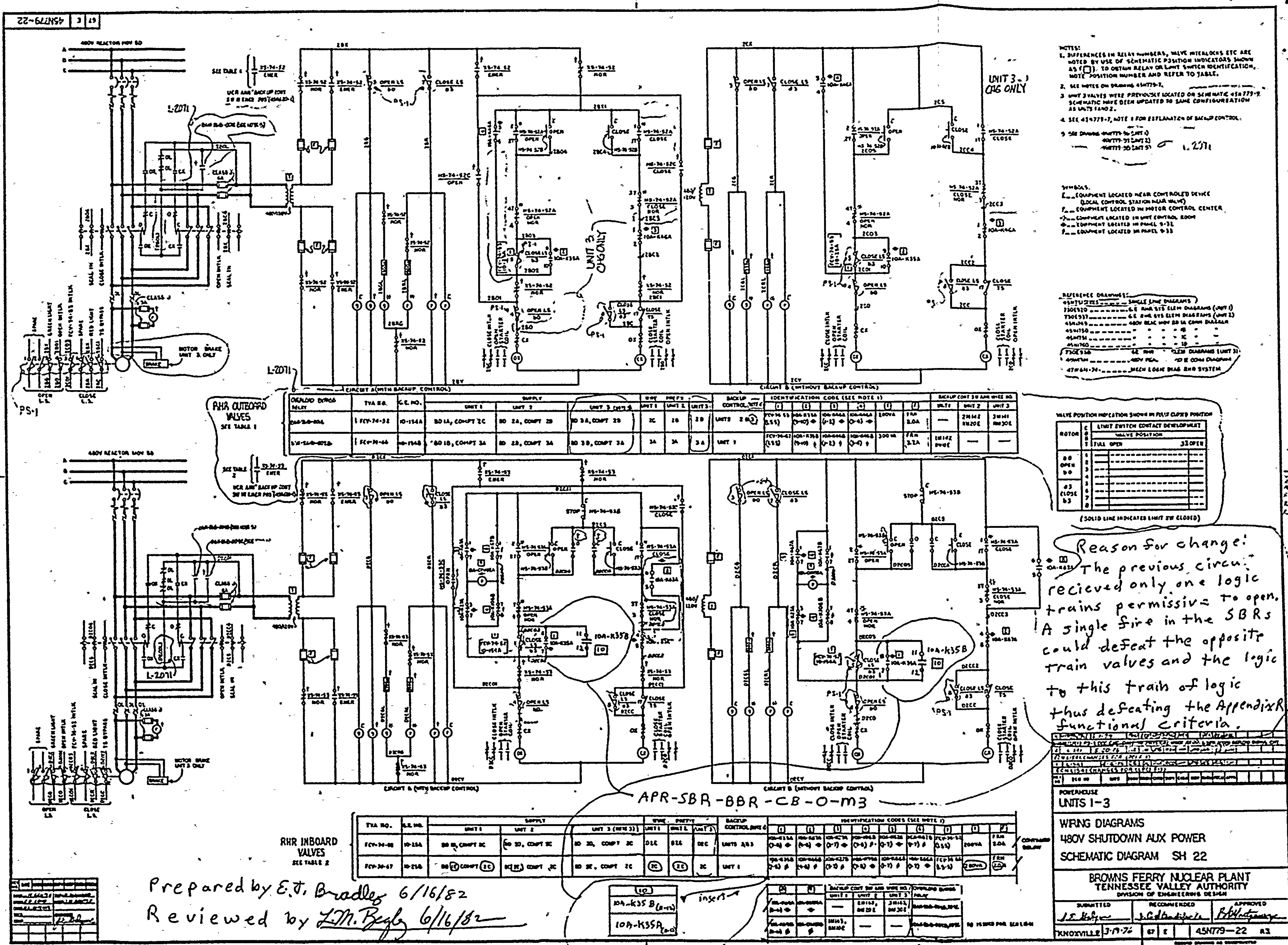
| SUBMITTED | RECOMMENDED | APPROVED |
|---|---|---|
| | | |

| KNOXVILLE | 11-19-68 | 67 | E | 4 | 55N2701-2 R5 |
|---|---|---|---|---|---|

THIS DRAWING IS UNDER FUNCTIONAL CONFIGURATION CONTROL



55N2701-1
GATEHOUSE
CENTRAL ALM STA
R9, P0007
R9, ECN-L2048
R8
APP. R
Fuses to be installed here
Fuses to be installed here
APPENDIX R MODIFICATION
SHIFT ENGR'S OFFICE
CONTROL RM. UNIT 1
ELECTRICAL CONTROL ROOM
CONTROL ROOM UNIT 2
COMMUNICATIONS ROOM
PAGING APPLIQUE
TO PAX FOR PAGING CALL AND ANSWER NUMBERS
RADIOACTIVE WASTE BUILDING
REACTOR BUILDING
CONTROL BAY
TURBINE BUILDING
UNIT 1
UNIT 2
POWERHOUSE
UNITS 1-3
COMMUNICATIONS
INTERCOM & PAGING SYSTEM
SINGLE LINE
BROWNS FERRY NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN
SUBMITTED
RECOMMENDED
APPROVED
KNOXVILLE 11-13-68 67 4 55N2701-1
THIS DRAWING IS UNDER FUNCTIONAL CONFIGURATION CONTROL




Reason for change:
The previous circuit recieved only one logic trains permissive to open. A single fire in the SBRs could defeat the opposite train valves and the logic to this train of logic thus defeating the Appendix R functional criteria.

Prepared by E.T. Bradley 6/16/82
Reviewed by L.M. Begley 6/16/82

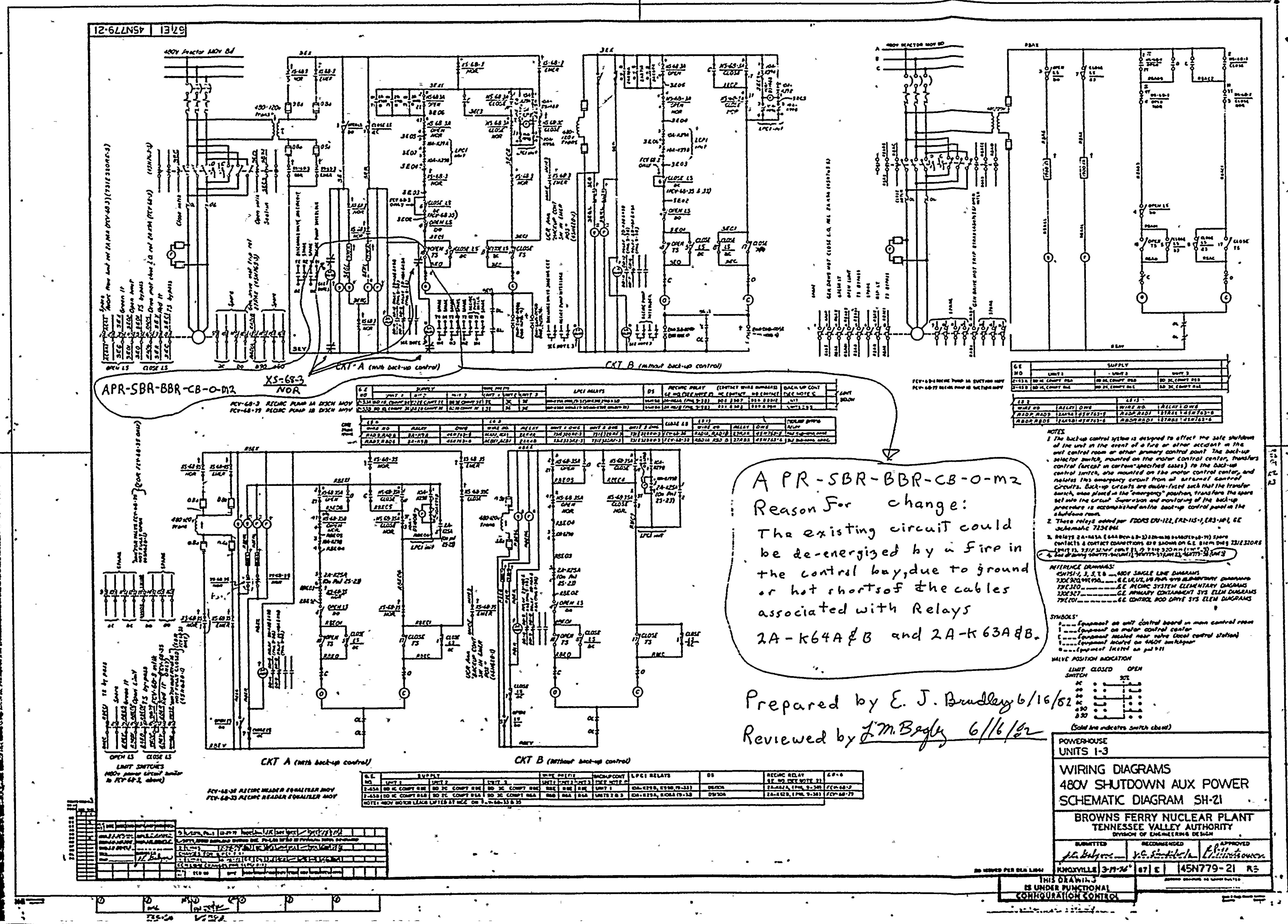
POWERHOUSE
UNITS 1-3

WIRING DIAGRAMS
480V SHUTDOWN AUX POWER
SCHEMATIC DIAGRAM SH 22

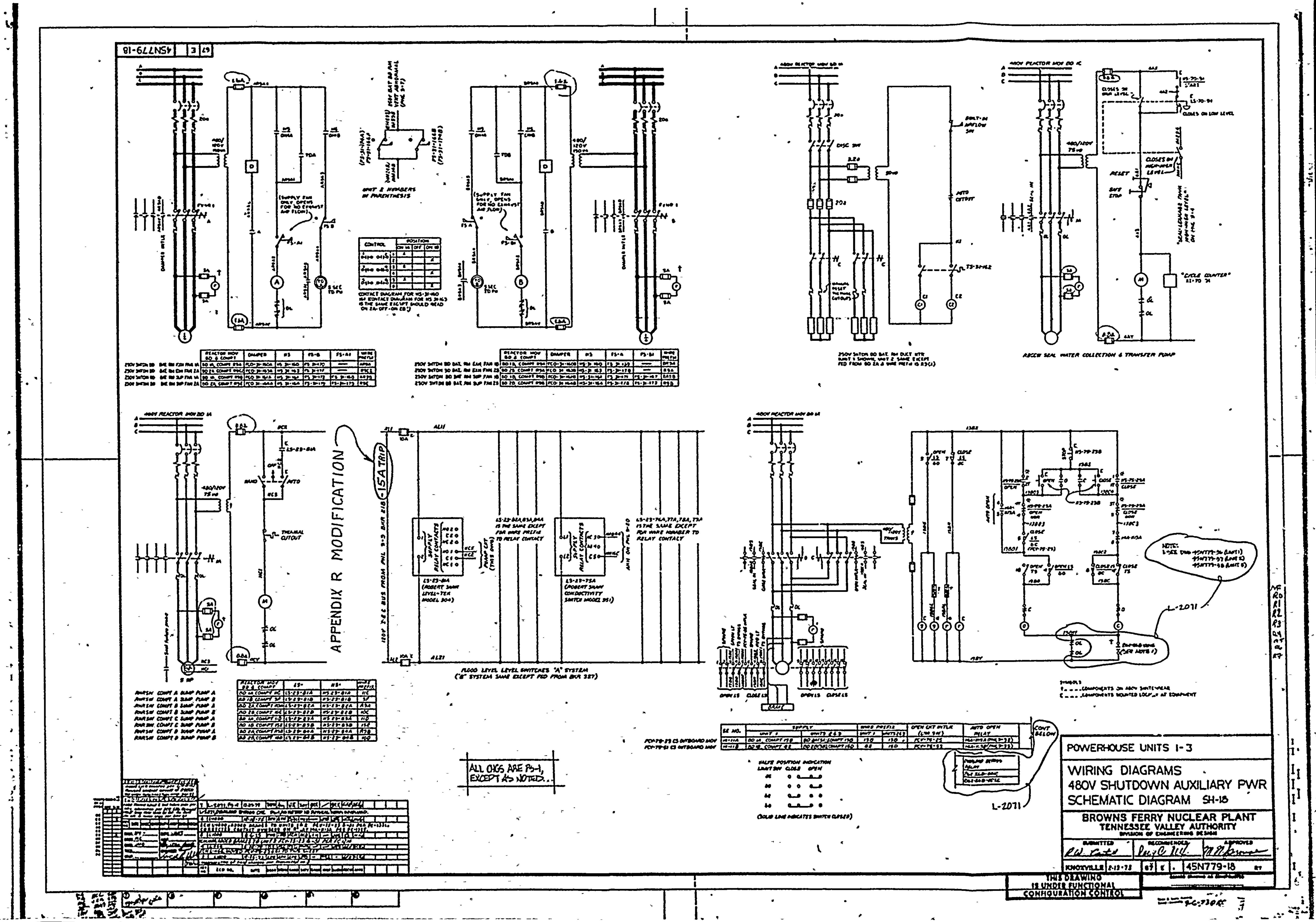
BROWNS FERRY NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN

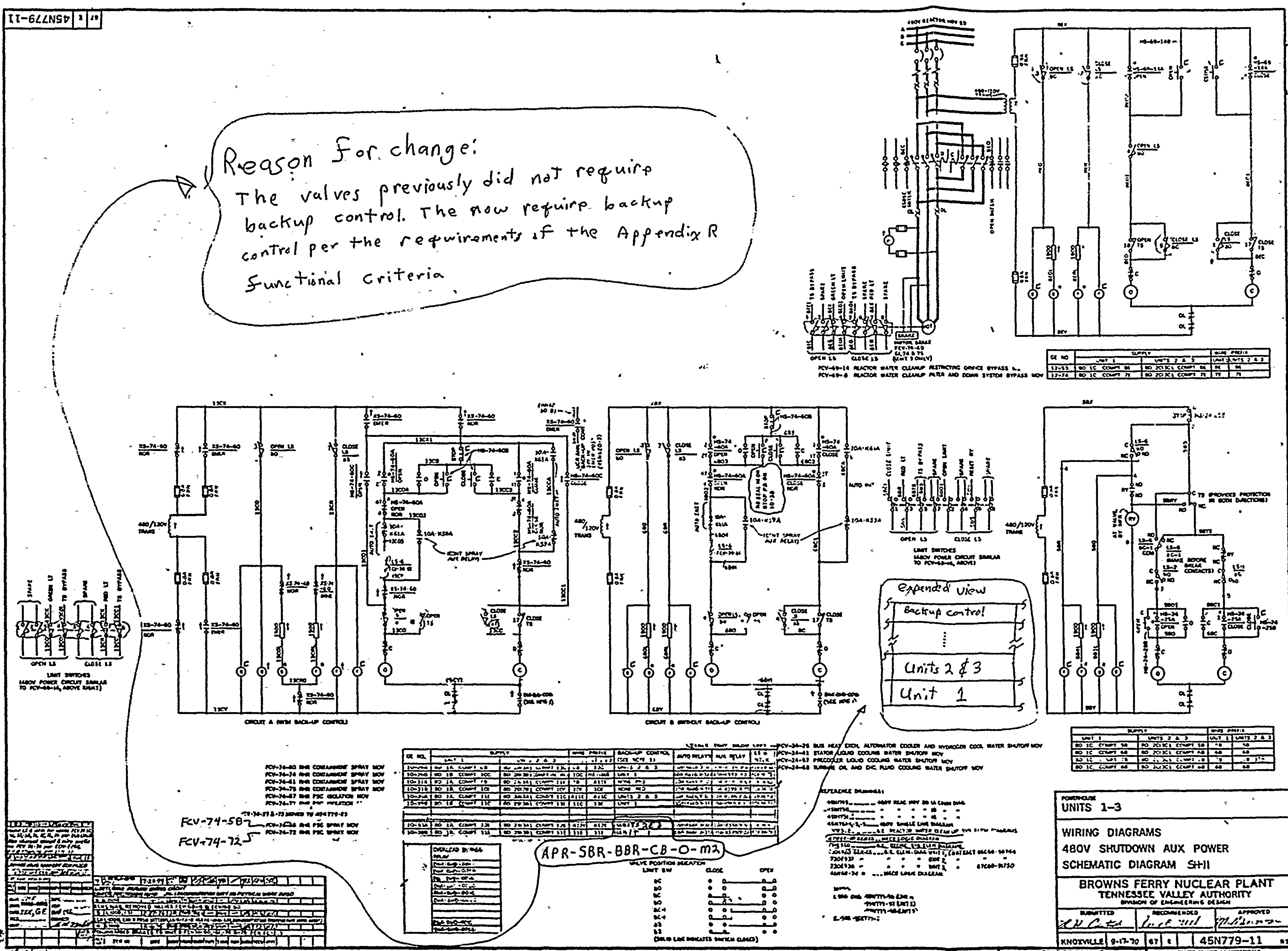
| SUBMITTED | RECOMMENDED | APPROVED |
|---|---|---|
| J.E. [illegible] | [illegible] | [illegible] |

KNOXVILLE 3-19-76 | 67 | E | 45N779-22 A3



45N779-21
480V Reactor MOV Bd
CKT A (with back-up control)
CKT B (without back-up control)
XS-68-3 NOR
APR-SBR-BBR-CB-0-M2
A PR-SBR-BBR-CB-0-M2
Reason For change:
The existing circuit could be de-energized by a fire in the control bay, due to ground or hot shorts of the cables associated with Relays 2A-K64A & B and 2A-K63A & B.
Prepared by E. J. Bradley 6/16/82
Reviewed by L.M. Begley 6/16/82
NOTES
REFERENCE DRAWINGS
SYMBOLS
VALVE POSITION INDICATION
POWERHOUSE
UNITS 1-3
WIRING DIAGRAMS
480V SHUTDOWN AUX POWER
SCHEMATIC DIAGRAM SH-21
BROWNS FERRY NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN
SUBMITTED
RECOMMENDED
APPROVED
KNOXVILLE
45N779-21 R5
THIS DRAWING IS UNDER FUNCTIONAL CONFIGURATION CONTROL

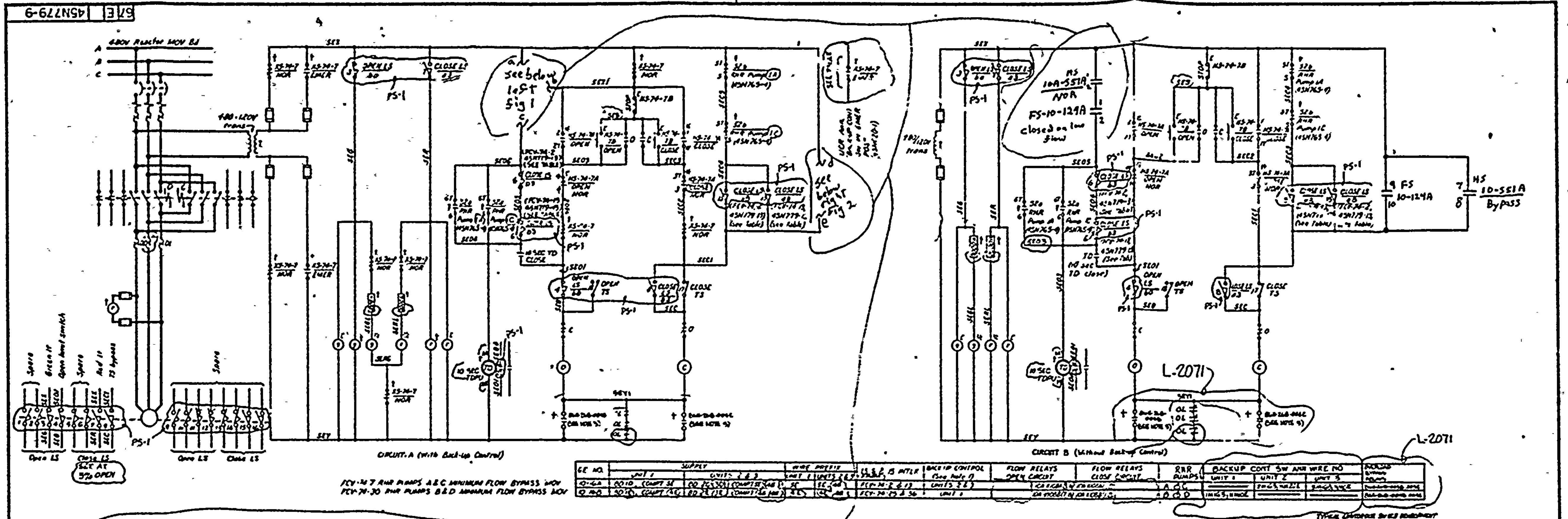

45N779-18
APPENDIX R MODIFICATION
15A TRIP
ALL OKGS ARE P5-1, EXCEPT AS NOTED.
L-2071
POWERHOUSE UNITS 1-3
WIRING DIAGRAMS
480V SHUTDOWN AUXILIARY PWR
SCHEMATIC DIAGRAM SH-18
BROWNS FERRY NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
KNOXVILLE
45N779-18
THIS DRAWING IS UNDER FUNCTIONAL CONFIGURATION CONTROL




THIS DRAWING IS UNDER FUNCTIONAL CONFIGURATION CONTROL

Prepared by E. J. Bradley 6/14/82

reviewed by J.M. Begley 6/16/82




Reason for change:

1) The previous circuit depended on the proper operation of a relay located in the control bay.

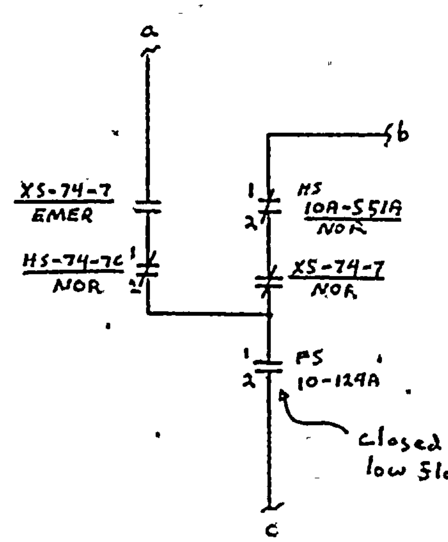



Figure 1

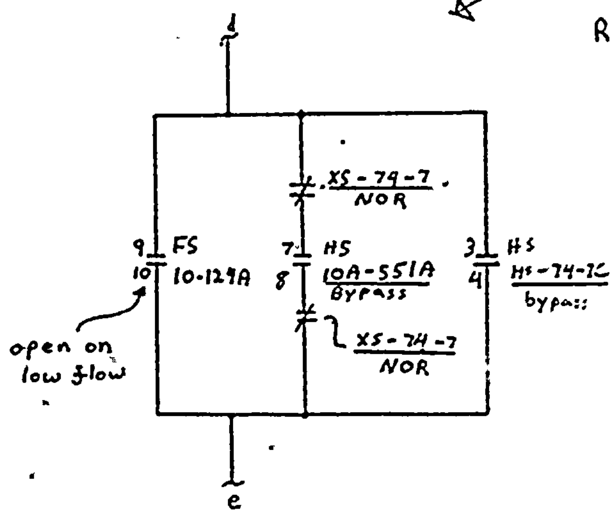



Figure 2

Prepared by E.J. Bradley 6/16/82

Reviewed by L.M. Begley 6/16/82

APR-SBR-BBR-CB-0-M2

See drawings 730E920 sheets 1, 8 & 5

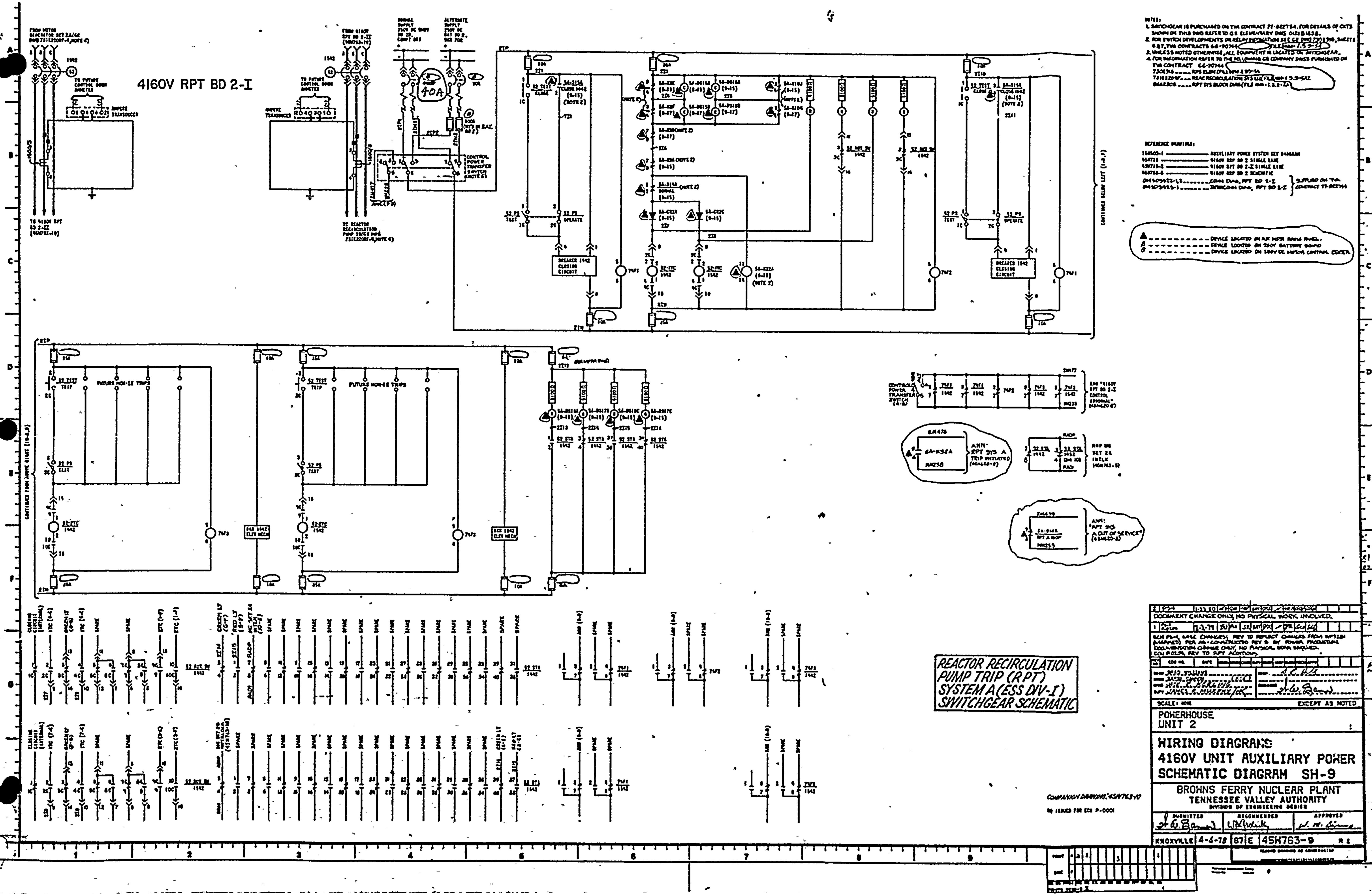
POWERHOUSE UNITS 1-3

WIRING DIAGRAMS
480V SHUTDOWN AUX POWER
SCHEMATIC DIAGRAM SH9

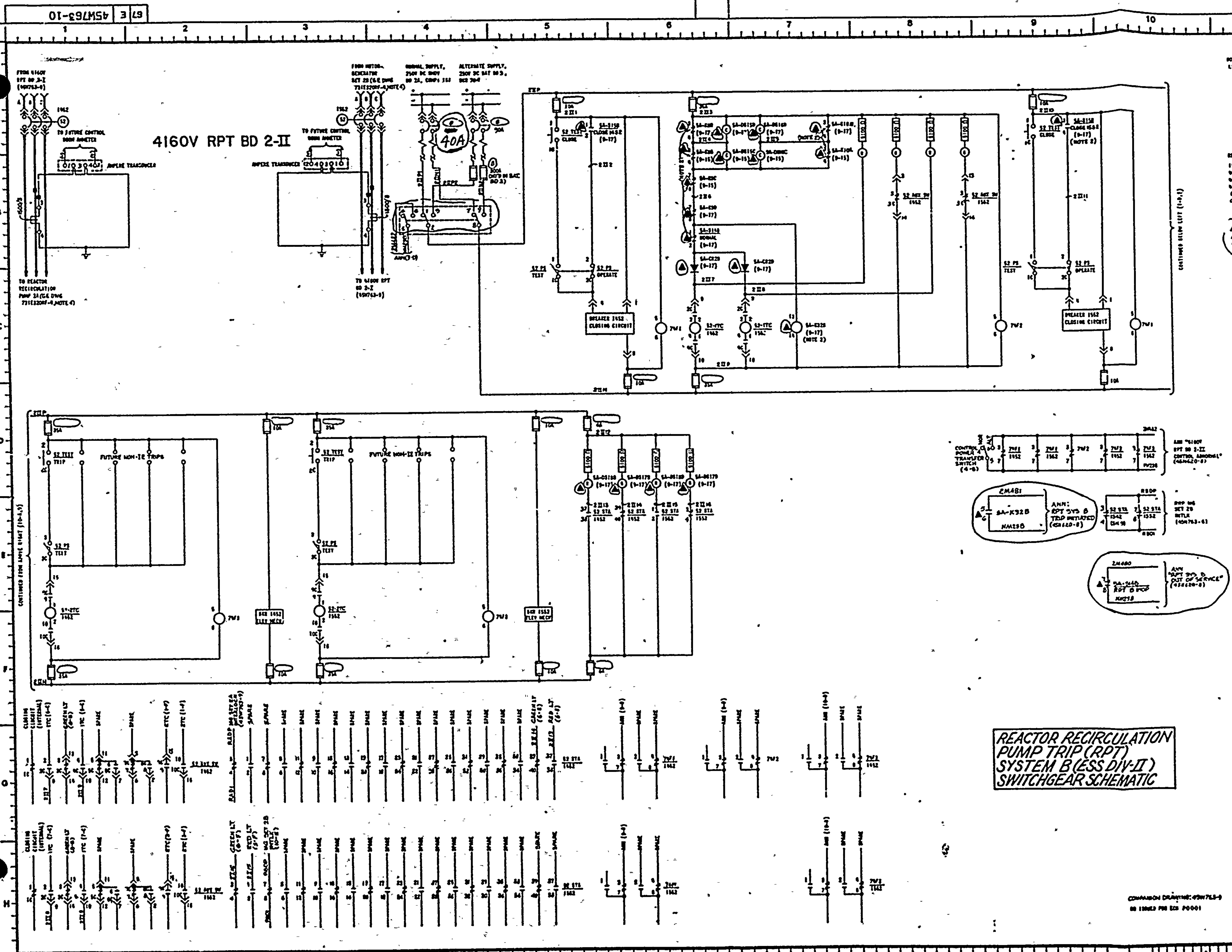
BROWNS FERRY NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN

KNOXVILLE 9-21-70 | 67 | E | 45N779-9 R9

THIS DRAWING IS UNDER FUNCTIONAL CONFIGURATION CONTROL



4160V RPT BD 2-I
REACTOR RECIRCULATION PUMP TRIP (RPT) SYSTEM A (ESS DIV-I) SWITCHGEAR SCHEMATIC
DOCUMENT CHANGE ONLY, NO PHYSICAL WORK INVOLVED.
SCALE: NONE
EXCEPT AS NOTED
POWERHOUSE
UNIT 2
WIRING DIAGRAMS
4160V UNIT AUXILIARY POWER
SCHEMATIC DIAGRAM SH-9
BROWNS FERRY NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
SUBMITTED
RECOMMENDED
APPROVED
KNOXVILLE
4-4-78
87
E
45N763-9
R 2




DOCUMENTATION CHANGE ONLY NO PHYSICAL WORK INVOLVED.

REVISED TO REFLECT AS CONSTRUCTED STATUS REVISION RC. DOCUMENTATION ONLY, NO PHYSICAL WORK INVOLVED

ECN P5-1, MISC CHANGES; REV TO REFLECT CHANGES FROM WPTTS (WPT28 MARKED) PER AS CONSTRUCTED REV-B BY POWER PRODUCTION. DOCUMENTATION CHANGE ONLY, NO PHYSICAL WORK INVOLVED

ECN P0205, REV TO RPT ADDITIONS

SCALE: NONE EXCEPT AS NOTED

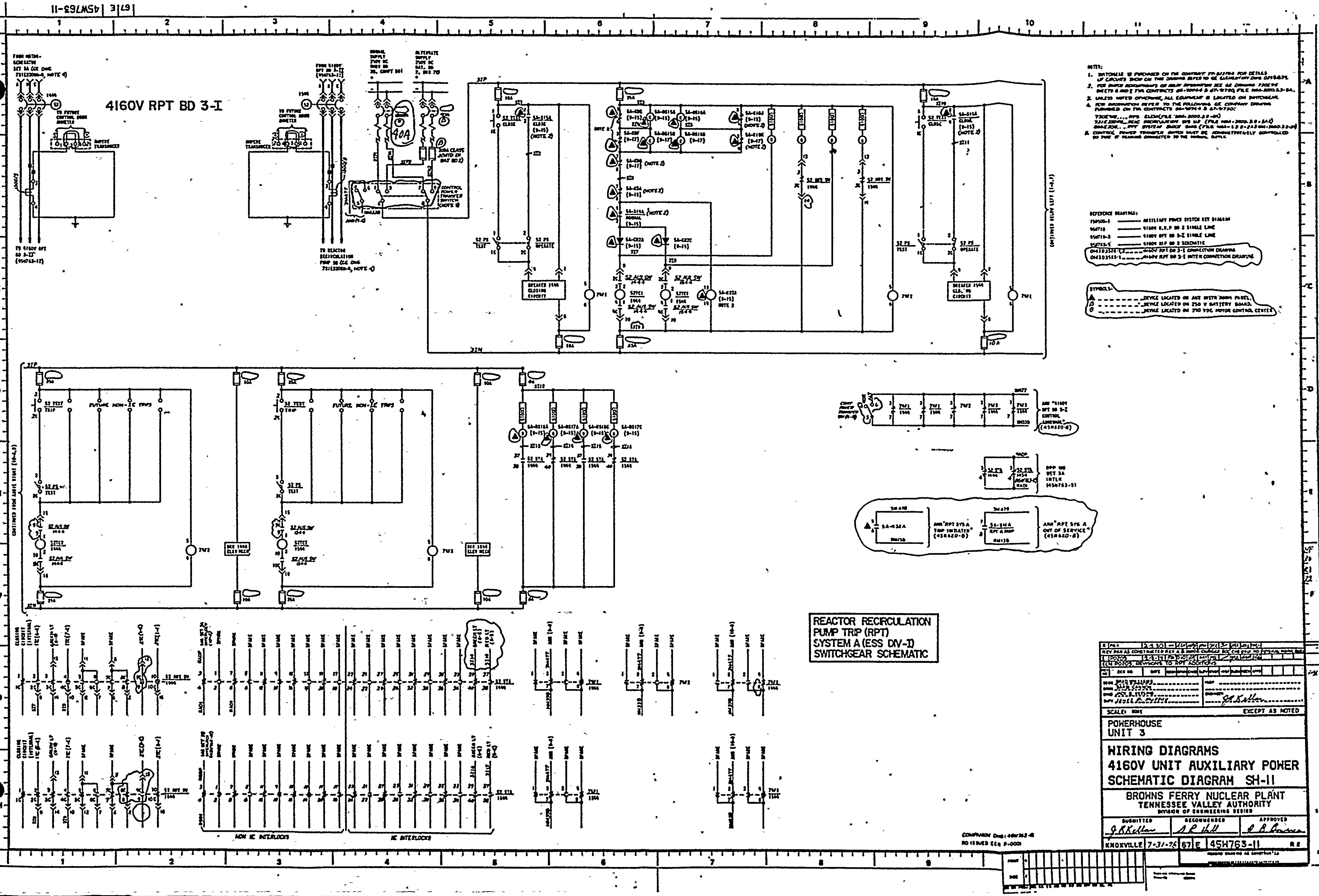
POWERHOUSE
UNIT 2

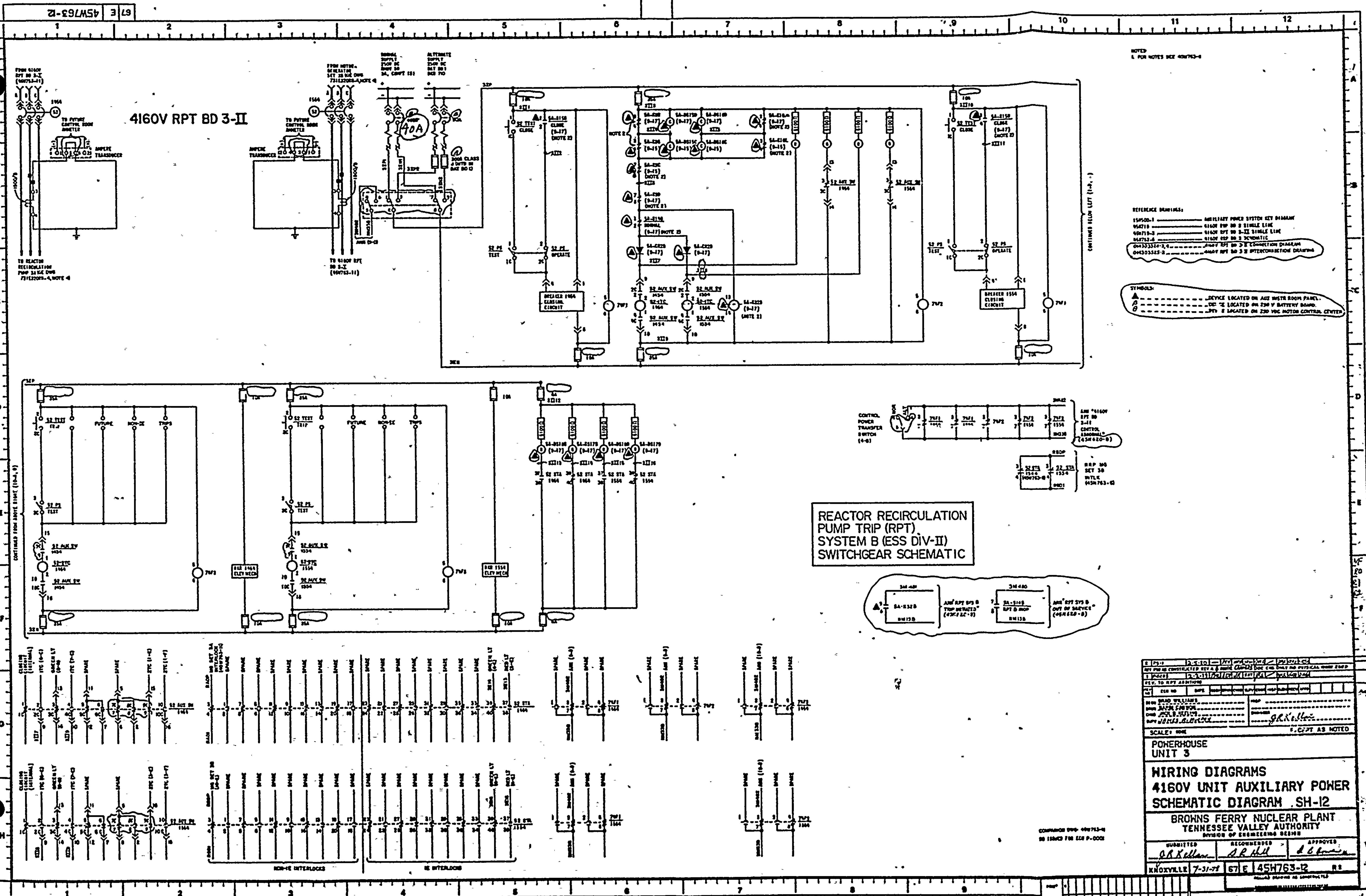
# WIRING DIAGRAMS
# 4160V UNIT AUXILIARY POWER
# SCHEMATIC DIAGRAM SH-10

BROWNS FERRY NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN

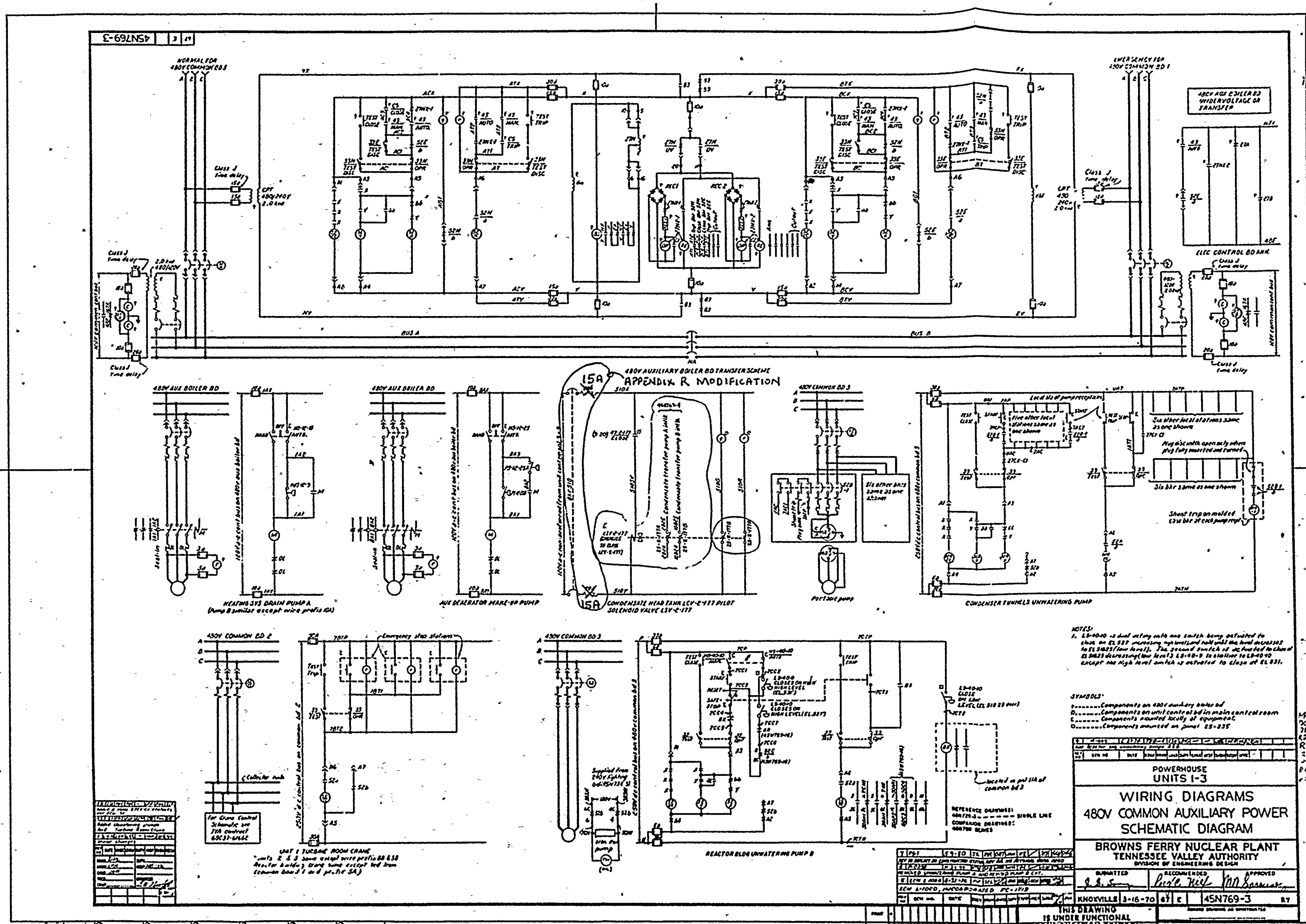
SUBMITTED | RECOMMENDED | APPROVED

KNOXVILLE 4-4-78 | 67 | E | 45W763-10 RC


67 E 45W763-11
4160V RPT BD 3-I
REACTOR RECIRCULATION
PUMP TRIP (RPT)
SYSTEM A (ESS DIV-I)
SWITCHGEAR SCHEMATIC
SCALE: NONE
EXCEPT AS NOTED
POWERHOUSE
UNIT 3
WIRING DIAGRAMS
4160V UNIT AUXILIARY POWER
SCHEMATIC DIAGRAM SH-11
BROWNS FERRY NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN
SUBMITTED
RECOMMENDED
APPROVED
KNOXVILLE 7-31-76 67 E 45H763-11 R8



67 E 45W763-12
4160V RPT BD 3-II
REACTOR RECIRCULATION
PUMP TRIP (RPT)
SYSTEM B (ESS DIV-II)
SWITCHGEAR SCHEMATIC
40A
POWERHOUSE
UNIT 3
WIRING DIAGRAMS
4160V UNIT AUXILIARY POWER
SCHEMATIC DIAGRAM SH-12
BROWNS FERRY NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN
KNOXVILLE 7-31-78 67 E 45H763-12 R8


45N769-3
NORMAL FOR 480V COMMON BD 3
EMERGENCY FOR 480V COMMON BD 1
480V AUX BOILER BD UNDERVOLTAGE OR TRANSFER
ELEC CONTROL BD ANN.
BUS A
BUS B
480V AUXILIARY BOILER BD TRANSFER SCHEME
15A
APPENDIX R MODIFICATION
480V AUX BOILER BD
HEATING SYS DRAIN PUMP A
(Pump B similar except wire prefix 10A)
AUX DEAERATOR MAKE-UP PUMP
CONDENSATE HEAD TANK LCV-2-177 PILOT SOLENOID VALVE LSV-2-177
480V COMMON BD 3
Portable pump
CONDENSER TUNNELS UNWATERING PUMP
480V COMMON BD 2
Emergency stop stations
Collector bar
UNIT 1 TURBINE ROOM CRANE
REACTOR BLDG UNWATERING PUMP B
NOTES:
1. LS-40-10 is dual acting with one switch being actuated to close on EL 537 increasing (high level) and hold until the level decreases to EL 518.25 (low level). The second switch is actuated to close at EL 518.25 decreasing (low level). LS-40-9 is similar to LS-40-10 except the high level switch is actuated to close at EL 531.
SYMBOLS:
A........Components on 480V auxiliary boiler bd
B........Components on unit control bd in main control room
C........Components mounted locally at equipment
D........Components mounted on panel 25-235
POWERHOUSE
UNITS 1-3
WIRING DIAGRAMS
480V COMMON AUXILIARY POWER
SCHEMATIC DIAGRAM
BROWNS FERRY NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN
SUBMITTED
RECOMMENDED
APPROVED
KNOXVILLE
3-16-70
45N769-3
R7
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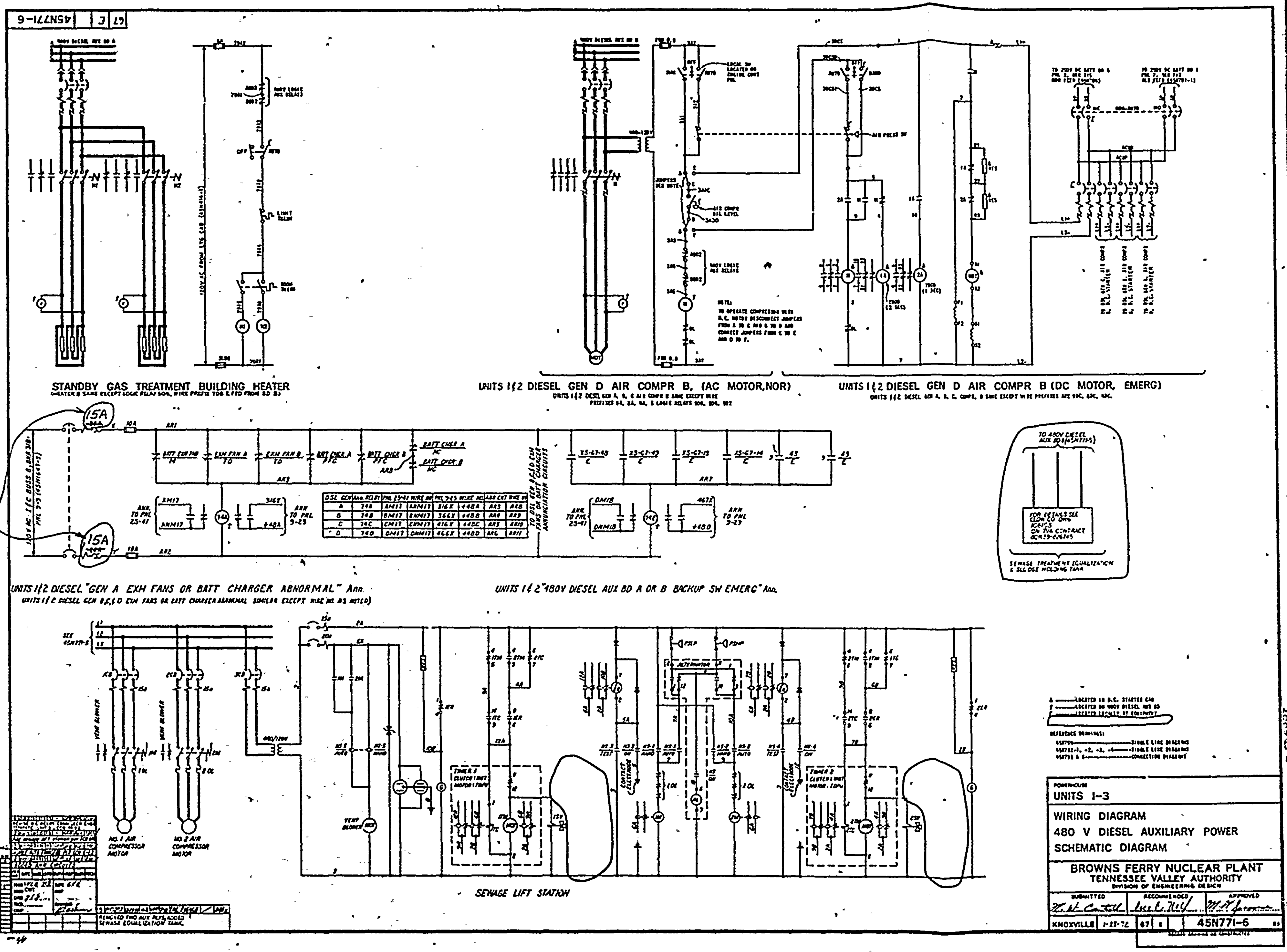
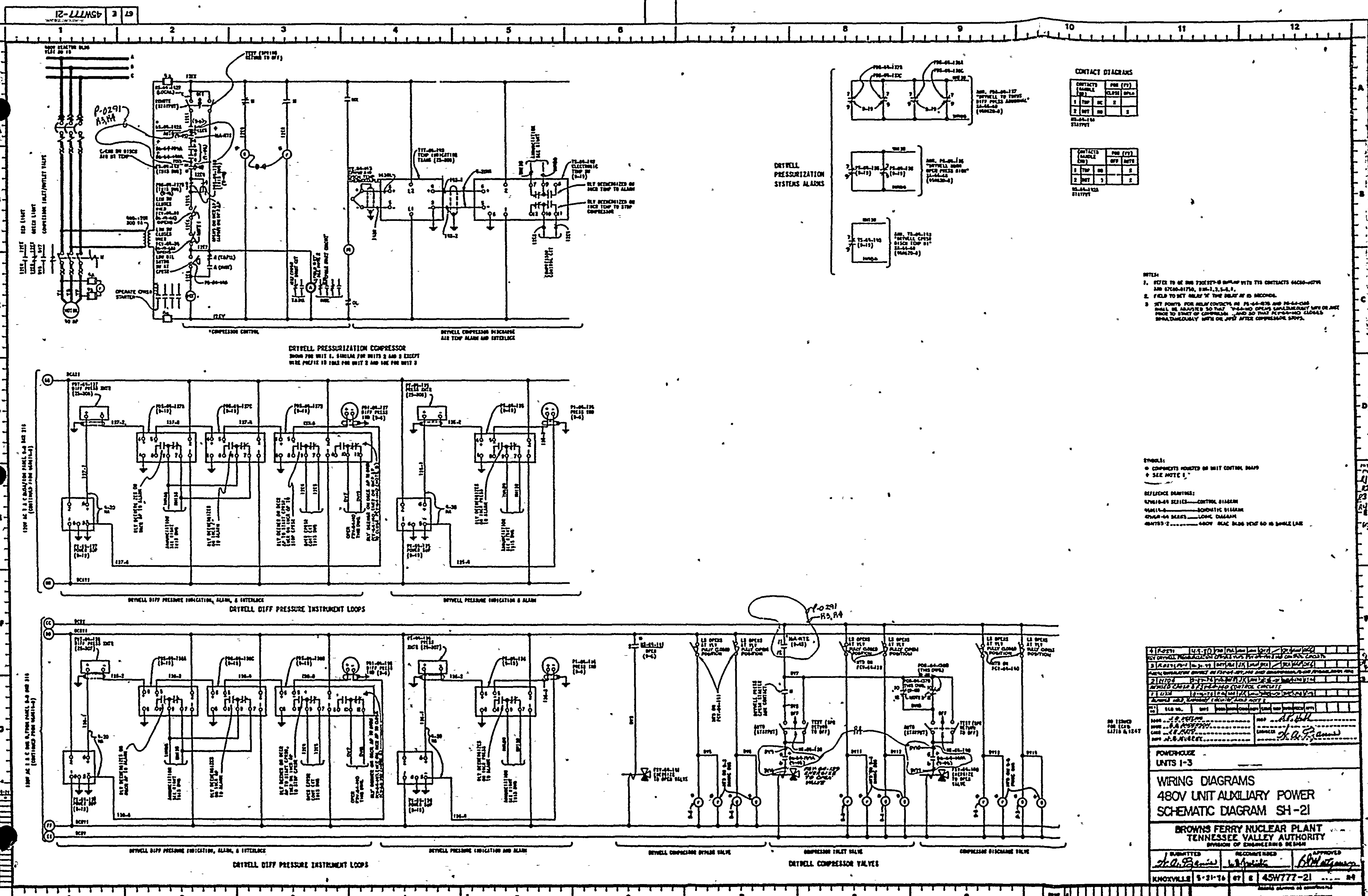
APPENDIX R MODIFICATION






POWERHOUSE
UNITS 1-3

WIRING DIAGRAMS
480V UNIT AUXILIARY POWER
SCHEMATIC DIAGRAM SH-21

BROWNS FERRY NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN

| SUBMITTED | RECOMMENDED | APPROVED |
|---|---|---|
| | | |

| KNOXVILLE | 5-21-76 | 67 | E | 45W777-21 |
|---|---|---|---|---|

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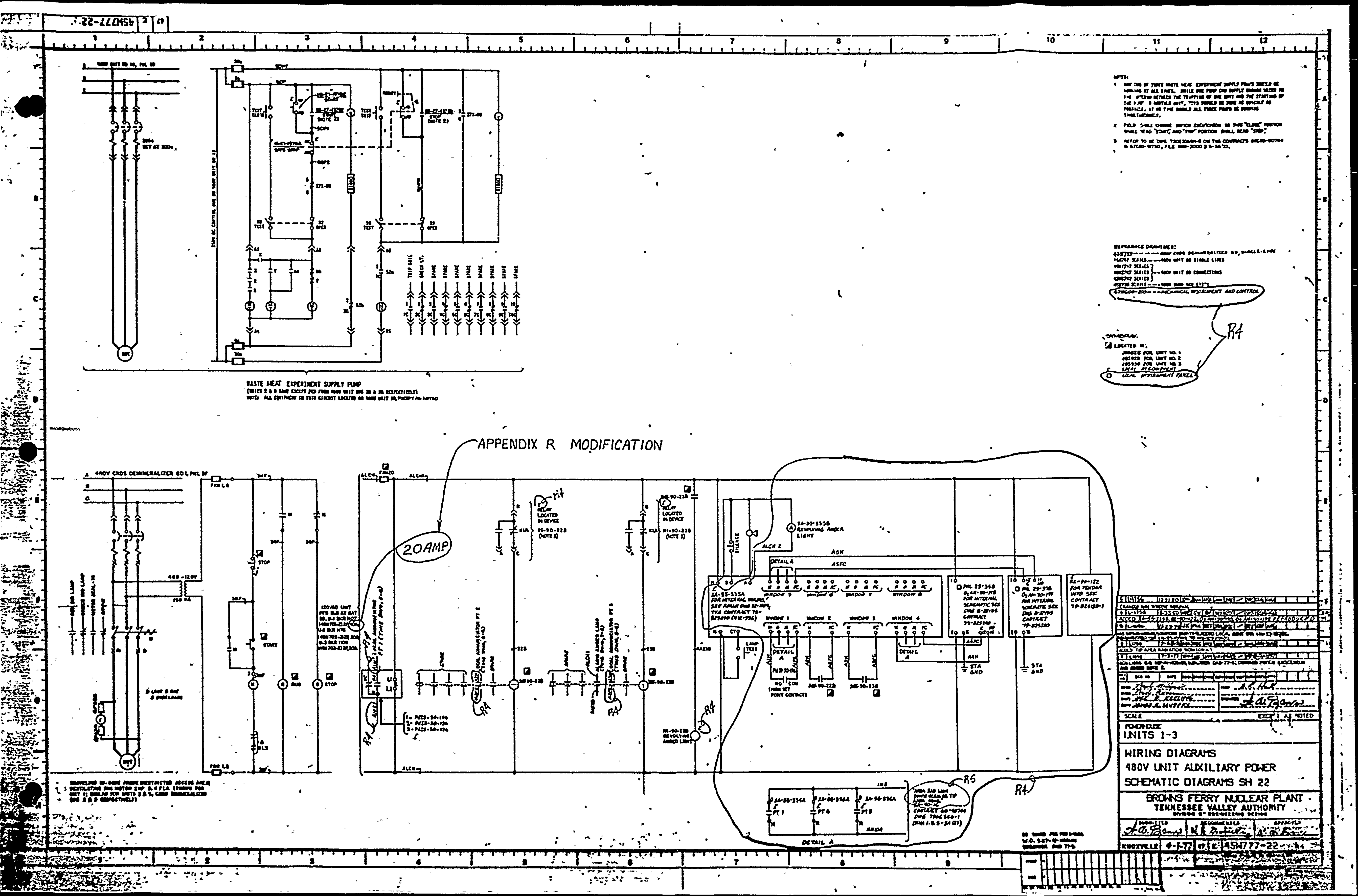
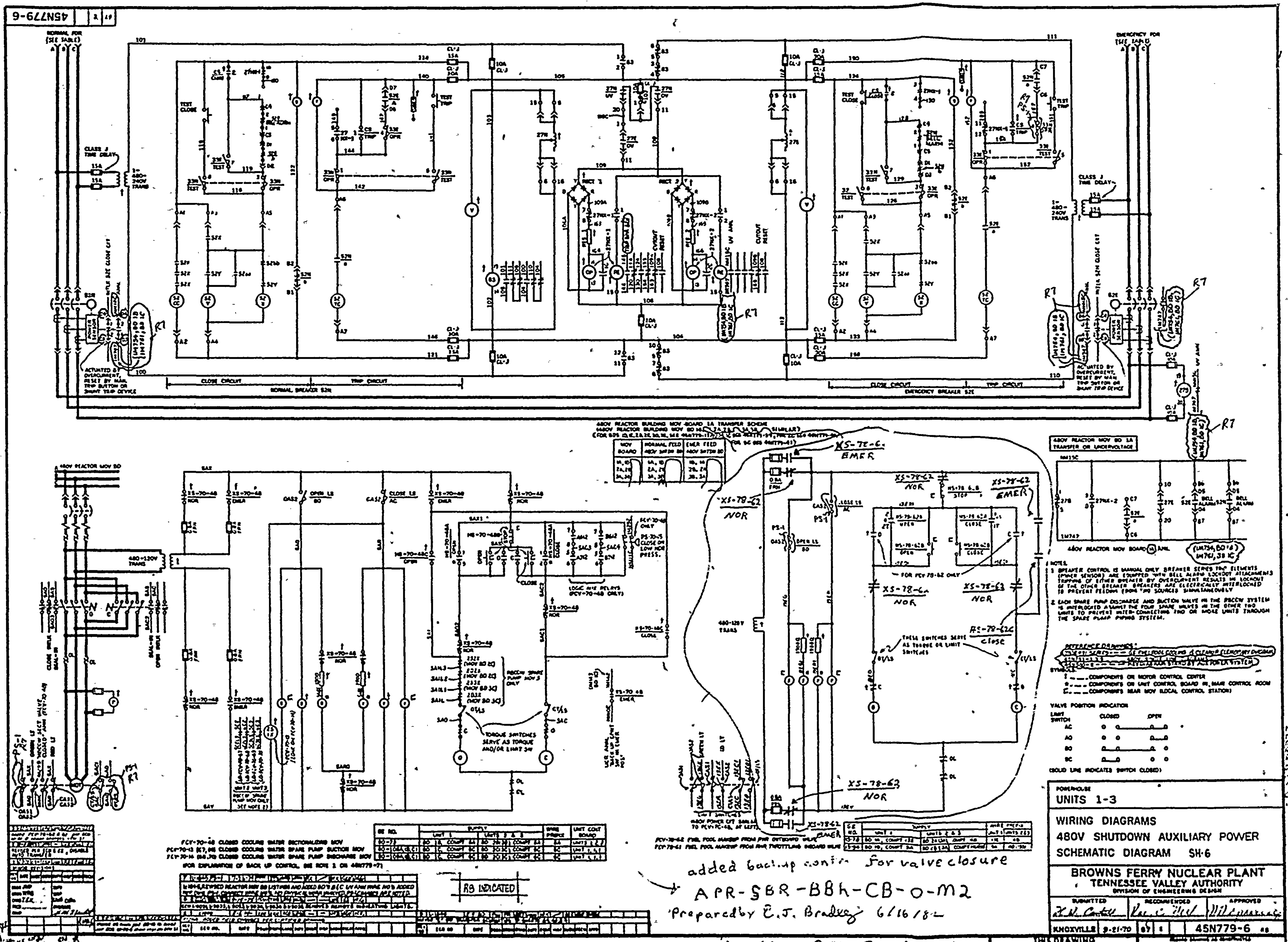


APPENDIX R MODIFICATION
20AMP
WASTE HEAT EXPERIMENT SUPPLY PUMP
440V CRDS DEMINERALIZER BD 1, PH1, 3P
DETAIL A
WINDOW 1
WINDOW 2
WINDOW 3
WINDOW 4
WINDOW 5
WINDOW 6
WINDOW 7
WINDOW 8
LOCAL INSTRUMENT PANEL
R4
R5
SCALE
EXCEPT AS NOTED
POWERHOUSE
UNITS 1-3
WIRING DIAGRAMS
480V UNIT AUXILIARY POWER
SCHEMATIC DIAGRAMS SH 22
BROWNS FERRY NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
KNOXVILLE
45W777-22




added backup contr for valve closure

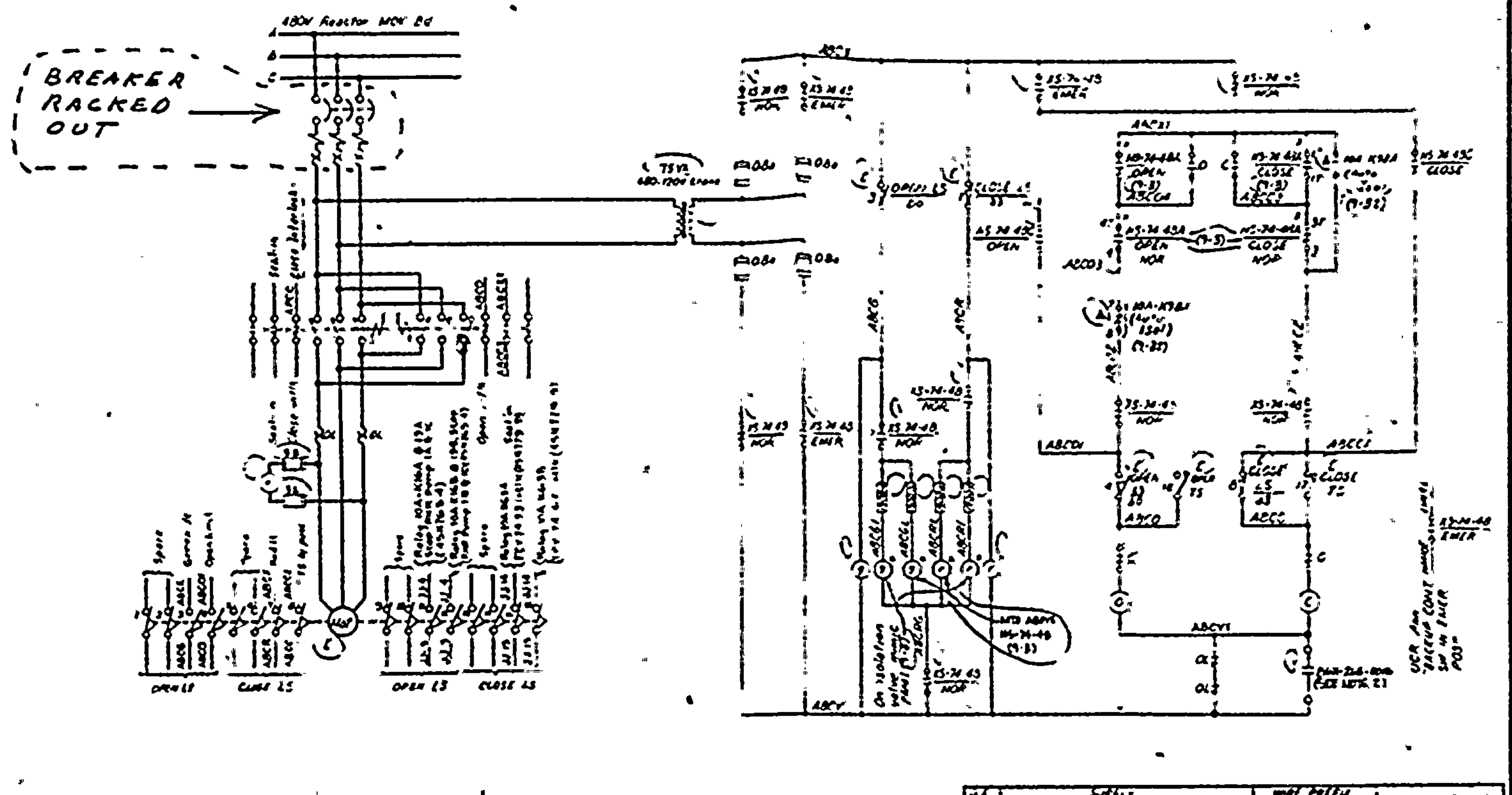
APR-SBR-BBh-CB-0-M2

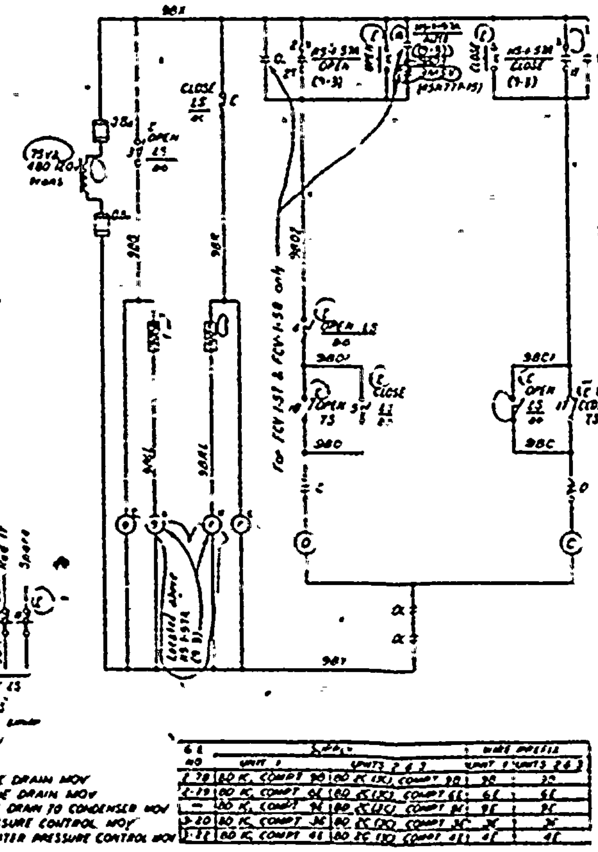
Prepared by E.J. Bradley 6/16/82

Reviewed by L.M. Begley 6/16/82

THIS DRAWING IS UNDER FUNCTIONAL CONFIGURATION CONTROL

67 E 45N779-7




NOTES

1. The back-up control system is designed to effect the safe shutdown of the unit in the event of a fire or other accident in the unit control room or other primary control point. The back-up selector switch, mounted on the motor control center, transfers control (except in certain specified cases) to the back-up control switch, also mounted on the motor control center, and isolates this emergency circuit from all external control circuits. Back-up circuits are double fused such that the transfer switch, when placed in the "emergency" position, transfers the spare set into the circuit. Supervision and monitoring of the back-up procedure is accomplished on the back-up control panel in the shutdown room.
2. See drawing 45N779-26 (Unit 1), 45N779-27 (Unit 2), 45N779-28 (Unit 3)
3. Unless noted otherwise, all equipment is located at the motor control center.

REFERENCE DRAWINGS:

- 45N751-4,5,6 — 480V SINGLE LINE DIAGRAMS
- 730E920AE — G.E. RHR SYSTEM ELEMENTARY DIAGRAMS
- 731E320 — G.E. RECIRC SYSTEM ELEMENTARY DIAGRAMS
- 730E927 — G.E. PRIMARY CONTAINMENT SYS ELEM DIAGRAMS
- 791E201 — G.E. CONTROL ROD DRIVE SYS ELEM DIAGRAMS

SYMBOLS:

- Equipment located locally
- Equipment on auxiliary instrument room panel
- Equipment on unit control board in main control room

VALVE POSITION INDICATION

LIMIT SWITCH / CLOSED / OPEN

(Solid line indicates switch closed)

POWERHOUSE
UNITS 1-3

WIRING DIAGRAMS
480V SHUTDOWN AUX POWER
SCHEMATIC DIAGRAM SH-7

BROWNS FERRY NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN

| SUBMITTED | RECOMMENDED | APPROVED |
|---|---|---|
| H. N. Culver | Ross C. Nix | M. N. Sprouse |

KNOXVILLE 9-21-70 67 E 45N779-7

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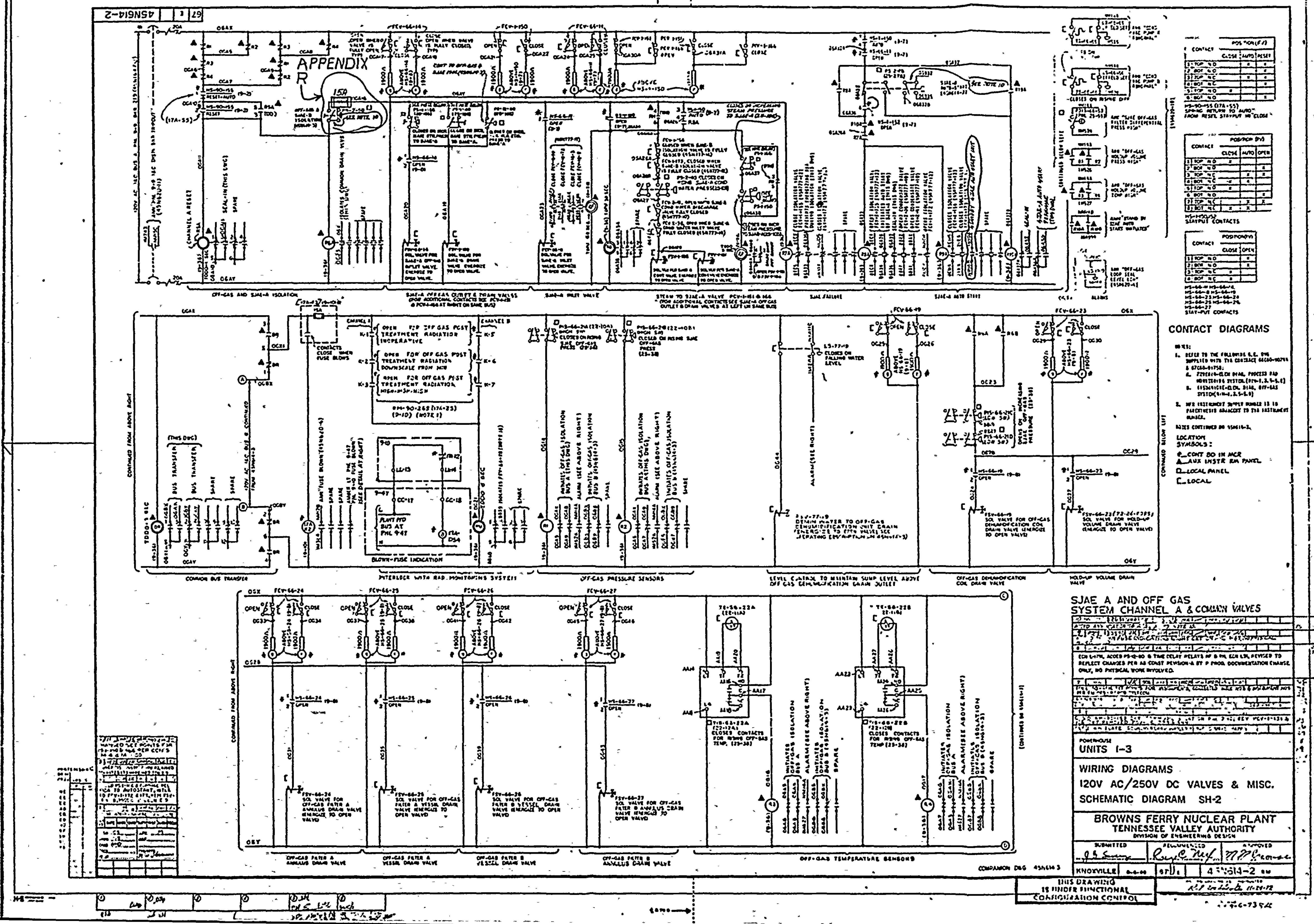
APPENDIX R
CONTACT DIAGRAMS
OFF-GAS AND SJAE-A ISOLATION
COMMON BUS TRANSFER
INTERLOCK WITH RAD. MONITORING SYSTEM
OFF-GAS PRESSURE SENSORS
OFF-GAS DEHUMIDIFICATION COIL DRAIN VALVE
HOLD-UP VOLUME DRAIN VALVE
OFF-GAS TEMPERATURE SENSORS
SJAE A AND OFF GAS
SYSTEM CHANNEL A & COMMON VALVES
ECN L4178, ADDED PS-12-80 & TIME DELAY RELAYS AF & PR. ECN L3L REVISED TO REFLECT CHANGES PER AS-CONST REVISION-A BY P PROG. DOCUMENTATION CHANGE ONLY, NO PHYSICAL WORK INVOLVED.
POWERHOUSE
UNITS 1-3
WIRING DIAGRAMS
120V AC/250V DC VALVES & MISC.
SCHEMATIC DIAGRAM SH-2
BROWNS FERRY NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN
SUBMITTED
RECOMMENDED
APPROVED
KNOXVILLE
COMPANION DWG 45N614 3
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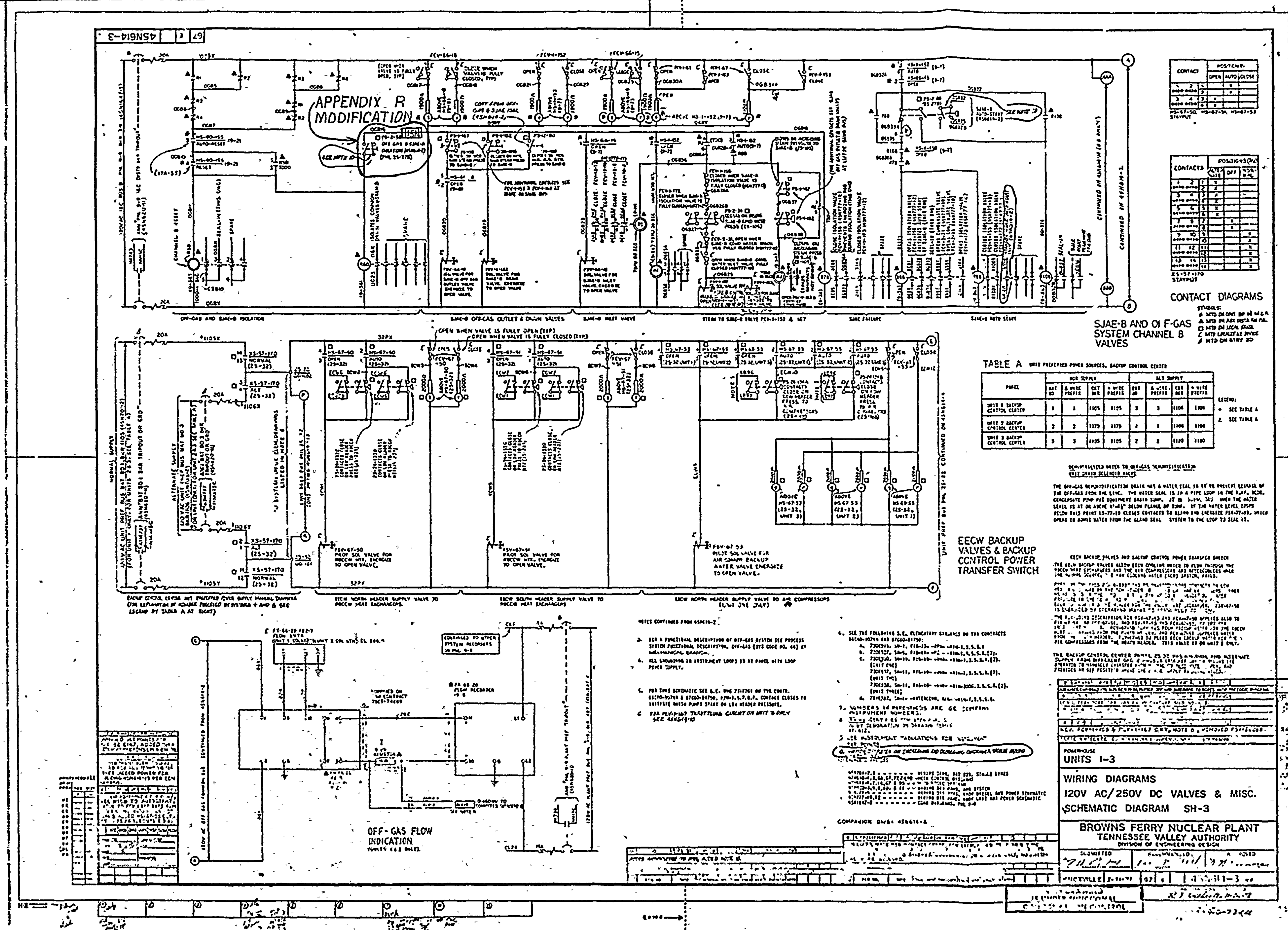
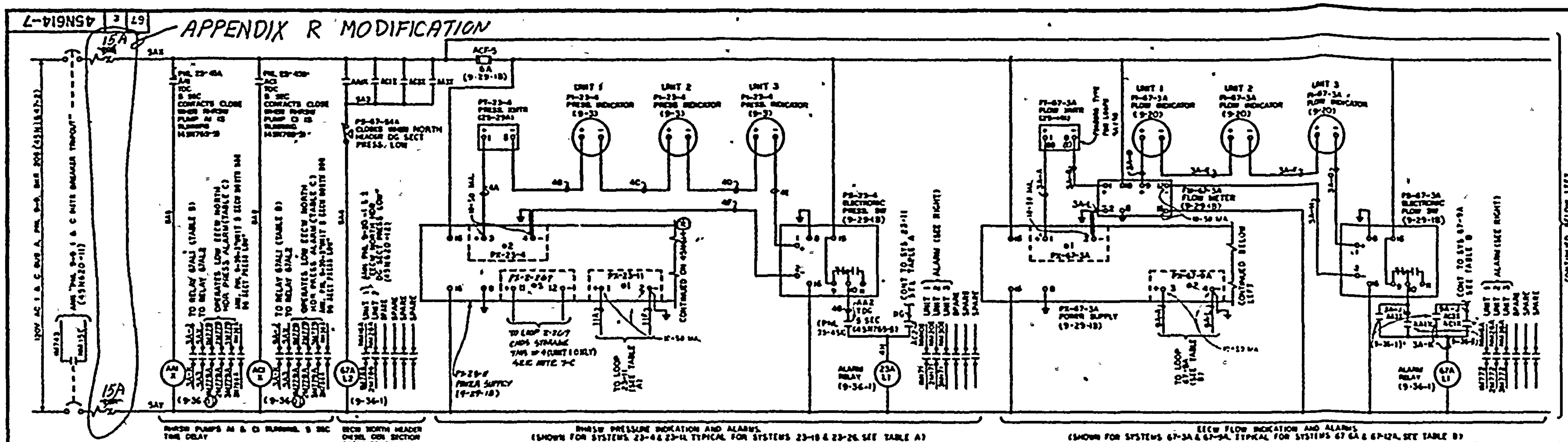
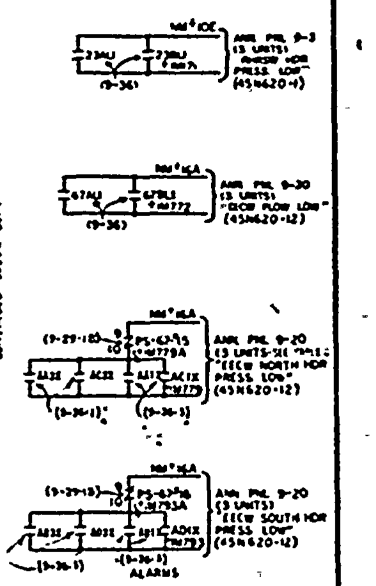
45N614-2


45N614-3
APPENDIX R
MODIFICATION
SJAE-B AND OFF-GAS
SYSTEM CHANNEL B
VALVES
CONTACT DIAGRAMS
TABLE A
EECW BACKUP
VALVES & BACKUP
CONTROL POWER
TRANSFER SWITCH
OFF-GAS FLOW
INDICATION
UNITS 1-3
WIRING DIAGRAMS
120V AC/250V DC VALVES & MISC.
SCHEMATIC DIAGRAM SH-3
BROWNS FERRY NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY

APPENDIX R MODIFICATION



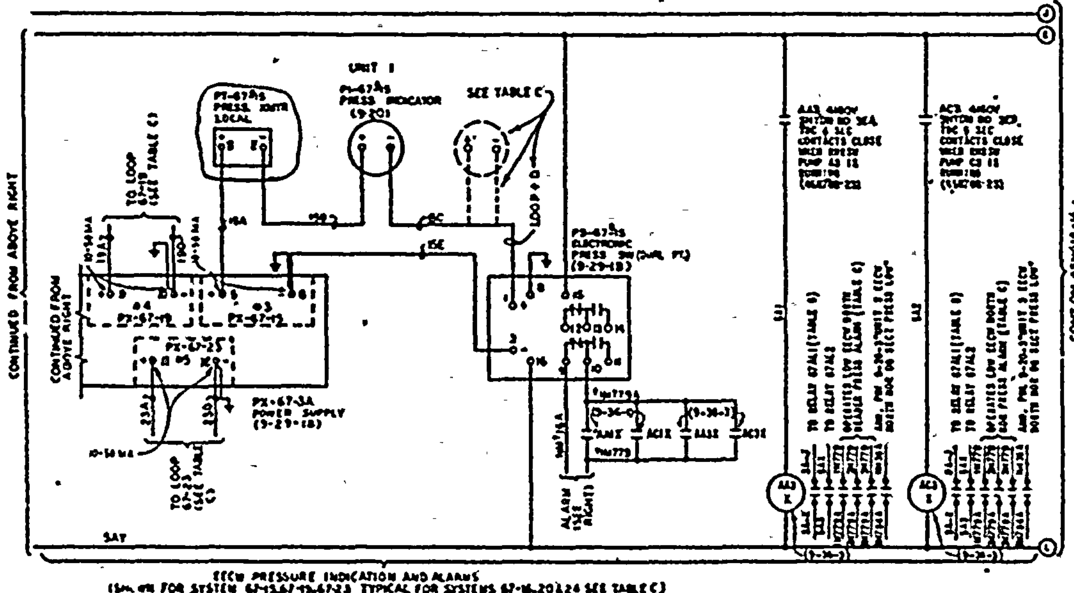




TABLE A

| GENERAL LOCATION OF EQUIPMENT | LOOP AND HEADER | AC POWER SOURCE | POWER WIRE PREFIX | LOOP WIRE PREFIX | DC POWER SUPPLY PNL 9-23-1B | PRESSURE TRANSMITTER & PANEL | PRESSURE INDICATOR & PANEL (3 UNITS) | ELECTRONIC PRESSURE SWITCH PNL 9-23-1B | TIME DELAY RELAY FROM RHRSW PUMP MOTOR BREAKER (45N765-51) | ALARM RELAY PNL 9-36 |
|---|---|---|---|---|---|---|---|---|---|---|
| MAIN CONTROL PANELS | 23-4 HDR-A | I&C BUS A | 5A | 4 | PX-23-4 B2 | PT-23-4 PNL 25-29A | PI-23-4 PNL 9-3 | PS-23-4 | AA2 PNL 25-45A | 23ALI |
| | 23-6 HDR-C | I&C BUS A | 5A | 6 | PX-23-6 B1 | PT-23-6 PNL 25-29C | PI-23-6 PNL 9-3 | PS-23-6 | AC2 PNL 25-45B | |
| | 23-18 HDR-B | I&C BUS B | 5B | 18 | PX-23-18 B1 | PT-23-18 PNL 25-29B | PI-23-18 PNL 9-3 | PS-23-18 | AB2 PNL 25-45C | 23BLI |
| | 23-26 HDR-D | I&C BUS B | 5B | 26 | PX-23-18 B2 | PT-23-26 PNL 25-29D | PI-23-26 PNL 9-3 | PS-23-26 | AD2 & 25-45D | |

RHRSW HDR PRESS. INST LOOPS POWER SUPPLY LOCATION & INTERLOCKS. SEE NOTE 1.

TABLE B

| GENERAL LOCATION OF EQUIPMENT | LOOP AND HEADER | AC POWER SOURCE | POWER WIRE PREFIX | LOOP WIRE PREFIX | DC POWER SUPPLY PNL 9-29-1B | FLOW TRANSMITTER & PNL | FLOW METER PNL 9-29-1B | FLOW INDICATOR & PANEL (3 UNITS) | ELECTRONIC FLOW SW PNL 9-29-1B | TO RELAY FROM RHRSW PUMP MOTOR BREAKER (45N765-51) (45N766-23) | TO SIGNAL INTERPOSING RELAY PNL 9-36 | ALARM RELAY PNL 9-36 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MAIN CONTROL PANELS | 67-3A (NORTH) | I&C BUS A PNL 9-9 BKR 206 | 5A | 3A | PX-67-3A B1 | FT-67-3A PNL 25-441 | FM-67-3A | FI-67-3A PNL 9-20 | FS-67-3A | [illegible] | AA1X(9-36-1) / AA3X(9-36-1) | 67ALI |
| | 67-9A (NORTH) | I&C BUS A PNL 9-9 BKR 206 | 5A | 9A | PX-67-3A B2 | FT-67-9A PNL 25-443 | FM-67-9A | FI-67-9A PNL 9-20 | FS-67-9A | [illegible] | AC1X(9-36-1) / AC3X(9-36-1) | |
| | 67-6A (SOUTH) | I&C BUS B PNL 9-9 BKR 309 | 5B | 6A | PX-67-6A B1 | FT-67-6A PNL 25-442 | FM-67-6A | FI-67-6A PNL 9-20 | FS-67-6A | [illegible] | AB1X(9-36-1) / AB3X(9-36-1) | 67BLI |
| | 67-12A (SOUTH) | I&C BUS B PNL 9-9 BKR 309 | 5B | 12A | PX-67-6A B2 | FT-67-12A PNL 25-443 | FM-67-12A | FI-67-12A PNL 9-20 | FS-67-12A | [illegible] | AD1X(9-36-1) / AD3X(9-36-1) | |

EECW FLOW INST LOOPS POWER SUPPLY, LOCATION & INTERLOCKS. SEE NOTE 1.

TABLE C

| LOOP AND HEADER | AC POWER SOURCE | POWER WIRE PREF | LOOP WIRE PREFIX | DC POWER SUPPLY & PNL 9-29-1B | FLOW TRANSMITTER & PANEL | FLOW INDICATOR & PANEL UNIT 1 | FLOW INDICATOR & PANEL UNIT 2 | FLOW INDICATOR & PANEL UNIT 3 | ELECTRONIC PRESS SW PNL 9-29-1B | TO RELAYS FROM RHRSW PUMP MOTORS (45N765-51) (45N766-23) | TO SIGNAL INTERPOSING RELAY PNL 9-36 (& 10 PNL...) | ALARM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 67-18 (NORTH) | I&C BUS A PNL 9-9 BKR 206 | 5A | 18 | PX-67-3A B3 | PT-67-18 | PI-67-18 PNL 9-20 | — | — | PS-67-18 | AA1/PNL 25-46A) | AA2(9-36-1) | PNL 9-20 UNIT 1 |
| 67-19 (NORTH) | I&C BUS A PNL 9-9 BKR 206 | 5A | 19 | PX-67-3A B4 | PT-67-19 | PI-67-19 PNL 9-20 | PI-67-19 PNL 9-20 | — | PS-67-19 | [illegible] | AA3X(9-36-1) / AC3(9-36-1) | PNL 9-20 UNIT 2 |
| 67-23 (NORTH) | I&C BUS A PNL 9-9 BKR 206 | 5A | 23 | PX-67-3A B5 | PT-67-23 | — | PI-67-23 PNL 9-20 | PI-67-23 PNL 9-20 | PS-67-23 | AC1/480V SHTDN BD [illegible] | AC3X(9-36-1) | PNL 9-20 UNIT 3 |
| 67-16 (SOUTH) | I&C BUS B PNL 9-9 BKR 309 | 5B | 16 | PX-67-6A B3 | PT-67-16 | PI-67-16 PNL 9-20 | — | — | PS-67-16 | AB1/480V SHTDN BD [illegible] | AB(9-36-1) | PNL 9-20 UNIT 1 |
| 67-20 (SOUTH) | I&C BUS B PNL 9-9 BKR 309 | 5B | 20 | PX-67-6A B4 | PT-67-20 | PI-67-20 PNL 9-20 | PI-67-20 PNL 9-20 | — | PS-67-20 | [illegible] | AB3X(9-36-1) / AD(9-36-1) | PNL 9-20 UNIT 2 |
| 67-24 (SOUTH) | I&C BUS B PNL 9-9 BKR 309 | 5B | 24 | PX-67-6A B5 | PT-67-24 | — | PI-67-24 PNL 9-20 | PI-67-24 PNL 9-20 | PS-67-24 | AD3 (PNL 25-46D) | AD3X(9-36-1) | PNL 9-20 UNIT 3 |

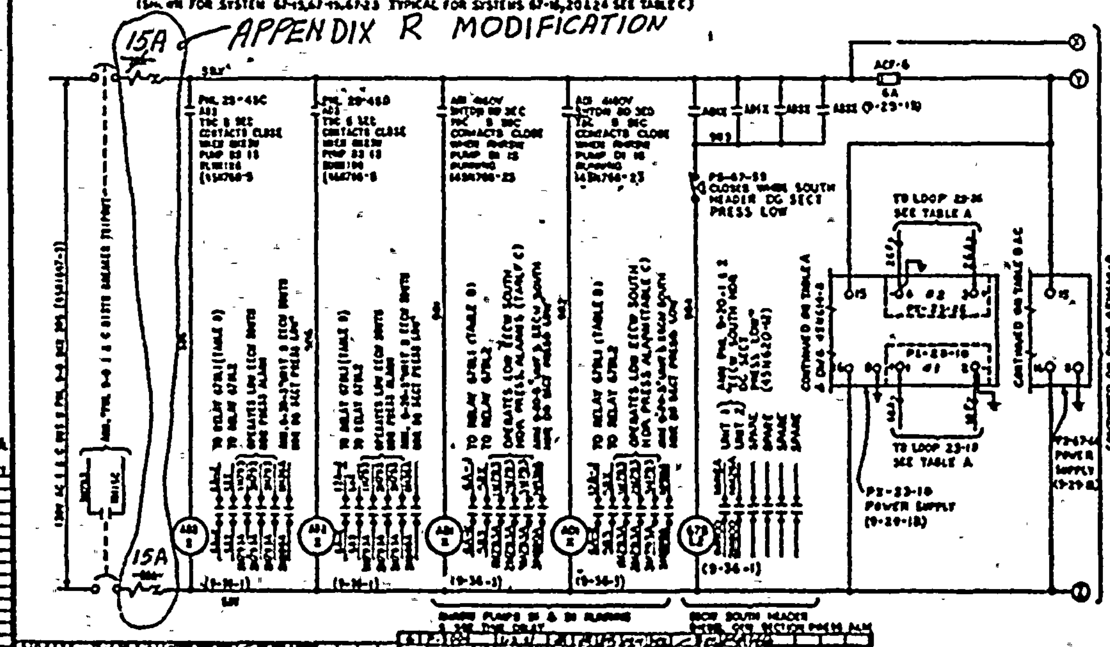
EECW HDR PRESS. INST LOOPS POWER SUPPLY, LOCATION & INTERLOCKS, SEE NOTE 1.

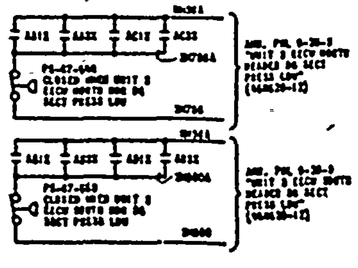
NOTE: LOOPS 67-18 AND 67-16 WILL INCLUDE ONE INDICATOR. OTHER LOOPS WILL INCLUDE TWO INDICATORS. ADDITIONAL WIRE REQUIRED FOR TWO-INDICATOR LOOPS WILL BE TAGGED "LOOP NO + B."

NOTES:

1. INSTRUMENT LOOPS ON THESE DRAWINGS ARE FOR PLANT EQUIPMENT AND WILL BE ON UNIT ONE ONLY. INDICATION AND ALARMS FOR THESE LOOPS ARE LOCATED ON CONTROL PANELS OF ALL 3 UNITS.
2. ALL GROUNDING OF INSTRUMENT LOOPS IS AT PANEL WITH LOOP POWER SUPPLY.
3. PNLS 25-45 & 46 ARE LOGIC RELAY PANELS ASSOCIATED WITH 480V SHUTDOWN BOARDS.
4. † DESIGNATES DIGIT 1 THAT CHANGES TO 2 AND 3 ON UNITS 2 AND 3 RESPECTIVELY.
5. ◊ INDICATES INSTRUMENT NUMBERS THAT CHANGE ON UNITS 2 & 3. SEE TABLE C.

NOTES CONTINUED ON 45N614-8.
FOR REFERENCE DWGS SEE 45N614-8.






COMPANION DWG 45N614-8

EECW LOOPS AND ALARMS

THE EMERGENCY EQUIPMENT COOLING WATER (EECW) SYSTEM DISTRIBUTES COOLING WATER FROM THE SERVICE WATER PUMPS TO THE DIESEL GENERATORS, CORE SPRAY SYSTEM EQUIPMENT, AND RHR PUMPS; AND BACKUP COOLING WATER TO THE CONTROL ROOM CHILLER, PLANT AIR COMPRESSORS, AND THE REACTOR BUILDING CLOSED COOLING WATER SYSTEM. TWO ELECTRONIC LOOPS MONITOR FLOW IN EACH OF THE HEADERS TO PROVIDE INDICATION AND ANNUNCIATE LOW FLOW IN THE CONTROL ROOMS AND BACKUP CONTROL CENTERS OF EACH UNIT.

FT-67-3A VARIES CURRENT IN A 10-50 MA LOOP PROPORTIONAL TO DIFFERENTIAL PRESSURE. FM-67-3A VARIES THE CURRENT IN THE SECOND 10-50 MA LOOP AS THE SQUARE ROOT OF THE CURRENT IN THE FIRST LOOP TO CONVERT DIFFERENTIAL PRESSURE TO FLOW. THIS LOOP OPERATES FLOW INDICATORS FI-67-3A ON EACH UNIT CONTROL ROOM PANEL 9-20, AND ELECTRONIC FLOW SWITCH FS-67-3A, WHICH CLOSES CONTACTS ON DECREASING FLOW.

RELAY AA1X IS ENERGIZED 5 SEC AFTER THE RHRSW PUMP MOTOR CIRCUIT BREAKER CLOSES TO PREVENT A NUISANCE ALARM. ALARM RELAY 67ALI IS ENERGIZED TO ANNUNCIATE LOW HEADER PRESSURE ON EACH UNIT CONTROL PANEL 9-3 ANNUNCIATOR.

RHRSW LOOPS AND ALARMS

THE RHR SERVICE WATER (RHRSW) SYSTEM PROVIDES RAW SERVICE WATER TO THE RHR HEAT EXCHANGERS AND STANDBY WATER TO FLOOD THE REACTOR AND SUPPRESSION POOL. TWO ELECTRONIC LOOPS MONITOR HEADER PRESSURE IN EACH OF FOUR HEADERS TO PROVIDE INDICATION AND ANNUNCIATE LOW HEADER PRESSURE IN THE CONTROL ROOMS AND BACKUP CONTROL CENTERS OF EACH UNIT.

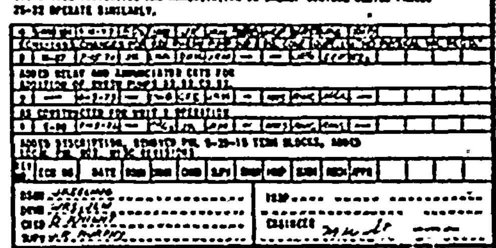
PT-23-4 VARIES CURRENT IN A 10-50 MA LOOP PROPORTIONAL TO PRESSURE IN HEADER A TO OPERATE PRESSURE INDICATORS PI-23-4 ON EACH UNIT CONTROL PANEL 9-3, AND ELECTRONIC PRESSURE SWITCH PS-23-4, WHICH CLOSES CONTACTS ON FALLING PRESSURE.

RELAY AA2 CLOSES CONTACTS 5 SEC AFTER THE RHRSW PUMP MOTOR CIRCUIT BREAKER CLOSES TO PREVENT A NUISANCE ALARM. ALARM RELAY 23ALI ... ANNUNCIATE LOW HEADER PRESSURE ON EACH UNIT CONTROL PANEL 9-3 ANNUNCIATOR.

INSTRUMENT LOOPS MONITOR HEADERS B, C, AND D SIMILARLY. AN IDENTICAL SYSTEM HAS INDICATORS AND ANNUNCIATION ON BACKUP CONTROL SYSTEM PANELS 25-32.

PRESSURE SWITCH PS-67-54A CLOSES CONTACTS WHEN PRESSURE IS LOW IN THE SECTION OF THE NORTH EECW HEADER WHICH SUPPLIES COOLING WATER TO THE DIESEL GENERATORS. WHEN RELAY AA4, AA3X, AC3X, AC3X CLOSE CONTACTS TO INDICATE RHRSW PUMPS WHICH SUPPLY THE HEADER ARE RUNNING. ALARM RELAY 67ALI IS ENERGIZED TO ANNUNCIATE LOW HEADER PRESSURE ON UNIT CONTROL PANEL 9-20-1 & 2 ANNUNCIATOR.

LOOPS MONITOR THE HEADER PRESSURE FOR INDIVIDUAL UNITS TO PROVIDE INDICATION AND ANNUNCIATE LOW PRESSURE AT THAT UNIT. THE LOOP CONSISTING OF PT-67-18, PI-67-18, AND PS-67-18 MONITORS AND ANNUNCIATES THE UNIT 1 PORTION OF THE NORTH HEADER ON UNIT 1 CONTROL PANEL 9-20 AND PS-67-19 MONITORS AND ANNUNCIATES THE UNIT 2 PORTION OF THE NORTH HEADER AND PT-67-23, PI-67-23, AND PS-67-23 MONITORS AND ANNUNCIATES THE UNIT 3 PORTION OF THE NORTH HEADER. INSTRUMENTS MONITORING FLOW AND PRESSURE ON THE SOUTH HEADER AND INSTRUMENT LOOPS WITH INDICATION AND ANNUNCIATION ON BACKUP CONTROL CENTER PANELS 25-32 OPERATE SIMILARLY.



POWERHOUSE
UNITS 1-3

WIRING DIAGRAMS
120V AC/250V DC VALVES & MISC
SCHEMATIC DIAGRAM SH-7

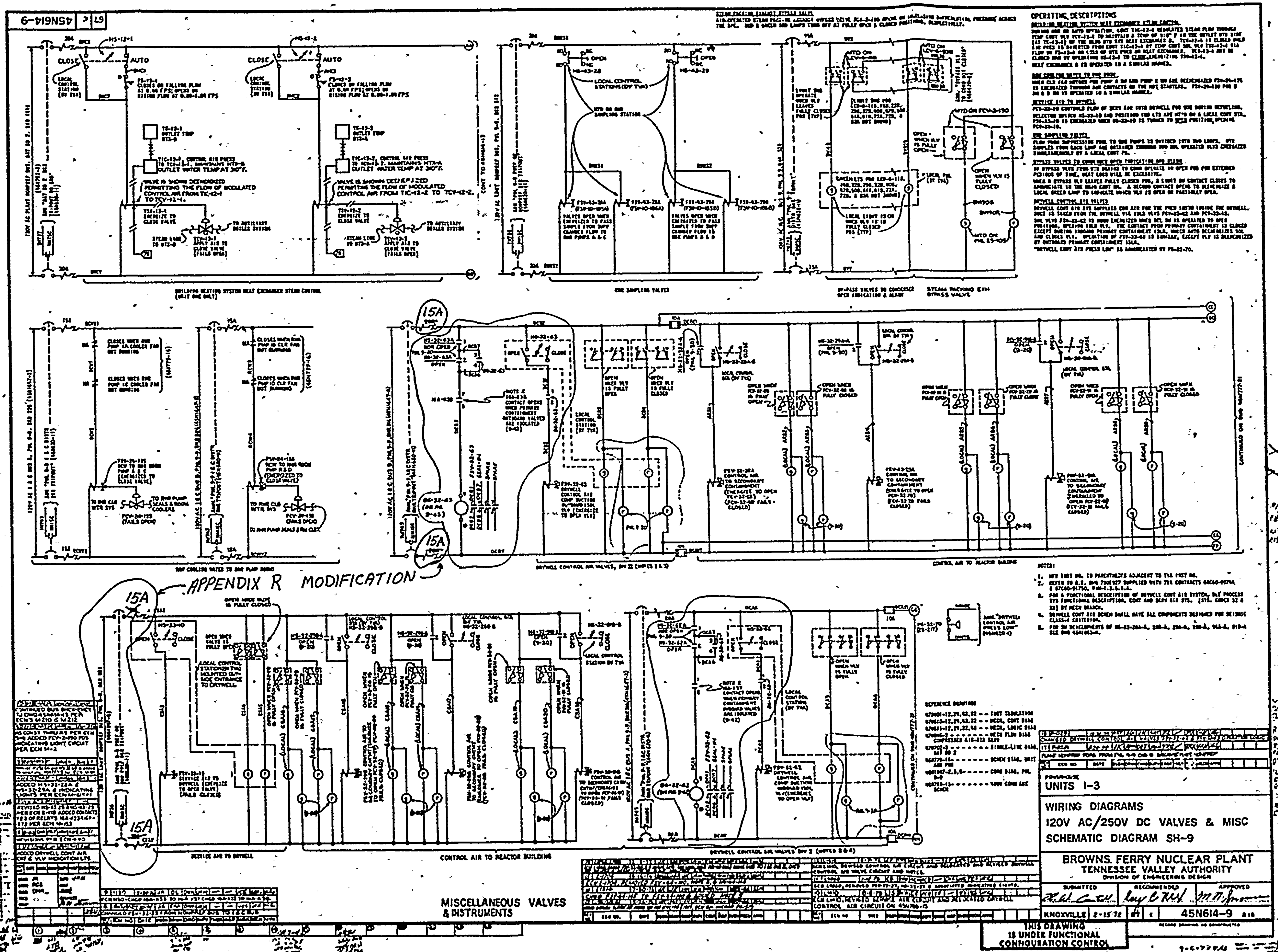
BROWNS FERRY NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN

SUBMITTED | RECOMMENDED | APPROVED

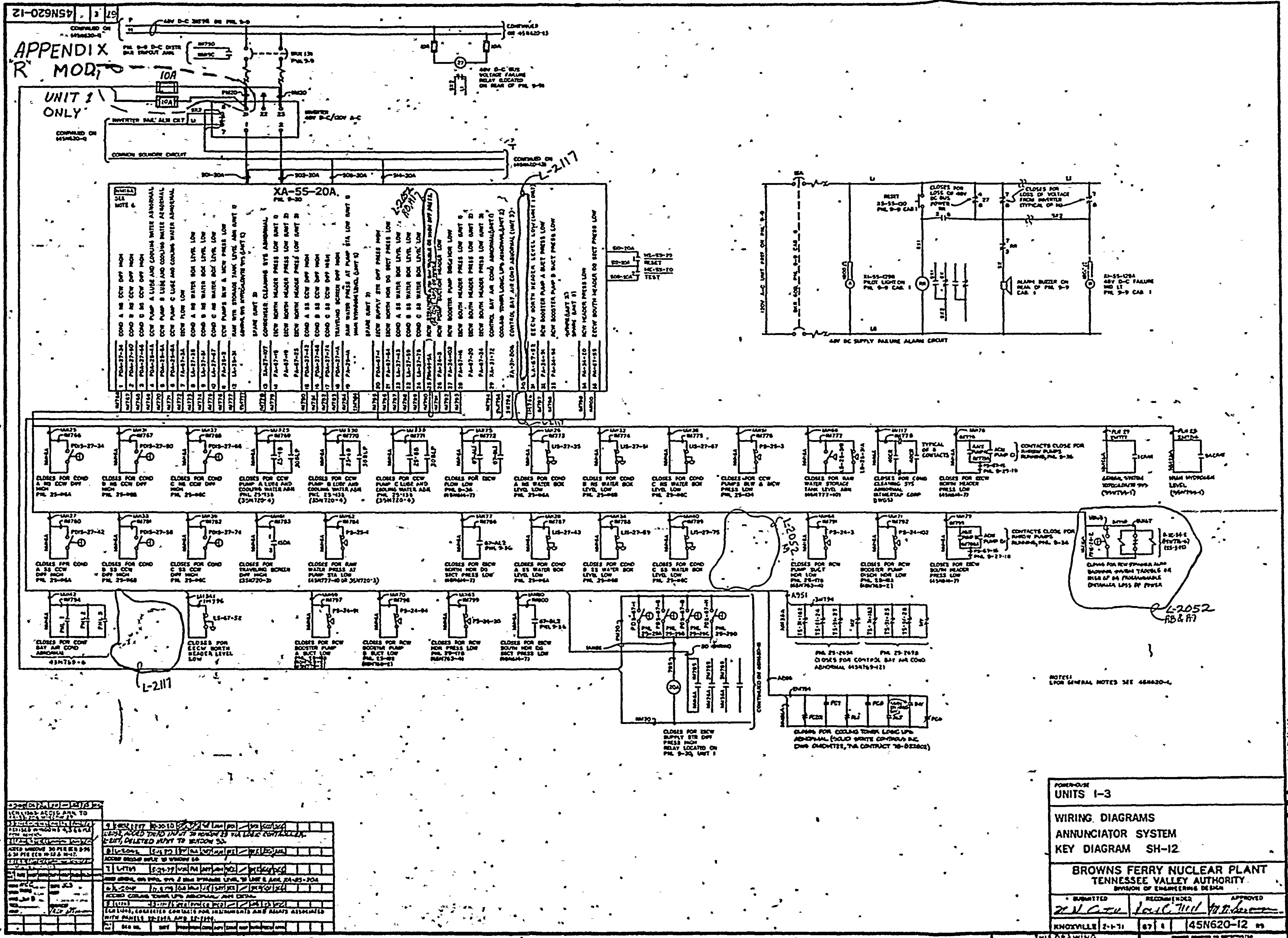
KNOXVILLE 3-31-71 | 67 | 2 | 45N614-7 R6

THIS DRAWING IS UNDER FUNCTIONAL CONFIGURATION CONTROL

45N614-7 | 3 | 67



45N614-9
OPERATING DESCRIPTIONS
CLOSE
AUTO
15A
APPENDIX R MODIFICATION
SERVICE AIR TO DRYWELL
CONTROL AIR TO REACTOR BUILDING
MISCELLANEOUS VALVES & INSTRUMENTS
UNITS 1-3
WIRING DIAGRAMS
120V AC/250V DC VALVES & MISC
SCHEMATIC DIAGRAM SH-9
BROWNS FERRY NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN
KNOXVILLE 2-15-72
45N614-9
THIS DRAWING IS UNDER FUNCTIONAL CONFIGURATION CONTROL




POWERHOUSE
UNITS 1–3

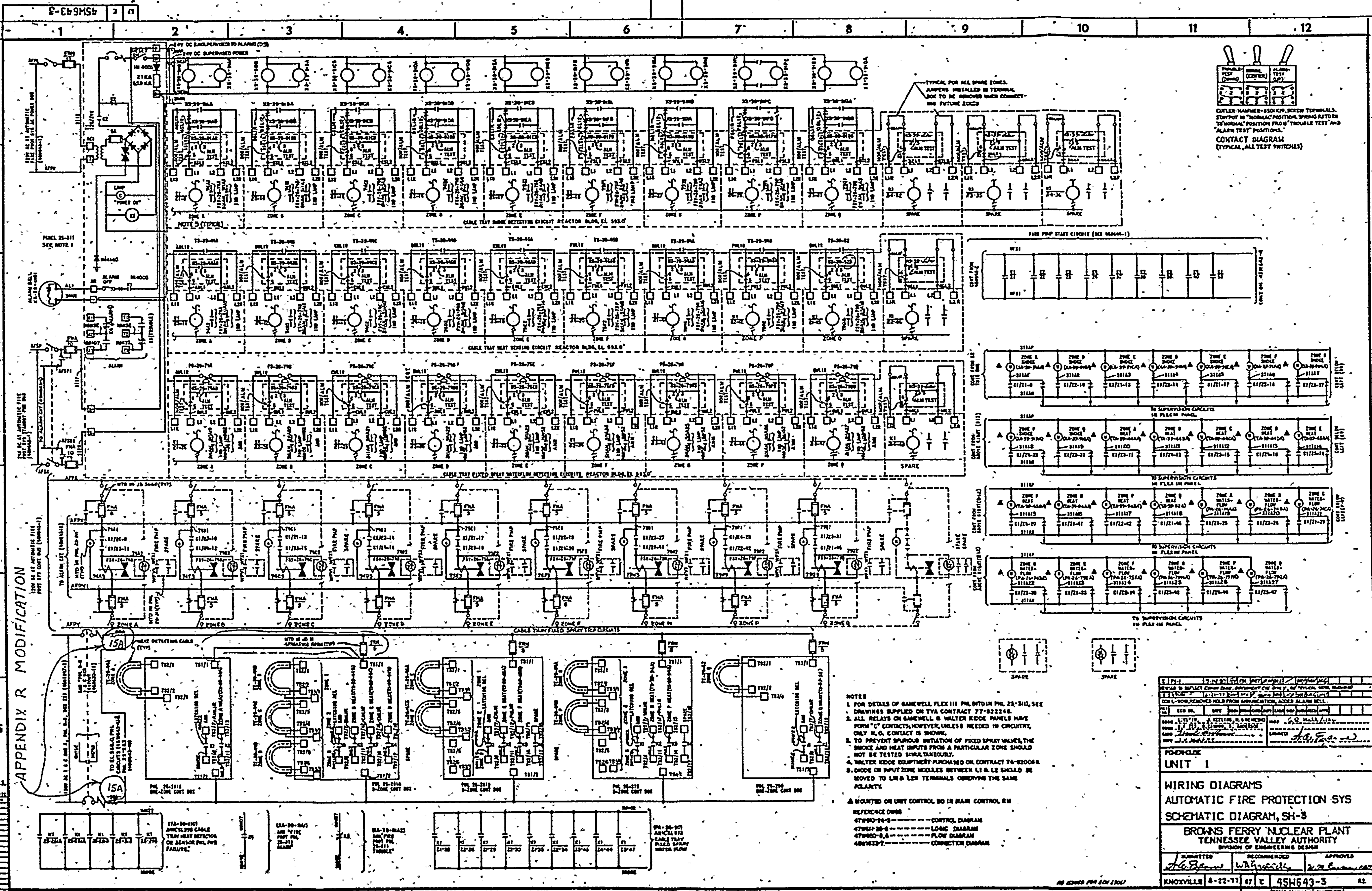
WIRING DIAGRAMS
ANNUNCIATOR SYSTEM
KEY DIAGRAM SH-12

BROWNS FERRY NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN

| SUBMITTED | RECOMMENDED | APPROVED |
|---|---|---|
| [signature] | [signature] | [signature] |

| KNOXVILLE | 2-1-71 | 67 | 1 | | 45N620-12 |
|---|---|---|---|---|---|

THIS DRAWING IS UNDER FUNCTIONAL CONFIGURATION CONTROL




NOTES

1. FOR DETAILS OF GAMEWELL FLEX III PNL (MTD IN PNL 25-311), SEE DRAWINGS SUPPLIED ON TVA CONTRACT 77-82224B.
2. ALL RELAYS ON GAMEWELL & WALTER KIDDE PANELS HAVE FORM "C" CONTACTS, HOWEVER, UNLESS NEEDED IN CIRCUITRY, ONLY N.O. CONTACT IS SHOWN.
3. TO PREVENT SPURIOUS INITIATION OF FIXED SPRAY VALVES, THE SMOKE AND HEAT INPUTS FROM A PARTICULAR ZONE SHOULD NOT BE TESTED SIMULTANEOUSLY.
4. WALTER KIDDE EQUIPMENT PURCHASED ON CONTRACT 76-82006B.
5. DIODE ON INPUT ZONE MODULES BETWEEN L1 & L2 SHOULD BE MOVED TO LR & L2R TERMINALS OBSERVING THE SAME POLARITY.

▲ MOUNTED ON UNIT CONTROL BD IN MAIN CONTROL RM

REFERENCE DWGS

47W610-26-3 ———— CONTROL DIAGRAM

47W611-26-6 ———— LOGIC DIAGRAM

47W600-5,6 ———— FLOW DIAGRAM

45W1633-? ———— CONNECTION DIAGRAM

POWERHOUSE

UNIT 1

WIRING DIAGRAMS

AUTOMATIC FIRE PROTECTION SYS

SCHEMATIC DIAGRAM, SH-3

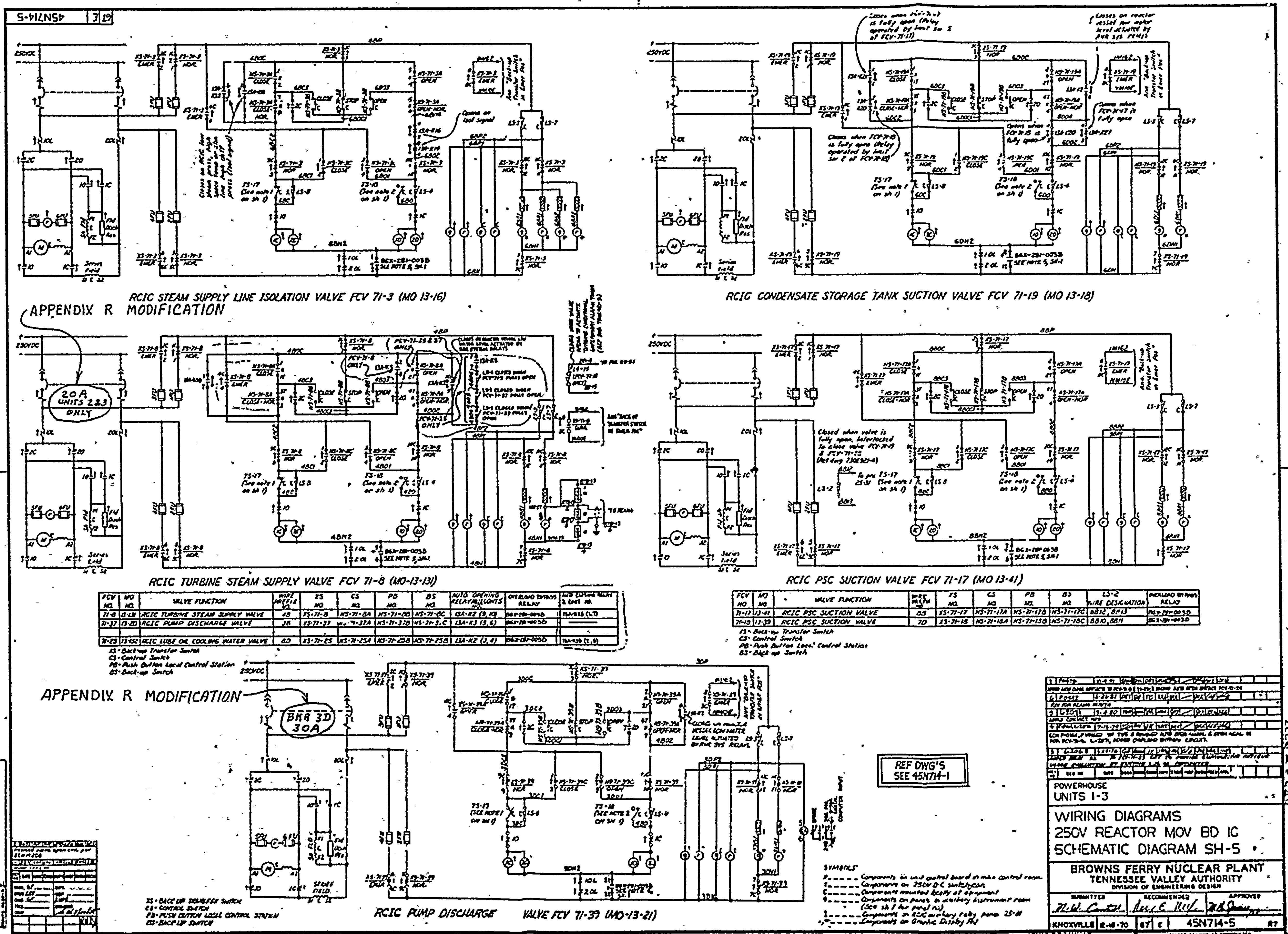
BROWNS FERRY NUCLEAR PLANT

TENNESSEE VALLEY AUTHORITY

DIVISION OF ENGINEERING DESIGN

| SUBMITTED | RECOMMENDED | APPROVED |
|---|---|---|

| KNOXVILLE | 4-22-77 | 47 | E | 45W643-3 | R2 |
|---|---|---|---|---|---|




| FCV NO. | MO NO. | VALVE FUNCTION | WIRE PREFIX NO. | XS NO. | CS NO. | PB NO. | BS NO. | AUTO OPENING RELAY & CONTS NO. | OVERLOAD BYPASS RELAY | AUTO CLOSING RELAY & UNIT NO. |
|---|---|---|---|---|---|---|---|---|---|---|
| 71-8 | 13-131 | RCIC TURBINE STEAM SUPPLY VALVE | 48 | XS-71-8 | HS-71-8A | HS-71-8B | HS-71-8C | 13A-K2 (9,10) | 86X-281-003B | 13A-K35 (1,2) |
| 71-37 | 13-20 | RCIC PUMP DISCHARGE VALVE | 38 | XS-71-37 | HS-71-37A | HS-71-37B | HS-71-3.C | 13A-K3 (5,6) | 86X-281-003B | — |
| | | | | | | | | | | |
| 71-25 | 13-132 | RCIC LUBE OIL COOLING WATER VALVE | 80 | XS-71-25 | HS-71-25A | HS-71-25B | HS-71-25B | 13A-K2 (3,4) | 86X-281-003B | 13A-K36 (1,2) |

XS - Back-up Transfer Switch
CS - Control Switch
PB - Push Button Local Control Station
BS - Back-up Switch

| FCV NO | MO NO | VALVE FUNCTION | WIRE PREFIX NO | XS NO. | CS NO. | PB NO. | BS NO. | LS-2 WIRE DESIGNATION | OVERLOAD BYPASS RELAY |
|---|---|---|---|---|---|---|---|---|---|
| 71-17 | 13-41 | RCIC PSC SUCTION VALVE | 85 | XS-71-17 | HS-71-17A | HS-71-17B | HS-71-17C | 8812, 8813 | 86X-281-003B |
| 71-18 | 13-39 | RCIC PSC SUCTION VALVE | 70 | XS-71-18 | HS-71-18A | HS-71-18B | HS-71-18C | 8810, 8811 | 86X-281-003B |

XS - Back-up Transfer Switch
CS - Control Switch
PB - Push Button Local Control Station
BS - Back-up Switch

XS - BACK UP TRANSFER SWITCH
CS - CONTROL SWITCH
PB - PUSH BUTTON LOCAL CONTROL STATION
BS - BACK UP SWITCH

SYMBOLS
Components in unit control board or main control room.
Components on 250V D-C switchgear
Component mounted locally at equipment
Components on panel in auxiliary instrument room (See sh 1 for panel no.)
Components on ECK auxiliary relay panel 25-31
Components on Graphic Display Pnl

POWERHOUSE
UNITS 1-3

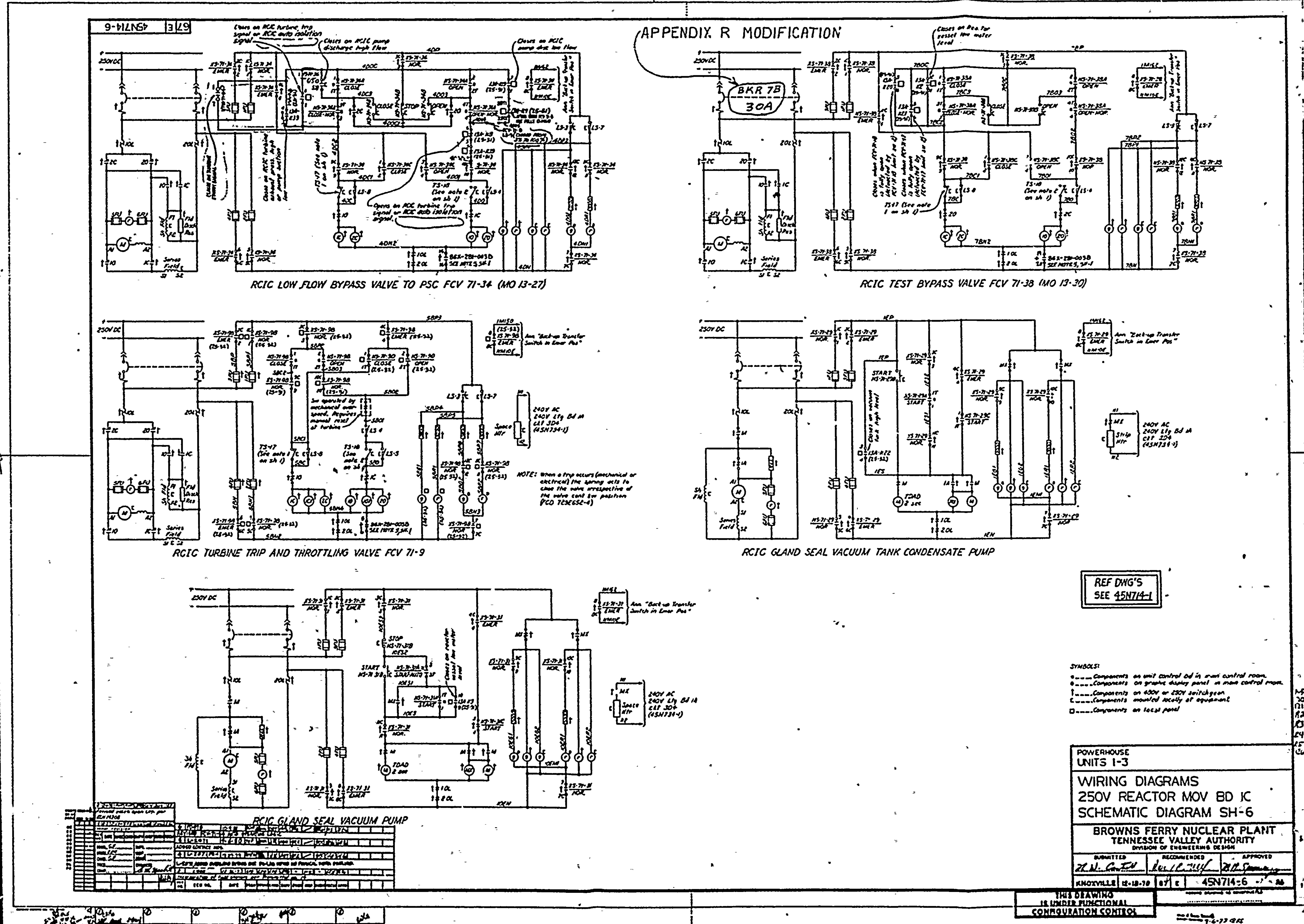
WIRING DIAGRAMS
250V REACTOR MOV BD 1C
SCHEMATIC DIAGRAM SH-5

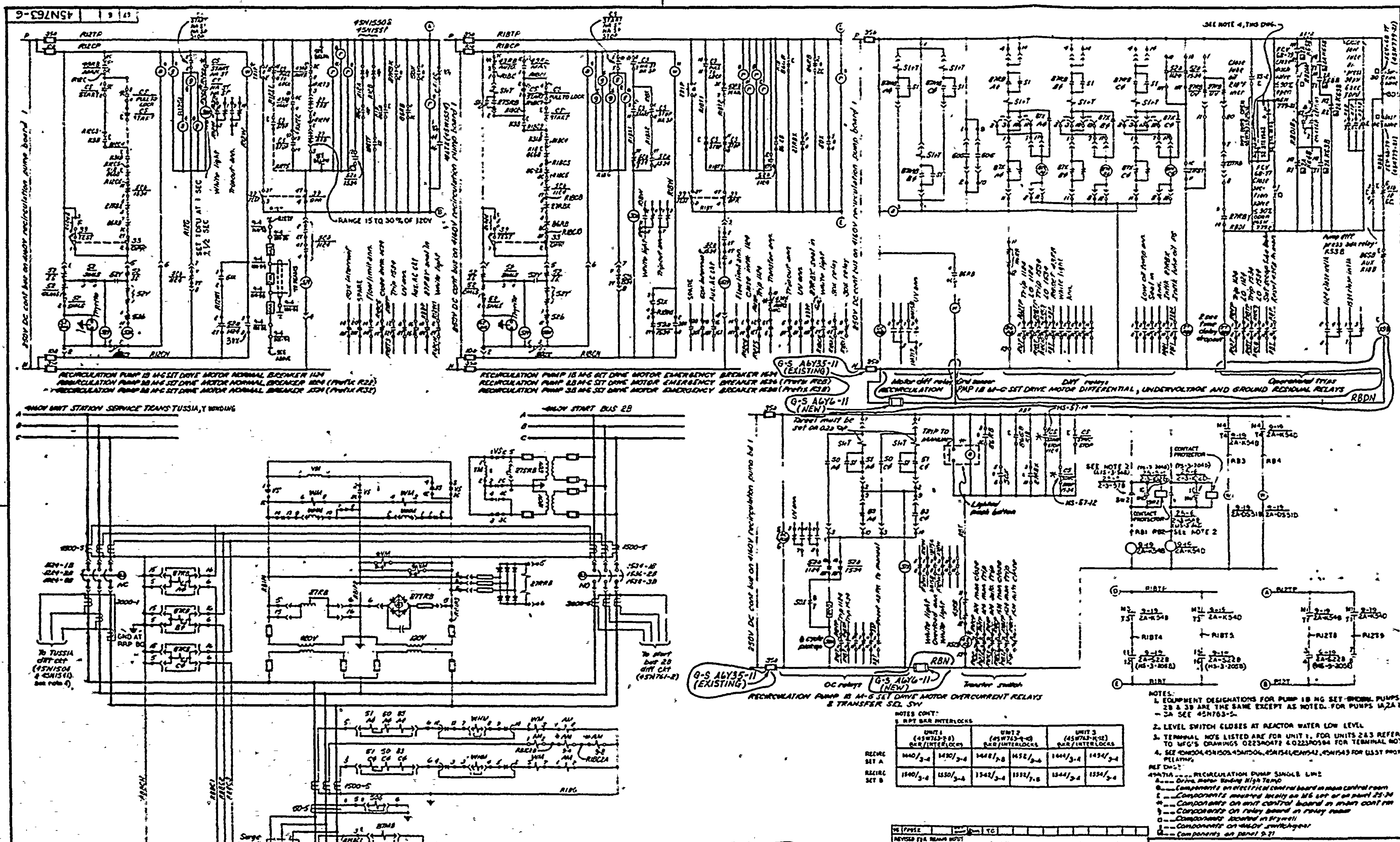
BROWNS FERRY NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN

SUBMITTED | RECOMMENDED | APPROVED

KNOXVILLE 12-18-70 | 45N714-5

THIS DRAWING IS UNDER FUNCTIONAL CONFIGURATION CONTROL


APPENDIX R MODIFICATION
BKR 7B
30A
RCIC LOW FLOW BYPASS VALVE TO PSC FCV 71-34 (MO 13-27)
RCIC TEST BYPASS VALVE FCV 71-38 (MO 13-30)
RCIC TURBINE TRIP AND THROTTLING VALVE FCV 71-9
RCIC GLAND SEAL VACUUM TANK CONDENSATE PUMP
RCIC GLAND SEAL VACUUM PUMP
REF DWG'S SEE 45N714-1
250V DC
SYMBOLS:
POWERHOUSE UNITS 1-3
WIRING DIAGRAMS
250V REACTOR MOV BD 1C
SCHEMATIC DIAGRAM SH-6
BROWNS FERRY NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN
SUBMITTED
RECOMMENDED
APPROVED
KNOXVILLE 12-18-70
45N714-6
THIS DRAWING IS UNDER FUNCTIONAL CONFIGURATION CONTROL



PROPOSED CIRCUIT CHANGES SHOWN FOR 4160V RECIRCULATION PUMP M-G SET 1B CIRCUITS; TYPICAL FOR M-G SETS 1A, 2A, 2B, 3A & 3B CIRCUITS.

NOTES:
1. EQUIPMENT DESIGNATIONS FOR PUMP 1B MG SET AND PUMPS 2B & 3B ARE THE SAME EXCEPT AS NOTED. FOR PUMPS 1A, 2A & 3A SEE 45N763-5.
2. LEVEL SWITCH CLOSES AT REACTOR WATER LOW LEVEL
3. TERMINAL NO'S LISTED ARE FOR UNIT 1. FOR UNITS 2 & 3 REFER TO MFG'S DRAWINGS 0223R0472 & 0223R0584 FOR TERMINAL NO'S.
4. SEE 45N1504, 45N1505, 45N1506, 45N1541, 45N1542, 45N1543 FOR USST PROT RELAYING.

REF DWG:
45N714 ---- RECIRCULATION PUMP SINGLE LINE

POWERHOUSE
UNITS 1-3

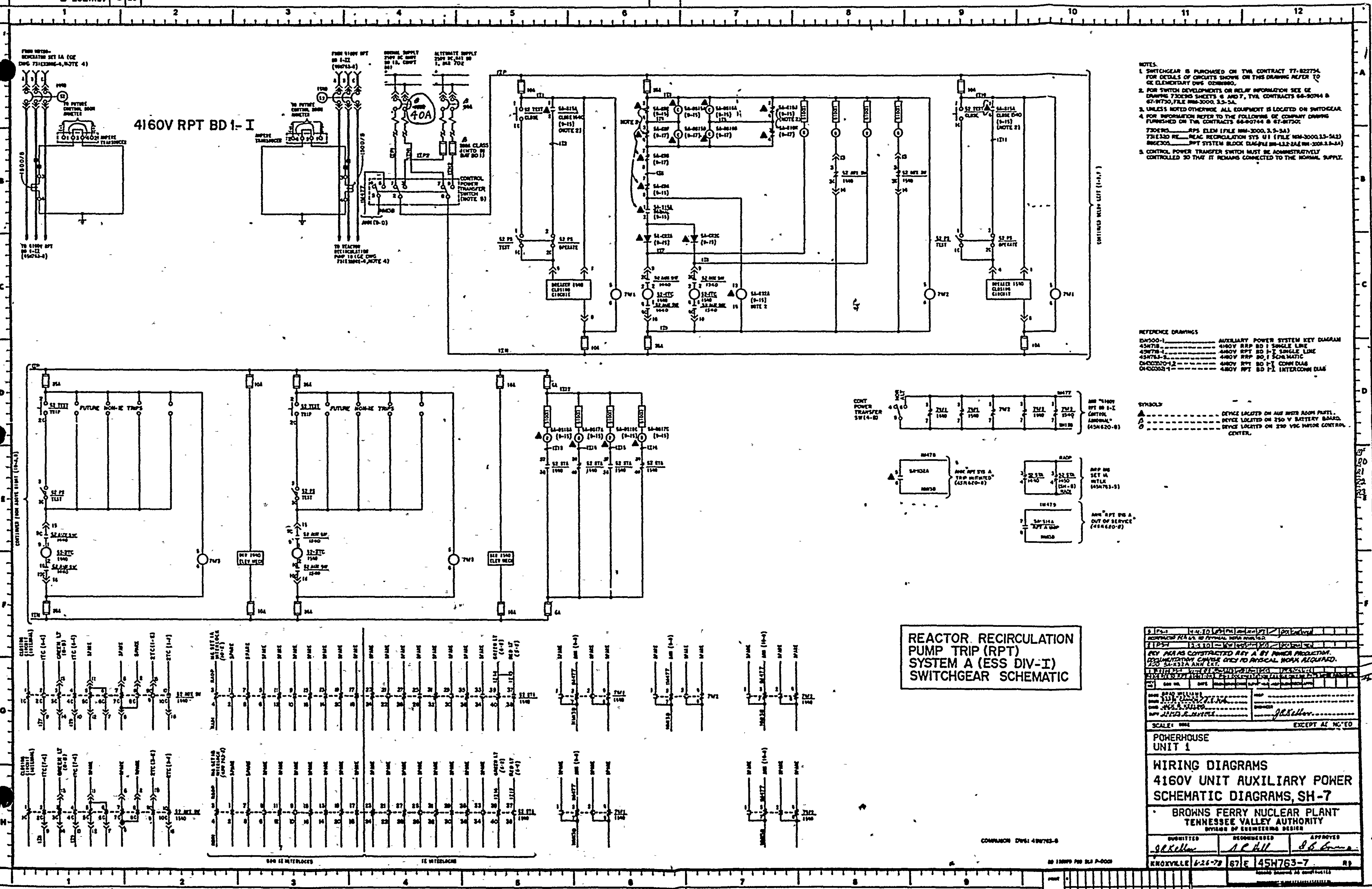
WIRING DIAGRAMS
4160V UNIT AUXILIARY POWER
SCHEMATIC DIAGRAMS

BROWNS FERRY NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN

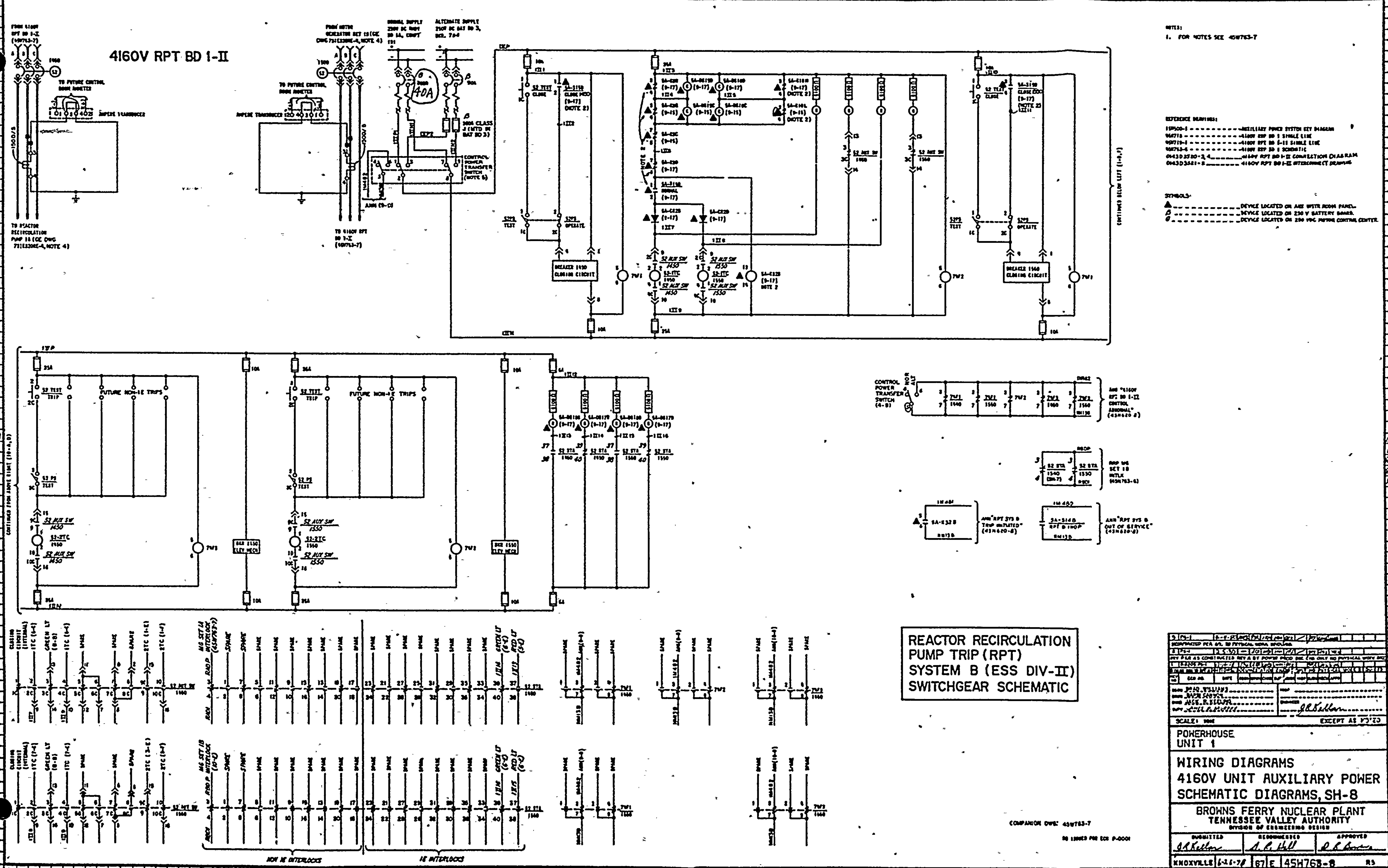
SUBMITTED | RECOMMENDED | APPROVED
C. McCord

KNOXVILLE 8-29-68 | 67 | E | 45N763-6

THIS DRAWING IS UNDER FUNCTIONAL CONFIGURATION CONTROL



4160V RPT BD 1- I
NOTES.
1. SWITCHGEAR IS PURCHASED ON TVA CONTRACT 77-82275. FOR DETAILS OF CIRCUITS SHOWN ON THIS DRAWING REFER TO GE ELEMENTARY DWG
2. FOR SWITCH DEVELOPMENTS OR RELAY INFORMATION SEE GE DRAWING 730E95 SHEETS 6 AND 7, TVA CONTRACTS 66-90744 & 67-91750, FILE 3000, 3.5-3A.
3. UNLESS NOTED OTHERWISE ALL EQUIPMENT IS LOCATED ON SWITCHGEAR.
4. FOR INFORMATION REFER TO THE FOLLOWING GE COMPANY DRAWING FURNISHED ON TVA CONTRACTS 66-90744 & 67-91750:
5. CONTROL POWER TRANSFER SWITCH MUST BE ADMINISTRATIVELY CONTROLLED SO THAT IT REMAINS CONNECTED TO THE NORMAL SUPPLY.
REFERENCE DRAWINGS
SYMBOLS
CONTROL POWER TRANSFER SWITCH (NOTE 5)
FUTURE NON-IE TRIPS
REACTOR RECIRCULATION PUMP TRIP (RPT) SYSTEM A (ESS DIV-I) SWITCHGEAR SCHEMATIC
SCALE: NONE
EXCEPT AS NOTED
POWERHOUSE UNIT 1
WIRING DIAGRAMS
4160V UNIT AUXILIARY POWER
SCHEMATIC DIAGRAMS, SH-7
BROWNS FERRY NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN
SUBMITTED
RECOMMENDED
APPROVED
KNOXVILLE 6-26-78 87 E 45H763-7




REACTOR RECIRCULATION
PUMP TRIP (RPT)
SYSTEM B (ESS DIV-II)
SWITCHGEAR SCHEMATIC

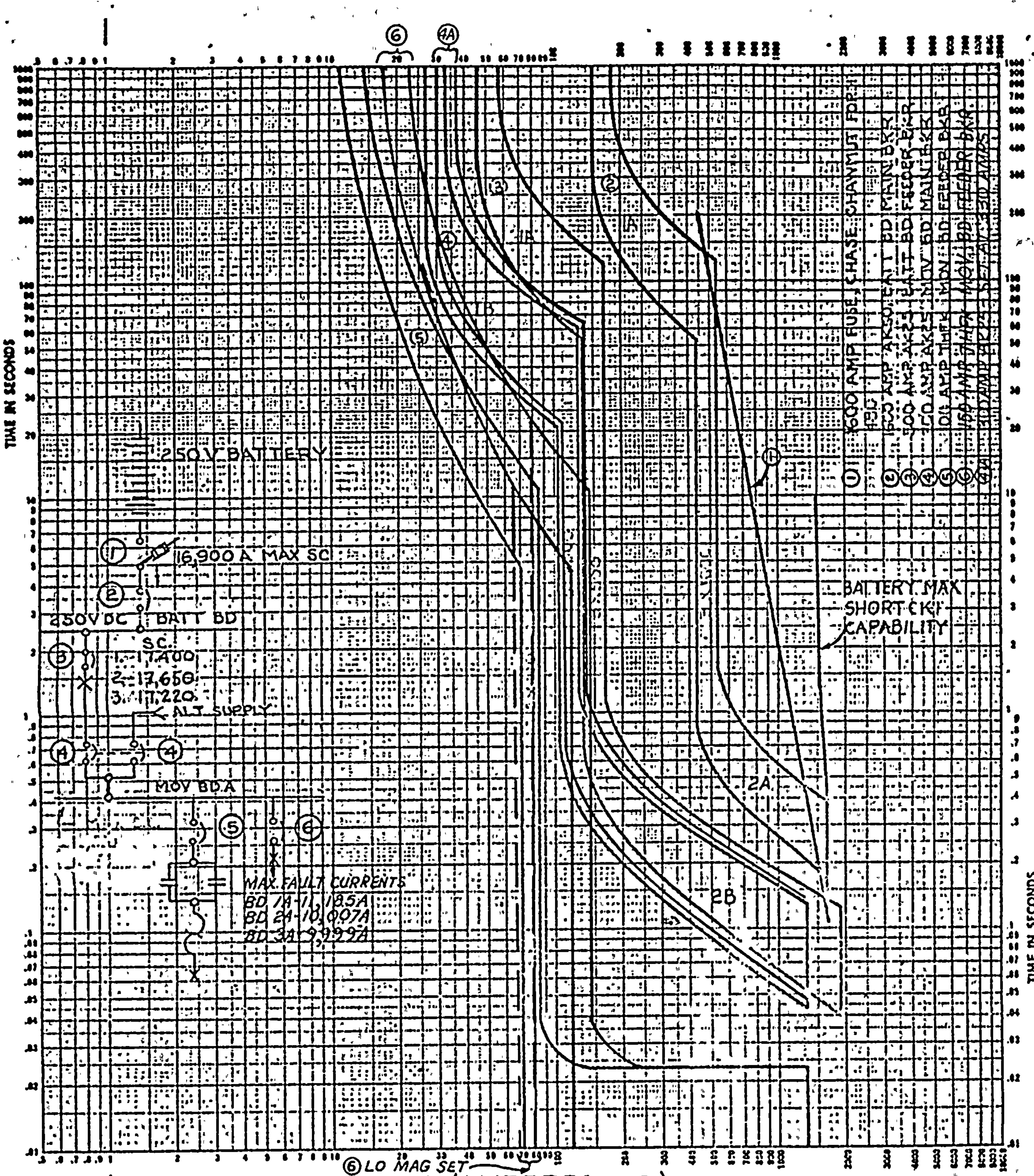
POWERHOUSE
UNIT 1

WIRING DIAGRAMS
4160V UNIT AUXILIARY POWER
SCHEMATIC DIAGRAMS, SH-8

BROWNS FERRY NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN

SCALE: NONE EXCEPT AS NOTED

KNOXVILLE 67 E 45W763-8 R5




CURRENT (AMPERES x10)

BREAKER AND FUSE COORDINATION·CURVES

REVISED BY *J.W. Simore* DATE *6-19-82*

CHECKED BY *[signature]* DATE *6-21-82*

| | | |
|---|---|---|
| GENERAL ELECTRIC | TIME-CURRENT CURVES | NO. 158B8127 X2 |

BROWNS FERRY NUCLEAR POWER PLANT 250VDC SYS
BATT BDS 1,2 & 3 WITH MOV BD A

COMPONENT APED — FCF 236 X 235 (BROWNS FERRY 1,2 & 3) GC-24 — DATE 3-17-70

LOCATION SAN JOSE — DRAWN BY [illegible]

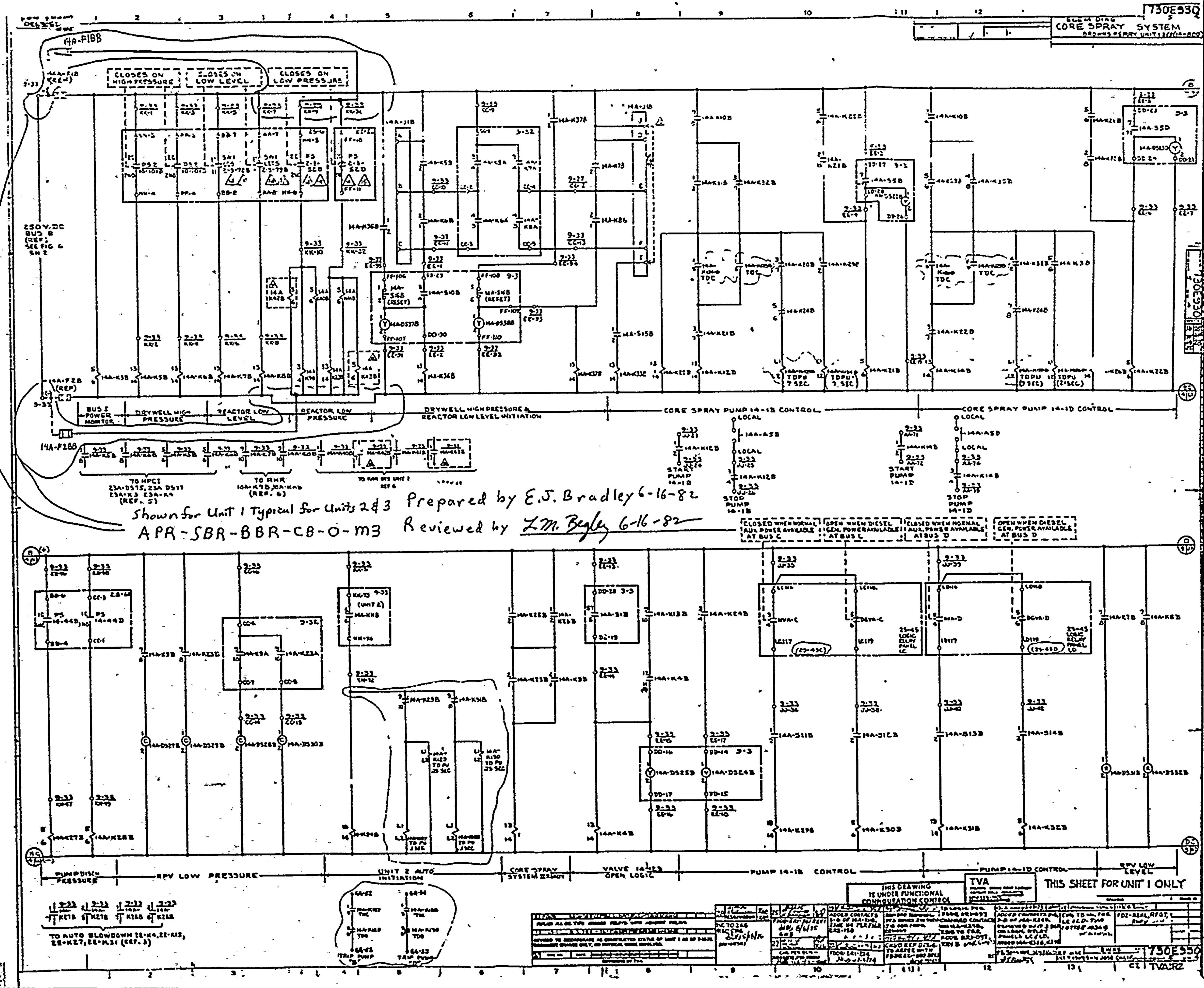
AUG 4 1972

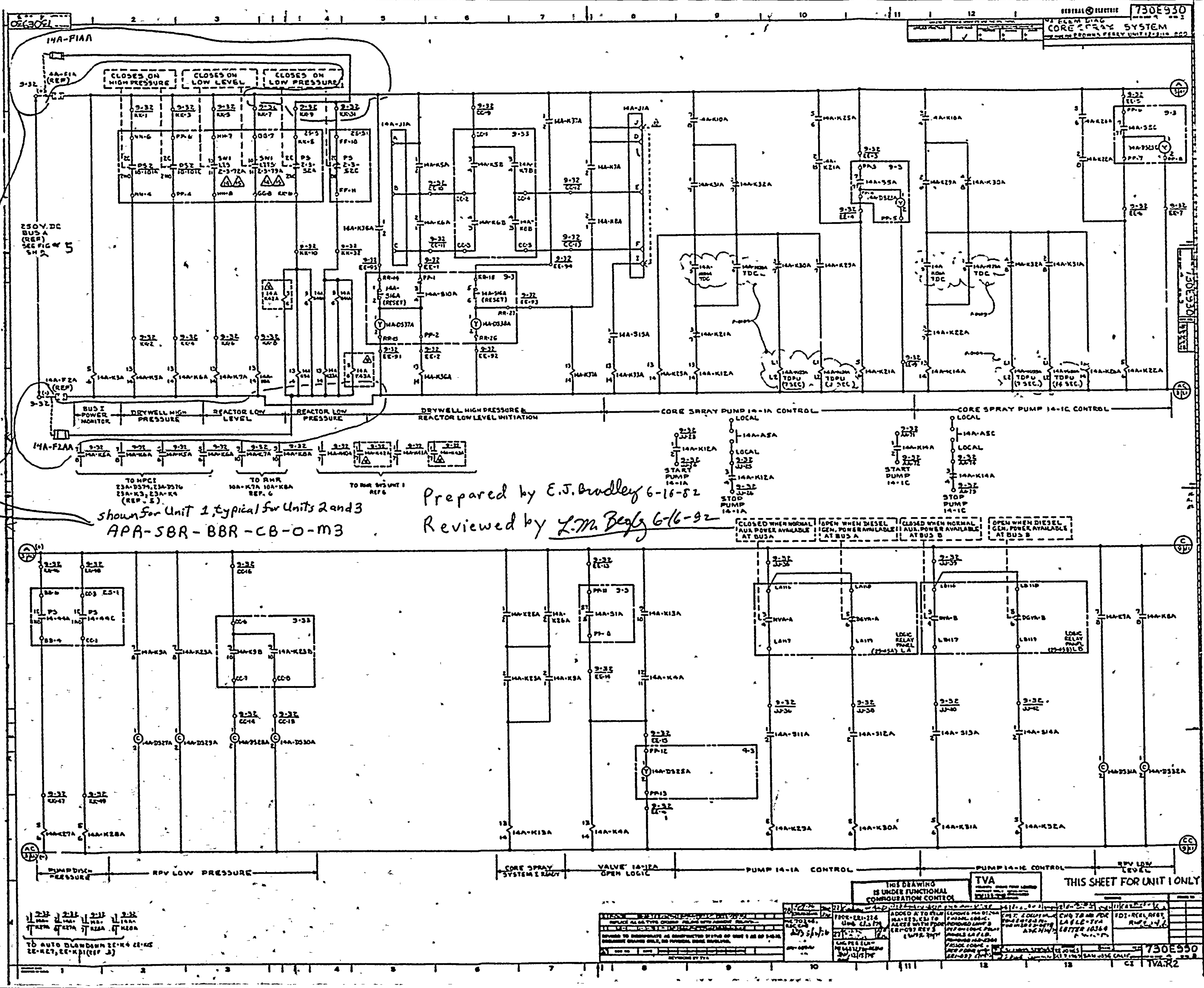
PROJECT: BROWNS FERRY 1, 2, & 3
CONTRACT NO. *66C60-90744*
MAJOR EQUIPMENT PACKAGE
CONTRACT NO. *67C60-91750*
NUCLEAR STEAM SUPPLY SYSTEM
TITLE *BATTERY BOARDS*
CHECKED *[signature]*

MF

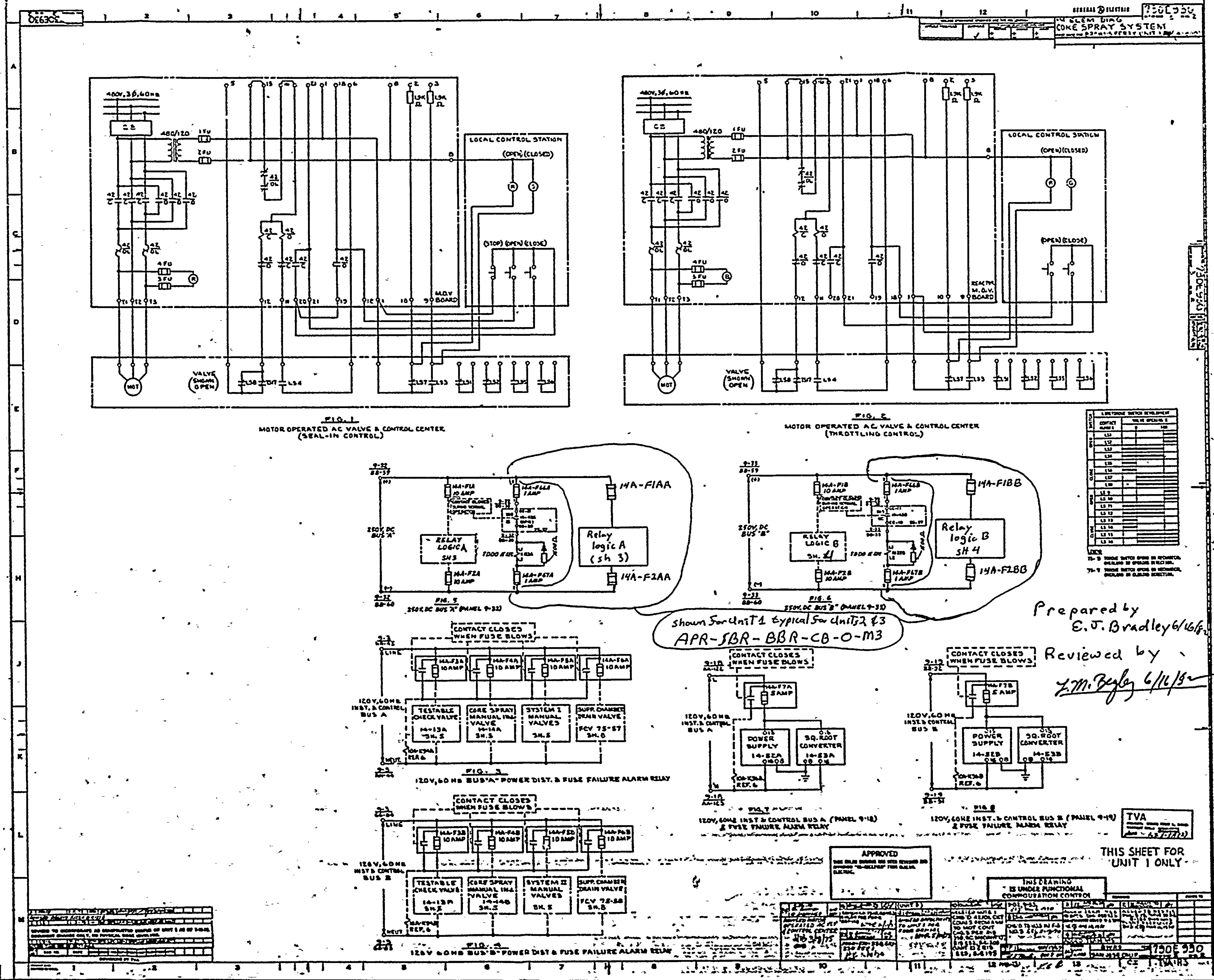


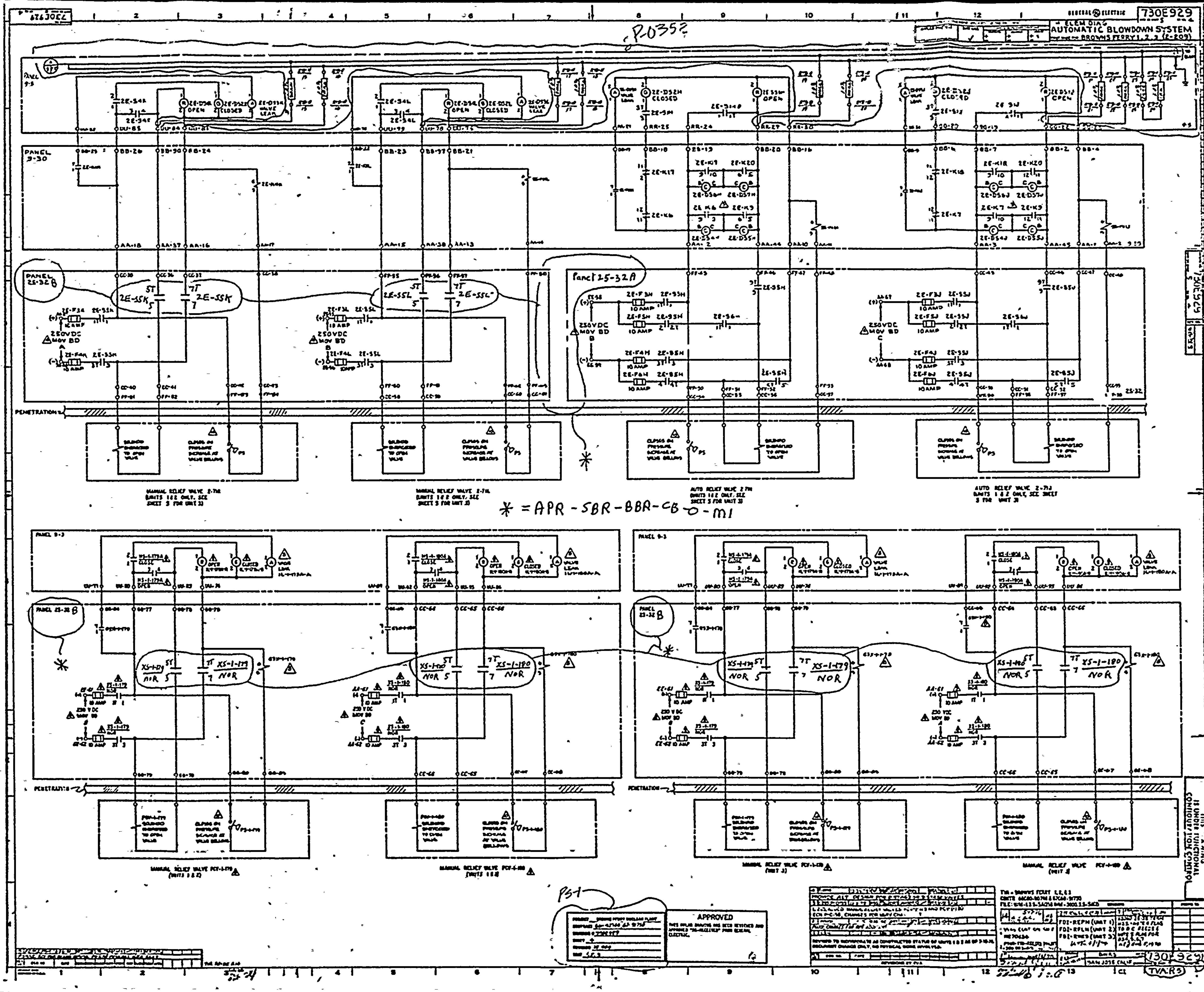
*66-90744-~~5.2~~-3D-110*


730E930
ELEM DIAG
CORE SPRAY SYSTEM
BROWNS FERRY
CLOSES ON HIGH PRESSURE
CLOSES ON LOW LEVEL
CLOSES ON LOW PRESSURE
14A-F18B
250V. DC BUS B
BUS B POWER MONITOR
DRYWELL HIGH PRESSURE
REACTOR LOW LEVEL
REACTOR LOW PRESSURE
DRYWELL HIGH PRESSURE & REACTOR LOW LEVEL INITIATION
CORE SPRAY PUMP 14-1B CONTROL
CORE SPRAY PUMP 14-1D CONTROL
START PUMP 14-1B
STOP PUMP 14-1B
START PUMP 14-1D
STOP PUMP 14-1D
TO HPCI
TO RHR
Shown for Unit 1 Typical for Units 2 & 3
Prepared by E.J. Bradley 6-16-82
APR-SBR-BBR-CB-0-M3
Reviewed by L.M. Begley 6-16-82
CLOSED WHEN NORMAL AUX. POWER AVAILABLE AT BUS C
OPEN WHEN DIESEL GEN. POWER AVAILABLE AT BUS C
CLOSED WHEN NORMAL AUX. POWER AVAILABLE AT BUS D
OPEN WHEN DIESEL GEN. POWER AVAILABLE AT BUS D
PUMP DISCH PRESSURE
RPV LOW PRESSURE
UNIT 2 AUTO INITIATION
CORE SPRAY SYSTEM
VALVE 14-12 OPEN LOGIC
PUMP 14-1B CONTROL
PUMP 14-1D CONTROL
RPV LOW LEVEL
TO AUTO BLOWDOWN
TRIP PUMP
THIS DRAWING IS UNDER FUNCTIONAL CONFIGURATION CONTROL
TVA
THIS SHEET FOR UNIT 1 ONLY
730E930

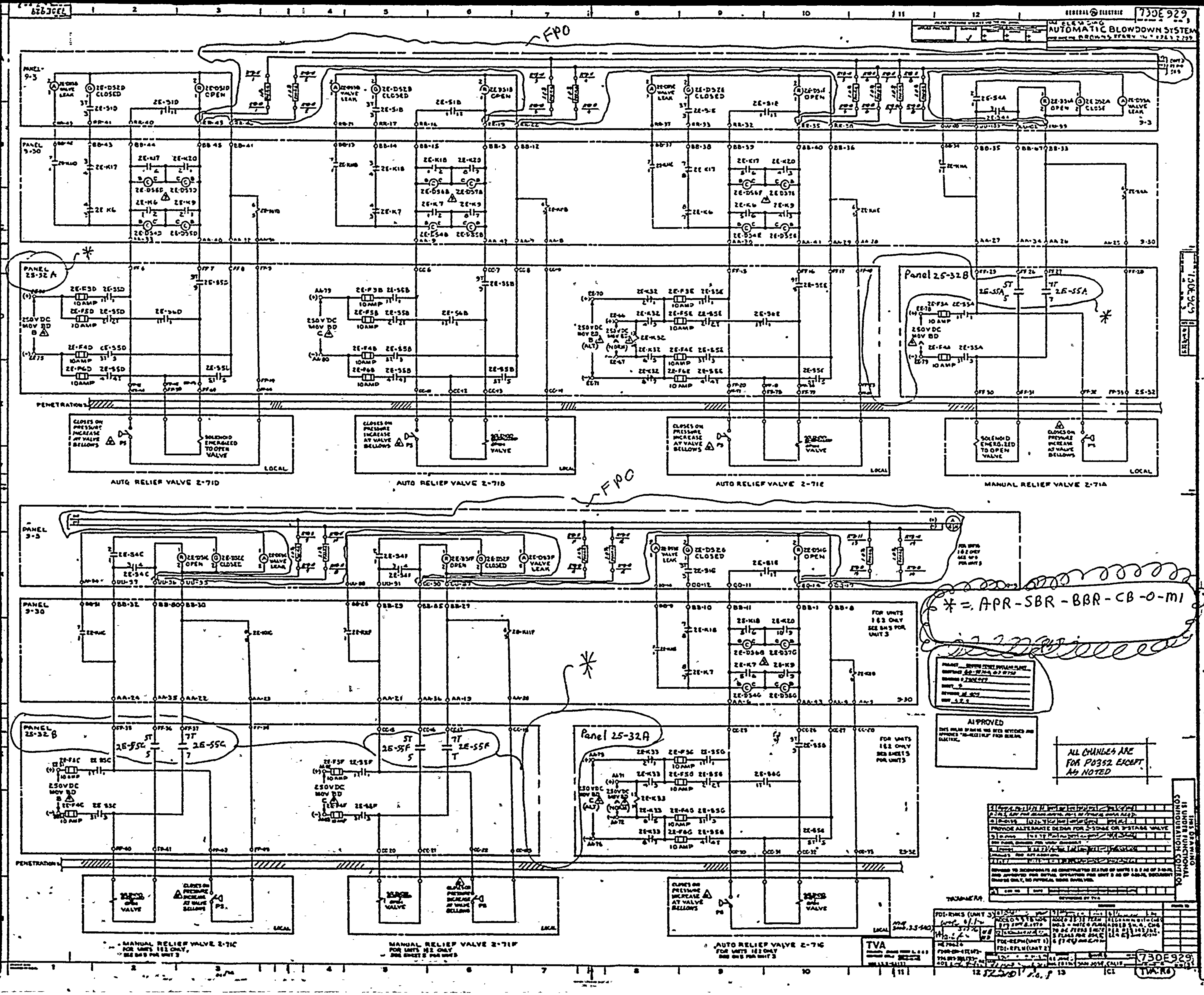


ELEM DIAG CORE SPRAY SYSTEM BROWNS FERRY UNIT 1-2-3
730E930
14A-F1AA
CLOSES ON HIGH PRESSURE
CLOSES ON LOW LEVEL
CLOSES ON LOW PRESSURE
250V DC BUS A (REF) SEE FIG 5 SH 2
14A-F2A (REF)
BUS I POWER MONITOR
DRYWELL HIGH PRESSURE
REACTOR LOW LEVEL
REACTOR LOW PRESSURE
DRYWELL HIGH PRESSURE & REACTOR LOW LEVEL INITIATION
CORE SPRAY PUMP 14-1A CONTROL
CORE SPRAY PUMP 14-1C CONTROL
14A-F2AA
TO HPCI
TO RHR
START PUMP 14-1A
STOP PUMP 14-1A
START PUMP 14-1C
STOP PUMP 14-1C
Prepared by E.J. Bradley 6-16-82
Reviewed by L.M. Begley 6-16-92
shown for Unit 1, typical for Units 2 and 3
APR-SBR-BBR-CB-O-M3
CLOSED WHEN NORMAL AUX POWER AVAILABLE AT BUS A
OPEN WHEN DIESEL GEN. POWER AVAILABLE AT BUS A
CLOSED WHEN NORMAL AUX POWER AVAILABLE AT BUS B
OPEN WHEN DIESEL GEN. POWER AVAILABLE AT BUS B
PUMP DISCH PRESSURE
RPV LOW PRESSURE
CORE SPRAY SYSTEM I READY
VALVE 14-12A OPEN LOGIC
PUMP 14-1A CONTROL
PUMP 14-1C CONTROL
RPV LOW LEVEL
TO AUTO BLOWDOWN
THIS DRAWING IS UNDER FUNCTIONAL CONFIGURATION CONTROL
TVA
THIS SHEET FOR UNIT 1 ONLY
730E930
TVA:R2


ELEM DIAG
CORE SPRAY SYSTEM
MOTOR OPERATED AC VALVE & CONTROL CENTER (SEAL-IN CONTROL)
MOTOR OPERATED AC VALVE & CONTROL CENTER (THROTTLING CONTROL)
LOCAL CONTROL STATION
(OPEN) (CLOSED)
(STOP) (OPEN) (CLOSE)
480V, 3Ø, 60HZ
480/120
M.O.V. BOARD
REACTOR M.O.V. BOARD
VALVE (SHOWN OPEN)
FIG. 1
FIG. 2
250V DC BUS "A"
RELAY LOGIC A SH 3
250V DC BUS "A" (PANEL 9-32)
250V DC BUS "B"
RELAY LOGIC B SH 4
250V DC BUS "B" (PANEL 9-33)
FIG. 5
FIG. 6
14A-F1AA
Relay logic A (sh 3)
14A-F2AA
14A-F1BB
Relay logic B sH 4
14A-F2BB
Shown for Unit 1 typical for Units 2 & 3
APR-SBR-BBR-CB-O-M3
Prepared by E.J. Bradley 6/16/82
Reviewed by L.M. Begley 6/16/82
CONTACT CLOSES WHEN FUSE BLOWS
120V, 60HZ INST. & CONTROL BUS A
TESTABLE CHECK VALVE 14-13A SH. 5
CORE SPRAY MANUAL INJ. VALVE 14-14A SH. 5
SYSTEM I MANUAL VALVES SH. 5
SUPP. CHAMBER DRAIN VALVE FCV 75-57 SH. 8
FIG. 3
120V, 60HZ BUS "A" POWER DIST. & FUSE FAILURE ALARM RELAY
120V, 60HZ INST. & CONTROL BUS B
TESTABLE CHECK VALVE 14-13B SH. 5
CORE SPRAY MANUAL INJ. VALVE 14-14B SH. 5
SYSTEM II MANUAL VALVES SH. 5
SUPP. CHAMBER DRAIN VALVE FCV 75-58 SH. 8
FIG. 4
120V, 60HZ BUS "B" POWER DIST. & FUSE FAILURE ALARM RELAY
POWER SUPPLY 14-52A
SQ. ROOT CONVERTER 14-53A
FIG. 7
120V, 60HZ INST. & CONTROL BUS A (PANEL 9-18) & FUSE FAILURE ALARM RELAY
POWER SUPPLY 14-52B
SQ. ROOT CONVERTER 14-53B
FIG. 8
120V, 60HZ INST. & CONTROL BUS B (PANEL 9-19) & FUSE FAILURE ALARM RELAY
APPROVED
THIS SHEET FOR UNIT 1 ONLY
THIS DRAWING IS UNDER FUNCTIONAL CONFIGURATION CONTROL
TVA
730E950




Prepared by E. J. Bradley 6/16/82
Reviewed by [illegible] 6-16-82



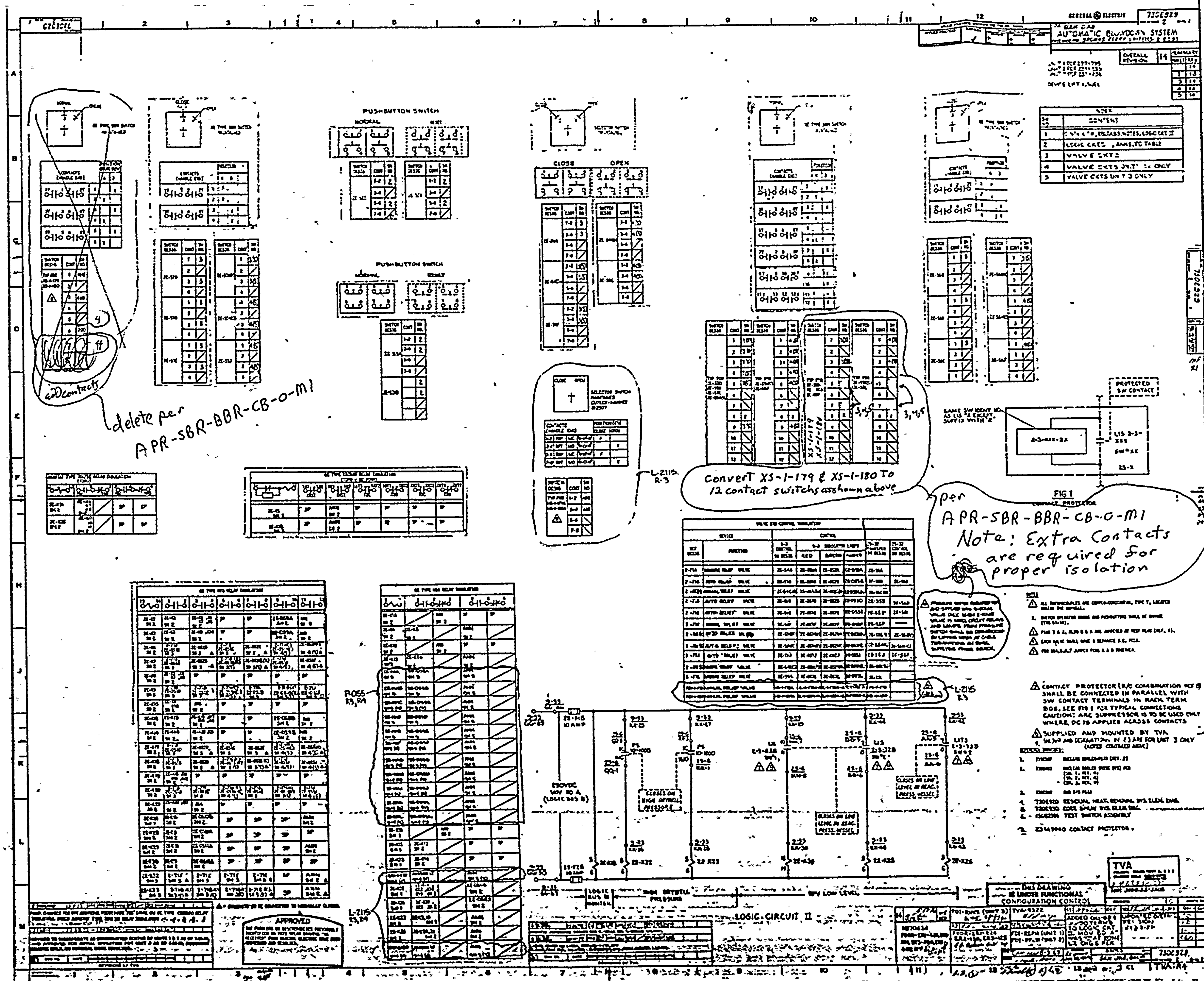

Prepared by E. J. Bradley 6/16/82

Reviewed by [signature] 6/16/82

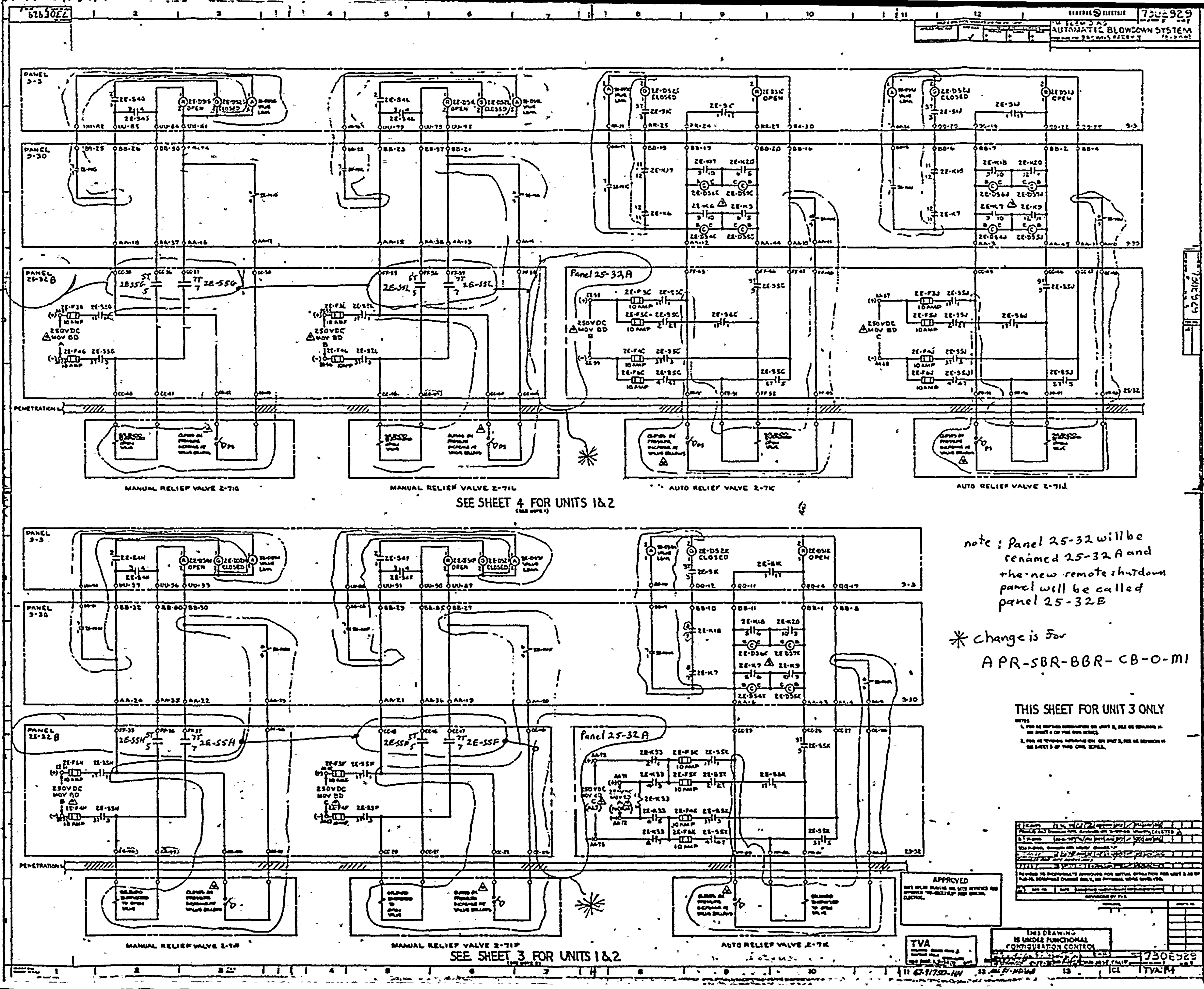
Reason For Changes:

1) To provide isolation of the control circuits from the control bay fire area.

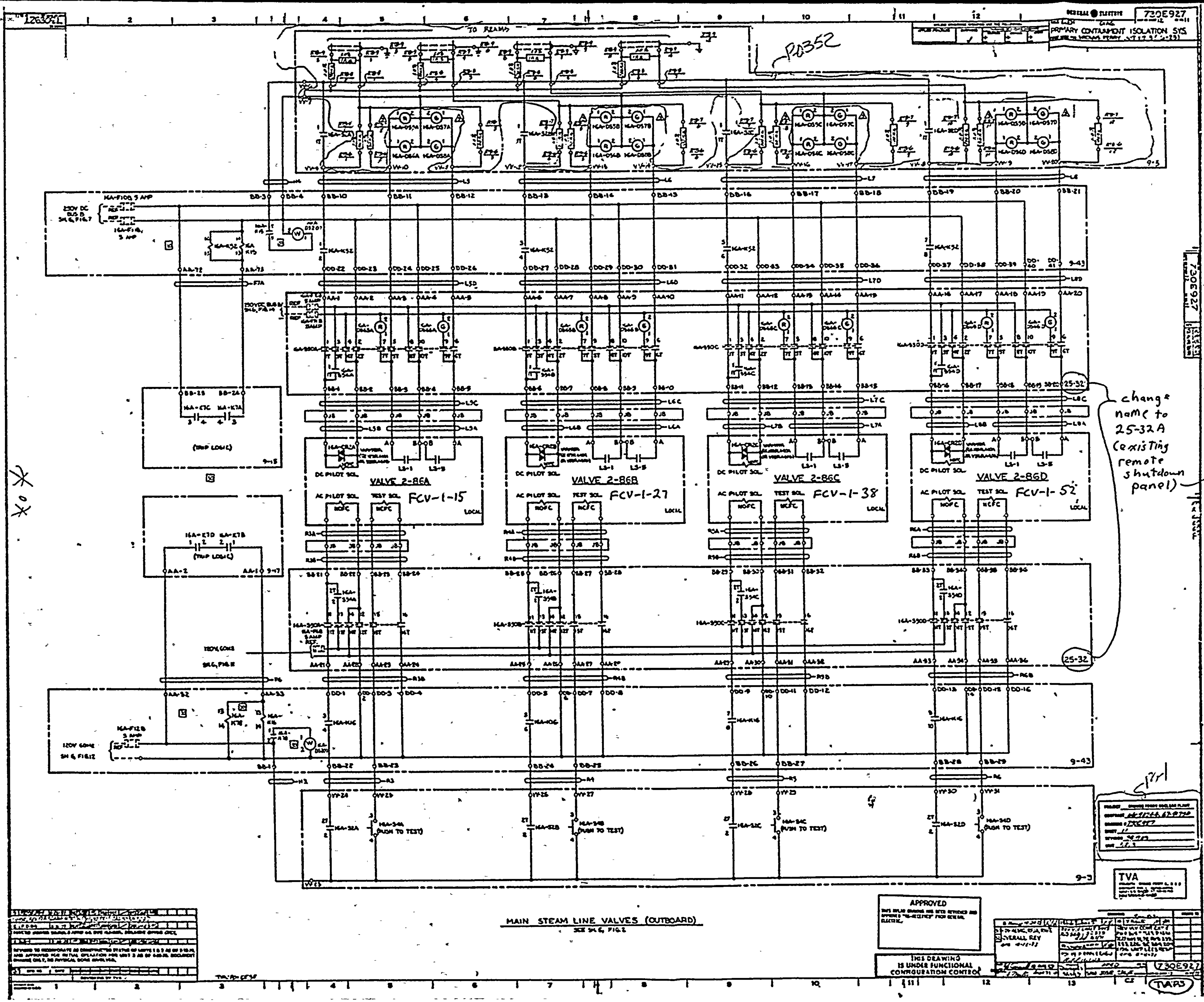
2) To separate half of the safety relief valves from the rest to prevent a single fire from spuriously opening them all without sufficient makeup available



Prepared by E.J. Bradley 6/16/82
Reviewed by L.M. Bagby 6/16/82



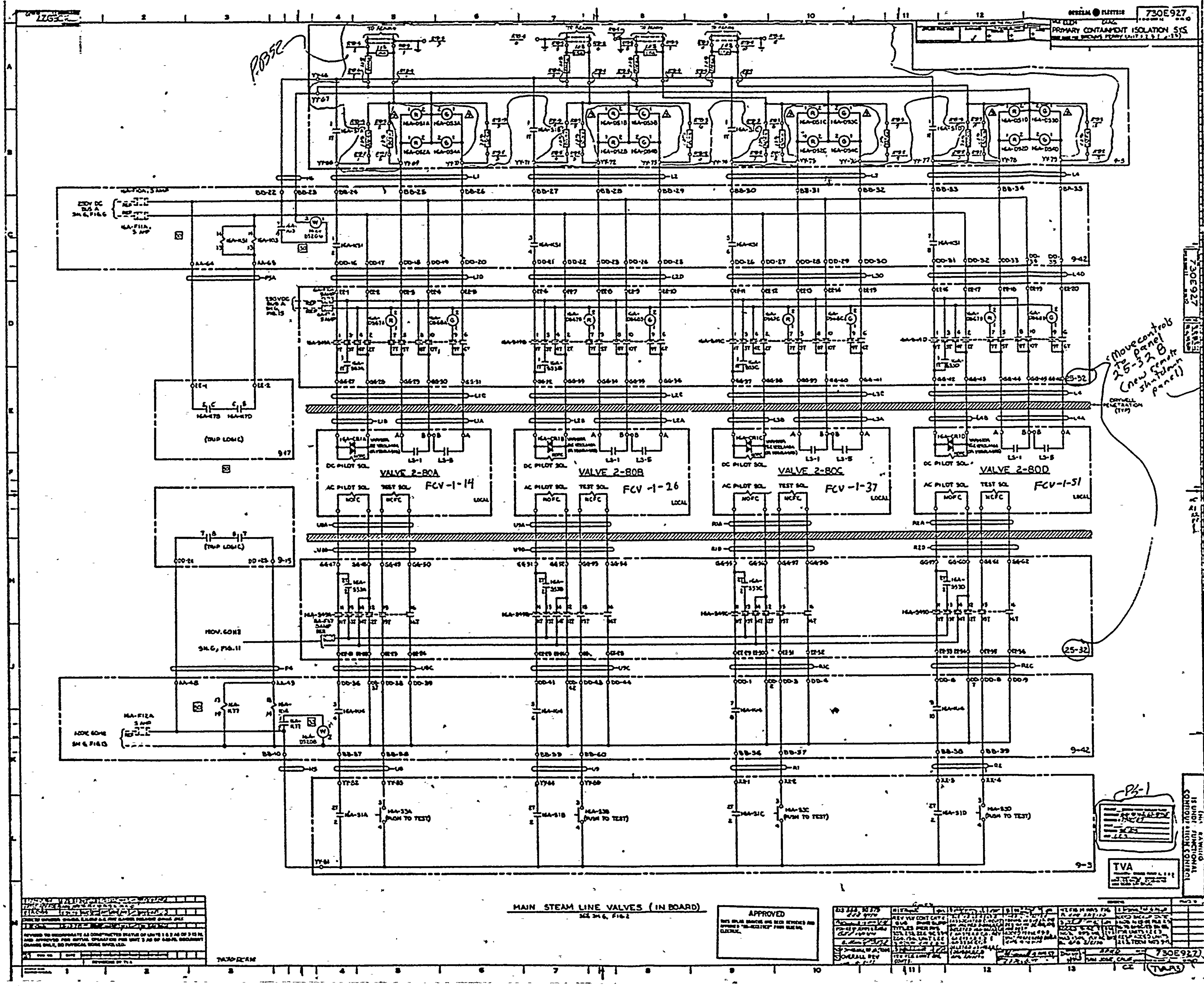

Prepared by E. J. Bradley 6/16/82
Reviewed by [illegible] 6/16/82




APR-SBR-BBR-CB-O-M

Prepared by E. J. Bradley 6/16/82

Reviewed by L.M. Begley 6/16/82

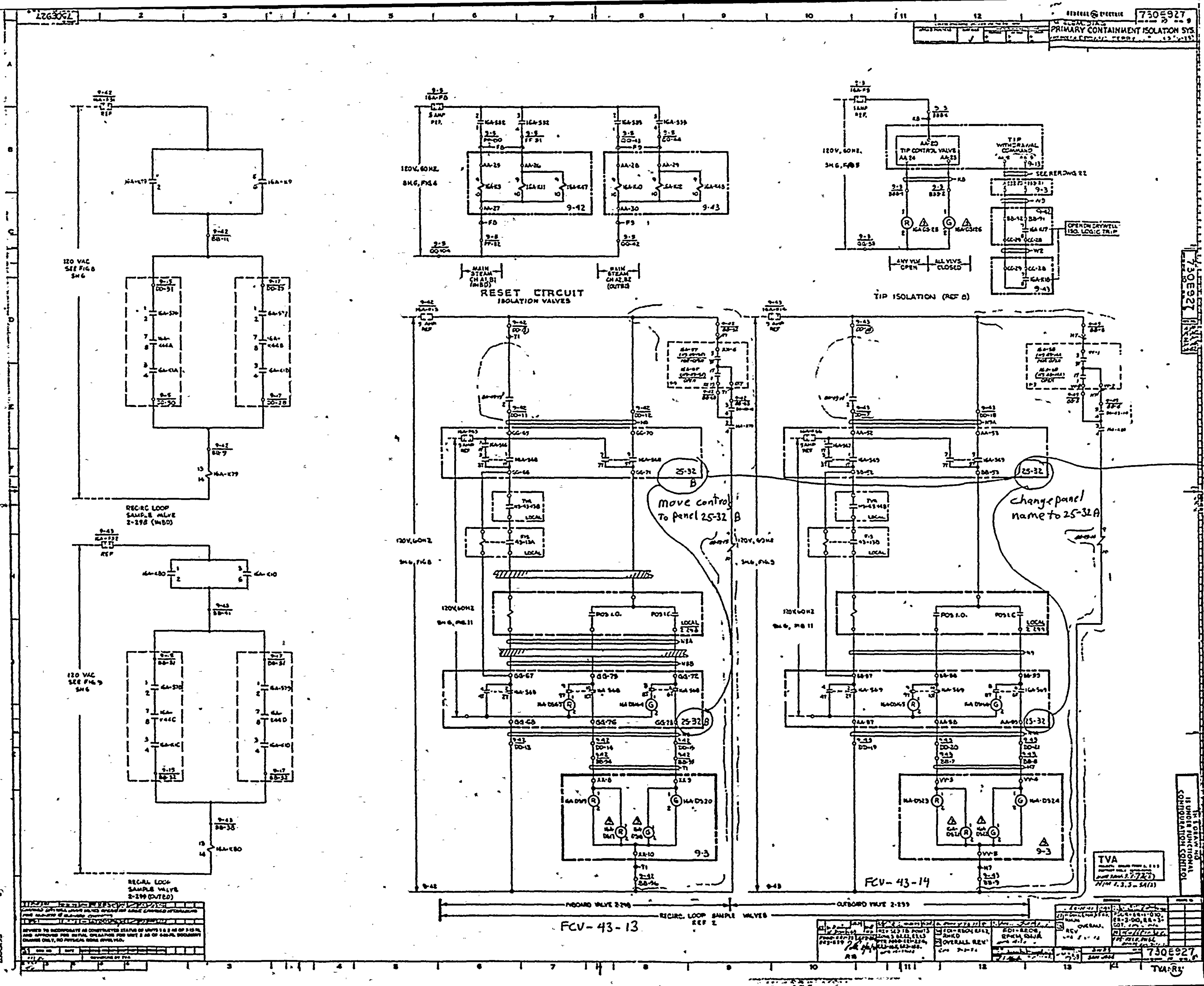


MAIN STEAM LINE VALVES (IN BOARD)

APR-SBR-BBR-CB-0-1

Prepared by E. J. Bradley 6/16/82

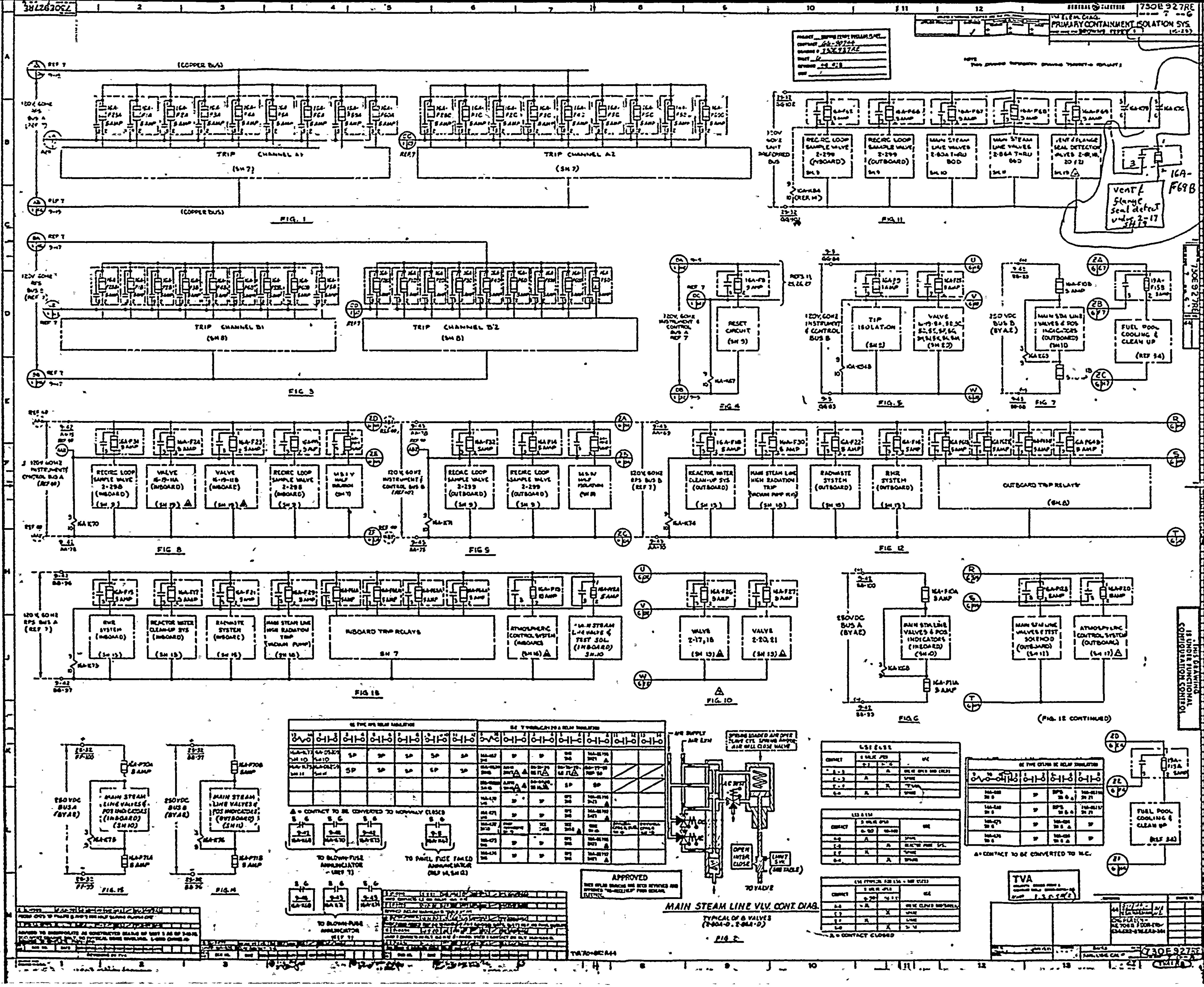
Reviewed by L. M. Begley 6/16/82




Prepared by E.J. Bradley 6/10/82

Reviewed by L.M. Begley 6/16/82

APR-5BR-BBR-CB-0-II.




Typical for Units 2

APR-SBR-BBR-CR-C-M:

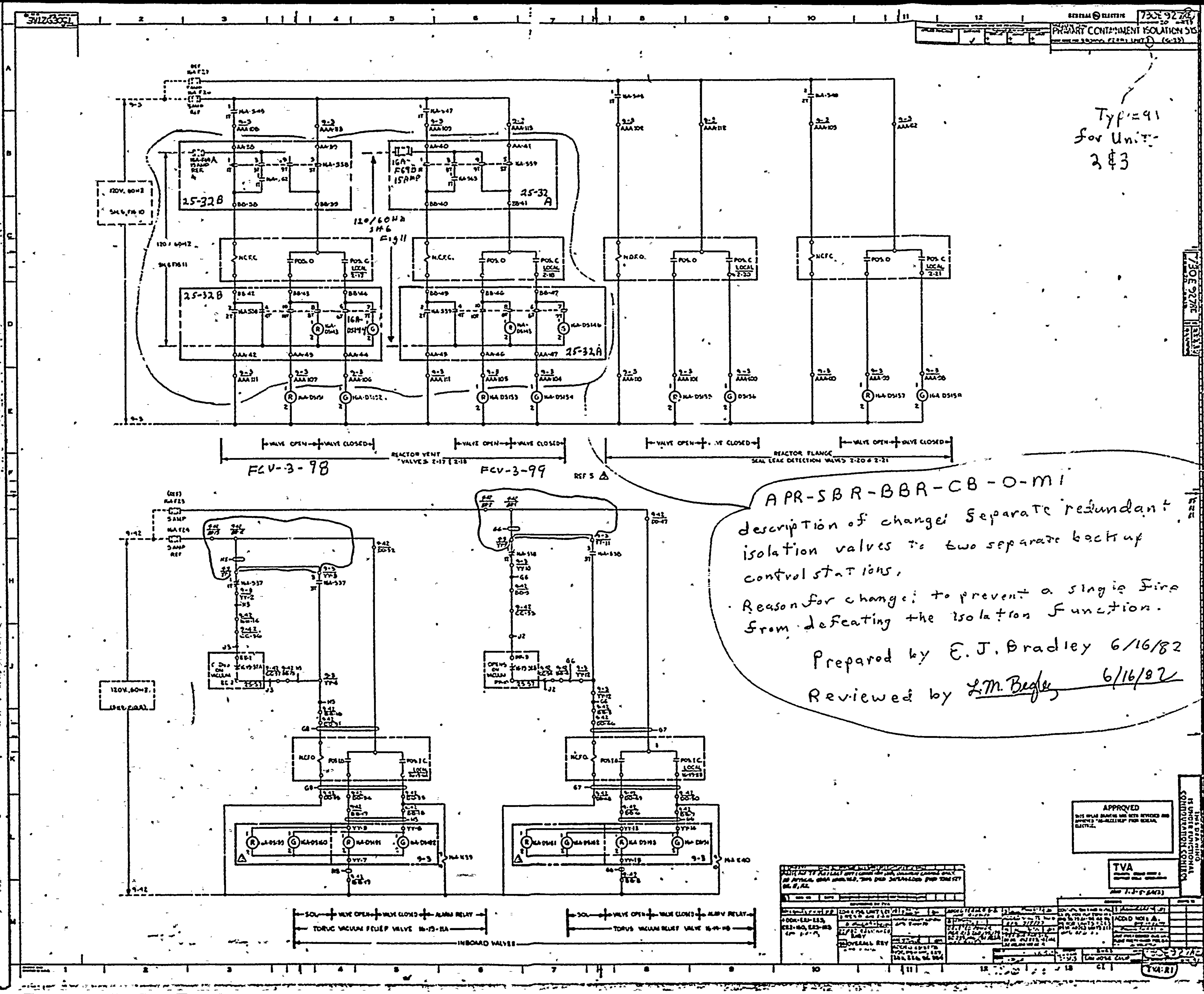
16A-F69B

Vent & flange seal detect valve 2-17 SH 19

Prepared by E.J. Bradley 6/16/82

Reviewed by J.M. Bailey 6/16/82

Reason for change: To prevent a single fire from opening both the inboard and outboard isolation valves the inboard valves will be separated from the outboard valves.



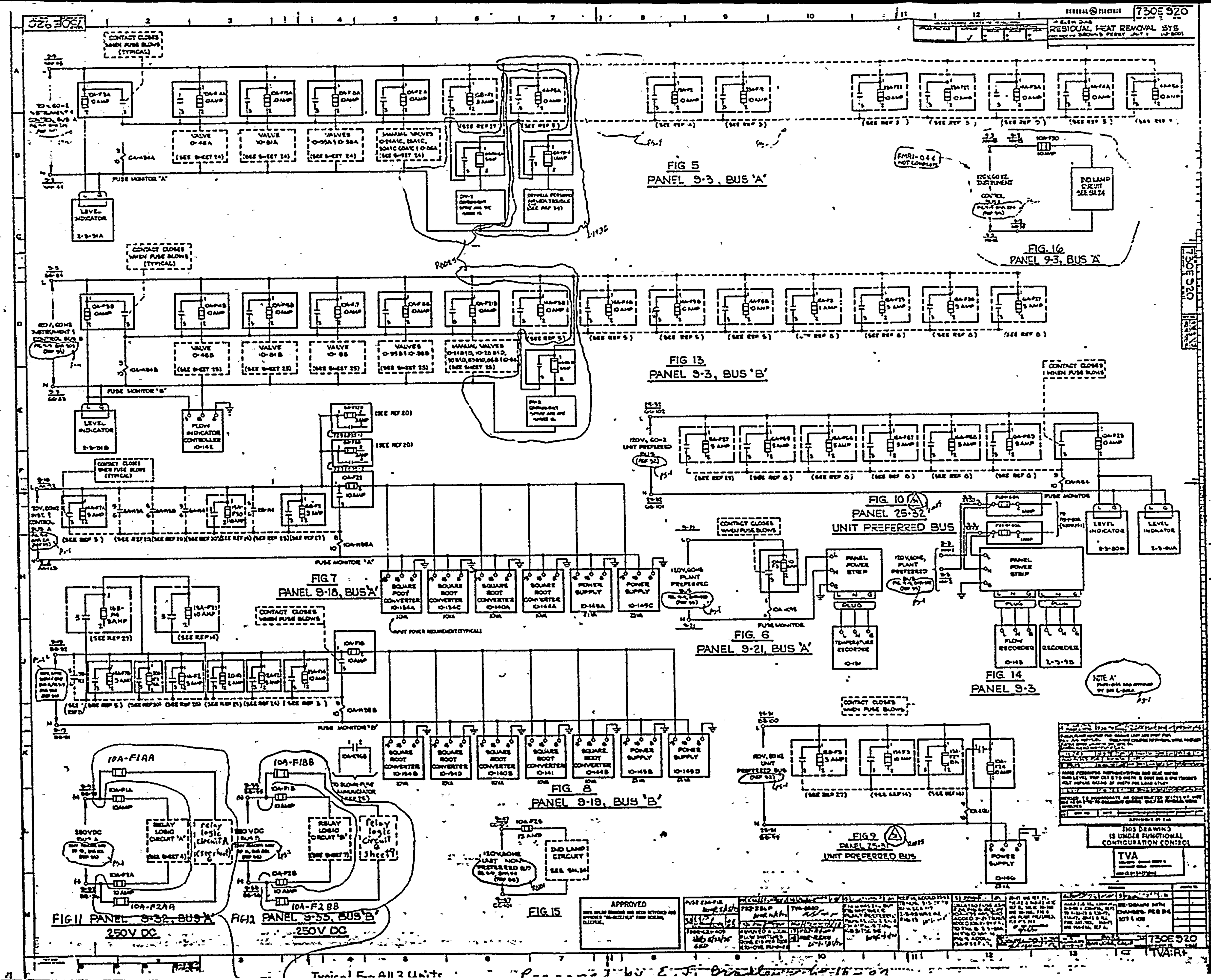

APR-SBR-BBR-CB-0-MI

description of change: Separate redundant isolation valves to two separate backup control stations,

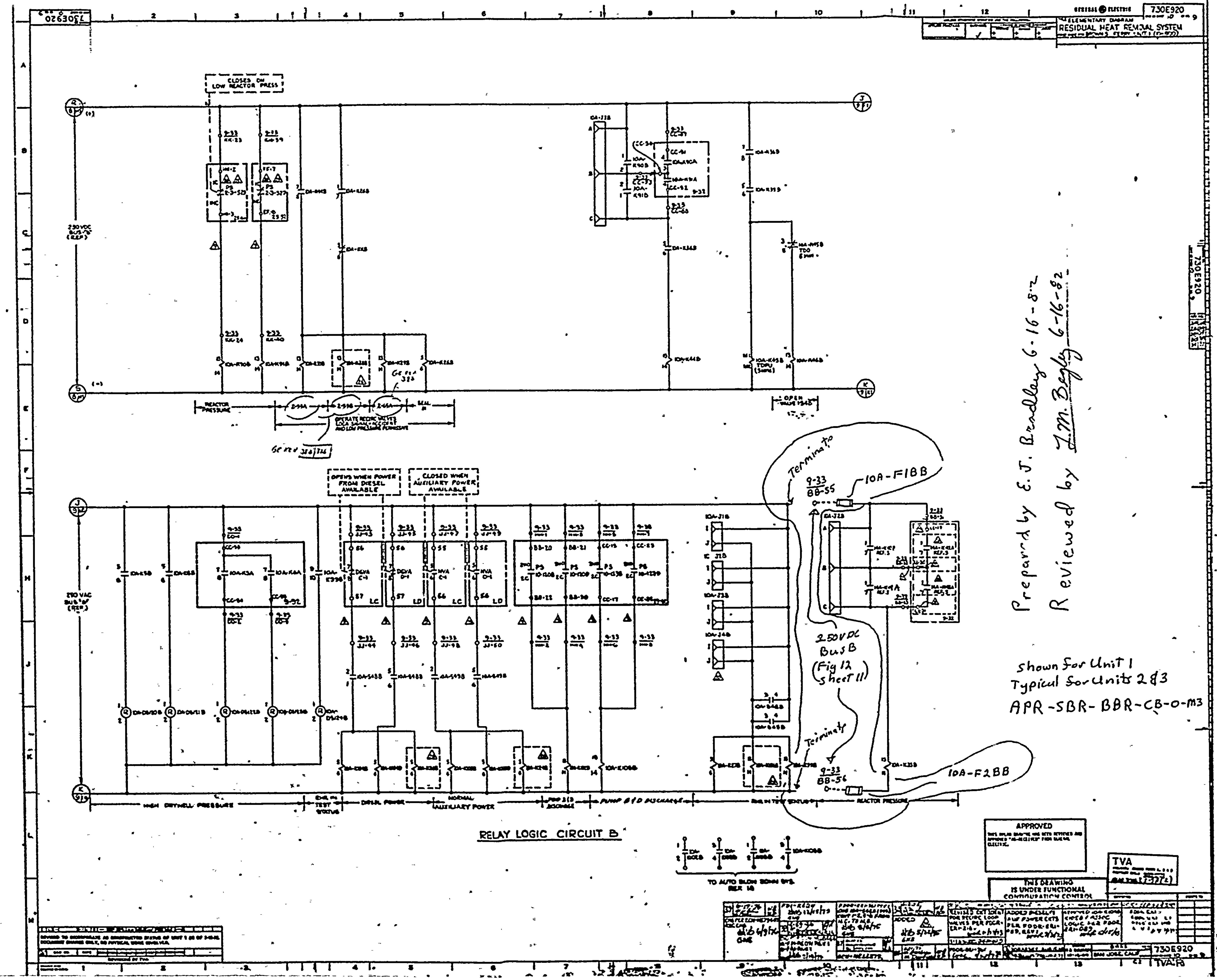
Reason for change: to prevent a single Fire from defeating the isolation Function.

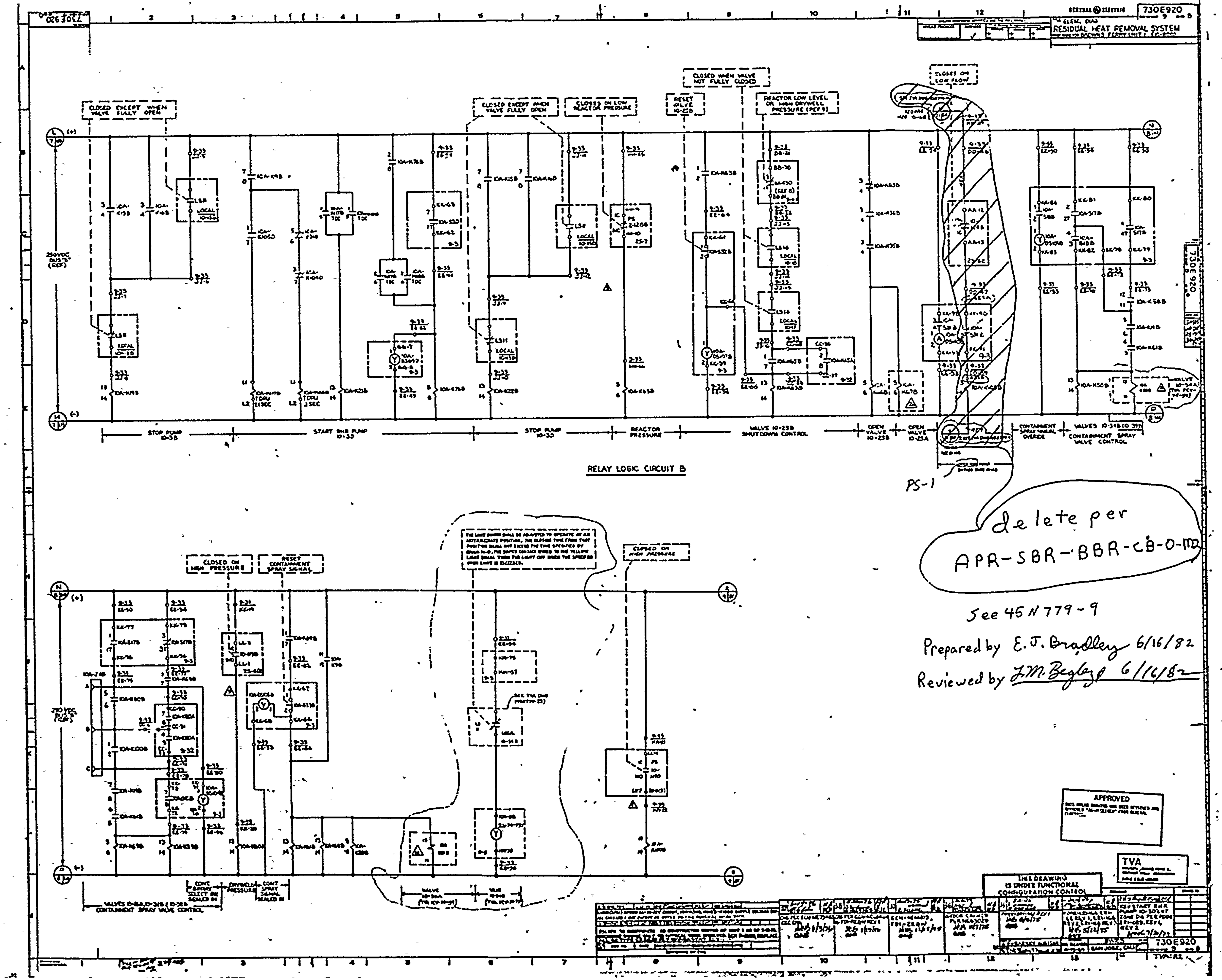
Prepared by E. J. Bradley 6/16/82

Reviewed by L.M. Begley 6/16/82



730E920
RESIDUAL HEAT REMOVAL SYS
BROWNS FERRY
FIG 5
PANEL 9-3, BUS 'A'
FIG. 16
PANEL 9-3, BUS 'A'
FIG 13
PANEL 9-3, BUS 'B'
FIG. 10
PANEL 25-32
UNIT PREFERRED BUS
FIG 7
PANEL 9-18, BUS 'A'
FIG. 6
PANEL 9-21, BUS 'A'
FIG. 14
PANEL 9-3
FIG. 8
PANEL 9-19, BUS 'B'
FIG 9
PANEL 25-31
UNIT PREFERRED BUS
FIG 15
FIG 11 PANEL 9-32, BUS 'A'
250V DC
FIG 12 PANEL 9-55, BUS 'B'
250V DC
CONTACT CLOSES WHEN FUSE BLOWS (TYPICAL)
FUSE MONITOR 'A'
FUSE MONITOR 'B'
LEVEL INDICATOR
FLOW INDICATOR CONTROLLER
SQUARE ROOT CONVERTER
POWER SUPPLY
PANEL POWER STRIP
TEMPERATURE RECORDER
FLOW RECORDER
RECORDER
RELAY LOGIC CIRCUIT 'A'
RELAY LOGIC CIRCUIT 'B'
IND LAMP CIRCUIT
10A-F1AA
10A-F2AA
10A-F1BB
10A-F2BB
APPROVED
THIS DRAWING IS UNDER FUNCTIONAL CONFIGURATION CONTROL
TVA
730E920
TVA:R+


GENERAL ELECTRIC
730E920
ELEMENTARY DIAGRAM
RESIDUAL HEAT REMOVAL SYSTEM
CLOSES ON LOW REACTOR PRESS
250 VDC BUS "A" (REP)
REACTOR PRESSURE
SEAL IN
OPERATE RECIRC VALVES LOCA SIGNAL + ACCIDENT AND LOW PRESSURE PERMISSIVE
OPENS WHEN POWER FROM DIESEL AVAILABLE
CLOSED WHEN AUXILIARY POWER AVAILABLE
250 VDC BUS "B" (REP)
HIGH DRYWELL PRESSURE
DIESEL POWER
NORMAL AUXILIARY POWER
REACTOR PRESSURE
RELAY LOGIC CIRCUIT B
TO AUTO BLOW DOWN SYS.
APPROVED
TVA
THIS DRAWING IS UNDER FUNCTIONAL CONFIGURATION CONTROL
Terminate
9-33 BB-55
10A-F1BB
250VDC Bus B (Fig 12 sheet 11)
Terminate
9-33 BB-56
10A-F2BB
Prepared by E. J. Bradley 6-16-82
Reviewed by J.M. Begley 6-16-82
Shown for Unit 1
Typical for Units 2&3
APR-SBR-BBR-CB-0-M3




PS-1

delete per APR-SBR-BBR-CB-0-m

See 45N779-9

Prepared by E.J. Bradley 6/16/82

Reviewed by L.M. Begley 6/16/82

ATTACHMENT 5

FIRE PROTECTION MODIFICATIONS

Section III.G.2 of Appendix R requires that automatic fire suppression systems and fire detection be provided in areas where redundant safe shutdown circuits or associated circuits of concern are not separated by adequate fire rated barriers. To bring the plant into compliance with this section, the following modifications will be implemented:

1. Preaction sprinkler systems will be added in the following areas:

   a. The entire floor on elevation 621 of the Reactor Building except for the shutdown board rooms.

   b. Between columns r and u on elevation 639 of the Reactor Building except for the areas over the recirculation pump MG sets which are already protected by aqueous film forming foam (AFFF) systems.

   c. In the residual heat removal system pump rooms at elevation 519 and 541 of the Reactor Building.

   The new systems will be designed in accordance with NFPA 13-1980 and will tie into existing sprinkler systems located on elevations 565 and 593 of the Reactor Building. The new systems will be hydraulically designed for a density of 0.22 gal/min/$ft^2$ over a maximum area of 1500 $ft^2$. Intermediate classification sprinkler heads will be utilized that have a temperature rating of between 175° to 225°F. All piping will be seismically supported so it will not fall during a design basis earthquake (DBE).

2. Total flooding Halon 1301 suppression systems will be added in shutdown board rooms A, C, and E. Separate pre-engineered systems complying with NFPA 12A-1980 will be provided for each board room. Halon storage cylinders, including 100 percent reserve capacity, will be located in the Control Building immediately outside the board rooms. The design Halon concentration will be 5 percent. Upon actuation of a system, the fire dampers located in ventilation duct penetrations through the board room walls will close. All piping located in the board rooms will be seismically supported so it will not fall during a DBE.

3. Cross-zoned ionization smoke detectors will be added to actuate the suppression systems identified in items 1 and 2 above. The detectors will be located in accordance with NFPA 72E-1978. The detectors will be monitored over class A supervised circuits by local panels designed in accordance with NFPA 72D-1979. The local panels will be provided with individual detection zone fire and trouble annunciations. The panels will contain the logic for suppression system actuation and for tripping the shutdown board room fire dampers. Nonsupervised output circuits from the local panels will provide common fire and trouble annunciation in the main control room on existing annunciation panels. The board room local panels, detectors, and damper release devices will be designed so they will not spuriously operate during a DBE. In addition, the detectors in the Reactor Building will be seismically mounted so they will not fall during a DBE.

TVA has evaluated existing fire suppression and detection systems for compliance with applicable NFPA standards in the areas where these features are required by sections III.G.2 or III.G.3. Several deviations have been identified and will be addressed as follows:

1. Ionization smoke detectors in the auxiliary instrument rooms 1, 2, and 3, at elevation 595 of the Control Building are an excessive distance from the ceiling. These detectors will be relocated to the ceiling and additional detectors will be installed in rooms 2 and 3 to provide coverage of beam pockets in accordance with NFPA 72E-1978.

2. The closed sprinkler heads used on the AFFF systems over the recirculation pump MG sets on elevation 639 of the Reactor Building are an excessive distance from the ceiling. Heat collectors will be provided over each head.

3. The closed sprinkler heads in the battery and battery board rooms 1, 2, and 3 on elevation 593 of the Control Building are located an excessive distance from the ceiling. Heads are also obstructed in the three battery board rooms. Heat collectors will be provided over each head in the battery rooms. Addition of heat collectors and relocation of heads will be used to address the deviations in the board rooms.

Two deviations to NFPA 13 were intentionally designed into the preaction sprinkler systems located in the Reactor Building and the cable spreading rooms. The deviations involve the use of pendant sprinkler heads in the upright position and locating closed sprinkler heads some distance from the ceiling. Both deviations were necessary to provide sprinkler discharge patterns required for a criteria mutually agreed to by the NRC staff and TVA in Part X, Section 5.2 of the Browns Ferry Recovery Plan for the March 1975 fire. This criteria called for the wetting of conduits at locations where the conduits of one division cross cable trays of the other division. The intentional deviations will not be corrected.

ATTACHMENT 6

SAFETY EVALUATION

## 1.0 PURPOSE

Determine the impact on safety due to the circuit and fire suppression system modifications required to satisfy the requirements of section III.G.2 of Appendix R to 10CFR50. Rerouting of cables and wrapping of conduits with fire resistive material is not addressed in this evaluation. A detailed evaluation to satisfy the requirements of 10CFR50.59 will be conducted as part of the standard design review cycle.

## 2.0 INTRODUCTION

Appendix R requires that safe shutdown capability must be provided regardless of a fire in any area of the plant. Upon reviewing the shutdown capability for a fire in the Control Building (CB) fire area, deficiencies were found in some circuits required. This is due, in part, to the expansion of the fire area considered in the design basis for backup control (reference FSAR section 7.18). Therefore, adequate backup control isolation from the expanded fire area and the additional circuits requiring backup control will be provided for the following equipment for the reasons given:

| Unit 1 | Unit 2 | Unit 3 |
|---|---|---|
| PCV-1-4[1] | PCV-1-4[1] | PCV-1-4[1] |
| PCV-1-18[1] | PCV-1-18[1] | PCV-1-23[1] |
| PCV-1-23[1] | PCV-1-23[1] | PCV-1-30[1] |
| PCV-1-41[1] | PCV-1-41[1] | PCV-1-31[1] |
| PCV-1-42[1] | PCV-1-42[1] | PCV-1-42[1] |
| PCV-1-179[1] | PCV-1-179[1] | PCV-1-179[1] |
| PCV-1-180[1] | PCV-1-180[1] | PCV-1-180[1] |
| FCV-74-30[1] | FCV-74-7[1] | FCV-74-7[1] |
| FCV-68-3[1] | FCV-68-79[1] | FCV-68-79[1] |
| FCV-74-72[2] | FCV-74-58[2] | FCV-74-58[2] |
| FCV-78-61[2] | FCV-78-62[2] | FCV-78-62[2] |
| RHR Pumps A,B,C,D[3] | RHR Pumps A,B,C,D[3] | RHR Pumps A,B,C,D[3] |

Notes:

1. Providing better isolation to meet the expanded fire area.

2. Providing backup control for these valves.

3. Modifying backup control to bypass drain valve position interlock.

In addition to the above modifications, valves FCV-74-53 and FCV-74-67 will be provided with a redundant low pressure signal in the manual control portion of the circuit for each unit. This will ensure that the loss of power to one logic circuit will not preclude manual operation of the valves.

To provide proper protection of required circuits from associated circuits, additional fuses and circuit breakers will be added to selected circuits as described in Attachment 4. The existing circuit configuration downstream of the proposed protective devices will remain unchanged.

Additional fire suppression will be added to Reactor Building elevations 519, 541, 621, and 630 in the form of preaction sprinkler systems. A Halon 1301 fire suppression system will be added for shutdown board rooms A, C, and E. Cross-zoned ionization smoke detectors will be installed to actuate these additions.

Each general change is addressed independently in the evaluation.

3.0 EVALUATION

A. Backup Control Modifications

The design bases for the backup control system listed in section 7.18 of BFN FSAR will be met for the expanded CB fire area. The circuit changes wil be limited to the backup control function and meet the bases for the circuitry defined in the BFN FSAR section 7.18. The normal function of the equipment will remain unchanged. Therefore, the addition or modification to the backup control circuits for the listed valves will not have any adverse impact on safety.

B. Manual Control Modification

The manual control circuit presently has a low pressure interlock to preclude opening both RHR injection valves when Reactor Pressure Vessel pressure is above 450 lb/in$^2$g. This function will be maintained with redundancy added to preclude a single failure preventing manual operation of the valve. The automatic operation of the valve will remain the same and adequate isolation between redundant channels will be maintained. Therefore, this change will not have any adverse impact on safety or the operation of the system.

C. Associated Circuit Modifications

The function of each circuit modified will remain the same. The protective devices are sized to permit all required operations while still providing the necessary interruption protection for faulted conditions. These devices also will be procured to the same requirements as the existing circuits to be modified. Therefore, the addition of the protective devices to the circuits listed in Attachment 4 will not adversely affect safety.

D. Fire Suppression System Modifications

The preaction sprinkler systems will be installed to the same criteria as existing systems, with regard to seismic supports and potential spraying of safety related electrical equipment. Conduits carrying Class 1E cables in the areas where the systems will be installed will be identified and sealed as necessary. This will assure existing safety systems will not be jeopardized.

The Halon 1301 system will be installed to preclude damaging safety related equipment during a seismic event. The gas will not hard electrical equipment if it is spuriously actuated. The cross-zone ionization smoke detectors will.be installed to the same criteria as the existing detectors.

These fire suppression system modifications will be tested after installation in accordance with the procedures developed for the existing systems. They will be included in the documented administrative control system used for existing systems to assure periodic inspection, testing and maintenance.

Based on the above considerations, the fire suppression system modifications will not adversely impact safety.

4.0 CONCLUSIONS

The circuit and fire suppression system changes to be made to comply with section III.G.2 of Appendix R will not degrade the safety systems ability to perform their design basis functions.

ATTACHMENT 7

EXEMPTION REQUESTS

TVA requests NRC approval of the following exceptions to the requirements of 10 CFR 50.48 and section III.G of Appendix R:

1. Exception - The modifications identified in Attachments 4 and 5 will be completely implemented on all three units by the end of the unit\3, cycle\7 outage which is presently scheduled to be complete by February 1987. This schedule will not satisfy the requirements of Section 50.48(c).

   Justification - The justification and Appendix R implementation schedule are presented in attachment 9 of this report.

2. Exception - Section III.G.2 requires three hour fire rated separation between the three redundant battery and battery board room complexes located on elevation 593 of the Control Building. The walls around each complex are only 1-1/2-hour construction.

   Justification - Elevation 593 of the Control Building is separated from other areas of the plant by at least 3-hour fire rated construction. The battery and battery board room complexes are separated from each other by two 1-1/2-hour fire barriers and at least 90 feet of spacial separate (refer to drawings 47W200-5 and 47W200-13). This level of separation is more than adequate considering the combustible loadings present.

| Room(s) | Combustible Loading[1] ($Btu/ft^2$) | Equivalent Combustible Weight[2] ($lb/ft^2$) |
|---|---|---|
| Instrument Shop, Office and Storage | 5,100 | 0.64 |
| Battery and Battery Board Complex 1 | 26,100 | 3.26 |
| Unit 1 Auxiliary Instrument Room | 21,800 | 2.73 |
| Units 1 and 2 Computer Room | 16,000 | 2.00 |

| Room(s) | Combustible Loading[1] ($Btu/ft^2$) | Equivalent Combustible Weight[2] ($lb/ft^2$) |
|---|---|---|
| Unit 2 Auxiliary Instrument Room | 21,800 | 2.73 |
| Battery and Battery Board Complex 2 | 23,900 | 2.99 |
| Communications Battery and Battery Board Rooms | 18,000 | 2.25 |
| Communications Room | 2,800 | 0.35 |
| Unit 3 Computer Room | 11,900 | 1.49 |
| Unit 3 Auxiliary Instrument Room | 8,300 | 1.04 |
| Battery and Battery Board Complex 3 | 23,900 | 2.99 |
| Record Storage Room and Mechanical Equipment Room | 11,200 | 1.40 |
| Corridor | No Significant Combustibles | |

Notes:
1. Potential heat release per unit of floor area.
2. Combustible loading divided by 8,000 Btu/lb.
3. The battery and battery board room complexes include DC equipment rooms.
4. The record storage room is currently being used as a temporary office.
5. The communications battery board room is labeled as a temporary DPO office on drawing 47W200-5.

Table 5-9B in the 14th edition of the National Fire Protection Association Handbook indicates that 1-1/2-hour construction is adequate for occupancies similar to the areas in question if the combustible loadings are less than 120,000 $Btu/ft^2$. The actual loading for every area on elevation 593 is less than 22 percent of this value.

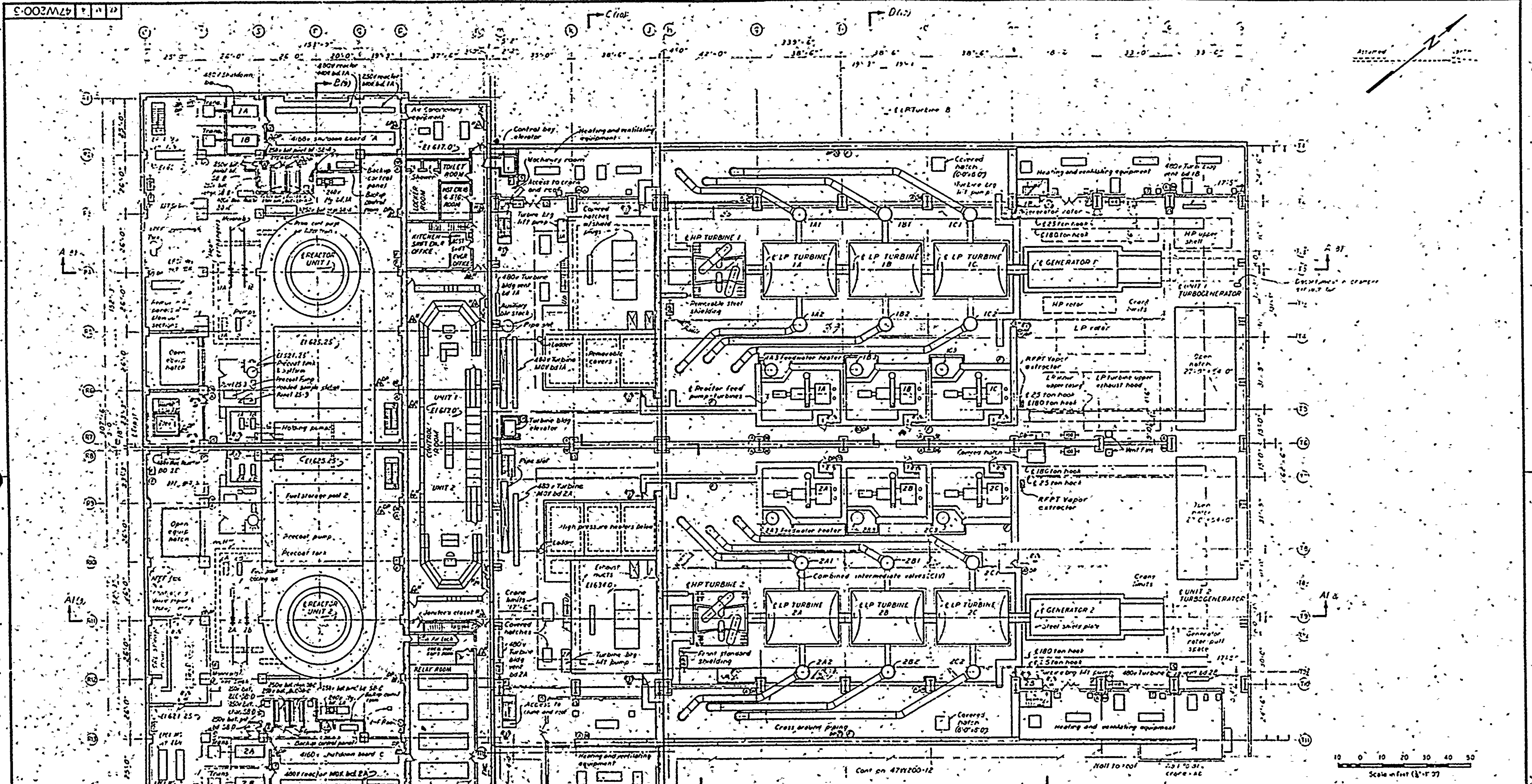
The fire severity curve A (the most conservative curve) on figure 5-9D of the same handbook indicates that 1-1/2-hour construction is adequate for up to 4 $lb/ft^2$ of equivalent combustible weight. The equivalent weight for all areas on elevation 593 are less than 82 percent of the limit.

Manually actuated fire suppression systems are provided in several areas on elevation 593. Preaction sprinkler systems are located in the battery and battery board rooms and total flooding carbon dioxide systems are provided in the auxiliary instrument rooms and the computer rooms. The sprinkler systems can be actuated from one of the main control rooms or at the preaction valves which are located in the Turbine Building. The carbon dioxide systems can be actuated at a control station located immediately outside each room.

All rooms on elevation 593 except the corridor and the record storage room are provided with ionization smoke detectors that annunciate in the main control rooms.

3. Exception - Section III.G.3 requires that alternative shutdown capability, fire detection, and fixed fire suppression be provided for the main control rooms (MCR). The fixed suppression is not provided.

   Justification - Ionization smoke detectors are provided in the MCRs as shown on drawings 47W605-1 and 47W605-2. Protable fire extinguishers and fire hose stations are also provided in the rooms as shown on drawings 47W200-3 and 47W200-12. These features coupled with the fact that the rooms are continuously manned ensure that any fire in an MCR will be quickly detected and extinguished.



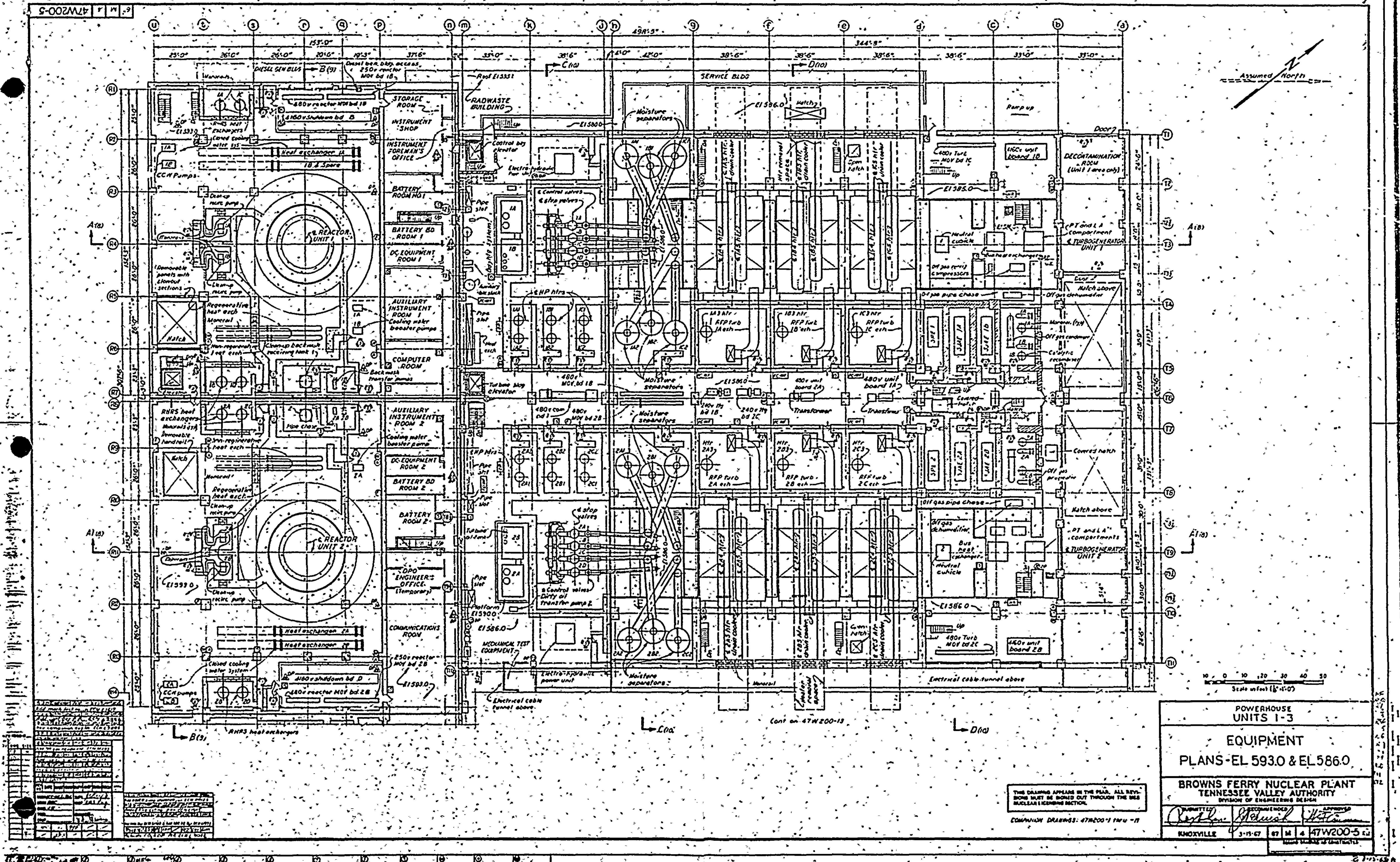

COMPANION DRAWINGS 47W200-1 thru -11

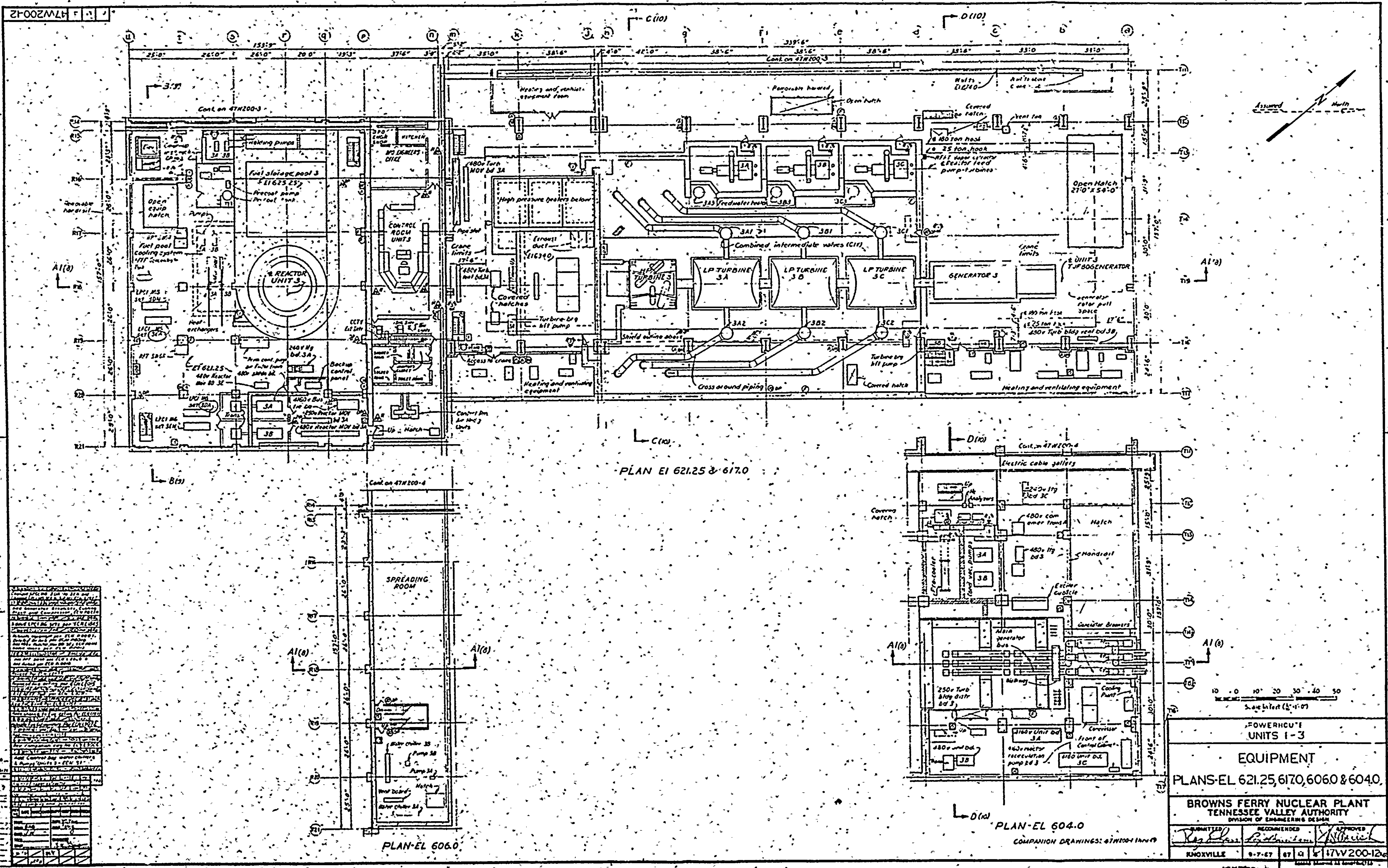
POWERHOUSE
UNITS 1-3

EQUIPMENT
PLANS-EL 621.25 & EL 617.0

BROWNS FERRY NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN

KNOXVILLE 3-13-67 47W200-3


47W200-5
SERVICE BLDG
RADWASTE BUILDING
STORAGE ROOM
INSTRUMENT SHOP
INSTRUMENT FOREMAN'S OFFICE
BATTERY ROOM NO 1
BATTERY BD ROOM 1
DC EQUIPMENT ROOM 1
AUXILIARY INSTRUMENT ROOM 1
COMPUTER ROOM
AUXILIARY INSTRUMENT ROOM 2
DC EQUIPMENT ROOM 2
BATTERY BD ROOM 2
BATTERY ROOM 2
OPO ENGINEER'S OFFICE (Temporary)
COMMUNICATIONS ROOM
REACTOR UNIT 1
REACTOR UNIT 2
DECONTAMINATION ROOM
TURBOGENERATOR UNIT 1
TURBOGENERATOR UNIT 2
Moisture separators
Heat exchanger 2A
Heat exchanger 2B
Hatch above
Electrical cable tunnel above
Assumed North
Scale in feet
POWERHOUSE
UNITS 1-3
EQUIPMENT
PLANS-EL 593.0 & EL 586.0
BROWNS FERRY NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN
KNOXVILLE 3-15-67
47W200-5

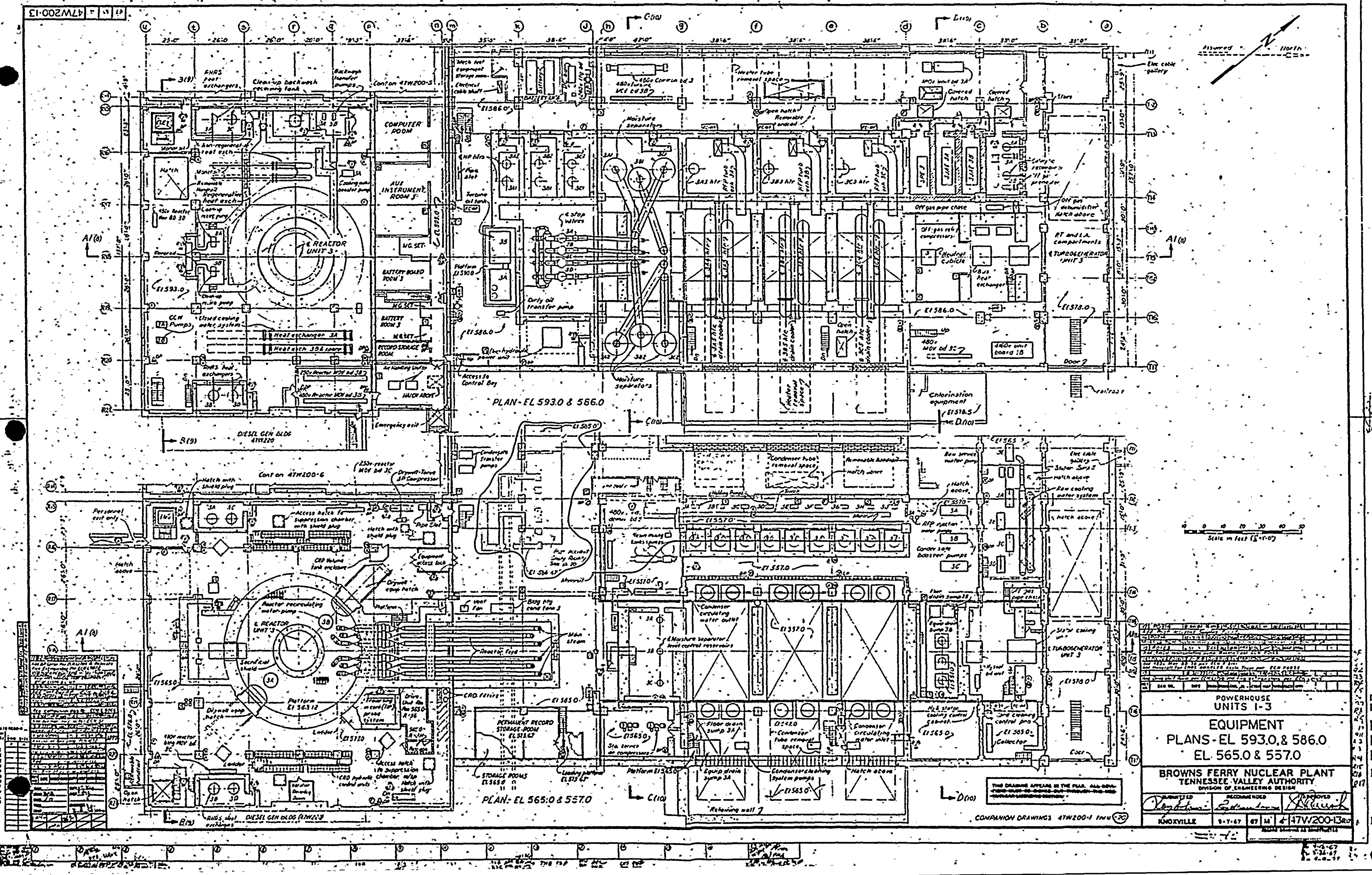



POWERHOUSE
UNITS 1-3

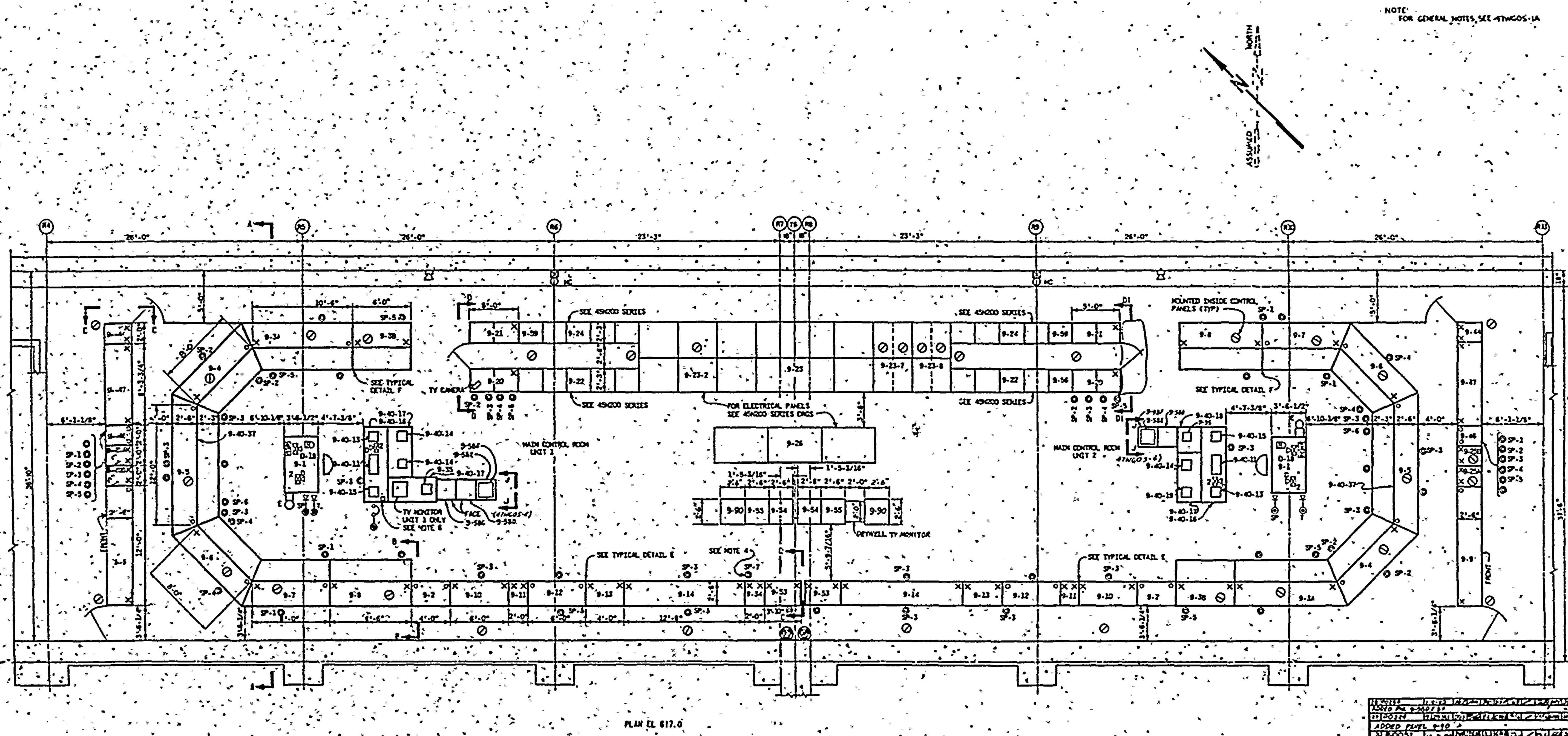
EQUIPMENT
PLANS-EL 621.25, 617.0, 606.0 & 604.0

BROWNS FERRY NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN

| SUBMITTED | RECOMMENDED | APPROVED |
|---|---|---|
| KNOXVILLE | 9-7-67 | 47W200-12 |



PLAN - EL 593.0 & 586.0
PLAN - EL 565.0 & 557.0
COMPUTER ROOM
AUX INSTRUMENT ROOM 3
REACTOR UNIT 3
TURBOGENERATOR UNIT 3
Moisture separators
Chlorination equipment
Scale in feet
COMPANION DRAWINGS 47W200-1 thru -20
POWERHOUSE
UNITS 1-3
EQUIPMENT
PLANS - EL 593.0, & 586.0
EL 565.0 & 557.0
BROWNS FERRY NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN
SUBMITTED
RECOMMENDED
APPROVED
KNOXVILLE
9-7-67
47W200-13




ADDED PANEL 9-90
REDRAWN, ADDED RECU, CHGD COMP DWG NOTE

SCALE ¼"=1'-0" EXCEPT AS NOTED

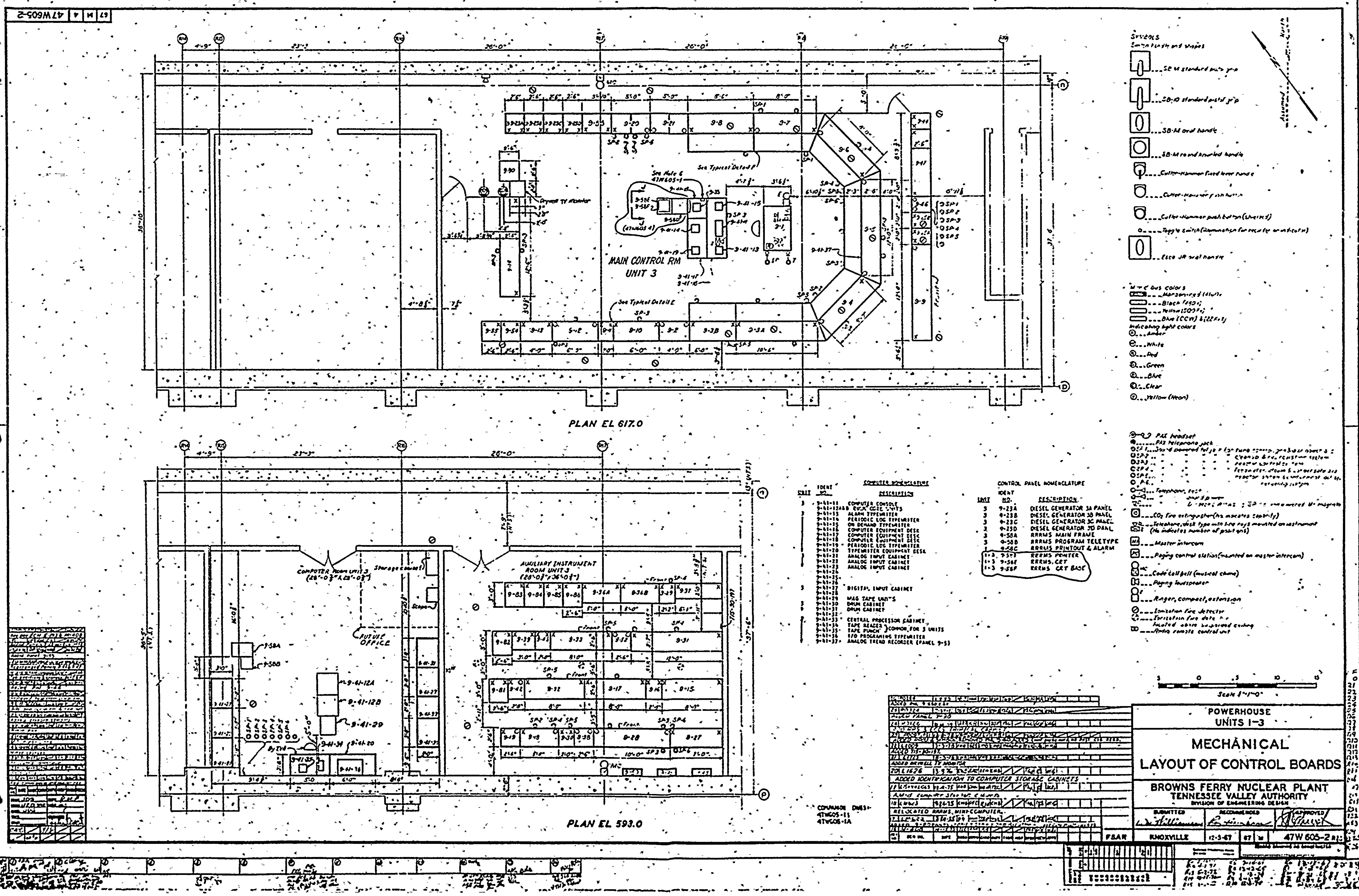
POWERHOUSE
UNITS 1 & 2

MECHANICAL
LAYOUT OF CONTROL BOARDS

BROWNS FERRY NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN

SUBMITTED | RECOMMENDED | APPROVED

KNOXVILLE 12-5-67 47W605-1


47W605-2
MAIN CONTROL RM
UNIT 3
PLAN EL 617.0
COMPUTER ROOM UNIT 3
AUXILIARY INSTRUMENT ROOM UNIT 3
FUTURE OFFICE
PLAN EL 593.0
COMPUTER NOMENCLATURE
UNIT IDENT NO. DESCRIPTION
3 9-41-11 COMPUTER CONSOLE
9-41-12A&B
3 9-41-13 ALARM TYPEWRITER
9-41-14 PERIODIC LOG TYPEWRITER
9-41-15 ON DEMAND TYPEWRITER
9-41-16 COMPUTER EQUIPMENT DESK
9-41-17 COMPUTER EQUIPMENT DESK
9-41-18 COMPUTER EQUIPMENT DESK
9-41-19 PERIODIC LOG TYPEWRITER
9-41-20 TYPEWRITER EQUIPMENT DESK
3 9-41-21 ANALOG INPUT CABINET
9-41-22 ANALOG INPUT CABINET
9-41-23 ANALOG INPUT CABINET
9-41-24
9-41-25
9-41-26
3 9-41-27 DIGITAL INPUT CABINET
9-41-28
9-41-29 MAG TAPE UNITS
3 9-41-30 DRUM CABINET
9-41-31 DRUM CABINET
9-41-32
9-41-33 CENTRAL PROCESSOR CABINET
9-41-34 TAPE READER } COMMON FOR 3 UNITS
9-41-35 TAPE PUNCH
9-41-36 I/O PROGRAMMING TYPEWRITER
9-41-37 ANALOG TREND RECORDER (PANEL 9-5)
CONTROL PANEL NOMENCLATURE
UNIT IDENT NO. DESCRIPTION
3 9-23A DIESEL GENERATOR 3A PANEL
3 9-23B DIESEL GENERATOR 3B PANEL
3 9-23C DIESEL GENERATOR 3C PANEL
3 9-23D DIESEL GENERATOR 3D PANEL
3 9-58A RRRMS MAIN FRAME
3 9-58B RRRMS PROGRAM TELETYPE
3 9-58C RRRMS PRINTOUT & ALARM
1-3 9-58D RRRMS PRINTER
1-3 9-58E RRRMS CRT
1-3 9-58F RRRMS CRT BASE
Symbols
Indicating light colors
Amber
White
Red
Green
Blue
Clear
Yellow (Neon)
Master intercom
Ringer, compact, extension
Scale
POWERHOUSE
UNITS 1-3
MECHANICAL
LAYOUT OF CONTROL BOARDS
BROWNS FERRY NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN
SUBMITTED
RECOMMENDED
APPROVED
FSAR
KNOXVILLE
47W605-2
ADDED IDENTIFICATION TO COMPUTER STORAGE CABINETS
RELOCATED RRRMS, MINI-COMPUTER
COMPANION DWGS-
47W605-1S
47W605-1A

ATTACHMENT 8

RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION

The following information is in response to NRC Generic Letter 81-12 dated February 20, 1981, from D. G. Eisenhut to All Power Reactor Licensees With Plants Licensed Prior to January 1, 1979.

SECTION 8 OF ENCLOSURE 1 TO GENERIC LETTER 81-12

Information Required for Staff Review:

(a) Description of the systems or portions thereof used to provide the shutdown capability and modifications required to achieve the alternative shutdown capability if required.

TVA Response: Attachment 2 identifies the backup control equipment that will be utilized for plant shutdown for a fire in one of these rooms. No new systems or components will be added for alternative shutdown capability. The existing backup control system described in section 7.18 of the Browns Ferry FSAR with the circuit modifications proposed in Attachment 4 provides alternative shutdown capability for a fire in a main control room, a cable spreading room, or an auxiliary instrument room.

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

TVA Response: Since no systems or components have been added to comply with section III.G.3 of Appendix R, the requested information has not been included in this report per 10CFR50.48 paragraph (c)(5). However, schematic drawings showing normal and alternate control and power circuits and cable tray and conduits drawings marked to show cable routings for the circuits evaluated in the safe shutdown analysis are available for NRC review upon request.

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

TVA Response: See Attachment 6 for an evaluation of the nuclear safety impact of modifications identified in Attachments 4 and 5.

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

<u>TVA Response</u>: The associated circuit analysis discussed in Attachment 3 and implementation of modifications identified in Attachment 4 will ensure that all wiring for required normal and alternate shutdown equipment is independent of equipment wiring located in postulated fire areas.

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

<u>TVA Response</u>: The associated circuit analysis discussed in Attachment 3 and implementation of modifications identified in Attachment 4 will ensure that required normal and alternate shutdown power sources have adequate isolation devices on control circuits routed through postulated fire areas.

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

<u>TVA Response</u>: Emergency Operating Instructions (EOIs) are currently in place which specify the operator actions necessary to achieve and maintain safe reactor conditions by identifying the methods which may be available and when to use them for given events. The equipment or systems to be used to this end are listed in the procedures under automatic or manual actions as appropriate. These instructions are the appropriate actions for a given plant condition regardless of what equipment or systems may be unavailable during a fire.

Normal operation instructions in conjunction with operator training tell the operator how to operate specific equiment or systems when called upon to do so by the EOIs. Manual operations identified to affect safe shutdown are consistent with the manner in which the equipment is operated in the non-fire condition with exception of those methods involving backup control. For cases including a fire in which the control room and automatic controls are no longer functioning, a special EOI describes operator actions necessary to transfer control of plant systems to backup control. All systems identified as having backup control operation to affect safe shutdown are included in this procedure. These procedures will be modified as appropriate to include any new provisions required by future Appendix R related modifications. The current procedures are available for NRC inspection on request.

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

<u>TVA Response</u>: Separately fused normal and alternate control power sources are provided on required shutdown circuits with conductors located in the cable spreading rooms and in the other plant areas provided with alternate control. The portions of the circuits located outside these areas are protected against fire induced faults inside the areas by the normal control power fuses. To shift plant operation to the alternate control stations, transfer switches are manipulated in the required circuits to disconnect the potentially blown fuses and faulted cable. The same switches, using break-before-make contacts, then tie in the alternate fuses and control power sources. This scheme eliminates the need for spare fuses during the shutdown process.

(h) Demonstrate that the manpower required to perform the shutdown functions using the procedures of (f) as well as to provide fire brigade members to fight the fire is available as required by the fire brigade technical specifications.

<u>TVA Response</u>: Operation of equipment identified as required to affect safe shutdown may be executed by a single operator from the control room except for cases in which backup stations must be manned (control room abandonment). In this worst case, at least four licensed operators and two assistant operators would be available to man backup panels while maintaining the fire brigade at full strength. These numbers do not include the shift engineer, an extra reactor operator normally on shift, and extra assistant operators. Additional operators and support personnel are also on call at short notice in conjunction with the Browns Ferry site emergency plans. This staffing is sufficient to perform the shutdown function while maintaining the fire brigade as required by technical specifications.

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

<u>TVA Response</u>: All required safe shutdown equipment was thoroughly tested during the plant's preoperational and startup test programs. Adequate acceptance tests will be performed on any existing circuits that are modified to meet Appendix R requirements.

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

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

<u>TVA Response</u>: No modifications are planned that will require a change to the existing technical specifications.

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

<u>TVA Response</u>: All systems that are required to be available as described in Attachment 2 will perform the same functions as they do in the FSAR analyses. The FSAR analyses bound all actions described in Attachment 2 with the exception of the RHR system torus cooling mode. Attachment 2 assumes that one RHR pump with its associated valves and heat exchanger is sufficient for torus cooling following vessel depressurization with four S/R valves. The FSAR vessel depressurization cases assume that two RHR pumps with their associated valves and heat exchangers are used for torus cooling.

Using one RHR pump results in a higher torus bulk water temperature than occurs in the FSAR analyses. This higher bulk water temperature could affect the required net positive suction head for the operating RHR pump, thermal stresses imposed on the torus structure, and the steam condensation capability of the torus. Each of these has been evaluated and the impact found to be acceptable for the specific vessel depressurization case assumed in Attachment 2. Thus the torus cooling function is adequately met.

(1) Demonstrate that repair procedures for cold shutdown systems are developed and materials for repairs is maintained on site.

<u>TVA Response</u>: Operation of the equipment identified in Attachment 2 and implementation of the modifications defined in Attachment 4 will ensure that the plant can be brought to a cold shutdown condition in 72 hours without relying on equipment repairs.

ENCLOSURE 2 OF GENERIC LETTER 81-12

Request for Additional Information:

1. For each fire area where an alternative or dedicated shutdown method, in accordance with section III.G.3 of Appendix R to 10CFR Part 50, is provided by proposed modifications, the following information is required to demonstrate that associated circuits will not prevent operation or cause maloperation of the alternative or dedicated shutdown method:

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

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

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

   d. Show that fire induced failures of the cables listed in b and c above will not prevent operation or cause maloperation of the alternative or dedicated shutdown method.

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

   TVA Response: No alternative or dedicated shutdown capability is being added for compliance with section III.G.3 of Appendix R.

2. The residual heat removal system is generally a low-pressure system that interfaces with the high-pressure primary coolant system. To preclude a LOCA through this interface, we require compliance with the recommendations of Branch Technical Position RSB5-1. Thus, this interface most likely consist of two redundant and independant motor-operated valves. These two motor-operated valves and their associated cable may be subject to a single fire hazard. It is our concern that this single fire could cause the two valves to open resulting in a fire-initiated LOCA through the subject high-low pressure system interface. To assure that this interface and other high-low pressure interfaces are adequately protected from the effects of a single fire we require the following information:

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

b. Identify the devices essential cabling (power and control) and describe the cable routing (by fire area) from source to termination.

c. Identify each location where the identifed cables are separated by less than a wall having a 3-hour fire rating from cables for the redundant device.

d. For the areas identifed in item 2.c above (if any), provide the basis and justification as to the acceptability of the existing design or any proposed modifications.

TVA Response: All high-low pressure interfaces using redundant electrically controlled devices to isolate or preclude rupture of a primary coolant boundary are identified in the Shutdown Logic Diagrams of Attachment 2 (see figures I.a, I.b, and I.c). The redundant devices were treated like all other required circuits in the safe shutdown analysis. Proposed modifications associated with high-low pressure interfaces are identified in Attachment 4.

ATTACHMENT 9

IMPLEMENTATION SCHEDULE

ATTACHMENT 9

IMPLEMENTATION SCHEDULE AND JUSTIFICATION

As stated in the letter from L. M. Mills to H. R. Denton dated October 28, 1981, the present schedule to implement NRC modification commitments at Browns Ferry Nuclear Plant through October 1983 is already supersaturated. No additional modifications without extensive priority changes can be added to the present schedule through October 1983 because of our design schedule capabilities and manpower limitations imposed at the site for safety and security reasons. Therefore, we are scheduling Appendix R work to commence with the unit 2, cycle 5 outage which presently is schedule to start in March 1984.

We have optimistically estimated that it will take an average of 150,000 man-hours per unit at Browns Ferry to implement the Appendix R modifications. From April 1981 through February 1984, Browns Ferry has scheduled or will have completed five outages betwen 121 and 184 days in length. The reason for the increased outage durations is because of the extensive amount of torus work and other commitments which have been required. Upon completion of the torus outages (i.e., at the end of the unit 3, cycle 5 outage in February 1984), TVA had estimated the remaining outage durations to be between 60 and 66 days in length. If we are to attempt to implement the Appendix R modifications and Postaccident Sampling Facility work which is also now scheduled during this timeframe, during one outage, it could increase the outage duration per unit to 250 days or greater. This is unacceptable to us for two reasons. It would force us into a dual outage situation at Browns Ferry which could not be safely supported or managed. Secondly, it would not support the capacity needed for our system load considerations. Therefore, we are scheduling Appendix R modifications to be completed over a period of two outages on each unit. Each of these outages will be approximately 2 to 2.5 times greater than our originally estimated outage lengths. If we were to attempt to maintain our present estimated outage durations, the Appendix R work would require approximately five outages on each unit to implement. TVA has considered this type of schedule and has determined that outage duration increases will be mandatory in order to support implmentation of Appendix R in a more timely fashion.

In summary, below is the schedule for implementing the Appendix R modifications for each unit at Browns Ferry.

Schedule by Unit

| Start Date | Finish Date |
| --- | --- |
| Unit 1, cycle 6 - October 1984 | Unit 1, cycle 7 - August 1986 |
| Unit 2, cycle 5 - March 1984 | Unit 2, cycle 6 - February 1986 |
| Unit 3, cycle 6 - March 1985 | Unit 3, cycle 7 - February 1987 |

It is our intention to do as much nonoutage work as possible before the above outages. Our present schedule, however, does not indicate that much nonoutage work can be completed before the unit 2, cycle 5 outage.