4.0 SAFE SHUTDOWN ANALYSIS

The hot and cold shutdown equipment and cabling in each fire area or equivalent was examined in this analysis. The physical location of safe shutdown equipment and cabling is shown on the F-drawings. For hot shutdown, damage to all electrical (including cable) and mechanical components within the fire area under consideration was assumed except where physically protected by fire barriers. For cold shutdown, damage to all electrical and mechanical equipment within each fire area is conservatively assumed except for the reactor buildings. In the reactor buildings, all electrical cable and components except for motor operators are assumed damaged in each fire area. All mechanical components and motor operators are assumed damaged only if they are located within the same fire zone. Justification for this assumption is provided in Section 3.8 and 4.10 of the Exemption Requests (F.P.R. Volume 4). For each fire area, a shutdown path composed of all mechanical equipment independent of that fire area was identified. While cable routing was considered in this selection, it was not always possible to select a shutdown path independent of all electrical cables in an area. If a cable necessary to operate or associated with equipment in that shutdown path was routed through the fire area under consideration, it was considered a discrepancy.

The disposition of each cable discrepancy was evaluated using the electrical schematic diagrams to identify an appropriate solution of each problem. The various types of solutions proposed for safe shutdown included, but are not limited to:

-local control and isolation capability,
-local mechanical indicators,
-mechanical piping crossties,
-manual valve operation,
-alternate power feeds for inaccessible valves.

Repair procedures are generally identified for each discrepancy for cold shutdown unless a modification was identified for hot shutdown. The resolution of each hot shutdown cable discrepancy on a fire area basis is documented in Appendix A. Specific modifications resulting from these resolutions are discussed in Section 6.0. The specific manual actions and cold shutdown repairs are listed in Section 7.0.

The following sections of this chapter present the hot and cold shutdown analysis on an area-by-area basis. Table 4.0-1 summarizes the fire area and the hot and cold safe shutdown path for each fire zone.

TABLE 4.0-1
APPENDIX R HOT SHUTDOWN PATHS BY FIRE ZONE

Fire Zone	Fire Area/ Equivalent Area/ Zone Group	Hot Shutdown Path	Cold Shutdown Path	Cold Shutdown DG (Note 1) Availability	Safe Shutdown Analysis Section
1.1.1.1	RB3-II	A1	SC	2/3, 2	4.5
1.1.1.2	RB3-II	A1	SC	2/3, 2	4.5
1.1.1.3	RB3-II	A1	LPCI Div. II	2/3, 2	4.5
1.1.1.4	RB3-II	A1	SC	2/3, 2	4.5
1.1.1.5.A	RB3-I	D	SC	2/3, 2, 3	4.4
1.1.1.5.B	RB3-I	D	SC	2/3, 2, 3	4.4
1.1.1.5.C	RB3-I	D	SC	2/3, 2, 3	4.4
1.1.1.5.D	RB3-II	A1*	SC	2/3, 2, 3	4.5
1.1.1.6	RB3-II	B*	SC	2/3, 2, 3	4.5
1.2.1	Drywell	B**	SC	2/3, 2, 3	4.6
1.2.2	Drywell	A**	SC	2/3, 2, 3	4.3
1.3.1	RB3-II	A1	LPCI Div.II	2/3, 2	4.5
1.3.2	RB2-I	C	LPCI Div. II	2/3, 3	4.1
1.4.1	RB3-I	D	SC	2/3, 2	4.4
1.1.2.1	RB2-II	B1	SC	2/3, 3	4.2
1.1.2.2	RB2-II	B1	SC	2/3, 3	4.2
1.1.2.3	RB2-II	B1	LPCI Div.II	2/3, 3	4.2
1.1.2.4	RB2-II	B1	SC	2/3, 3	4.2
1.1.2.5.A	RB2-I	C	SC	2/3, 2, 3	4.1
1.1.2.5.B	RB2-I	C	SC	2/3, 2, 3	4.1
1.1.2.5.C	RB2-I	C	SC	2/3, 2, 3	4.1
1.1.2.5.D	RB2-II	B1*	SC	2/3, 2, 3	4.2
1.1.2.6	RB2-II	A*	SC	2/3, 2, 3	4.2
2.0	TB-V	A2 and B2	SC	2/3, 2, 3	4.12
6.1	TB-III	A1	SC	2/3, 2	4.10
6.2	TB-V	A2 and B2	SC	2/3, 2, 3	4.12
7.0.A.1	TB-I	B1	SC	2/3, 3	4.8
7.0.A.2	TB-I	B1	SC	2/3, 3	4.8

* No shutdown cable or equipment is located in this zone. All methods of shutdown are available

** Drywell is inerted, no fire postulated. All methods of shutdown are available.

TABLE 4.0-1
APPENDIX R HOT SHUTDOWN PATHS BY FIRE ZONE

Fire Zone	Fire Area/ Equivalent Area/ Zone Group	Hot Shutdown Path	Cold Shutdown Path	Cold Shutdown DG (Note 1) Availability	Safe Shutdown Analysis Section
7.0.A.3	TB-I	B1	SC	2/3, 3	4.8
7.0.B	TB-III	A1	SC	2/3, 2	4.10
8.1	TB-I	B1*	SC	2/3, 2, 3	4.8
8.2.1.A	TB-I	B1	SC	2/3, 3	4.8
8.2.1.B	TB-III	A1	SC	2/3, 2	4.10
8.2.2.A	TB-I	B1	SC	2/3, 3	4.8
8.2.2.B	TB-III	A1	SC	2/3, 2	4.10
8.2.4	TB-III	A1	SC	2/3, 2	4.10
8.2.5.A	TB-I	B1	SC	2/3, 3	4.8
8.2.5.B	TB-I	B1	SC	2/3, 3	4.8
8.2.5.C	TB-II	A2 and B2	SC	2/3, 2	4.9
8.2.5.D	TB-III	A1	SC	2/3, 2	4.10
8.2.5.E	TB-III	A1	SC	2/3, 2	4.10
8.2.6.A	TB-I	B1	SC	2/3, 3	4.8
8.2.6.B	TB-I	B1	SC	2/3, 3	4.8
8.2.6.C	TB-II	A2 and B2	SC	2/3, 2	4.9
8.2.6.D	TB-III	A1	SC	2/3, 2	4.10
8.2.6.E	TB-III	A1	SC	2/3, 2	4.10
8.2.7	TB-I	B1	SC	2/3, 3	4.8
8.2.8	TB-IV	A and B*	SC	2/3, 2, 3	4.11
9.0.A	TB-I	B1	SC	2/3, 3	4.8
9.0.B	TB-III	A1	SC	2/3, 2	4.10
9.0.C	RB 2/3	E and F	SC	2, 3	4.7
11.1.1	RB3-II	A1	SC	2/3, 2	4.5
11.1.2	RB3-II	A1	SC	2/3, 2	4.5
11.1.3	RB 2/3	F	SC	2, 3	4.7
11.2.1	RB2-II	B1	SC	2/3, 3	4.2
11.2.2	RB2-II	B1	SC	2/3, 3	4.2
11.2.3	RB 2/3	E	SC	2, 3	4.7
11.3	Crib House	E and F or A2 and B2	SC	2/3, 2, 3 (Note 2)	4.13
14.1	Radwaste	A and B*	SC	2/3, 2, 3	4.14

* No shutdown cable or equipment is located in this zone. All methods of shutdown are available

** Drywell is inerted, no fire postulated. All methods of shutdown are available.

TABLE 4.0-1
APPENDIX R HOT SHUTDOWN PATHS BY FIRE ZONE

Fire Zone	Fire Area/ Equivalent Area/ Zone Group	Hot Shutdown Path	Cold Shutdown Path	Cold Shutdown DG (Note 1) Availability	Safe Shutdown Analysis Section
14.2	TB-IV	A and B*	SC	2/3, 2, 3	4.11
14.3	TB-IV	A and B*	SC	2/3, 2, 3	4.11
14.4	Misc	A and B*	SC	2/3, 2, 3	4.15
14.5	Radwaste	A and B*	SC	2/3, 2, 3	4.14
14.6	Radwaste	A and B*	SC	2/3, 2, 3	4.14
18.1.1	Misc	A and B*	SC	2/3, 2, 3	4.15
18.1.2	Misc	A and B*	SC	2/3, 2, 3	4.15
18.2.1	Misc	A and B*	SC	2/3, 2, 3	4.15
18.2.2	Misc	A and B*	SC	2/3, 2, 3	4.15
18.3.1	Misc	A and B*	SC	2/3, 2, 3	4.15
18.3.2	Misc	A and B*	SC	2/3, 2, 3	4.15
18.4	Misc	A and B*	SC	2/3, 2, 3	4.15
	Unit 1 Structures				

Note 1: a. 2/3 diesel generator implies that Division I power is available for cold shutdown.

b. 2 diesel generator or 3 diesel generator implies that Division II power is available for cold shutdown.

c. One diesel generator must be available for cold shutdown for each unit if offsite power is lost (i.e., 2 of 3).

Note 2. Two of three diesel generator cooling water pumps will be available for cold shutdown depending on location of the fire in the crib house lower level.

* No shutdown cable or equipment is located in this zone. All methods of shutdown are available

** Drywell is inerted, no fire postulated. All methods of shutdown are available.

4.1 Unit 2 Reactor Building Fire Area RB2-I

Safe shutdown equipment and cabling located in this fire area are shown on Drawings F-3 (Fire Zone 1.3.2), F-4 (Fire Zone 1.1.2.5.C), F-5 (Fire Zone 1.1.2.5.B) and F-6 (Fire Zone 1.1.2.5.A).

4.1.1 Hot Shutdown Analysis

For a fire in RB2-I, HPCI system shutdown path C (Table 3.1-8) will be used to shut down the unit. Diesel Generator 2 will be used to power essential equipment. The electromatic relief valves are available for initial pressure control except in Fire Zone 1.3.2. In this zone, the target rock valve and the safety valve are available for pressure control. The LPCI system and containment cooling water system are available for suppression pool cooling. All necessary equipment may be operated from the control room. Reactor pressure and level are monitored at local indicators. Instruments for Torus temperature and level are monitored in the control room. This fire area contains no essential or associated cable for HPCI shutdown path C.

4.1.2 Cold Shutdown Analysis

For the cold shutdown analysis, the Unit 2 reactor building was analyzed as a single fire area. This analysis is in Section 4.2 which follows

4.2 Unit 2 Reactor Building Fire Area RB2-II

Safe shutdown equipment and cabling located in this fire area are shown on Drawings F-2 (Fire Zones 11.2.1, 11.2.2 and 1.1.2.1), F-3 (Fire Zone 1.1.2.2), F-4 (Fire Zone 1.1.2.3), F-5 (Fire Zone 1.1.2.4), F-6 (Fire Zone 1.1.2.5.D) and F-7 (Fire Zone 1.1.2.6).

4.2.1 Hot Shutdown Analysis

Alternative isolation condenser shutdown path B1 (Table 3.1-7) is used to shut down Unit 2 using Unit 3 equipment and interunit crossties independent of this fire area. Since the Unit 2 4-kV switchgear, 480-V switchgear, 250-V MCC's and 125-V reactor building distribution center with their associated cables are located in this fire area, the 2/3 diesel generator is used to power essential equipment via the Unit 3 power train. Control rod drive pump 3A is available for reactor water makeup. The electromatic relief valves may not be available for initial pressure control but the target rock valve and safety valves are available if necessary. Makeup to the isolation condenser is available from either isolation condenser makeup pump. Service water pump 3A is available for cooling of the CRD pumps and for makeup to the isolation condenser if long-term operation of the isolation condenser is necessary. Local instruments are used to monitor Reactor Pressure and Reactor Vessel water level. See Subsections 3.1.1.1.5 of this report.

The control rod drive pump and service water pump are powered from Unit 3 and are available to support Unit 2 shutdown through mechanical crossties. The bus duct from the 2/3 diesel generator to 4-kV switchgear 23-1 is routed in this area. A fault on the bus duct would not affect operation of the diesel generator because a 4-kV breaker in the diesel generator room would isolate this feed from the diesel generator. The 2/3 diesel generator would remain available to provide power via Unit 3 (see Subsection 6.2.3.1). All cables routed in this area that could affect control and excitation of the 2/3 diesel generator and associated circuits can be isolated in the diesel generator room and panels have been installed to permit local starting and operation of the 2/3 diesel generator. Redundant 125-Vdc control power is available from Unit 3. Redundant power feeds to the 2/3 diesel generator auxiliaries (room ventilation fan and fuel oil transfer pump) area are available from Unit 3. Local transfer switches have been installed in the 2/3 diesel generator room to isolate the Unit 2 feeds. (See Subsection 6.2.3.1)

Cables and power supplies for the Unit 2 isolation condenser valves are located in this fire area. All isolation condenser motor-operated valves are independent of this fire area and are accessible for manual operation except for valves MO2-1301-1 and MO2-1301-4 which are located in the drywell. The normal power feeds to these drywell valves are routed through Fire Zone 1.1.2.2 from 480-V MCC 28-1 to the drywell penetrations in Fire Zone 1.3.2 (part of RB2-I). To ensure that these valves will be open as required for safe shutdown, alternate power feeds have been routed to the Unit 2 drywell penetrations in Fire Zone 1.3.2 from Unit 3 (see Subsection 6.2.1.4). The normal access to valves MO2-1301-2 and MO2-1301-3, located in the isolation condenser pipe chase (RB2-I), is through the fire doors to the pipe chase at 41/M on both the 545-foot 6-inch elevation and the 570-foot 0-inch elevation. Access to the pipe chase is also available from Elevation 589 feet 0 inches in Fire Area RB2-I. Intervening grating has been cut and access

ladders and platforms provided to ensure that these valves may be manually operated in the event of a fire in this area (see Subsection 6.2.1.6). Vent valves AO2-1301-17 and AO-1301-20 fail in the closed position. In the event these valves fail to close, manual valve 2-1301-16 may be closed to isolate this line. Manual operation of valves MO2-4399-74, MO2-4102 and MO2-1301-10 may be required to add makeup water to the isolation condenser.

480V Bus 29 which supplies power to the Unit 2 fuel oil transfer pump could potentially be affected by a fire in this area. If isolation condenser makeup is required for more than 8 hours after shutdown is initiated, the diesel oil day tanks for the isolation condenser makeup pumps can be manually refilled.

If one of the diesel makeup pumps runs out of fuel, the other pump may be started to provide water.

Associated cables routed in this zone include LPCI circuits, core spray circuits, primary containment isolation circuits, and main steam isolation circuits. The LPCI and core spray circuitry is associated with the 4-kV power distribution. However, since the Unit 3 power train is used for this zone, faults on these circuits will not affect safe shutdown. The primary containment isolation, and main steam isolation circuits are associated with isolation condenser valves. However, the drywell valves will be controlled from the alternate power source by isolating the automatic circuitry and the power train to the remaining valves will be deenergized and the valves operated manually. Therefore, faults on the associated circuitry will not prevent safe shutdown. Spurious auto blowdown initiation is prevented by manual operation of the ADS auto-blowdown inhibit switch installed at the MCB (see Subsection 6.2.1.8) and spurious operation of the individual relief valves is prevented by placing the handswitch of the Electromatic relief valves (ERV's) and the Target Rock safety/relief valve control switches in the "OFF" positions and by racking out the circuit breakers that supply 125-Vdc power to the valves.

Cable discrepancies within RB2-II and their resolutions are presented in Appendix A. A discussion of the instrumentation available to the operators is in Subsection 3.1.1.1.5.

The refueling floor of Fire Zone 1.1.2.6 and Fire Zone 1.1.2.5.D contains no safe shutdown equipment or cabling but is considered part of Fire Area RB2-II. Therefore, the isolation condenser shutdown path A (Table 3.1-3), which would normally be used in case of loss of offsite power, can be utilized for a postulated fire in these fire zones.

There are no cable discrepancies in Fire Zone 1.1.2.6.

4.2.2 RB2-I and RB2-II Cold Shutdown Analysis

A significant amount of electrical and mechanical equipment necessary for cold shutdown is located in the Unit 2 reactor building Fire Areas RB2-I and RB2-II. The reactor building is divided into fire zones by floor elevations and rated fire barriers on a particular floor. These floor slabs present a substantial barrier to the spread of fire. However, they are not fire rated. Additionally, the combustible loading is low and area-wide automatic fire detection would ensure that the fire was detected and extinguished before it spread to adjacent floor elevations disabling

the mechanical components and their operators. See the Fire Hazards Analysis, Sections 4.1 and 4.2 (F.P.R. Volume 1) and Section 3.8 of the Exemption Requests (F.P.R. Volume 4) for detailed justification for this assumption.

The mechanical and electrical equipment necessary for cold shutdown located by fire zone is identified in Table 4.2-1.

The location of cable and equipment in the reactor building is shown on the drawings listed below.

Fire Zone	F Series Drawings	Cold Shutdown Method
1.1.2.1	F-2	Shutdown Cooling
1.1.2.2	F-3	Shutdown Cooling
1.1.2.3	F-4	LPCI
1.1.2.4	F-5	Shutdown Cooling
1.1.2.5.A,B,C,D	F-4, F-5, F-6	Shutdown Cooling
1.1.2.6	F-7	Shutdown Cooling
1.3.2	F-3	LPCI
11.2.1	F-2	Shutdown Cooling
11.2.2	F-2	Shutdown Cooling

In the Unit 2 reactor building fire area, the shutdown cooling system can be used for cold shutdown in every fire zone except for the mezzanine floor, Fire Zone 1.1.2.3 (Fire Area RB2-II) and the shutdown cooling pump room, Fire Zone 1.3.2 (Fire Area RB2-I). On the mezzanine floor, the presence of the RBCCW pumps precludes the use of the shutdown cooling system (see Subsection 3.2.1). In the shutdown cooling pump room, the presence of the shutdown cooling pumps preclude the use of the shutdown cooling systems.

Table 4.2-2 identifies the manual actions and repairs necessary to achieve cold shutdown using shutdown cooling. The actions identified in this table conservatively assume the loss of all electrical cable and equipment in the Unit 2 reactor building. Electrical power is provided to Unit 2 equipment by temporary connections to switchgear and motor control centers in Unit 3. Manual handwheel operation of accessible valves is assumed. Modifications identified in the hot shutdown analysis provide capability to operate the 2/3 diesel generator independent of fire damage in Unit 2 (see Subsection 6.2.3.1); also, diesel generator 3 and its auxiliaries are independent of the Unit 2 reactor building.

Table 4.2-3 identifies the manual actions and repairs necessary to achieve cold shutdown using the LPCI method for Fire Zones 1.1.2.3 and 1.3.2.

Redundant mechanical components of the selected cold shutdown path are located in the same fire zone in two instances. The justification for why a fire will not affect both redundant

components is given below.

1. Basement Floor (Fire Zone 1.1.2.1)

Valves MO2-1001-5A, MO2-1001-5B, MO2-3702, and MO2-3703 are located in this fire zone and are associated with the shutdown cooling method. The shutdown cooling method would still be available based on the following justification.

MO2-1001-5A MO2-1001-5B	These valves are located 180° apart on opposite sides of the torus. These valves are in separate loops. As stated in Sub-section 3.2.1, only one loop is normally used. Therefore, only one of the two valves needs to be opened. They can be handwheel operated. A single fire would not disable mechanical operation of both valves due to the physical separation, low combustible loading, and lack of intervening combustibles. See Fire Hazards Analysis Section 4.2 (F.P.R. Volume 1) and Section 3.8 of the Exemption Requests (F.P.R. Volume 4).
MO2-3702 MO2-3703	These valves are normally open and must remain so. The only associated cables in this zone are from the limit switch and the 480-V power cable. A fault in the limit switch and 480-V power cable cannot cause valves to change position.

2. Mezzanine Floor (Fire Zone 1.1.2.3)

LPCI valves MO2-1501-27B and MO2-1501-28B are located in this zone and are associated with the LPCI/CCSW method. The LPCI/CCSW method would still be available based on the following justification.

LPCI Valve MO2-1501-27B LPCI Valve MO2-1501-28B	These valves are in the piping to the containment spray header and are not needed for the LPCI cold shutdown system. They are normally closed and both must spuriously open to have an adverse effect on cold shutdown. The simultaneous opening of two normally closed motor-operated valves in series is not postulated except in a high-low pressure interface. This is not a high-low pressure interface.

TABLE 4.2-1

COLD SHUTDOWN EQUIPMENT CONTAINED IN THE UNIT 2 REACTOR BUILDING FIRE AREAS RB2-I AND RB2-II

Fire Zone 1.1.2.1

Shutdown Cooling

1. SC Valve MO2-1001-5A
2. SC Valve MO2-1001-5B
3. RBCCW Valve MO2-3702
4. RBCCW Valve MO2-3703

LPCI, Div. II

1. LPCI Valve MO2-1501-22B
2. LPCI Valve MO2-1501-20B
3. LPCI Valve MO2-1501-38B
4. LPCI Valve MO2-1501-18B
5. LPCI Valve MO2-1501-19B
6. LPCI Valve MO2-1501-13B

Fire Zone 1.1.2.2

Electrical Equipment

1. 480-V MCC 28-1
2. 480-V MCC 29-1
3. 480-V MCC 29-4
4. 480-V MCC 29-7
5. 480-V MCC 28-7

LPCI, Div. II

1. LPCI Valve MO2-1501-21B

Fire Zone 1.1.2.3

Electrical Equipment

1. 4-kV SWGR 23-1
2. 4-kV SWGR 24-1

TABLE 4.2-1

COLD SHUTDOWN EQUIPMENT CONTAINED IN THE UNIT 2 REACTOR BUILDING FIRE AREAS RB2-I AND RB2-II

Shutdown Cooling

1. SC Heat Exchangers 2A-1003, 2B-1003, 2C-1003
2. RBCCW Pumps 2A-3701, 2B-3701
3. RBCCW Heat Exchangers 2A-3702, 2B-3702
4. RBCCW Valve MO2-3701
5. RBCCW Valve MO2-3704
6. Service Water Valve TCV-2-3904A
7. Service Water Valve TCV-2-3904B
8. Service Water Valve TCV-2-3904C
9. SC Valve MO2-1001-4A
10. SC Valve MO2-1001-4B
11. SC Valve MO2-1101-4C

LPCI, Div. II

1. LPCI Valve MO2-1501-27B
2. LPCI Valve MO2-1501-28B

Fire Zone 1.1.2.4

Electrical Equipment

1. 480-V SWGR 28
2. 480-V SWGR 29
3. 250-Vdc Reactor Building MCC 2A
4. 250-Vdc Reactor Building MCC 2B
5. 125-Vdc Reactor Building Distribution Panel

Fire Zones 1.1.2.5.A, 1.1.2.5.B, and 1.1.2.5.C

NONE

Fire Zone 1.1.2.6

NONE

TABLE 4.2-1

COLD SHUTDOWN EQUIPMENT CONTAINED IN THE UNIT 2 REACTOR BUILDING FIRE AREAS RB2-I AND RB2-II

Fire Zone 1.3.2

Shutdown Cooling

1. SC Pumps 2A-1002, 2B-1002, 2C-1002
2. SC Valves MO2-1001-2A, MO2-1001-2B, MO2-1001-2C
3. Electrical Division I Penetrations

Fire Zone - 11.2.1

LPCI, Div. II

1. LPCI Pump 2C-1502
2. LPCI Pump 2D-1502
3. LPCI Emergency Air Cooler 2-5746B
4. LPCI Valve MO2-1501-3B
5. LPCI Valve MO2-1501-5C
6. LPCI Valve MO2-1501-5D
7. LPCI Valve MO2-1501-11B
8. LPCI Valve MO2-1501-32B

Fire Zone 11.2.2

NONE

TABLE 4.2-2

ACTIONS TO ACHIEVE COLD SHUTDOWN IN UNIT 2 USING THE SHUTDOWN COOLING SYSTEM ASSUMING A FIRE IN THE UNIT 2 REACTOR BUILDING

Component	Manual Action/Repair
MECHANICAL EQUIPMENT	
Shutdown Cooling Pumps	
2A-1002 2B-1002 *2C-1002	A temporary power cable connection for two pumps to SWGR 33-1 or 34-1 on the Unit 3 side can be provided. A procedure to manually start pumps at SWGR is available. (See Subsection 7.4.1 for details.)
Shutdown Cooling Valves	
MO2-1001-2A MO2-1001-2B MO2-1001-2C MO2-1001-4A MO2-1001-4B MO2-1001-4C MO2-1001-5A MO2-1001-5B	Disable feed and manually position the valve.
MO2-1001-1A MO2-1001-1B	A temporary power cable from an operable 480-V MCC to the drywell penetration can be provided. A procedure to locally operate valves from the MCC is available. (See Subsection 7.4.1 for details.)
Recirculation Piping Valves	
MO2-0202-4A MO2-0202-4B	A temporary power cable from an operable 480-V MCC to the drywell penetrations can be provided. A procedure to locally operate valves from the MCC is available. (See Subsection 7.4.1 for details.)
RBCCW Pumps	
2A-3701 2B-3701	A temporary power cable connection for two pumps to SWGR 33-1 or 34-1 in Unit 3 can be provided. A procedure to start pumps at the SWGR is available. (See Subsection 7.4.1 for details.)
RBCCW Valves	
MO2-3701 MO2-3704	Disable the feed and manually position the valve.

TABLE 4.2-2

ACTIONS TO ACHIEVE COLD SHUTDOWN IN UNIT 2 USING THE SHUTDOWN COOLING SYSTEM ASSUMING A FIRE IN THE UNIT 2 REACTOR BUILDING

Component	Manual Action/Repair
MO2-3702 MO2-3703 MO2-3706	Spurious operation concern only. This valve is normally open for drywell cooling. The drywell cooling function, while important, is not considered essential to cold shutdown. (See Subsection 7.4.1 for details.)
Service Water Pumps	
2A-3901 2B-3901	Unit 3 service water pumps 3A-3901, 3B-3901, and 2/3-3901, which are powered from SWGR 33 and 34, are available independent of the Unit 2 reactor building. The normal feeds to SWGR 23 and 24 are disabled.
TCV-2-3904A TCV-2-3904B TCV-2-3904C	Spurious operation concern. These valves fail open, which is the position necessary for cold shutdown.
ELECTRICAL EQUIPMENT	
Division I	The 2/3 diesel generator is operable from the 2/3 diesel generator room (Fire Zone 9.0.C, Fire Area RB-2/3). See Subsections 4.2.1 and 6.2.3.1 for the modifications identified in the Hot Shutdown Analysis to ensure this operability. All other Unit 3 Division I components and associated circuits are independent of the Unit 2 reactor building except for 4-kV Buses 23-1 to 33-1 breaker interlock control cables which can be manually isolate at SWGR.
Division II	All Unit 3 diesel generator and Unit 3 Division II components and associated circuits are independent of the Unit 2 reactor building.
250-Vdc	Primary feed to Unit 3 is from Unit 2, however, a secondary feed can be made from TB 250- Vdc MCC#3. Unit 2 250-V valve can be operated manually.
125-Vdc	Unit 2 motor operators will be temporarily connected to Unit 3 switchgear for power and control via temporary power cable connections as described above. Therefore, no 125-Vdc to Unit 2 in necessary. All Unit 3 125-Vdc is independent of the Unit 2 reactor building.
Process Monitoring Equipment	
RPV Water Temp. Recirc Loop A RPV Water Temp. Recirc Loop B RPV Shell Temperature RPV Flange Temperature	If RPV water, shell and shell flange temperature indicators are not available in the control room, then establish local indication monitoring capability in accordance with cold shutdown repair procedure DSSP-0200-T9.

TABLE 4.2-3

ACTIONS TO ACHIEVE COLD SHUTDOWN IN UNIT 2 USING THE LPCI/CCSW SYSTEM ASSUMING A FIRE IN THE UNIT 2 REACTOR BUILDING

Component	Manual Action/Repair
MECHANICAL EQUIPMENT	
LPCI Pumps	
2C-1502 2D-1502	A temporary cable connection for the pumps to SWGR 33-1 or 34-1 in Unit 3 can be provided. Procedures to manually start pumps at the SWGR are available. (See Subsection 7.4.1 for details.)
CCSW Pumps	
2C-1501-44 2D-1501-44	These pumps will be powered by a temporary feed from SWGR 33 and 34 if normal power feed to the pump cannot be established (see Subsection 7.4.1 for details.
LPCI Valves	
MO2-1501-22B MO2-1501-3B	Disable the feed and manually position the valve.
MO2-1501-21B MO2-1501-5C MO2-1501-5D MO2-1501-27B MO2-1501-28B MO2-1501-18B MO2-1501-19B MO2-1501-38B MO2-1501-20B MO2-1501-11B MO2-1501-32B MO2-1501-13B	Of concern in regard to spurious operation only. Disable the feed and manually position the valve.
Target Rock/Electromatic Relief Valves	
2-203-3A 2-203-3B 2-203-3C 2-203-3D 2-203-3E	Temporary 125-Vdc power connection to the drywell penetration can be provided. Procedures to manually operate these valves are available. (See Subsection 7.4.1 for details.)

TABLE 4.2-3

ACTIONS TO ACHIEVE COLD SHUTDOWN IN UNIT 2 USING THE LPCI/CCSW SYSTEM ASSUMING A FIRE IN THE UNIT 2 REACTOR BUILDING

Component	Manual Action/Repair
CCSW Pump Coolers	
2-5700-30A 2-5700-30B	A temporary cable connection can be provided to an operable 480-V MCC in Unit 3. Procedures to locally start cooler fans are available. (See Section 7.4.1 for details.)
LPCI Emergency Air Cooler	
2-5746B	A temporary cable connection can be provided to an operable 480-V MCC in Unit 3. Procedures to locally start cooler fans are available. (See Section 7.4.1 for details.)
ELECTRICAL EQUIPMENT	
Division I	The 2/3 diesel generator is operable from the 2/3 diesel generator room (Fire Zone 9.0.C, Fire Area RB-2/3). See Subsections 4.2.1 and 6.2.3.1 for the modifications identified in the Hot Shutdown Analysis to ensure this operability. All other Unit 3 Division I components and associated circuits are independent of the Unit 2 reactor building except for 4-kV Bus 33-1 to 23-1 breaker interlock control cables which can be manually isolated at SWGR.
Division II	All Unit 3 diesel generator and Unit 3 Division II components and associated circuits are independent of the Unit 2 reactor building.
250-Vdc	Primary feed to Unit 3 is from Unit 2, however, a secondary feed can be made from TB 250-Vdc MCC#3. Unit 2 250-V valve can be operated manually.
125-Vdc	Unit 2 motor operators will be temporarily connected to Unit 3 switchgear for power and control via temporary power cable connection as described above. Therefore, no 125-Vdc to Unit 2 is necessary. All Unit 3 125-Vdc is independent of the Unit 2 reactor building.
Process Monitoring Equipment	
RPV Water Temp. Recirc Loop A RPV Water Temp. Recirc Loop B RPV Shell Temperature RPV Flange Temperature	If RPV water, shell and shell flange temperature indicators are not available in the control room, then establish local indication monitoring capability in accordance with cold shutdown repair procedure DSSP-0200-T9.

4.3 Unit 2 Primary Containment (Fire Area 1.2.2)

Safe shutdown equipment and cabling located in this fire area are shown on Drawings F-3 through F-6.

4.3.1 Hot Shutdown Analysis

The Unit 2 primary containment (Zone 1.2.2) is separated from the rest of the reactor building by a 3-hour rated fire barrier. The primary containment is inerted, thus, a fire cannot start and a safe shutdown can be achieved and maintained using any of the shutdown methods.

4.3.2 Cold Shutdown Analysis

The Technical Specifications require that the drywell be inerted during normal reactor operation. Therefore, no fire is postulated. The mechanical equipment associated with cold shutdown located in the drywell is identified in Table 4.3-1.

TABLE 4.3-1

COLD SHUTDOWN EQUIPMENT CONTAINED IN THE DRYWELL

Fire Zone 1.2.2	Fire Zone 1.2.1
Shutdown Cooling	Shutdown Cooling
1. Recirculation Loop A Valves	1. Recirculation Loop A Valves
MO2-0202-4A	MO3-0202-4A
MO2-0202-5A	MO3-0202-5A
2. Recirculation Loop B Valves	2. Recirculation Loop B Valves
MO2-0202-4B	MO3-0202-4B
MO2-0202-5B	MO3-0202-5B
3. RBCCW Valve MO2-3706	3. RBCCW Valve MO3-3706
4. SC Valves	4. SC Valves
MO2-1001-1A	MO3-1001-1A
MO2-1001-1B	MO3-1001-1B
LPCI DIV. II	LPCI DIV. II
1. Target Rock Valve 2-203-3A	1. Target Rock Valve 3-203-3A
2. Electromatic Relief Valves	2. Electromatic Relief Valves
2-203-3B	3-203-3B
2-203-3C	3-203-3C
2-203-3D	3-203-3D
2-203-3E	3-203-3E

4.4 Unit 3 Reactor Building Fire Area RB3-I

Safe shutdown equipment and cabling located in this fire area are shown on Drawings F-3 (Fire Zone 1.4.1), F-4 (Fire Zone 1.1.1.5.C), F-5 (Fire Zone 1.1.1.5.B) and F-6 (Fire Zone 1.1.1.5.A).

4.4.1 Hot Shutdown Analysis

For a fire in RB3-I, the HPCI system shutdown path D (Table 3.1-9), will be used to shut down the unit. Diesel generator 3 will be used to power essential equipment. Control rod drive pump 3B is available for reactor water makeup if the operator chooses to use the HPCI turbine for steam condensing only. The electromatic relief valves are available for initial pressure control except for Fire Zone 1.4.1. In this zone the target rock valve and the safety valves are available for pressure control. The LPCI system and containment cooling service water system are available for suppression pool cooling.

All necessary equipment may be operated from the control room. Local instrumentation is used for monitoring Reactor Pressure and Reactor Water Level indication. This fire area contains no essential or associated cables for the HPCI shutdown path D.

4.4.2 Cold Shutdown Analysis

For the cold shutdown analysis, the Unit 3 reactor building was analyzed as a single fire area in Section 4.5.

4.5 Unit 3 Reactor Building Fire Area RB3-II

Safe shutdown equipment and cabling located in this fire area are shown on Drawings F-2 (Fire Zones 1.1.1.1, 11.1.1, and 11.1.2), F-3 (Fire Zones 1.1.1.2 and 1.3.1), F-4 (Fire Zone 1.1.1.3), F-5 (Fire Zone 1.1.1.4), F-6 (Fire Zone 1.1.1.5.D) and F-6 (Fire Zone 1.1.1.6).

4.5.1 Hot Shutdown Analysis

Isolation condenser shutdown path A1 (Table 3.1-4) is used to shut down Unit 3 using Unit 2 equipment and interunit crossties independent of this fire area. Since the Unit 3 4-kV switchgear, 480-V switchgear, 250-V MCC's and 125-V reactor building distribution center are located in this fire area, the 2/3 diesel generator is used to power essential equipment via the Unit 2 power train. Control rod drive pump 2A is available for reactor water makeup. The electromatic relief valves are not available for initial pressure control but the target rock valve and safety valves are available. Makeup to the isolation condenser is available from either isolation condenser makeup pump. Service water pump 2A is available for cooling of the CRD pump and for makeup to the isolation condenser, if long-term operation is necessary. Local instruments are used to monitor Reactor Pressure and Reactor Vessel Water level. Instruments for monitoring Torus temperature and level are available in the control room.

The necessary control rod drive pump and service water pump are powered from Unit 2 and are available to support Unit 3 shutdown through mechanical crossties. The bus duct from the 2/3 diesel generator to 4-kV switchgear 33-1 is routed in this area. A fault on the bus duct would not affect operation of the diesel generator because a 4-kV breaker in the diesel generator room would isolate this feed from the diesel generator. The 2/3 diesel generator would remain available to provide power via Unit 2 (see Subsection 6.2.3). All Unit 3 cables routed in this area that could affect control and excitation of the 2/3 diesel generator and its auxiliaries are isolated in the diesel generator room to permit local starting and operation. Cables to the 2/3 diesel generator from Unit 2 and the bus duct from the 2/3 diesel generator to SWGR 23-1 pass through the corner of Fire Zone 1.1.1.2 nearest to the diesel generator room. These cables are provided with a 1-hour fire wrap. See Subsections 6.2.3.1.5 and 6.3.3.2 and Section 4.7 of the Exemption Requests (F.P.R. Volume 4). Redundant 125-Vdc control power is available from Unit 2. Redundant power feeds to the 2/3 diesel generator auxiliaries (room ventilation fan and fuel oil transfer pump) are available from Unit 2. Local transfer switches have been installed in the 2/3 diesel generator room to isolate the Unit 3 feeds. See Subsection 6.2.3.1.

Cables and power supplied for Unit 3 isolation condenser valves are located in this fire area. All isolation condenser motor-operated valves are independent of this fire area and are accessible for manual operation except for valves MO3-1301-1 and MO3-1301-4 which are located in the drywell. The normal power feeds to these drywell valves are routed through Fire Zone 1.1.1.2 from 480-V MCC 38-1 to the drywell penetrations in Fire Zone 1.4.1 (part of RB3-I). To ensure that these valves will be open as required for safe shutdown, alternate power feeds have been routed to Unit 3 drywell penetrations in Fire Zone 1.4.1 from Unit 2 (see Subsection 6.2.2.4). The normal access to valves MO3-1301-2 and MO3-1301-3, located in the isolation condenser pipe chase (RB3-I), is through fire doors located at roughly 47/M on both the 545-foot 6-inch

elevation and the 570-foot 0-inch elevation. Access to the pipe chase is also available from the 589-foot 0-inch elevation in Fire Area RB3-I. Intervening grating has been cut and access ladders and platforms provided to ensure that these valves may be manually operated in the event of a fire in this area (see Subsection 6.2.2.6). Vent valves AO3-1301-17 and AO3-1301-20 fail in the closed position. In the event these valves fail to close, manual valve 3-1301-16 may be closed to isolate this line. Manual operation of valves MO3-4399-74 or MO3-4102 and MO3-1301-10 may be required to add makeup water to the isolation condenser.

Associated cables routed in this zone include LPCI circuits, core spray circuits, primary containment isolation circuits, and main steam isolation circuits. The LPCI and core spray circuitry are associated with the 4-kV power distribution. However, since the Unit 2 power train is used for this zone, faults on these circuits will not affect safe shutdown. The primary containment isolation, and main steam isolation circuits are associated with isolation condenser valves. However, the drywell valves will be controlled from the alternate power source by isolating the automatic circuitry and the power train to the remaining valves will be deenergized and the valves operated manually. Therefore, faults on the associated circuitry will not prevent safe shutdown. Spurious auto blowdown initiation is prevented by manual operation of the ADS Auto-blowdown Inhibit Switch installed at the MCB (see Subsection 6.2.2.8) and spurious operation of the individual relief valves is prevented by placing the handswitch of the Electromatic relief valves (ERV's) and the Target Rock safety/relief valve control switches in the "OFF" position and by racking out the circuit breakers that supply 125-Vdc power to these valves.

Cable discrepancies within RB3-II and their resolution are presented in Appendix A. A discussion of the instrumentation available to the operators is in Subsection 3.1.1.1.5.

The refueling floor of Fire Zone 1.1.1.6 and Fire Zone 1.1.1.5.D contains no safe shutdown equipment or cabling but is considered part of Fire Area RB3-II. Therefore, the isolation condenser shutdown path B (Table 3.1-6), which would normally be used in case of loss of offsite power, can be utilized for a postulate fire in these fire zones.

There are no cable discrepancies in Fire Zone 1.1.1.6.

4.5.2 RB3-I and RB3-II Cold Shutdown Analysis

A significant amount of electrical and mechanical equipment necessary for cold shutdown is located in the Unit 3 reactor building Fire Areas RB3-I and RB3-II. The reactor building is divided into fire zones by floor elevations and rated fire barriers on a particular floor. These floor slabs present a substantial barrier to the spread of fire. However, they are not fire rated. Additionally, the combustible loading is low and area-wide automatic fire detection would ensure that the fire was detected and extinguished before it spread to adjacent floor elevations disabling the mechanical components and their operators. See the Fire Hazards Analysis, Sections 3.4 and 3.5 (F.P.R. Volume 1), and Section 4.10 of the Exemption Requests (F.P.R. Volume 4) for a detailed justification of this assumption.

The mechanical and electrical equipment necessary for cold shutdown and located by fire zone

are identified in Table 4.5.1. The cable and equipment in the reactor building are shown on the drawings listed below.

Fire Zone	F Series Drawings	Cold Shutdown Method
1.1.1.1	F-2	Shutdown Cooling
1.1.1.2	F-3	Shutdown Cooling
1.1.1.3	F-4	LPCI
1.1.1.4	F-5	Shutdown Cooling
1.1.1.5.A,B,C,D	F-4, F-5, F-6	Shutdown Cooling
1.1.1.6	F-7	Shutdown Cooling
1.3.1	F-3	LPCI
1.4.1	F-3	Shutdown Cooling
11.1.1	F-2	Shutdown Cooling
11.1.2	F-2	Shutdown Cooling

In the Unit 3 reactor building fire areas, the shutdown cooling system can be used for cold shutdown in every fire zone except for the mezzanine floor, Fire Zone 1.1.1.3 (Fire Area RB3-II) and the shutdown cooling pump room, Fire Zone 1.3.1 (Fire Area RB3-II). On the mezzanine floor, the presence of the RBCCW pumps precludes the use of the shutdown cooling system. In the shutdown cooling pump room, the presence of the shutdown cooling pumps precludes the use of the shutdown cooling systems.

Table 4.5-2 identifies the manual actions and repairs necessary to achieve cold shutdown using shutdown cooling. The actions identified in this table conservatively assume the loss of all electrical cable and equipment in the Unit 3 reactor building. Electrical power to Unit 3 equipment is provided by temporary connections to switchgear and motor control centers in Unit 2. Manual handwheel operation of accessible valves is assumed. Modifications identified in the hot shutdown analysis Subsection 6.2.3.1 provide capability to operate the 2/3 diesel generator independent of fire damage in Unit 3. Also, Unit 2 diesel generator and auxiliaries are independent of the Unit 3 reactor building.

Table 4.5-3 identifies the manual actions and repairs necessary to achieve cold shutdown using the LPCI method.

Additionally, redundant mechanical components of the selected cold shutdown path are in the same fire zone in two instances. The justification for why a fire will not affect both redundant components is given below.

1. Basement Floor (Fire Zone 1.1.1.1)

Valves MO3-1001-5A, MO3-1001-5B, MO3-3702, and MO3-3703 are located in this fire zone and are associated with the shutdown cooling method. The shutdown cooling method would still be available based on the following justification.

MO3-1001-5A MO3-1001-5B	These valves are located 180 apart on opposite sides of the torus. These valves are in separate loops; as stated in Subsection 3.2.1 only one loop is normally used. Therefore, only one of the two valves needs to be opened. They can be handwheel operated. A single fire would not disable mechanical operation of both valves due to the physical separation, low combustible loading, and lack of intervening combustibles. See Fire Hazards Analysis, Subsection 3.5.1 (F.P.R. Volume 1).
MO3-3702 MO3-3703	These valves are normally open and must remain so. The only cables in this zone are from the limit switches and the 480-V power cable. A fault in the limit switch and 480-V power cable cannot cause these valves to change position.

2. Ground Floor (Fire Zone 1.1.1.2)

LPCI Valves MO3-1501-27B and MO3-1501-28B are located in this fire zone and are associated with the LPCI/CCSW method. The LPCI/CCSW method would still be available based on the following justification.

LPCI Valve MO3-1501-27B LPCI Valve MO3-1501-28B	These valves are in the piping to the containment spray header and are not needed for the LPCI cold shutdown system. They are to have an adverse effect on cold shutdown. The simultaneous opening of two normally closed motor-operated valves in series is not credible and is not postulated except in a high-low pressure interface. This is not a high-low pressure interface.

TABLE 4.5-1

COLD SHUTDOWN EQUIPMENT CONTAINED IN THE UNIT 3 REACTOR BUILDING FIRE AREAS RB3-I AND RB3-II

Fire Zone 1.1.1.1

Shutdown Cooling

1. SC Valve MO3-1001-5A
2. SC Valve MO3-1001-5B
3. RBCCW Valve MO3-3702
4. RBCCW Valve MO3-3703

LPCI, Div. II

1. LPCI Valve MO3-1501-22B
2. LPCI Valve MO3-1501-20B
3. LPCI Valve MO3-1501-38B
4. LPCI Valve MO3-1501-18B
5. LPCI Valve MO3-1501-19B
6. LPCI Valve MO3-1501-13B
7. LPCI Valve MO3-1501-32B

Fire Zone 1.1.1.2

Electrical Equipment

1. 480-V MCC 38-1
2. 480-V MCC 39-1
3. 480-V MCC 39-7
4. 480-V MCC 38-7

LPCI, Div. II

1. LPCI Valve MO3-1501-21B
2. LPCI Valve MO3-1501-27B
3. LPCI Valve MO3-1501-28B

TABLE 4.5-1

COLD SHUTDOWN EQUIPMENT CONTAINED IN THE UNIT 3 REACTOR BUILDING FIRE AREAS RB3-I AND RB3-II

Fire Zone 1.1.1.3

Electrical Equipment

1. 4-kV SWGR 33-1
2. 4-kV SWGR 34-1

Shutdown Cooling

1. SC Heat Exchangers 3A-1003, 3B-1003, 3C-1003
2. RBCCW Pumps 3A-3701, 3B-3701
3. RBCCW Heat Exchangers 3A-3702, 3B-3702
4. RBCCW Valve MO3-3701
5. RBCCW Valve MO3-3704
6. Service Water Valve TCV-3-3904A
7. Service Water Valve TCV-3-3904B
8. SC Valve MO3-1001-4A
9. SC Valve MO3-1001-4B
10 SC Valve MO3-1001-4C

Fire Zone - 1.1.1.4

Electrical Equipment

1. 480-V SWGR 38
2. 480-V SWGR 39
3. 250-Vdc Reactor Building MCC 3A
4. 250-Vdc Reactor Building MCC 3B
5. 125-Vdc Reactor Building Distribution Panel 3

Fire Zones 1.1.1.5.A, 1.1.1.5.B, and 1.1.1.5.C

NONE

Fire Zone 1.3.1

Shutdown Cooling

1. SC Pumps 3A-1002, 3B-1002, 3C-1002
2. SC Valves MO3-1001-2A, MO3-1001-2B, MO3-1001-2C

TABLE 4.5-1

COLD SHUTDOWN EQUIPMENT CONTAINED IN THE UNIT 3 REACTOR BUILDING FIRE AREAS RB3-I AND RB3-II

Fire Zone 1.4.1

Electrical Division I Penetrations

Fire Zone - 11.1.1

LPCI, Div. II

1. LPCI Pump 3C-1502
2. LPCI Pump 3D-1502
3. LPCI Emergency Air Cooler 3-5746B
4. LPCI Valve MO3-1501-3B
5. LPCI Valve MO3-1501-5C
6. LPCI Valve MO3-1501-5D
7. LPCI Valve MO3-1501-11B
8. LPCI Valve MO3-1501-32B

Fire Zone 11.1.2

NONE

TABLE 4.5-2

ACTIONS TO ACHIEVE COLD SHUTDOWN IN UNIT 3 USING THE SHUTDOWN COOLING SYSTEM ASSUMING A FIRE IN THE UNIT 3 REACTOR BUILDING

Component	Manual Action/Repair
MECHANICAL EQUIPMENT	
Shutdown Cooling Pumps	
3A-1002 3B-1002 *3C-1002	A temporary cable connection for two pumps to SWGR-23-1 or 24-1 on the Unit 2 side can be is available. (See Subsection 7.4.1 for details.) * Loop C is normally connected to fuel pool cooling.
Shutdown Cooling Valves	
MO3-1001-2A MO3-1001-2B MO3-1001-2C	Disable feed and manually position the valve.
MO3-1001-4A MO3-1001-4B MO3-1001-4C	
MO3-1001-5A MO3-1001-5B	
MO3-1001-1A MO3-1001-1B	A temporary power cable from an operable 480-V MCC to Unit 3 drywell penetration can be provided. A procedure to locally operate valves is available. (See Subsection 7.4.1 for details.)
Recirculation Piping Valves	
MO3-0202-4A MO3-0202-4B	A temporary power cable from an operable 480-V MCC to Unit 3 drywell penetrations can be provided. (See Subsection 7.4.1 for details.)
RBCCW Pumps	
3A-3701 3B-3701	A temporary power cable connection for two pumps to SWGR 23-1 or 24-1 in Unit 2 can be provided. A procedure to start pumps at the SWGR is available. (See Subsection 7.4.1 for details.)
RBCCW Valves	
3A-3701 3B-3701	Disable the feed and manually position the valve.
MO3-3706 MO3-3702 MO3-3703	This valve are normally open for drywell cooling. The drywell cooling function, while important, is not considered essential to cold shutdown. (See Subsection 7.4.1 for details.)

TABLE 4.5-2

ACTIONS TO ACHIEVE COLD SHUTDOWN IN UNIT 3 USING THE SHUTDOWN COOLING SYSTEM ASSUMING A FIRE IN THE UNIT 3 REACTOR BUILDING

Component	Manual Action/Repair
Service Water Pumps	
3A-3901 3B-3901	Unit 2 service water pumps 2A-301, 2B-3901, and 2/3-3901, which are powered from SWGR 23 and 24, are available independent of the Unit 3 reactor building. The normal feed to SWGR 33 and 34 are disabled.
TCV-3-3904A TCV-3-3904B TCV-3-3904C	Spurious operation concern. These valves fail open, which is the position necessary for cold shutdown.
ELECTRICAL EQUIPMENT	
Division I	The 2/3 diesel generator is operable from the 2/3 diesel generator room (Fire Zone 9.0.C, Fire Area RB-2/3). See Subsection 4.5.1, 6.2.3.1, and 6.3.3.2 for the modifications identified in the Hot Shutdown Analysis to ensure this operability. All other Unit 2 Division I components and associated circuits are independent of the Unit 3 reactor building except for the 4-kV Buses 33-1 and 23-1 breaker interlock control cables which can be manually isolated at SWGR.
Division II	All Unit 2 diesel generator and Unit 2 Division II components and associated circuits are independent of the Unit 3 reactor building.
250-Vdc	Primary feed to Unit 3 is from Unit 2, however, a secondary feed can be made from TB 250-Vdc MCC#3. Unit 2 250-V valve can be operated manually.
125-Vdc	Unit 3 motor operators will be temporarily connected to Unit 2 switchgear for power and control via temporary power cable connections as described above. Therefore, no 125-Vdc to Unit 3 is necessary. All Unit 2 125-Vdc is independent of the Unit 3 reactor building.
Process Monitoring Equipment	
RPV Water Temp. Recirc Loop A RPV Water Temp. Recirc Loop B RPV Shell Temperature RPV Flange Temperature	If RPV water, shell and shell flange temperature indicators are not available in the control room, then establish local indication monitoring capability in accordance with cold shutdown repair procedure DSSP-0200-T9.

TABLE 4.5-3

ACTION TO ACHIEVE COLD SHUTDOWN IN UNIT 3 USING THE LPCI/CCSW SYSTEM ASSUMING A FIRE IN THE UNIT 3 REACTOR BUILDING

Component	Manual Action/Repair
MECHANICAL EQUIPMENT	
LPCI Pumps	
3C-1501 3D-1501	A temporary cable connection for the pumps to SWGR 23-1 or 24-1 in Unit 2 can be provided. Procedures to manually start pumps at the SWGR are available. (See Section 7.4.1 for details.)
CCSW Pumps	
3C-1501-44 3D-1501-44	These pumps will be powered by a temporary feed from SWGR 23 and 24 if normal power feed to the pump cannot be established (see Subsection 7.4.1. for details).
LPCI Valves	
MO3-1501-22B MO3-1501-3B	Disable the feed and manually position the valve.
MO3-1501-21B MO3-1501-5C MO3-1501-5D MO3-1501-27B MO3-1501-28B MO3-1501-18B MO3-1501-19B MO3-1501-38B MO3-1501-20B MO3-1501-11B MO3-1501-32B MO3-1501-13B	Of concern in regard to spurious operation only. Disable the feed and manually position the valve.
Target Rock/Electromatic Relief Valves	
3-203-3A 3-203-3B 3-203-3C 3-203-3D 3-203-3E	Temporary 125-Vdc power connection can be provided. Procedures to manually operate these valves are available. (See Section 7.4.1 for details.)
CCSW Pump Coolers	
3-5700-30A 3-5700-30B	A temporary cable connection can be provided to an operable 480-V MCC in Unit 2. Procedures to locally start cooler fans are available. (See Section 7.4.1 for details.)

TABLE 4.5-3

ACTION TO ACHIEVE COLD SHUTDOWN IN UNIT 3 USING THE LPCI/CCSW SYSTEM ASSUMING A FIRE IN THE UNIT 3 REACTOR BUILDING

Component	Manual Action/Repair
LPCI Emergency Air Cooler	
3-5746B	A temporary cable connection can be made to an operable 480-V MCC in Unit 2. Procedures to locally start cooler fans are available. (See Section 7.4.1 for details.)
ELECTRICAL EQUIPMENT	
Division I	The 2/3 diesel generator is operable from the 2/3 diesel generator room (Fire Zone 9.0.C, Fire Area RB-2/3). See Subsections 4.5.1, 6.2.3.1, and 6.3.3.2 for the modifications identified in the Hot Shutdown Analysis to ensure this operability. All other Unit 2 Division I components and associated circuits are independent of the Unit 3 reactor building except for the 4-kV Bus 33-1 and 23-1 breaker interlock control cables which can be manually isolated at SWGR.
Division II	All Unit 2 diesel generators and Unit 2 Division II components and associated circuits are independent of the Unit 3 reactor building.
250-Vdc	Primary feed to Unit 3 is from Unit 2, however, a secondary feed can be made from TB 250-Vdc MCC#3. Unit 2 250-V valve can be operated manually.
125-Vdc	Unit 3 motor operators will be temporarily connected to Unit 2 switchgear for power and control via temporary power cable connection as described above. Therefore, no 125-Vdc is necessary. All Unit 2 125-Vdc is independent of the Unit 3 reactor building.
Process Monitoring Equipment	
RPV Water Temp. Recirc Loop A RPV Water Temp. Recirc Loop B RPV Shell Temperature RPV Flange Temperature	If RPV water, shell and shell flange temperature indicators are not available in the control room, then establish local indication monitoring capability in accordance with cold shutdown repair procedure DSSP-0200-T9.

4.6 Unit 3 Primary Containment (Fire Area 1.2.1)

Safe shutdown equipment and cabling located in this fire area are shown on Drawings F-3 through F-6.

4.6.1 Hot Shutdown Analysis

The Unit 3 primary containment (Area 1.2.1) is separated from the rest of the reactor building by a 3-hour rated fire barrier. The primary containment is inerted, thus, a fire cannot start and a safe shutdown can be achieved and maintained using any of the shutdown methods.

4.6.2 Cold Shutdown Analysis

The Technical Specifications require that the drywell be inerted during normal reactor operation. Therefore, no fire is postulated. The mechanical equipment associated with cold shutdown located in the drywell is identified in Table 4.3-1.

4.7 2/3 Diesel Generator and HPCI Rooms (Fire Area RB-2/3)

Safe shutdown equipment and cabling located in this fire area are shown on Drawings F-2 (Fire Zones 11.1.3 and 11.2.3) and F-3 (Fire Zone 9.0.C).

4.7.1 Hot Shutdown Analysis

For a fire in Fire Area RB-2/3, which contains the 2/3 diesel generator room and the Unit 2 and Unit 3 HPCI rooms, isolation condenser shutdown paths E and F (Tables 3.1-10 and 3.1-11) will be used to shut down Units 2 and 3, respectively. Unit 2 and 3 diesel generators are used to power essential equipment. Control rod drive pumps 2B and 3B are available for reactor water makeup. The electromatic relief valves are available for initial pressure control, if necessary. Both isolation condenser makeup pumps are available for makeup to the isolation condenser. Service water pump 2B or 3B is available for cooling the CRD pumps and for makeup to the isolation condensers if long-term operation is necessary.

All necessary equipment may be operated from the control room. Local instrumentation is used for monitoring Reactor Pressure and Reactor Water level. This area contains no essential or associated cables for shutdown methods E and F except for cables associated with the alternate feeds to the isolation condenser inboard valves. Since the controls for the alternate feeds are located in the 2/3 diesel generator room, the valves may be spuriously closed. To defeat this possibility, the isolation switch in Fire Zones 1.3.2 and 1.4.1 must be manually switched to the isolation position so that control is retained in the control room. In addition, the Division I switchgear 28(38) must be tied to the Division II switchgear 29(39) to ensure power to the inboard valves (Division I) and the dedicated diesel generator auxiliaries (Division II) simultaneously.

4.7.2 Cold Shutdown Analysis

The shutdown cooling method of cold shutdown is available independent of this fire zone. As seen on Table 4.7-1, only equipment associated with the 2/3 diesel generator is located in this zone. The Unit 2 and Unit 3 diesel generators are available and are independent of this zone.

TABLE 4.7-1
COLD SHUTDOWN EQUIPMENT CONTAINED IN FIRE AREA RB-2/3

Fire Zone - 9.0.C

Cold Shutdown Equipment Contained in the Fire Zone:

1. 2/3 Diesel Generator 2/3-5210
2. 2/3 Diesel Generator Supply Fan 2/3-5790
3. 2/3 Diesel Generator Fuel Oil Transfer Pump 2/3-5303

Fire Zone 11.1.3 NONE

Fire Zone 11.2.3 NONE

4.8 Turbine Building Eastern Zone Group (Fire Area TB-I)

Safe shutdown equipment and cabling located in these fire areas are shown on Drawings F-8 (Fire Zones 7.0.A, 8.2.5.A, 8.2.6.A, and 8.2.7), F-9 (Fire Zones 8.2.1.A and 8.2.2.A), F-10 (Fire Zones 8.1, 8.2.5.A, 8.2.5.B, and 9.0.A), and F-13 (Fire Zones 8.2.6.A and 8.2.6.B).

4.8.1 Hot Shutdown Analysis

For a fire in TB-I, the Eastern Zone Group of the turbine building, isolation condenser path B1 (Table 3.1-7) can be used to shut down Unit 2. Cable discrepancies in this zone group are associated with Unit 2 4-kV, 480-V, 250-Vdc, and 125-Vdc power. Also, the 4-kV switchgears 23 and 24, 480-V MCC's 25-2, 26-1, 28-2, 28-3, and 29-2, and the Unit 2 125-Vdc turbine building main and reserve buses are located in this area. Additional control cable discrepancies are associated with Unit 3. These cables originate in the control room and are in risers that pass outside of the control room and AEER to the Unit 3 cable tunnel. They are associated with the controls to breakers associated 4-kV Switchgear 33, 4-KV Switchgear 33-1, and 480-V Switchgear 38. The risers and pull boxes containing these cables are provided with 1-hour fire wraps. In addition, the area in the vicinity of the risers has suppression and detection systems installed. Therefore, the 2/3 diesel generator is used to power essential equipment via the Unit 3 power train. Control rod drive pump 3A is available for reactor water makeup via a mechanical crosstie. The electromatic relief valves may not be available for initial pressure control but the target rock valve and safety valves are available if necessary. Makeup to the isolation condenser is available from both isolation condenser makeup pumps. Service water pump 3A is available for cooling the CRD pump and for makeup to the isolation condenser if a long-term operation of the isolation condenser is necessary. Local instruments can be used to monitor reactor conditions.

The necessary control rod drive pump and service water pump are powered from Unit 3 and are available to support Unit 2 shutdown through mechanical crossties. The isolation condenser makeup pumps can be operated locally from panels 2223-126A and 2223-126B located in fire zones 18.7.1.and 18.7.2. All cables routed in this zone group that could affect control and excitation of the 2/3 diesel generator and its auxiliaries were isolated in the diesel generator room to permit local starting and operation (see Subsection 6.2.3). Redundant 125-Vdc control power is available from Unit 3. Redundant power feeds to the 2/3 diesel generator auxiliaries (room ventilation fan and fuel oil transfer pump) are available from Unit 3. Local controls have been installed to isolate these feeds from possible spurious signals which might be a result of a fire in RB2-II (see Subsection 6.2.3.1). All isolation condenser valves are located in the reactor building and are accessible for manual operation except valves MO2-1301-1 and MO2-1301-4 which are located in the drywell. Since a fire in TB-I would affect the Unit 2 power train and control cable to all isolation condenser valves, alternate power feeds to the inaccessible valves have been installed independent of this zone group to ensure that the valves will be open as required for safe shutdown. The routing of these new cables is discussed in Subsection 6.2.1.4. The normal access to valves MO2-1301-2 and MO2-1301-3, located in the isolation condenser pipe chase (RB2-I), is through the fire doors to the pipe chase at 41/M on both the 545-foot-6-inch elevation and the 570-foot 0-inch elevation. Access to the pipe chase is also available from Elevation 589 feet 0 inches in Fire Area RB2-I. Intervening grating has been cut and access ladders and platforms provided to ensure that these valves may be manually operated in the event of a fire in this area (see Subsection 6.2.1.6). Vent valves AO2-1307-17 and AO2-1301-20 fail in the closed

position. In the event these valves fail to close, manual valve 2-1301-16 may be closed to isolate the line. Manual operation of valves MO2-4399-74 or MO2-4102 and MO2-1301-10 may be required to add make up water to the isolation condenser.

The Unit 2 fuel oil transfer pump is located in this fire area and could potentially be affected by a fire in this area. If isolation condenser makeup is required for longer than 8 hours after shutdown is initiated, the diesel oil day tanks for the isolation condenser makeup pumps can be manually filled.

If one of the diesel makeup pumps runs out of fuel, the other pump may be started to provide makeup water.

Associated cables routed in this zone include LPCI circuits, core spray circuits, primary containment isolation circuits, process radiation monitoring circuits, and main steam isolation circuits. The LPCI and core spray circuitry is associated with the 4-kV power distribution. However, since the Unit 3 power train is used for this zone, faults on these circuits will not affect safe shutdown. The primary containment isolation, process radiation monitoring and main steam isolation circuits are associated with isolation condenser valves. However, the drywell valves will be controlled from an alternate location by isolating the automatic circuitry and the power train to the remaining valves will be deenergized and the valves operated manually. Therefore, faults on the associated circuitry will not prevent safe shutdown. Spurious auto blowdown initiation is prevented by manual operation of the ADS Auto-blowdown Inhibit Switch. This switch is installed at the MCB (See Subsection 6.2.1.8). Spurious operation of the individual relief valves is prevented by placing the handswitch of the Electromatic Relief Valves (ERV's) and the Target Rock Safety/Relief valve control switches in the "OFF" position and by removing power to these valves by pulling the fuses at auxiliary equipment room panel 902-32.

Cable discrepancies within TB-I and their resolutions are presented in Appendix A.

4.8.2 Cold Shutdown Analysis

The shutdown cooling system is available for shutting down Unit 2 as a result of a fire in any of the zones within the Eastern Zone Group. As seen on Table 4.8-1, no mechanical equipment associated with the shutdown cooling method is located in this zone group.

A significant amount of cable and electrical equipment is located in this area as seen on the drawings listed below:

Fire Zone	F Series Drawings
7.0.A	F-8
8.1	F-10
8.2.1.A	F-9
8.2.2.A	F-9
8.2.5.A	F-8, F-10
8.2.5.B	F-10
8.2.6.A	F-8, F-13
8.2.6.B	F-13
8.2.7	F-8
9.0.A	F-10

Table 4.8-2 lists the repairs necessary to establish onsite power and to establish operability of Unit 2 shutdown cooling method equipment. Both the 2/3 diesel generator and the Unit 3 diesel generator can be made operable.

TABLE 4.8-1
COLD SHUTDOWN EQUIPMENT CONTAINED IN FIRE AREA TB-I

Fire Zone 7.0.A.1

Electrical Equipment

1. 125-V Battery Charger 2
2. 125-V Battery Charger 2A
3. Turbine Building 125-Vdc Main Bus 2
4. Battery Charger 2/3
5. Turbine Building 250-Vdc MCC 2
6. 250-V Battery Charger 2
7. Turbine Building 125-V Reserve Bus 2

Fire Zone 7.0.A.2

Electrical Equipment

1. 125-V Batteries

Fire Zone 7.0.A.3

Electrical Equipment

1. 250-V Batteries

Fire Zone 8.2.1.A

NONE

Fire Zone 8.2.2.A

LPCI Div. II

1. CCSW Pump 2C-1501-44
2. CCSW Pump 2D-1501-44
3. CCSW Pump Cooler 2-5700-30C
4. CCSW Pump Cooler 2-5700-30D

Fire Zone 8.2.5.A

Electrical Equipment

1. MCC 29-2

TABLE 4.8-1
COLD SHUTDOWN EQUIPMENT CONTAINED IN FIRE AREA TB-I

Fire Zone 8.2.5.B

NONE

Fire Zone - 8.2.6.A

Electrical Equipment

1. 480-V MCC 28-2
2. 4-kV SWGR 23
3. 4-kV SWGR 24
4. 480-V MCC 28-3

Fire Zone 8.2.6.B

NONE

Fire Zone 8.2.7

NONE

Fire Zone 9.0.A

Electrical Equipment

1. Unit 2 Diesel Generator 2-5210
2. Unit 2 Diesel Generator Supply Fan 2-5790
3. Unit 2 Diesel Generator Fuel Oil Transfer Pump 2-5203

TABLE 4.8-2

ACTIONS TO ACHIEVE COLD SHUTDOWN IN UNIT 2 USING THE SHUTDOWN COOLING SYSTEM ASSUMING A FIRE IN FIRE AREA TB-I

Component	Manual Action/Repair
MECHANICAL EQUIPMENT	
Shutdown Cooling Pumps	
2A-1002 2B-1002 2C-1002	These pumps can be powered from SWGR 23-1 and 24-1. Division I and Division II power is available as described below. Procedures are available to locally operate the necessary breakers. (See Subsection 7.4.1 for details.)
Shutdown Cooling Valve	
MO2-1001-2A MO2-1001-2B MO2-1001-2C MO2-1001-4A MO2-1001-4B MO2-1001-4C MO2-1001-5A MO2-1001-5B	Disable the feed and manually position the valve.
MO2-1001-1A MO2-1001-1B	Procedures are available to make repairs to isolate existing control circuits and operate the valves locally at the MCC. (See Subsection 7.4.1 for details.)
Recirculation Piping Valves	
MO2-0202-4A MO2-0202-4B MO2-0202-5A MO2-0202-5B	Procedures are available to make repairs to isolate existing control circuits and locally operate the valves at the MCC. Power is available to Division I and Division II MCC's as described below. (See Subsection 7.4.1 for details.)
RBCCW Pumps	
2A-3701 2B-3701	These pumps can be powered from SWGR 23-1 and 24-1. Division I and Division II power is available as described below. Procedures are available to locally operate the necessary breakers. (See Subsection 7.4.1 for details.)
RBCCW Valves	
MO2-3701 MO2-3704	Disable the feed and manually position the valve.

TABLE 4.8-2

ACTIONS TO ACHIEVE COLD SHUTDOWN IN UNIT 2 USING THE SHUTDOWN COOLING SYSTEM ASSUMING A FIRE IN FIRE AREA TB-I

Component	Manual Action/Repair
MO2-3702 MO2-3703 MO2-3706	Spurious operation concern only. Procedures are available to isolate existing control circuits and operate at MCC.
Service Water Pumps	
2A-3901 2B-3901 2/3-3901	The power and control to the two Unit 3 service water pumps are unaffected by the fire.
TCV-2-3904A TCV-2-3904B TCV-2-3904C	Spurious operation concern only. These valves fail in the open position.
ELECTRICAL EQUIPMENT	
Division I ac Power System	Control and operation of the 2/3 diesel generator is ensured in the hot shutdown analysis for TB-I. All 2/3 diesel generator components and auxiliaries and SWGR breakers have isolation and manual control capability installed. (See Subsections 4.8.1 and 6.2.3.1.) 125-Vdc control power can be established as discussed below. Procedures exist to ensure the availability of Division I ac power.
Division II ac Power System	Unit 2 diesel generator and its auxiliaries may not be operable. However, Division II power can be provided to Unit 2 via the crosstie between SWGR 34-1 and 24-1. Procedures are available to establish the crosstie between SWGR 34-1 and 24-1. Unit 3 Division II power is available independent of Unit 2 Eastern Zone Group (TB-I) except for the following associated cables. 125-Vdc control power to 4-kV and 480-V SWGR can be established as discussed below. Procedures exist to ensure the availability of Division II ac Power.
Division I 125-Vdc Control Power System	A temporary 125-V power cable connection must be from unit 3 reactor building 125-V distribution panel 3 to the Unit 2 reactor building 125-V distribution panel 2 to establish control power to SWGR 23-1, 24-1, 28 and 29. A procedure is available to ensure the availability of 125-Vdc power to Unit 3.

TABLE 4.8-2

ACTIONS TO ACHIEVE COLD SHUTDOWN IN UNIT 2 USING THE SHUTDOWN COOLING SYSTEM ASSUMING A FIRE IN FIRE AREA TB-I

Component	Manual Action/Repair
250-Vdc Power System	A fire in the Eastern Zone Group could disable normal 250-Vdc power to both Units 2&3. A procedure is available to establish reserve feed to Unit 3. (See Subsection 7.4.1) Unit 2 250-Vdc power-oriented valves have handwheel operation capability.
Process Monitoring Equipment	
RPV Water Temp. Recirc Loop A RPV Water Temp. Recirc Loop B RPV Shell Temperature RPV Flange Temperature	If RPV water, shell and shell flange temperature indicators are not available in the control room, then establish local indication monitoring capability in accordance with cold shutdown repair procedure DSSP-0200-T9.

4.9 Turbine Building Central Zone Group (Fire Area TB-II)

Safe shutdown equipment and cabling located in this fire area are shown on Drawings F-10 (Fire Zone 8.2.5.C), F-11 (Fire Zone 8.2.5.C), F-13 (Fire Zone 8.2.6.C) and F-14 (Fire Zone 8.2.6.C).

4.9.1 Hot Shutdown Analysis

For a fire in TB-II, the Central Zone Group, shutdown of Units 2 and 3 can be accomplished with shutdown paths A2 and B2 (Tables 3.1-5 and 3.1-8) which utilize Unit 2 and 3 equipment and are powered by the 2/3 diesel generator.

Cable discrepancies in this zone group include cables associated with Unit 2 480-Vac power, 2/3 diesel generator control metering and excitation, 2/3 diesel generator room supply fan and 2/3 diesel generator cooling water pump. Unit 3 cable discrepancies include cable associated with 4-kV, 480-V and 125-Vdc power. However, the required circuit breakers can be isolated by existing isolation switches at the switchgear to prevent spurious signal that may result from a fire in the control cables. The switchgear can then be operated locally, if necessary. (See Subsections 6.2.1.2 and 6.2.2.2.) Transfer switches in 2/3 diesel generator auxiliary power feed cable prevent a fault in Unit 2 cable from affecting the Unit 3 feed. The 2/3 diesel generator can be started and controlled locally in Fire Zone 9.0.C (see Subsection 6.2.3.1). The Unit 3 feeds to the 2/3 diesel generator auxiliaries are protected by a 1-hour barrier and automatic suppression and detection in Fire Area TB-II and will be available to provide power to the auxiliaries for a fire in this area. (See Subsection 6.3.4.4.)

The electromatic relief valves may not be available for initial pressure control but the target rock valve and safety valves are available if necessary. Control rod drive pumps 2A and 3A are available for reactor water makeup. Both isolation condenser makeup pumps are available for makeup to the isolation condenser. Service water pump 2A (or 3A not required/credited) is available for cooling the CRD pumps and for makeup to the isolation condensers if long term operation is necessary. The control rod drive pump can be operated from the control room. Reactor pressure and level can be monitored through local indicators in the reactor building.

The 2/3 diesel generator feed breaker control logic has been modified to allow the operator to supply power to both Units Division I swtichgear 23-1 and 33-1 simultaneously by manually overriding the unit selection logic (see Subsection 6.2.3.2.6).

Control cables for isolation condenser valves MO2(3)-1301-2, MO2(3)-1301-3, MO2(3)-1301-10, and MO2(3)-4102 are located in this fire area. All of these valves are located in the reactor building and are accessible for manual operation. The normal access to valves MO2(3)-1301-2 and MO2(3)-1301-3, located in the isolation condenser pipe chase (RB2(3)-I), is through the fire doors to the pipe chase at 41/M (47/M for Unit 3) on both the 545-foot 6-inch elevation and 570-foot 0-inch elevation. Access to the pipe chase is also available from Elevation 589 feet 0 inches in Fire Area RB2(3)-I. Intervening grating has been cut and access ladders and platforms provided to ensure that these valves may be manually operated in the event of a fire in this area (see Subsections 6.2.1.6 and 6.2.2.6). Cables for valves MO3-1301-1 and MO3-1301-4 are located in this fire area. These valves are in the drywell and are not accessible for manual operation. However, alternate feeds have been installed to these valves independent of this fire

area. These feeds, operated from Fire Zone 9.0.C, can be used to open the inboard valves in the event that faults on the cables in TB-II cause them to spuriously close (see Subsection 6.2.3.1.6). Vent valves AO3-1301-17 and AO3-1301-20 fail in the closed position as required for safe shutdown. In the event that they fail to close, manual valve 3-1301-16 may be locally closed to isolate this line. Manual operation of valves MO2-4399-74, MO3-4399-74, MO2-4102, MO2-1301-10, MO3-4102 and MO3-1301-10 may be required to add makeup feedwater to the isolation condensers. Power and control cables for CRD Pump Discharge Valve MO2-0301-2B are located in this fire area. This valve is located in Fire Zone 8.2.2.A and available for manual operation if required.

Cables from 480V Bus 29 which energize 480V MCC 29-2 are routed through this fire area. A fire in this area could potentially affect these cables rendering the Unit 2 fuel oil transfer pump inoperable. If isolation condenser makeup is required at times greater than 8 hours after shutdown is initiated, the diesel oil day tanks for the isolation condenser makeup pumps can be manually refilled.

If one of the diesel makeup pumps runs out of fuel, the other pump may be started to provide makeup water.

The control cable for breakers feeding 480-V MCC 38-1 and 38-4 is located in this area. This control switch has been moved to Fire Area RB2/3 and the cable in the turbine building is no longer used (see Subsection 6.2.3.1.3).

Associated cables routed in this zone include Unit 2 and Unit 3 LPCI circuits, core spray circuits, primary containment isolation circuits, process radiation monitoring circuits, and main steam isolation circuits. The LPCI and core spray circuitry is associated with the 4-kV power distribution. However, since local control and isolation capability is provided, faults on these circuits will not affect safe shutdown (see Subsections 6.2.1.1 and 6.2.2.2). The primary containment isolation, process radiation monitoring, and main steam isolation circuits are associated with isolation condenser valves. However, the drywell valves will be controlled from an alternate location by isolating the automatic circuitry and the power train to the remaining valves will be deenergized and the valves operated manually. Therefore, faults on the associated circuitry will not prevent safe shutdown.

Cable discrepancies in Fire Area TB-II and their resolutions are presented in Appendix A.

4.9.2 Cold Shutdown Analysis

The shutdown cooling system is available for shutting down both units as a result of a fire in any of the zones within the Central Zone Group. As seen in Table 4.9-1, no mechanical equipment associated with the shutdown cooling method is located in this zone group. However, MCC 39-2 and a significant amount of cable and electrical equipment are located in this zone group as seen on the drawings listed below:

Fire Zone	F Series Drawings
8.2.5.C	F-10, F-11
8.2.6.C	F-13, F-14

The repairs necessary to establish operability of both Unit 2 and Unit 3 shutdown cooling equipment are listed in Table 4.9-2. The presence of MCC 39-2 which feeds the Unit 3 diesel generator auxiliaries precludes using the Unit 3 diesel generator as an onsite power source. However, Table 4.9-2 indicates that both the 2/3 diesel generator and the Unit 2 diesel generator can be made operable.

TABLE 4.9-1

COLD SHUTDOWN EQUIPMENT CONTAINED IN FIRE AREA TB-II

Fire Zone 8.2.5.C

NONE

Fire Zone 8.2.6.C

Electrical Equipment

1. 480-V MCC 39-2

TABLE 4.9-2

ACTION TO ACHIEVE COLD SHUTDOWN IN UNITS 2 AND 3 USING THE SHUTDOWN COOLING SYSTEM ASSUMING A FIRE IN FIRE AREA TB-II

Component	Manual Action/Repair
UNIT 2 MECHANICAL EQUIPMENT	
Shutdown Cooling Pumps	
2A-1002 2B-1002 2C-1002	These pumps can be powered from SWGR 23-1 and 24-1. Division I and Division II power is available as described below. Procedures are available to locally operate the necessary breakers. (See Subsection 7.4.1 for details.)
Shutdown Cooling Valve	
MO2-1001-2A MO2-1001-2B MO2-1001-2C MO2-1001-4A MO2-1001-4B MO2-1001-4C MO2-1001-5A MO2-1001-5B	Disable the feed and manually position the valve.
MO2-1001-1A MO2-1001-1B	Procedures are available to make repairs to isolate existing control circuits and operate the valves locally at the MCC. (See Subsection 7.4.1 for details.)
Recirculation Piping Valves	
MO2-0202-4A MO2-0202-4B MO2-0202-5A MO2-0202-5B	Procedures are available to make repairs to isolate existing control circuits and locally operate the valves at the MCC. Power is available to Division I and Division II MCC's as described below. (See Subsection 7.4.1 for details.)
UNIT 3 MECHANICAL EQUIPMENT	
Shutdown Cooling Pumps	
3A-1002 3B-1002 3C-1002	These pumps can be powered from SWGR 33-1 and 34.1. Division I and Division II power is available as described below. Procedures are available to locally operate the necessary breakers. (See Subsection 7.4.1 for details.)

TABLE 4.9-2

ACTION TO ACHIEVE COLD SHUTDOWN IN UNITS 2 AND 3 USING THE SHUTDOWN COOLING SYSTEM ASSUMING A FIRE IN FIRE AREA TB-II

Component	Manual Action/Repair
Shutdown Cooling Valves	
MO3-1001-2A MO3-1001-2B MO3-1001-2C	Disable the feed and manually position the valve.
MO3-1001-4A MO3-1001-4B MO3-1001-4C	
MO3-1001-5A MO3-1001-5B	
Shutdown Cooling Valves	
MO3-1001-1A MO3-1001-1B	Procedures are available to make repairs to isolate existing control circuits and operate the valves locally at the MCC. (See Subsection 7.4.1 for details.)
Recirculation Piping Valves	
MO3-0202-4A MO3-0202-4B MO3-0202-5A MO3-0202-5B	Procedures are available to make repairs to isolate existing control circuits and locally operate the valves at the MCC. (See Subsection 7.4.1 for details.)
RBCCW Pumps	
3A-3701 3B-3701	These pumps can be powered from SWGR 33-1 and 34-1. Division I and Division II power is available as described below. Procedures are available to locally operate the necessary breakers. (See Subsection 7.4.1 for details.)
RBCCW Valves	
MO3-3701 MO3-3704	Disable the feed and manually position the valve.
MO3-3702 MO3-3703 MO3-3706	Spurious operation concern only. Procedures are available to isolate existing control circuits and operate at the MCC.

TABLE 4.9-2

ACTION TO ACHIEVE COLD SHUTDOWN IN UNITS 2 AND 3 USING THE SHUTDOWN COOLING SYSTEM ASSUMING A FIRE IN FIRE AREA TB-II

Component	Manual Action/Repair
Service Water Pumps 3A-3901 3B-3901 TCV-3-3904A TCV-3-3904B TCV-3-3904C	Power and control to Unit 2 Service Water Pumps are unaffected by the fire. NOTE: Pump 3A-3901 is available (not required/credited) due to modifications provided to ensure hot shutdown capability. (See Subsections 4.9.1, 6.2.2.2, 6.2.3.1, and 6.3.4.4.) Spurious operation concern only. These valves fail in the open position, which is the position necessary for cold shutdown.
UNITS 2&3 ELECTRICAL EQUIPMENT	
Division I ac Power System (Unit 3)	All 2/3 diesel generator components and auxiliaries and Division I SWGR breakers have isolation and manual control capabilities installed. Protection including 1-hour wrap and suppression and detection is provided to all Unit 3 Division I cables in this fire area except for control cable 31561 which controls breaker 252-385 A and MCC 38-7. (See Subsections 4.9.1, 6.2.2.2, 6.2.3.1, and 6.3.4.4.) Procedures are available to isolate these circuits and locally control the breakers. 125-Vdc breaker control power is available as described below. Procedures exist to ensure the availability of Division I ac power.
Division II ac Power System (Unit 2)	Procedures exist to ensure the availability of Division II ac power where required.
125-Vdc Control Power System	Procedures exist to ensure the availability of 125-Vdc power where required.

TABLE 4.9-2

ACTION TO ACHIEVE COLD SHUTDOWN IN UNITS 2 AND 3 USING THE SHUTDOWN COOLING SYSTEM ASSUMING A FIRE IN FIRE AREA TB-II

Component	Manual Action/Repair
250-Vdc Power System	A fire in the Central Zone Group could disable normal 250-V power to both Units 2 and 3. 250-Vdc to Units 2 RX Building 250-V MCC 2 can be established by closing the reserve feed breaker from TB 250-V MCC 2 to RB 250-Vdc MCC 2A until the battery is depleted because cables to both battery chargers could be affected. 250-Vdc to Unit 3 RX Building 250-Vdc MCC 3 can be established by closing the reserve feed breaker from TB 250-Vdc to Unit 3 RX Building 250-Vdc MCC 3 can be established by closing the reserve feed breaker from TB 250-Vdc MCC 3 to RB 250-Vdc MCC 3A.
Process Monitoring Equipment	
RPV Water Temp. Recirc Loop A RPV Water Temp. Recirc Loop B RPV Shell Temperature RPV Flange Temperature	If RPV water, shell and shell flange temperature indicators are not available in the control room, then establish local indication monitoring capability in accordance with cold shutdown repair procedure DSSP-0200-T9.

4.10 Turbine Building Western Zone Group (Fire Area TB-III)

Safe shutdown equipment and cabling located in this fire area are shown on Drawings F-9 (Fire Zones 8.2.1.B and 8.2.2.B), F-11 (Fire Zones 8.2.5.D, 8.2.5.E and 9.0.B), F-12 (Fire Zone 8.2.4) and F-14 (Fire Zones 6.1, 7.0.B, 8.2.6.D and 8.2.6.E).

4.10.1 Hot Shutdown Analysis

For a fire in TB-III, the Western Zone Group of the turbine building, isolation condenser path A1 (Table 3.1-4) can be used to shut down Unit 3. Cable discrepancies in this area are associated with Unit 3 4-kV, 480-V, 250-Vdc, and 125-Vdc power. Also, the 4-kV switchgears 33 and 34, 480 MCC's 35-2, 36-1, 38-2 and 38-3, and Unit 3 125-Vdc turbine building main and reserve buses are located in this area. Therefore, the 2/3 diesel generator is used to power essential equipment via the Unit 2 power train. Control rod drive pump 2A is available for reactor water makeup via a mechanical crosstie. The electromatic relief valves may not be available for initial pressure control but the target rock valve and safety valves are available if necessary. Makeup to the isolation condenser is available from both isolation condenser makeup pumps. Service water pump 2A is available for cooling the CRD pump and for makeup to the isolation condenser if a long-term operation of the isolation condenser is necessary. Local instruments can be used to monitor reactor conditions.

The necessary control rod drive pump and service water pump are powered from Unit 2 and are available to support Unit 3 shutdown through mechanical crossties. All cables routed in this zone group that could affect control and excitation of the 2/3 diesel generator and its auxiliaries were isolated in the diesel generator room to permit local starting and operation (see Subsection 6.2.3.1). Redundant 125-Vdc control power is available from Unit 3. Redundant power feeds to the 2/3 diesel generator auxiliaries (room ventilation fan and fuel oil transfer pump) are available from Unit 2. Local controls have been installed to isolate these feeds from possible spurious signals which might be a result of a fire in this area (see Subsection 6.2.3.1).

All isolation condenser valves are located in the reactor building and are accessible for manual operation except valves MO3-130-1and MO3-1301-4 which are located in the drywell. Since a fire in TB-II would affect the Unit 3 power train and control cable to all isolation condenser valves, alternate power feeds to these valves have been installed independent of this zone group to ensure that the valves will be open as required for safe shutdown. The routing of these new cables is discussed in Subsection 6.2.2.4. The normal access to valves MO3-1301-2 and MO3-1301-3, located in the isolation condenser pipe chase (RB3-I), is through the fire doors located at roughly 47/M on both the 545-foot 6-inch elevation and the 570-foot 0-inch elevation. Access to the pipe chase is also available from the 589-foot 0-inch elevation in Fire Area RB3-I. Intervening grating has been cut and access ladders and platforms provided to ensure that these valves may be manually operated in the event of a fire in this area (see Subsection 6.2.2.6). Vent valves AO3-1301-17 and AO3-1301-20 fail in the closed position. In the event these valves fail to close, manual valve 3-1301-16 may be closed to isolate the line. Manual operation of valves MO3-4399-74 or MO3-4102 and MO3-1301-10 may be required to add makeup water to the isolation condenser.

Associated cables routed in this zone include LPCI circuits, core spray circuits, primary

containment isolation circuits, process radiation monitoring circuits, and main steam isolation circuits. The LPCI and core spray circuitry is associated with the 4-kV power distribution. However, since the Unit 2 power train is used for this zone, faults on these circuits will not affect safe shutdown. The primary containment isolation, process radiation monitoring, and main steam isolation circuits are associated with isolation condenser valves. However, the drywell valves will be controlled from the alternate power source by isolating the automatic circuitry and the power train to the remaining valves will be deenergized and the valves operated manually. Therefore, faults on the associated circuitry will not prevent safe shutdown. Spurious auto blowdown initiation is prevented by manual operation of the ADS Auto-blowdown Inhibit Switch installed at the MCB (see Subsection 6.2.2.8) and spurious operation of the individual relief valves is prevented by placing the handswitch of the Electromatic Relief Valves (ERV's) and the Target Rock Safety/Relief valve control switches in the "OFF" position and by removing power to these valves by pulling fuses at Panel 2203-32.

Cable discrepancies within TB-III and their resolutions are presented in Appendix A.

4.10.2 Cold Shutdown Analysis

The shutdown cooling system is available for shutting down Unit 3 as a result of a fire in any of the zones within the Western Zone Group. As seen in Table 4.10.1, no mechanical equipment associated with the shutdown cooling method is located in this zone group.

However, a significant amount of cable and electrical equipment is located in this area as seen on the drawings listed below:

Fire Zone	F Series Drawings
6.1	F-14
7.0.B	F-14
8.2.1.B	F-9
8.2.4	F-12
8.2.5.D	F-11
8.2.5.E	F-11
8.2.6.D	F-14
8.2.6.E	F-14
9.0.B	F-11

Table 4.10-2 lists the repairs necessary to establish onsite power and to establish operability of Unit 3 shutdown cooling method equipment. Both the 2/3 diesel generator and the Unit 2 diesel generator can be made operable.

TABLE 4.10-1

COLD SHUTDOWN EQUIPMENT IN THE WESTERN ZONE GROUP

Fire Zone 6.1

Electrical Equipment

1. 125-V Battery Charger 3
2. 125-V Battery Charger 3A
3. Turbine Building 125-Vdc Main Bus 3
4. Turbine Building 125-V Reserve Bus 3
5. 250-Vdc Battery Charger 3
6. Turbine Building 250 MCC 3

Fire Zone 7.0.B

Electrical Equipment

1. 125-V Batteries
2. 250-V Batteries

Fire Zone 8.2.1.B

NONE

Fire Zone 8.2.2.B

LPCI, Div. II

1. CCSW Pump 3C-1501-44
2. CCSW Pump 3D-1501-44
3. CCSW Pump Cooler 3-5700-30C
4. CCSW Pump Cooler 3-5700-30D

Fire Zone 8.2.4

NONE

Fire Zone 8.2.5.D

NONE

Fire Zone 8.2.5.E

NONE

TABLE 4.10-1

COLD SHUTDOWN EQUIPMENT IN THE WESTERN ZONE GROUP

Fire Zone 8.2.6.D

NONE

Fire Zone 8.2.6.E

Electrical Equipment

1. 480-V MCC 38-3
2. 480-V MCC 38-2
3. 4-kV SWGR 33
4. 4-kV SWGR 34

Fire Zone 9.0.B

Electrical Equipment

1. Unit 3 Diesel Generator 3-5210
2. Unit 3 Diesel Generator Supply Fan 3-5790
3. Unit 3 Diesel Generator Fuel Oil Transfer Pump 3-503

TABLE 4.10-2

ACTIONS TO ACHIEVE COLD SHUTDOWN IN UNIT 3 USING THE SHUTDOWN COOLING SYSTEM ASSUMING A FIRE IN FIRE AREA TB-III

Component	Manual Action/Repair
MECHANICAL EQUIPMENT	
Shutdown Cooling Pumps	
3A-1002 3B-1002 3C-1002	These pumps can be powered from SWGR 33-1 and 34-1. Division I and Division II power is available as described below. Procedures are available to locally operate the necessary breakers. (See Subsection 7.4.1 for details.)
Shutdown Cooling Valves	
MO3-1001-2A MO3-1001-2B MO3-1001-2C MO3-1001-4A MO3-1001-4B MO3-1001-4C MO3-1001-5A MO3-1001-5B	Disable the feed and manually position the valve.
MO3-1001-1A MO3-1001-1B	Procedures are available to make repairs to isolate existing control circuits and operate the valves locally at the MCC. (See Subsection 7.4.1 for details.)
Recirculation Piping Valves	
MO3-0202-4A MO3-0202-4B MO3-0202-5A MO3-0202-5B	Procedures are available to make repairs to isolate existing control circuits and locally operate the valves at the MCC. (See Subsection 7.4.1 for details.)
RBCCW Pumps	
3A-3701 3B-3701	These pumps can be powered from SWGR 33-1 and 34-1. Division I and Division II power is available as described below. Procedures are available to locally operate the necessary breakers. (See Subsection 7.4.1 for details.)
RBCCW Valves	
MO3-3701 MO3-3704	Disable the feed and manually position the valves.

TABLE 4.10-2

ACTIONS TO ACHIEVE COLD SHUTDOWN IN UNIT 3 USING THE SHUTDOWN COOLING SYSTEM ASSUMING A FIRE IN FIRE AREA TB-III

Component	Manual Action/Repair
MO3-3702 MO3-3703 MO3-3706	Spurious operation concern only.
Service Water Pumps	
3A-3901 3B-3901	The power and control to the two Unit 2 service water pumps are unaffected by the fire.
TCV-3-3904A TCV-3-3904B TCV-3-3904C	Spurious operation concern only. These valves fail in the open position which is the position necessary for cold shutdown.
ELECTRICAL EQUIPMENT	
Division I ac Power System	All 2/3 diesel generator components and auxiliaries and Division I SWGR breakers have isolation and manual control capability installed. (See Subsections 4.10.1 and 6.2.3.1.) Power to these components via Unit 2 is still available. 125-Vdc DC control power to 4-kV and 480-V SWGR is available as discussed below.
Division II ac Power System	The Unit 3 diesel generator and auxiliaries may not be operable. However, Division II power can be provided to Unit 3 via the tie between SWGR 34-1 and 24-1. Procedures are available to establish the tie between SWGR 24-1 and 34-1. (See Subsection 7.4.1 for details.) The Unit 2 diesel generator is independent of this area. 125-Vdc control power to 4-kV and 480-V SWGR is available as discussed below.
125-Vdc Power System	A temporary 125-V power cable connection must be established from Unit 2 reactor building 125-V distribution panel 2 to the Unit 3 reactor building 125-V distribution panel 3 to establish control power to SWGR 33-1, 34-1, 38 and 39. 125-Vdc power is available to Unit 2 except for the 125-Vdc reserve Bus 2 feed cables 32374 and 32375. (See Subsection 7.4.1 for details.) A procedure is available to manually establish an alternate feed to the 125-V reserve bus 2B-1 from the Unit 2 125-V main bus 2 by closing a normally open tie breaker 125-V main bus. (See Subsection 7.4.1 for details.)

TABLE 4.10-2

ACTIONS TO ACHIEVE COLD SHUTDOWN IN UNIT 3 USING THE SHUTDOWN COOLING SYSTEM ASSUMING A FIRE IN FIRE AREA TB-III

Component	Manual Action/Repair
250-Vdc Power System	A fire in the Western Zone Group would disable normal 250-V power to both Units 2&3. A procedure is available to establish reserve feed to Unit 2 (see Subsection 7.4.1). Unit 3 250-Vdc powered valves have handwheel operation capability.
Process Monitoring Equipment	
RPV Water Temp. Recirc Loop A RPV Water Temp. Recirc Loop B RPV Shell Temperature RPV Flange Temperature	If RPV water, shell and shell flange temperature indicators are not available in the control room, then establish local indication monitoring capability in accordance with cold shutdown repair procedure DSSP-0200-T9.

4.11 Turbine Building Main Floor (Fire Area TB-IV)

4.11.1 Hot Shutdown Analysis

The main operating floor of the turbine building, Fire Area TB-IV, contains no Unit 2 safe shutdown equipment or cabling. No Unit 3 safe shutdown equipment is located in TB-IV and instrument cables are the only safe shutdown cabling located there. Therefore, isolation condenser path A for Unit 2 (Table 3.1-3) and path B for Unit 3 (Table 3.1-6), which would normally be used in case of loss of offsite power, can be used if shutdown is required as a result of a fire in Fire Area TB-IV. All major fire hazards in this zone are protected. Should a fire start on this floor, it is highly unlikely that it could spread to lower elevations where it could damage safe shutdown equipment.

4.11.2 Cold Shutdown Analysis

No cold shutdown equipment or cable is located in this area.

4.12 Control Room and AEER (Fire Area TB-V)

Safe shutdown equipment and cabling located in this fire area are shown on Drawing F-8 (Fire Zones 2.0 and 6.2).

4.12.1 Hot Shutdown Analysis

A fire in the control room and auxiliary electrical equipment room fire area (TB-V) has the potential for causing the loss of control of all motor-operated equipment associated with both units. Shutdown of Unit 2 and Unit 3 can be accomplished with shutdown paths A2 and B2 (Tables 3.1-5 and 3.1-8) which utilize Unit 2 and Unit 3 equipment powered from the 2/3 diesel generator.

Control rod drive pumps 2A and 3A are available for reactor water makeup. The electromatic relief valves may not be available for initial pressure control but the target rock valve and safety valves are available if necessary. Both isolation condenser makeup pumps are available for makeup to the isolation condenser. Service water pump 2A is available to cool the CRD pump and for either Unit 2 or Unit 3 isolation condenser makeup if long-term operation is necessary. Local instruments will be used to monitor reactor conditions and support systems.

Cable discrepancies in this area include control functions associated with 4-kV and 480-V power for both units. However, the required circuit breakers can be isolated by existing isolation switches at the switchgear to prevent spurious signals which might result from a control room fire. (See Subsections 6.2.1.2 and 6.2.2.2.) The switchgear can then be operated locally, if necessary. The diesel generator will also be started and controlled locally. Local control stations have been provided for the diesel fuel transfer pump, diesel cooling water pump, and diesel room vent fan. (See Subsection 6.2.3.1.)

The 2/3 diesel generator feed breaker control logic has been modified to allow the operator to supply power to both Unit's Division I switchgear 23-1 and 33-1 simultaneously by manually overriding the unit selection logic. (See Subsection 6.2.3.1.6.)

Control cables for the control rod drive pumps, CRD discharge valves, isolation condenser makeup pumps, and service water pumps are located in this area. Local pushbutton stations have been installed for the control rod drive pumps. The isolation condenser pumps can be operated locally from panels 2223-126A and 2223-126B located in fire zones 18.7.1 and 18.7.2. These local controls will isolate faults on control room cables. Local isolation and control capability have also been installed for the service water pumps. (See Subsections 6.2.1.2, 6.2.1.3, 6.2.2.2 and 6.2.2.3). For the CRD discharge valves, 480 VAC power can be removed and valves manually operated in their local area.

Control cables to all isolation condenser valves are located in this area. All of these valves are accessible for manual operation except valves MO2(3)-1301-1 and MO2(3)-1301-4, which are located in the respective drywells. To ensure that these valves will be open as required for the safe shutdown function in the event a fire in this area affects the normal power feeds, alternate feeds from an alternate power source have been installed along with local control capability located in the diesel generator 2/3 room as discussed in Subsection 6.2.1.4.

The normal access to valves MO2(3)-1301-2 and MO2(3)-1301-3, located in the isolation condenser pipe chase (RB2(3)-I), is through the fire doors to the pipe chase at 41/M (47/M for Unit 3) on both the 545-foot 6-inch elevation and 570-foot 0-inch elevation. Access to the pipe chase is also available from Elevation 589 feet 0 inches in Fire Area RB2(3)-I. Intervening grating has been cut and access ladders and platforms provided to ensure that these valves may be manually operated in the event of a fire in this area (see Subsections 6.2.1.6 and 6.2.2.6). Vent valves AO2-1301-17 and AO2-1301-20 fail in the closed position as required for safe shutdown. In the event these valves fail to close, manual valve 2-1301-16 may be locally closed to isolate this line. Manual operation of valves MO2-4399-74, MO3-4399-74, MO2-4102, MO2-1301-10, MO3-4102 and MO3-1301-10 may be required to add makeup feedwater to the isolation condensers.

Associated cables routed in this zone include LPCI circuits, core spray circuits, primary containment isolation circuits, process radiation monitoring circuits, and main steam isolation circuits. The LPCI and core spray circuitry is associated with the 4-kV power distribution. However, since the diesel generator and all necessary breakers will be operated locally, faults on these circuits will not affect safe shutdown. The primary containment isolation, process radiation monitoring, and main steam isolation circuitry are associated with isolation condenser valves. However, the drywell valves will be controlled locally from the alternate power source by isolating the automatic circuitry. The power train to the remaining valves will be operated manually. Therefore, faults on the associated circuitry will not prevent safe shutdown. Spurious auto blowdown initiation is prevented by manually tripping the 125-Vdc feeds to the auto blowdown logic at the 125-Vdc distribution panels in the turbine building. Additional protection from spurious auto blowdown is provided by placing the ADS "Auto Blowdown Inhibit" switch in the "INHIBIT" position and the ERV's "Auto Blowdown MANUAL-OFF-AUTO" switch in the "OFF" position. These switches are located in the control room and they will be operated before control room evacuation (see Subsections 6.2.1.8 and 6.2.2.8).

Cable discrepancies in TB-V and their resolutions are presented in Appendix A.

4.12.2 Cold Shutdown Analysis

The shutdown cooling method is available for cold shutdown after a fire in this fire area. The equipment associated with cold shutdown and located in this area is identified in Table 4.12-1. Drawing F-8 shows the location of cable and equipment. No mechanical equipment necessary for the shutdown cooling method is located in this fire area. Only control equipment and cables are located in the control room (Fire Zone 2.0) and AEER (Fire Zone 6.2). Power cables to MCC 29-2 (Division II) and service water pump 2/3-3901 are routed through the AEER. The Unit 2 diesel generator auxiliaries are fed from MCC 29-2. Power to all Division I (2/3 diesel generator) equipment is available for Unit 2 and Division II (diesel generator 3) equipment for Unit 3. Table 4.12-2 lists the repairs necessary to control electrical equipment independent of these fire areas.

TABLE 4.12-1

COLD SHUTDOWN EQUIPMENT CONTAINED IN FIRE AREA TB-V

Fire Zone 6.2

1. 120/240 Essential Service Distribution Panel 902-49
2. 120/240 Instrument Bus 902-50
3. 120/240 Essential Service Distribution Panel 903-49
4. 120/240 Instrument Bus 903-50

Fire Zone 2.0

1. Control Panel 902-4 (Unit 2 Shutdown Cooling Controls)
2. Control Panel 903-4 (Unit 3 Shutdown Cooling Controls)
3. Control Panel 923-1 (Unit 2&3 RBCCW and Service Water Controls)
4. Control Panel 902-8 (Unit 2 Auxiliary Power Controls)
5. Control Panel 903-8 (Unit 3 Auxiliary Power Controls)

TABLE 4.12-2

ACTIONS TO ACHIEVE COLD SHUTDOWN IN UNITS 2 AND 3 USING THE SHUTDOWN COOLING SYSTEM ASSUMING A FIRE IN FIRE AREA TB-V

Component	Manual Action/Repair
UNIT 2 MECHANICAL EQUIPMENT	
Shutdown Cooling Pumps	
2A-1002 2B-1002 *2C-1002	These pumps can be powered from SWGR 23-1 and 24-1. Division I and Division II power is available as described below. Procedures are available to locally operate the necessary breakers. (See Subsection 7.4.1 for details.) *Loop C is normally connected to fuel pool cooling.
Shutdown Cooling Valve	
MO2-1001-2A MO2-1001-2B MO2-1001-2C MO2-1001-4A MO2-1001-4B MO2-1001-4C MO2-1001-5A MO2-1001-5B	Disable the feed and manually position the valve.
MO2-1001-1A MO2-1001-1B	Procedures are available to make repairs to isolate existing control circuits and operate the valves locally at the MCC. (See Subsection 7.4.1 for details.)
Recirculation Piping Valves	
MO2-0202-4A MO2-0202-4B	Procedures are available to make repairs to isolate existing control circuits and locally operate the valves at the MCC. Power is available to Division I and Division II MCCs as described below. (See Subsection 7.4.1 for details.)
RBCCW Pumps	
2A-3701 2B-3701	These pumps can be powered from SWGR 23-1 and 24-1. Division I and Division II power is available as described below. Procedures are available to locally operate the necessary breakers. (See Subsection 7.4.1 for details.)

TABLE 4.12-2

ACTIONS TO ACHIEVE COLD SHUTDOWN IN UNITS 2 AND 3 USING THE SHUTDOWN COOLING SYSTEM ASSUMING A FIRE IN FIRE AREA TB-V

Component	Manual Action/Repair
RBCCW Valves	
MO2-3701 MO2-3704	Disable the feed and manually position the valve.
MO2-3702 MO2-3703 MO2-3706	Spurious operation concern only. Procedures are available to isolate existing control circuits and operate at MCC.
Service Water Pumps	
2A-3901 2B-3901 2/3-3901	Local control capability exists for all service water pumps (see Subsections 4.12.1 and 6.2.1.2). Procedures are available to implement this capability.
TCV-2-3904A TCV-2-3904B TCV-2-3904C	Spurious operation concern only. These valves fail in the open position.
UNIT 3 MECHANICAL EQUIPMENT	
Shutdown Cooling Pumps	
3A-1002 3B-1002 *3C-1002	These pumps can be powered from SWGR 33-1 and 34-1. Division I and Division II power is available as described below. Procedures are available to locally operate the necessary breakers. (See Subsection 7.4.1 for details.) *Loop C is normally connected to fuel pool cooling.
Shutdown Cooling Valves	
MO3-1001-2A MO3-1001-2B MO3-1001-2C	Disable the feed and manually position the valve.
MO3-1001-4A MO3-1001-4B MO3-1001-4C	
MO3-1001-5A MO3-1001-5B	

TABLE 4.12-2

ACTIONS TO ACHIEVE COLD SHUTDOWN IN UNITS 2 AND 3 USING THE SHUTDOWN COOLING SYSTEM ASSUMING A FIRE IN FIRE AREA TB-V

Component	Manual Action/Repair
MO3-1001-1A MO3-1001-1B	Procedures are available to make repairs to isolate existing control circuits and operate the valves locally at the MCC. (See Subsection 7.4.1 for details.)
Recirculation Piping Valves	
MO3-0202-4A MO3-0202-4B	Procedures are available to make repairs to MO3-0202-5A circuits and locally operate the valves at the MCC. (See Subsection 7.4.1 for details.)
RBCCW Pumps	
3A-3701 3B-3701	These pumps can be powered from SWGR 33-1 and 34-1. Division I and Division II power is available as described below. Procedures are available to locally operate the necessary breakers. (See Subsection 7.4.1 for details.)
RBCCW Valves	
MO3-3701 MO3-3704	Disable the feed and manually position the valve.
MO3-3702 MO3-3703 MO3-3706	Spurious operation concern only. Procedures are available to isolate existing control circuits and operate at the MCC.
Service Water Pumps	
3A-3901 3B-3901	Local control capability exists for all service water pumps. (See Subsections 4.12.1 and 6.2.2.2.) Procedures are available to implement this capability.
TCV-3-3904A TCV-3-3904B TCV-3-3904C	Spurious operation concern only. These valves fail in the open position which is the position necessary for cold shutdown

TABLE 4.12-2

ACTIONS TO ACHIEVE COLD SHUTDOWN IN UNITS 2 AND 3 USING THE SHUTDOWN COOLING SYSTEM ASSUMING A FIRE IN FIRE AREA TB-V

Component	Manual Action/Repair
UNIT 2&3 ELECTRICAL EQUIPMENT	
Division I ac Power System	All 2/3 diesel generator components and auxiliaries and Division I SWGR breakers have isolation and manual control capabilities installed. (See Subsections 4.12.1, 6.2.1.2, 6.2.2.2, and 6.2.3.1.) Repair procedures are available to establish local control for all other breakers. Procedures are available to implement this capability. All normal 125-V control power is available.
Division II ac Power System	Power cables to MCC 29-2 are routed through the AEER. Therefore, the Unit 2 diesel generator is assumed to be unavailable.
Division II ac Power System	Procedures are available to repair Unit 3 diesel generator control circuits and operate the diesel generator. Local breaker control is provided for breakers. (See Subsections 6.2.1.2 and 6.2.2.2.) All normal 125-V control power is available.
125-Vdc System	The 125-Vdc system is not affected by a fire in this area.
250-Vdc System	The 250-Vdc system is not affected by a fire in this area.
Process Monitoring Equipment	
RPV Water Temp. Recirc Loop A RPV Water Temp. Recirc Loop B RPV Shell Temperature RPV Flange Temperature	If RPV water, shell and shell flange temperature indicators are not available in the control room, then establish local indication monitoring capability in accordance with cold shutdown repair procedure DSSP-0200-T9.

4.13 Crib House Fire Area 11.3

Safe shutdown equipment and cabling located in this fire area are shown on Drawing F-18.

4.13.1 Hot Shutdown Analysis

For the cribhouse, the alternate shutdown path available depends on the location of the postulated fire. Fire protection measures have been taken in accordance with Appendix R to prevent the spread of fire from one area to another. These measures are described in the Fire Hazard Analysis (F.P.R. Volume 1), in Section 6.0, Proposed Modifications of this report, and in the Exemption Requests, Section 6.0 (F.P.R. Volume 4).

The analysis of the crib house can be divided into the following areas:

A. Vicinity of the Unit 2 or Unit 3 diesel generator cooling water pumps
B. Vicinity of the 2/3 diesel generator cooling water pump
C. Vicinity of the service water pumps

Fire protection modifications have been made which ensure that either: 1) the 2/3 diesel generator cooling water pump is available, or 2) the 2 and 3 dedicated diesel generator cooling water pumps and at least one service water pump are available. See Subsection 6.3.5 for modifications made.

A. Unit 2 or Unit 3 Diesel Generator Cooling Water Pumps

For a fire in the crib house, isolation condenser shutdown path A (Table 3.1-3) will be used to shut down Unit 2 if the Unit 2 dedicated diesel generator cooling water pump (located on the lower level of the crib house) has been damaged. If the Unit 3 dedicated diesel generator cooling water pump (also located on the lower level of the crib house) has been damaged by a fire, isolation condenser shutdown path B (Table 3.1-6) will be used to shut down Unit 3.

The 2/3 diesel generator will be used to power the necessary equipment. The diesel will be cooled by the 2/3 diesel generator cooling water pump which remains free of fire damage as discussed in Subsection 6.3.5 of this report and Section 6.0 of the Exemption Requests (F.P.R. Volume 4). Control rod drive pumps 2A and 3A are available for reactor coolant makeup. The electromatic relief valves are available for initial pressure control, if necessary. Both isolation condenser makeup pumps are available to provide makeup to the isolation condenser. Service water pump 2A (or 3A not required/credited) is available to cool the CRD pumps and provide makeup to the isolation condensers if long-term operation is necessary.

All necessary equipment can be operated from the control room. Local instrumentation is used to monitor Reactor Pressure and Reactor Water level.

Cable discrepancies in the crib house and their resolutions are presented in Appendix A.

B. 2/3 DG Cooling Water Pump

Isolation condenser shutdown paths E and F will be used to shut down Unit 2 and Unit 3 respectively if the 2/3 diesel generator cooling water pump (located on the lower level of the cribhouse) has been damaged.

Diesel generators 2 and 3 will be used to power the necessary equipment. The diesel will be cooled by the dedicated cooling water pump which remains free of fire damage as discussed in Subsection 6.3.5 of this report and Section 6.0 of the Exemption Requests (F.P.R. Volume 4). Control rod drive pumps 2B and 3B are available for reactor coolant makeup. The electromatic relief valves are available for initial pressure control, if necessary. Both isolation condenser makeup pumps are available to provide makeup to the isolation condenser. Service water pump 2B or 3B is available to cool the CRD pumps and provide makeup to the isolation condensers if long-term operation is necessary.

All necessary equipment can be operated from the control room. Reactor instruments can be monitored in the control room.

C. Service Water Pumps

Only one of five service water pumps is needed to cool the CRD pumps for both units. The service water pumps are widely separated on the upper level of the crib house. A complete area suppression system is provided at this level. Curbs are provided to prevent combustible liquid spills from exposing more than half the floor simultaneously (see Subsection 6.3.5). The above measure ensures that at least one service water pump will be operable independent of a fire in this area. See Section 6.2 of the Exemption Requests (F.P.R. Volume 4).

4.13.2 Cold Shutdown Analysis

The shutdown cooling method is available for cold shutdown after a fire in this zone. Table 4.13-1 identifies mechanical and electrical equipment located in the zone. Drawing F-18 shows equipment and cable locations.

Hot shutdown fire protection measures described in the Fire Hazards Analysis, Section 4.13 (F.P.R. Volume 1), and the Cold Shutdown Exemption Requests, Section 6.2 (F.P.R. Volume 4) ensure that at least two service water pumps and two diesel generator cooling water pumps and their associated cable would not be damaged by a fire in this area.

The following fire protection measures ensure that at least two diesel generator cooling water pumps are available.

1. The transfer switch for the 2/3 diesel generator cooling water pump (see Subsection 6.2.3.1.4) in the crib house is protected with a 1-hour barrier. This modification, in conjunction with the addition of suppression and detection systems (discussed below), ensures that a fire affecting either of the dedicated diesel generator's cooling water pumps will not also disable the 2/3 diesel generator's cooling water pump.

2. A curb is installed around the 2/3 diesel generator cooling water pump. This prevents the spread of any flammable liquids either from the 2/3 pumps to the dedicated cooling water pumps or from circulating water pumps to the 2/3 pump.

3. An automatic, open-head water suppression system is installed over the 2/3 diesel generator cooling water pump. As with the curbing, this modification aids in preventing a fire originating at the 2/3 pump from spreading and also prevents a fire outside the 2/3 pump region from affecting the 2/3 pump.

4. A thermal fire detection system is installed throughout the lower elevation of the crib house. This provides early warning of a fire in the region, allowing station personnel to respond rapidly and to extinguish a fire before significant damage can occur.

5. A ceiling level wet pipe sprinkler system is installed to protect the entire central area of the lower level (column/row 3.5-4.5/A-B). This provides additional assurance that a fire in the lower level would be quickly controlled and damage limited to one side of the crib house.

6. An open-head water spray system actuated by a linear thermal detector provides protection to all cable trays and conduit along the north, west, and east walls of the crib house.

The following fire protection measures ensure that at least two service water pumps will be available.

1. Curbs are installed along the entire length of column line B on the 509-foot 6-inch and 517-foot 6-inch elevations and along the entire length of column line 3.75 on the 509-foot 6-inch and 517-foot 6-inch elevations. The curbs prevent the spread of flammable liquids from the 517-foot 6-inch elevation of the upper level to the 509-foot 6-inch elevation as well as preventing the spread of flammable liquids from one side to the other on both elevations. In addition, the diesel fire pump day tank is enclosed in a curb with a drain line to the yard drain system to prevent diesel fuel oil from exposing the service water pumps.

2. A wet pipe sprinkler system is provided which covers the entire upper level of the crib house. This ensures that, should a fire start, it will be quickly contained so that at least two service water pumps and their cabling will remain free of fire damage.

TABLE 4.13-1

COLD SHUTDOWN EQUIPMENT CONTAINED IN THE CRIB HOUSE

Fire Zone 11.3

Shutdown Cooling System

1. SW Pump 2A-3901
2. SW Pump 2B-3901
3. SW Pump 2/3-3901
4. SW Pump 3A-3901
5. SW Pump 3B-3901

Electrical Equipment

1. Unit 2 Diesel Generator Cooling Water Pump 2-3903B
2. Unit 3 Diesel Generator Cooling Water Pump 3-3903B
3. 2/3 Diesel Generator Cooling Water Pump 2/3-3903B

LPCI-Division II

1. Unit 2 Diesel Generator Cooling Water Pump 2-3903B
2. Unit 3 Diesel Generator Cooling Water Pump 3-3903B

4.14 Radwaste Building (Fire Zones 14.1, 14.5 and 14.6)

The radwaste building contains no Unit 2 or Unit 3 hot or cold safe shutdown equipment or cabling.

4.15 Miscellaneous Structures

The Dresden 2&3 miscellaneous structures contain no Unit 2 or Unit 3 hot or cold safe shutdown equipment or cabling. Therefore, the miscellaneous structures not physically attached to Dresden 2&3 structures would not affect safe shutdown.

4.15.1 Dresden Units 2&3 Safe Shutdown Analysis for a Dresden 1 Fire

The Dresden 2/3 structure connects to Unit 1 along column row 31, i.e., the Unit 2 turbine building east wall. This wall is generally constructed of unrated metal siding; however, the wall between the Auxiliary Electric Equipment Room and the Unit 1 Battery Room is 3-hour rated. The Unit 2/3 Control Room is isolated from adjacent Unit 1 areas by 3-hour rated walls, floor, and ceiling. The floor for the control room is supported on 3-hour fire protected structural steel. The combustible loading in the general area outside the Control Room is low except for directly under the control room, which has a concentration of cables, which are protected by automatic water-spray systems. Transient fire hazards in the area are administratively controlled.

If a fire were to start in the Unit 1 turbine building, it could affect Units 2 and 3 in two ways. The first would be a fire which would migrate from Unit 1 to the Unit 2 turbine building. This type of fire scenario would be no worse than a fire, which initiated in Unit 2 turbine building. An alternate shutdown path has been identified for a fire in the Unit 2 turbine building (Fire Area TB-I).

The second way a fire could affect Units 2 and 3 would be a fire that affected the Control Room. This fire could start in the Unit 1 Turbine Building near the control room or in adjacent areas at the same level as the control room. Fire rated construction of a 3-hour rating is provided to isolate the control room from a fire originating in these areas.

A fire of sufficient intensity could only occur under the Unit 1 Control Room floor. As stated before, the likelihood of a fire in the trays under the control room floor is remote due to administrative controls, automatic suppression systems and administrative control of ignition sources. Any fire in the Unit 1 Turbine Building near the Control Room would be detected by fire protection systems and quickly extinguished. In addition, structural steel in this area that supports the control room floor is protected with 3-hour rated fire proofing material.

A fire originating in the Unit 1 Turbine Building would have no greater effect on safe shutdown of Units 2 and 3 than a fire that originated in either the Control Room or the Unit 2 Turbine Building. For a fire in these areas, an alternate shutdown method has been identified which is independent of these areas.

4.15.2 Isolation Condenser Makeup Pump Rooms (Fire Zones 18.7.1 and 18.7.2)

These fire zones are separated from other fire areas by 3-hour rated barriers (See Fire Hazards Analysis Figure 3.3-27, Fire Protection Report, Volume 1). A fire in these fire zones would not affect equipment or systems used to shutdown and cool the reactor during operations, therefore the 10CFR50 Appendix R safe shutdowns would not be required to bring the reactor to cold shutdown. No equipment or cables used by safe shutdown paths C and D would be affected by a fire in these zones.

5.0 SUPPORTING ASSOCIATED CIRCUITS ANALYSIS

5.1 Valve Spurious Operation Analysis

5.1.1 Methodology

A review of the P&ID's was performed for Dresden Units 2&3 to assess the impact of spurious valve operation on the safe shutdown of the plant. Two cases were specifically considered. Case 1 examined those valves whose malfunction could impact the operation of the safe shutdown systems. Case 2 considered those valves whose malfunction could result in a loss of reactor inventory. The basis used in Cases 1 and 2 can be found illustrated in Figures 5.5-1 and 5.5-2, respectively. The Dresden 2 & 3 valves which fit either Case 1 or Case 2 are identified in Appendix B.

The assessment considered only electrically operated valve types which include Motor Operated (MO), Solenoid Operated (SO), Air Operated (AO), Pressure Controlled (PC), and Temperature Controlled (TC) Valves.

The concern over spurious operations or malfunctions of a valve or valve combination was resolved if any of the following criteria were met:

1. For valves where spurious operation was of concern, a valve combination was considered acceptable defense against adverse spurious operation if any of the following conditions were met: (a) there were two or more normally closed electrically operated valves in series and these valves did not constitute a high-low pressure interface; (b) there was at least one normally closed, manually operated valve in series; (c) there was a mechanically operated check valve in the line which would prevent flow in the undesirable direction; and (d) the impact of the adverse valve operation would not degrade safe shutdown capability.

2. The control and/or power for the valve or valve combination was independent of any fire area where credit was taken for a shutdown path which included the valve as a component.

3. Manual operation of the valves was acceptable for safe shutdown.

4. The control power for at least one normally closed valve in series was locked out.

For those valves or valve combinations where the above criteria did not apply, the following procedure was used to identify a means of preventing spurious operation, demonstrating that spurious operation cannot happen or identifying a means of defeating spurious operation:

1. Identify the schematics which show the valve controls and all associated circuits.

2. Study each schematic and identify all short circuits that can cause the unwanted effect. Note whether it is a short between two conductors in the same cable or if it requires two

separate cables to short together. List the cables involved. If the spurious operation cannot occur, state so and proceed to the next item.

3. If separate cables are involved, consult the cable tab to determine the extent of their common routing. List all common routing points.

4. Consider possible prefire actions to prevent spurious operation. These may entail a prescribed combination of control switch settings or the tripping of a breaker when not in use. Any recommended prefire action must not interfere with the automatic operation of an engineered safety feature.

5. If there are no acceptable prefire actions, consider postfire actions to be taken immediately upon determining that a fire in the vulnerable area is severe enough to require the use of alternate shutdown capability. Postfire actions are generally similar to prefire actions but because they are performed only upon detection of a severe fire, they do not affect normal operations. Repair procedures are not permitted for hot shutdown; therefore, any cutting of wires or pulling of fuses other than those normally pulled in the process of racking out breakers cannot be included in the postfire action.

6. Where no prefire nor postfire action is satisfactory, additional modifications will be necessary. These can include fire-retardant cable wraps, isolation switches, etc.

5.1.2 Results

Appendix B lists all valves considered under Case 1 or Case 2, the concern in regard to spurious valve operation, and the justification for no action or the prefire or postfire action taken.

Those valves for which a prefire or postfire action was considered to be necessary are listed in Table 5.1-1.

TABLE 5.1-1

POTENTIAL SPURIOUS VALVE OPERATIONS THAT COULD AFFECT SAFE SHUTDOWN FOR WHICH A PREFIRE OR POSTFIRE ACTION WAS NECESSARY

Potential Spurious Component	System	Mechanical Drawings	Concern with Malfunction	Resolution
AO2(3)-203-1A,B,C,D AO2(3)-203-2A,B,C,D	MS	M-12, M-345	Spurious opening will result in loss of reactor coolant through the main steam line.	A spurious signal will cause only one solenoid (either ac or dc) of a valve to fail to perform its function. As a result, for a given fire, one MSIV on each steamline could fail to close. But, the redundant valve on each steamline would isolate the line.
Target Rock Valve 2(3)-203-3A or Electromatic Relief Valves 2(3)-203-3B or 2(3)-203-3C or 2(3)-203-3D or 2(3)-203-3E	MS	M-12, M-345 (sht. 1)	Spurious opening will vent RPV inventory to suppression pool.	An inhibit switch has been added in panel 902-3 (903-3) to prevent spurious blowdown from a fire outside Fire Area TB-V (Control Room and Auxiliary Electric Equipment Room or AEER Area) (see Sub-sections 6.2.1.8 and 6.2.2.8). For a fire in Fire Area TB-V, spurious blowdown is prevented by removing power to the ADS logic by opening circuit breakers at the 125-Vdc Turbine Building main bus 2A-1 (3A-1) distribution panel and at 125-Vdc Turbine Building reserve bus 2B-1 (3B-1) distribution panel. To prevent spurious operation of any single pressure relief valve for a fire in Fire Areas RB2-I, RB2-II, TB-I, TB-III, TB-V, RB3-I or RB3-II, 125-Vdc power to these valves is removed by either tripping breakers or pulling fuses.

TABLE 5.1-1

POTENTIAL SPURIOUS VALVE OPERATIONS THAT COULD AFFECT SAFE SHUTDOWN FOR WHICH A PREFIRE OR POSTFIRE ACTION WAS NECESSARY

Potential Spurious Component	System	Mechanical Drawings	Concern with Malfunction	Resolution
MO2(3)-0302-8 AO2(3)-0302-6A AO2(3)-0302-6B MO2(3)-0301-2A MO2(3)-0301-2B	CRD	M-34, M-357 M-365	Spurious closure prevents RPV makeup from cooling water line during shutdown using the isolation condenser.	Should MO2(3)-0302-8, both MO2(3)-0301-2A and MO2(3)-0301-2B, or both AO2(3)-0302-6A and AO2(3)-0302-6B close, makeup water from the CRD pump via CRD cooling line to the RPV could be disrupted. The AO valves close on loss of air (i.e., loss of normal power). Makeup water is still available to the RPV from the other unit's CRD pumps via the cross-connect valves 2/3-0301-162 and -163 to the charging water line and scram injection valves CV2(3)-0305-126 (typical of 177). These valves open for scram and fail open on loss of power. Instructions are included in shutdown procedures to insure that MO-0302-8, MO-0301-2A or MO-0301-2B, and either AO-0302-6A or AO-0302-6B are open.
MO2(3)-1201-1 MO2(3)-1201-1A MO2(3)-1201-2 MO2(3)-1201-3 PCV2(3)-1217	RWCU	M-30, M-361	Failure in open position may cause pressure to build-up in low pressure piping downstream of PCV-2-1217 (with RO) and fluid loss to condenser and/or equipment drains via the relief valves.	A postfire action to isolate the RWCU system by closing normally open valve MO2(3)-1201-2 and verifying closed manually closed valve MO2(3)-1201-3 will be done to prevent loss of reactor coolant from relief valves in the low pressure portion of the RWCU system if the RWCU system does not automatically isolate. For fires in Fire Areas RB2-II and RB3-II air will be removed to valve 2 (3)-1217 to insure RWCU isolation.

TABLE 5.1-1

POTENTIAL SPURIOUS VALVE OPERATIONS THAT COULD AFFECT SAFE SHUTDOWN FOR WHICH A PREFIRE OR POSTFIRE ACTION WAS NECESSARY

Potential Spurious Component	System	Mechanical Drawings	Concern with Malfunction	Resolution
MO2(3)-1301-1 and MO2(3)-1301-4	IC	M-28, M-359	Spurious closure will isolate RPV from isolation condenser. NOTE: MO2(3)-1301-1 and MO2(3)-1301-4 are in the drywell and inaccessible.	An alternate feed and control arrangement has been developed for valves MO2(3)-1301-1 and MO2(3)-1301-4 which are in the drywell (see Subsections 6.2.1.4 and 6.2.2.4).
MO2(3)-1301-2 and MO2(3)-1301-3	IC	M-28, M-359	Failure to open or spurious close prevents condensed steam from returning from isolation coil to RPV. This defeats natural circulation path.	The Safe Shutdown Procedures (DSSPs) implement opening MO2(3)-1301-2 and MO2(3)-1301-3 should they fail in closed position. MO2(3)-1301-3 is normally closed.
MO2(3)-1301-10 or MO2(3)-4102	IC	M-28, M-359	Spurious closure isolates makeup to isolation condenser from service water system.	These normally closed valves can be manually opened.
2(3)-1301-17 2(3)-1301-20	IC	M-28, M-359	Spurious failure to open position would allow steam to vent to the main steam lines.	A procedure has been developed to insure these valves are closed or close manually valve 2(3)-1301-16.
MO2(3)-2301-3	HPCI	M-51, M-334	Spurious opening of this valve would result in loss of reactor inventory to the suppression pool.	If the HPCI pump is not delivering water to the reactor, verify closed MO2(3)-2301-5 or trip the HPCI turbine.
MO2(3)-2301-14	HPCI	M-51, M-334	Spurious opening of this valve could result in a drain path for the CST to the torus.	Flow from the CST due to spurious operation of this valve will not result in high water level in the torus.
MO2(3)-4399-74	IC	M-39, M369	Spurious closure potentially isolates makeup to insolation condenser	These normally closed valves can be manually opened.

General Notes for Figure 5.1-1

1. Valves in the primary flow path for the safe shutdown system considered must remain in their normally open position or be capable of being opened.

2. Valves in lines that bypass the safe shutdown system must remain in their normally closed position or be capable of being closed.

3. Where multiple valves are in series, the postulated simultaneous failure of all valves in series is considered necessary for system failure.

All systems which require fluid flow for safe shutdown are considered including HPCI, isolation condenser, diesel fuel oil, diesel cooling water, service water, etc.

General Notes for Figure 5.1-2

1. Where a mechanical check valve is in series with a motor operated valve, the check valve is assumed to preserve the isolation function independent of any operation of electrically operated valves downstream.

2. Where multiple valves in series perform the isolation function, the simultaneous opening of all valves must be postulated before system failure is assumed.

All systems that communicate with the reactor vessel were considered including SRVs, MS, HPCI, LPCI, shutdown cooling, RWCU, FW, etc.

5.2 Spurious Breaker Operation Analysis

For major loads connected to the safety-related 4-kV switchgear, but not required for safe shutdown, procedures require observation of the breaker status prior to manually loading the diesel onto the bus. Any unwanted load that is closed will be manually tripped and its closing circuit fuse will be removed. After the diesel is loaded onto the bus, this same action will be taken as a precautionary measure for all other unwanted loads that could conceivably overload the diesel if they were to operate coincidentally with the required safe shutdown loads.

5.3 Current Transformers/Control Power Transformer Analysis

5.3.1 Control Power Transformers

A concern was raised about the possibility of a secondary fire starting in a motor control center due to a short circuit on the control power transformer's secondary. The secondaries of Dresden motor control center control transformers are unfused and ungrounded. Field experience with shorted MCC control circuits indicates that considerable smoke is produced, but the primary winding shorts and trips the circuit breaker before any flame can erupt. It is unreasonable to assume that such a fire can propagate beyond an individual MCC bucket. Therefore, a safe shutdown can still be achieved.

5.3.2 Current Transformers

The current transformer (CT) circuits are special because they function as "current sources" rather than as "voltage sources." Most of the circuits in the station (including all of the power circuits and control circuits) are voltage sources; i.e., they maintain a reasonably constant voltage, while the current varies with the load. The nominal circuit voltage is never exceeded by more than a few percent regardless of any physical damage to the cables. But a CT does just the opposite. It maintains a reasonably constant current through its secondary circuit, in direct proportion to the primary current. The CT secondary produces as much voltage as necessary to force that constant current through the load.

In normal operation the CT secondary current passes through relay coils and meter movements having very low resistances, on the order of a few ohms. The CT secondary current (5A or less) produces less than 30 volts across such normal burdens.

As the burden resistance increases, so does the voltage that the CT must produce to maintain the desired current. In an open circuit (infinite resistance), the CT secondary voltage will theoretically become infinite. In practice, due to core saturation, the CT secondary voltage will be limited to some value ranging from 2-kV to approximately 25-kV. The exact value depends on the CT ratio and design. Smaller ratio CTs (the majority of CTs in the plant) will tend to produce voltages in the low end of this range. Since control board wiring is customarily hi-pot tested at 2-kV, smaller ratio CTs are no cause for concern. The large ratio CTs can exceed the hi-pot test voltage by an order of magnitude and can potentially cause insulation breakdown in equipment and cables.

Because the open-circuit voltage varies with the CT design, no broad generalization can be made regarding the range of CT ratios for which concern is warranted. Therefore, the possible consequences of a CT circuit insulation breakdown were investigated with respect to the continued functional integrity of nearby safe shutdown cables and equipment.

The investigation concluded that any conceivable insulation breakdown will result in a carbon track having a resistance on the order of 2 ohms. The CT secondary current will pass harmlessly through the carbon track, dropping the voltage to its normal (approximately 10 volts). The integrity of adjacent safety-related circuits is not threatened.

5.4 Redundant Fusing of Control Circuits Analysis (IE Information Notice 85-09)

In IE Information Notice 85-09, the NRC is concerned about a possible scenario in which a hot shutdown circuit has an isolation switch, but has only one fuse common to both the local and remote control circuitry. Should a fire-induced fault on the remote circuit blow the fuse before the isolation switch is operated, the local control circuit will not function until the fuse is replaced.

Each safe shutdown equipment item for which local control is utilized was checked to determine whether a fault on the remote circuit (prior to isolation) can blow a fuse needed for local control. Several items were found to be deficient in this regard (see Table 5.4-1).

Dresden Station does not use a remote shutdown panel in performing safe shutdown procedures. The shutdown procedures have identified manual operation of switchgear and local control of equipment. A majority of the required safe shutdown circuits protected by a single fuse are 4-kV circuit breakers. These 4-kV breakers are equipped with local mechanical "TRIP" and "CLOSE" buttons that are good for one close and one trip without the benefit of control power. This stored energy within the switchgear is equivalent to redundant fusing since both require a manual action.

Some of the remaining identified circuits are 480-V breakers on buses 28 and 38. If the control circuit is found to be inoperable, then the circuit breaker may be manually closed.

The remaining circuits are associated with the inboard isolation condenser valves and the engine starting controls for the 2/3 diesel generator. For a fire in the reactor buildings where shutdown paths A1 and B1 are used, fuses (2) for the opposite unit's inboard isolation condenser valve isolation switches in the Unit 2 shutdown cooling pump room on the Unit 3 TIP room may need to be replaced. For a fire in the 2/3 diesel generator room where safe shutdown paths E and F are used, fuses (4) for both units' inboard isolation condenser valve isolation switches may have to be replaced. Procedures will require operators to be sent to these rooms to operate the isolation switches and replace fuses as necessary. Replacement fuses and fuse pullers will be maintained under surveillance in the proximity of these rooms and will be readily accessible if fuse replacement is necessary.

The remaining circuit for which fuse replacement (actually four fuses are replaced) will be the only available solution is the engine starting controls at the 2/3 diesel generator. The possibility of fuse replacement arises for a fire in the reactor buildings where safe shutdown paths A1 and B1 are used. Again, replacement fuses and fuse pullers will be maintained under surveillance in the proximity of these controls. An operator will be in the 2/3 diesel generator room to locally control the diesel generator and inboard isolation condenser valves for all paths which use the 2/3 diesel generator.

Table 5.4-1

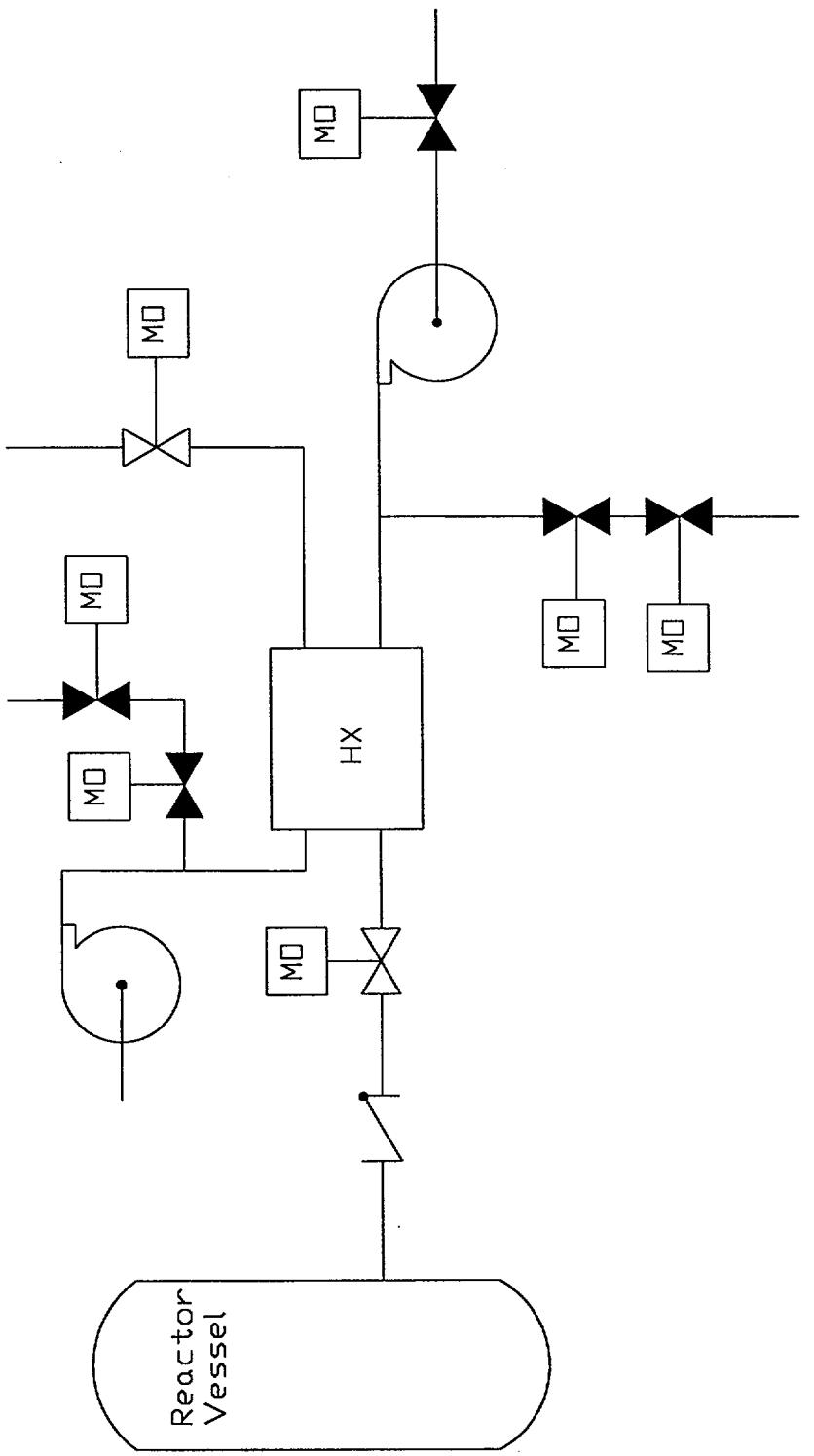
List of Circuits Per IEIN 85-09 Concerns Which May Require Manual Action Following a Fire

		Time of Use (Minutes After Scram)
I	480-V Breakers	
	A. Bus 28 Main Feed	20
	B. Bus 38 Main Feed	20
II	Other	
	C. 2/3 Diesel Generator Local Controls (Engine Starting)	10
	B. Isolation Condenser Valve MO2-1301-1 Isolation Switch	30
	C. Isolation Condenser Valve MO2-1301-4 Isolation Switch	30
	D. Isolation Condenser Valve MO3-1301-1 Isolation Switch	30
	E. Isolation Condenser Valve MO3-1301-4 Isolation Switch	30

5.5 Coordinated Fault Protection Analysis

There has always been a known lack of coordination between the main feeds to the 480-V motor control centers and the branch circuits on those motor control centers. The main feed breakers, located at the 480-V switchgear buses (28, 29, 38 and 39) are equipped with instantaneous trip devices that will operate whenever they experience a fault current of 4800 A or more. These instantaneous trip devices enable the 480-V breakers to interrupt momentary faults greater than the maximum fault current available on the 480-V system. If these devices were changed to short-time delay trips, the interrupting ratings would be degraded to less than the available fault current. Thus, modifying the switchgear will not solve the problem. To prevent potential faults in the branch lines from affecting the 480-V MCCs and the 125-V and 250-Vdc systems, all loads that are not essential for safe shutdown will be tripped after the essential loads are started.

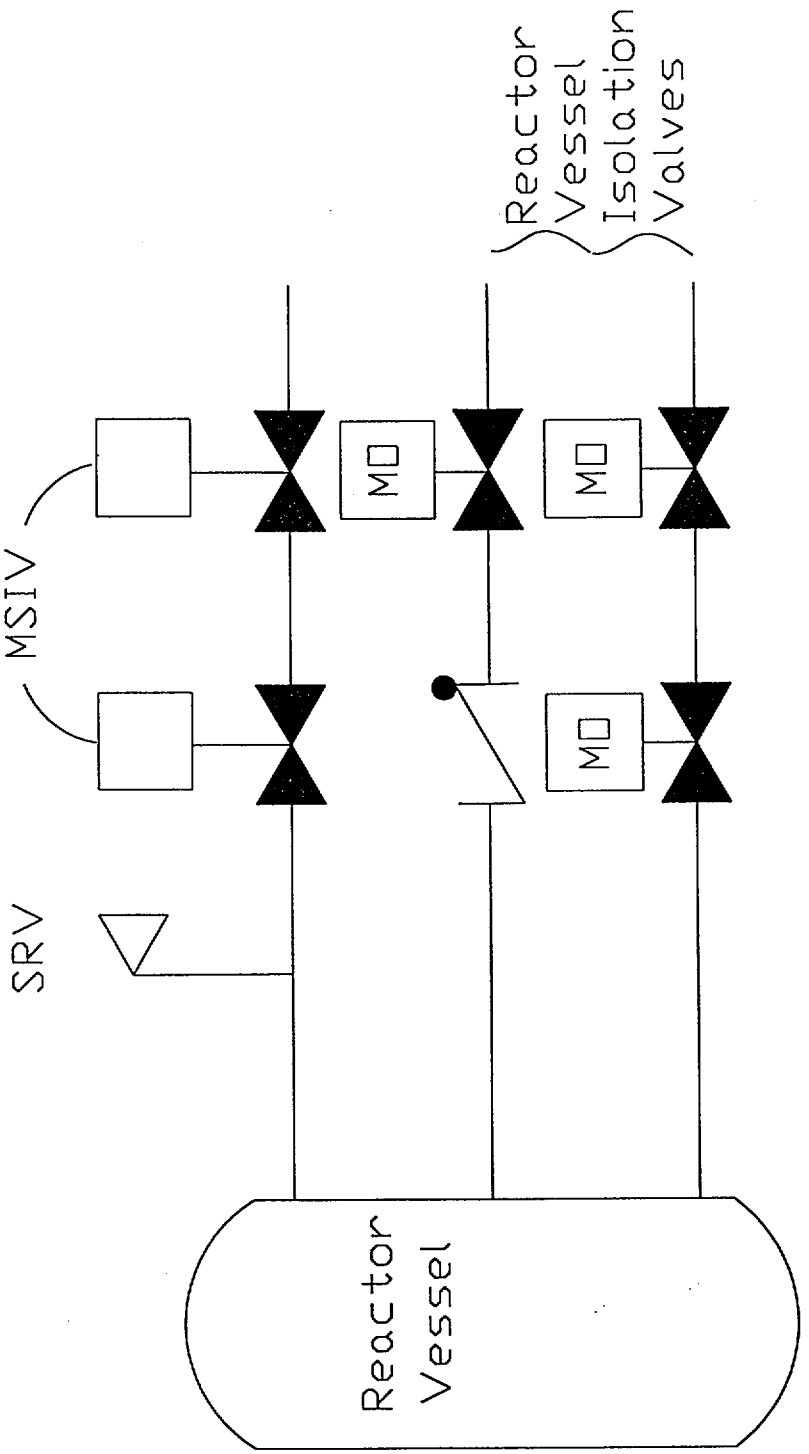
For Dresden all of the safe shutdown loads on a given bus are known to be free of fire induced faults whenever that bus is called upon to power safe shutdown loads. The non-safe shutdown loads that are also connected to the essential buses were not analyzed to determine if a high impedance fault could cause a tripping of the main feed breakers. The safe shutdown procedures address high impedance faults on non-safe shutdown loads by instructing the operator to pull the control power fuses for electrically-operated 4-kV switchgears (23, 24, 33, 34, 23-1, 24-1, 33-1 and 34-1) and 480-V switchgear (28, 29, 38 and 39) breakers that feed non-safe shutdown loads and then to manually trip all such loads. With the fuses pulled, the possibility of spurious closure of the breakers is eliminated. When a breaker at a motor control center is tripped, no further action is required to prevent spurious closure. The same is also true for manually-operated breakers at the 480-V switchgear buses. The tripping of unwanted loads needs to be performed for shutdown paths that use the affected unit's own power train.



DRESDEN STATION
UNITS 2 & 3

FIGURE 5.1-1

VALVES WHOSE SPURIOUS OPERATION
COULD DEGRADE OPERABILITY
OF SAFE SHUTDOWN SYSTEMS



DRESDEN STATION
Units 2 & 3

FIGURE 5.1-2

VALVES WHOSE SPURIOUS OPERATION COULD CAUSE LOSS OF REACTOR INVENTORY

6.0 MODIFICATIONS

6.1 Introduction

As a consequence of 1) the original hot shutdown analysis, the results of which are documented in the "Fire Protection Safe Shutdown Analysis Dresden Station Units 2&3," June 1978 (F.P.P.D.P. Volumes 1 and 2), 2) the 1982 Appendix R Evaluation, the results of which are documented in the Dresden 2&3 "Fire Protection Associated Circuits Analysis and Modifications Report," (F.P.P.D.P. Volumes 1 and 2), and 3) the 1984 Appendix R Reverification, the results of which are presented in this report, several modifications were identified. These modifications were implemented to upgrade the level of fire protection at the station and to satisfy, in conjunction with certain exemptions, the requirements of Appendix R.

The modifications are of two general types:

1. Safe shutdown system or alternate shutdown modifications, e.g., rerouting of cables, installation of local control capability, and installation of new electrical feeds; and

2. Fire protection system modifications, e.g., upgrading of barriers and installation of detection systems.

The safe shutdown system modifications and the circumstances giving rise to them are described in Section 6.2. The fire protection system modifications are described in Section 6.3. Table 6.1-1 contains the completion dates for all modifications identified in Sections 6.2 and 6.3.

Table 6.1-1

Completion Schedule For Identified Modifications

Section	Modification	Completion Date
6.2.1.1	Provide Local Isolation Condenser Water Level Indication	Complete
6.2.1.2	Provide Local Breaker Control	Complete
6.2.1.3	*Provide Local Control for Condensate Transfer Pump 2A (the 2A pump is no longer credited for SSD)	Complete
6.2.1.4	Provide Alternate Power Feeds to Inboard Isolation Condenser Valves	Complete
6.2.1.5	Deleted	
6.2.1.6	Provide Access to Valves in Isolation Condenser Pipe Chase	Complete
6.2.1.7	Provide Secondary CRD Pump Cooling Water	Complete
6.2.1.8	Provide ADS Inhibit Switch for Auto Blowdown	Complete
6.2.2.1	Provide Local Isolation Condenser Water Level Indication	Complete
6.2.2.2	Provide Local Breaker Control	Complete
6.2.2.3	*Provide Local Control for Condensate Transfer Pump 3A (The 3A pump is no longer credited for SSD)	Complete
6.2.2.4	Provide Alternate Power Feeds to Inboard Isolation Condenser Valves	Complete
6.2.2.5	Deleted	
6.2.2.6	Provide Access to Valves in Isolation Condenser Pipe Chase	Complete
6.2.2.7	Provide Secondary CRD Pump Cooling Water	Complete
6.2.2.8	Provide ADS Inhibit Switch for Auto Blowdown	Complete
6.2.3.1.1	Bifurcate 2/3 Diesel Generator Bus Duct	Complete
6.2.3.1.2	Electrically Isolate 2/3 Diesel Generator and Auxiliaries	Complete
6.2.3.1.3	Relocate Local Control Station for MCC 38-1 Main Feed	Complete
6.2.3.1.4	Install Transfer Switch for 2/3 Diesel Generator Auxiliaries	Complete
6.2.3.1.5	Reroute Unit 2 Cables for the 2/3 Diesel Generator and Auxiliaries	Complete
6.2.3.1.6	Modification to 2/3 Diesel Generator Breakers Feeding 4kV SWGR	Complete
6.2.3.2	CRD Pump Discharge Header Crosstie Piping	Complete
6.2.4	Modification to Provide Access to Valves for Cold Shutdown	Complete
6.2.5	Modification to provide alternate access to the Unit 2 CRD pumps	Complete
6.2.6	Modification to Provide Motor Operators for CRD Pump Discharge Valves MO2(3)-0301-2A(B)	Complete
6.3.1.1	Provide Fire Detection in Unit 2 Reactor Building	Complete
6.3.1.2.1	Modifications to Barriers Separating Fire Areas RB2-I and RB2-II	Complete

* Modification installed in 1997 credited the Diesel Driven Isolation Condenser makeup pumps to deliver the preferred source of make-up water to the ISCO during a fire. Therefore, the condensate transfer pumps are no longer credited for SSD but still available.

Table 6.1-1

Completion Schedule For Identified Modifications

Section	Modification	Completion Date
6.3.1.2.2	Modifications to Barriers Separating Fire Areas RB2-II and RB 2/3	Complete
6.3.1.3	Provide Protection for Cables in Unit 2 Reactor Building	Complete
6.3.2.1	Provide Fire Detection in Unit 3 Reactor Building	Complete
6.3.2.2.1	Modifications to Barriers Separating Fire Areas RB3-I and RB3-II	Complete
6.3.2.2.2	Modifications to Barriers Separating Fire Areas RB3-II and RB 2/3	Complete
6.3.2.2.3	Modification to Barriers Separating Fire Zone 1.3.1 and Fire Area RB3-II	Complete
6.3.2.3	Provide Protection for Cables in Unit 3 Reactor Building	Complete
6.3.3.1	Upgrade Barrier Between Units 2 and 3 Reactor Building	Complete
6.3.3.2	Protect the 2/3 Diesel Generator Unit 2 Bus Duct in Unit 3 Reactor Building with 1-Hour Barrier	Complete
6.3.3.3	Protect Unit 2 Power and Control Cables for the 2/3 Diesel Generator and Auxiliaries in the Unit 3 Reactor Building with 1-Hour Barrier	Complete
6.3.4.1	Provide Additional Fire Detection and Suppression Systems on the Ground and Mezzanine Floor Levels of Turbine Building	Complete
6.3.4.2	Provide Fire Suppression System on Unit 3 CRD Pump Floor	Complete
6.3.4.3	Seal All Penetrations to Fire Area TB-V	Complete
6.3.4.4	Protect Cable Tray in Ground Floor Access Corridor with 1-Hour Fire Barrier	Complete
6.3.4.5	Protect Cable Risers Adjacent to TB-V	Complete
6.3.5.1	Protect Diesel Generator 2/3 Cooling Water Pump Transfer Switch with 1-Hour Barrier	Complete
6.3.5.2	Provide Automatic Suppression and Detection Systems and Curbing in Lower Level of Crib House	Complete
6.3.5.3	Provide Curbing and Automatic Suppression in Upper Level of Crib House	Complete

6.2 Safe Shutdown System Modifications

6.2.1 Unit 2 Safe Shutdown System Modifications

6.2.1.1 Provide Local Isolation Condenser Water Level Indication

A sight glass was installed on the isolation condenser to provide the operator with the capability of local visual monitoring of the shell side water level if the control room indicator LI-2-1340-2 is disabled. The sight glass is located at the isolation condenser on Elevation 589 feet in the Reactor Building and made operable by opening two hand operated valves. Since no cable separation analysis was performed for LI-2-1340-2, credit for the sight glass is taken throughout Dresden 2. This modification is used for alternative shutdown paths B1 and A2. This modification was identified during the 1978 hot shutdown analysis (see F.P.P.D.P. Volumes 1 and 2).

6.2.1.2 Provide Local Breaker Control

Local breaker control is installed for the following Division I breakers:

1. 4-kV SWGR 2/3 diesel generator feed breaker to SWGR 23-1,
2. 4-kV SWGR tie breakers between SWGR 23-1 and SWGR 23,
3. 4-kV to 480-kV SWGR feed breakers from SWGR 23-1 to SWGR 28,
4. Feeds from SWGR 23 to control rod drive pump 2A, and
5. Feed from SWGR 23 to service water pump 2A.

These modifications were installed to allow the operator to isolate faults in the normal breaker controls and to locally control the breaker at the switchgear. These modifications together with the electrical isolation and control capability provided for the 2/3 diesel generator and its auxiliaries (see Subsection 6.2.3.2) assure that onsite auxiliary electrical power is available to the control rod drive pump, the service water pump, and the condensate transfer pump (The 2A and 3A pumps are no longer credited for SSD). These modifications are applicable to Fire Area TB-V which is composed of Fire Zones 2.0 (Control Room) and 6.2 (AEER). Fire Area TB-V contains control cables for both Units 2 and 3. Credit is taken for this modification in alternative shutdown path A2, for the above mentioned fire zones. This modification was identified as being needed during the 1978 hot shutdown analysis (see F.P.P.D.P. Volumes 1 and 2).

Local breaker isolation and control is also installed for the following Division II breakers:

1. 4-kV SWGR Unit 2 diesel generator 2 feed breaker to SWGR 24-1,
2. 4-kV SWGR tie breakers between SWGR 24 and 24-1,
3. 4-kV to 480-V SWGR feed breaker from SWGR 24-1 to SWGR 29,
4. Feeds from SWGR 24 to control rod drive pump 2B, and
5. Feeds from SWGR 24 to service water pumps 2B and 2/3.

However, no credit is taken in the current safe shutdown analysis for this capability.

6.2.1.3 Provide Local Control for Condensate Transfer Pump 2A

The local control capability has been provided for condensate transfer pump 2A. To locally control the pump, it is necessary to electrically isolate the normal control circuits to the pump. This isolation is accomplished by pulling one fuse at MCC 28-2 (see Exemption Requests, F.P.R. Volume 4).

This modification together with local control of 2/3 diesel generator (see Subsection 6.2.3.1) and local breaker control (see Subsection 6.3.1.2) assure that power and control capability is available to the condensate transfer pumps. This modification is applicable to Fire Area TB-V which is composed of Fire Zones 2.0 (Control Room) and 6.2 (AEER.) This fire area contains control cables for both Units 2 & 3. Credit is no longer taken for this modification in alternate shutdown path A2 in the above mentioned fire zones. This modification was identified during the 1978 hot shutdown analysis. Similar isolation and control capability is installed for condensate transfer pump 2B. However, no credit is taken for either pumps' capability in the current analysis.

Note: The original 10CFR50 Appendix R analysis used the condensate transfer pump 2A to supply the initial makeup water to the isolation condenser. Initial makeup to the isolation condenser is now provided by the isolation condenser makeup pumps. Therefore, CST transfer pump 2A is no longer credited for SSD.

6.2.1.4 Provide Alternate Power Feeds to Inboard Isolation Condenser Valves

Alternate electrical power and control feeds have been installed on each of the two inboard, i.e., inside primary containment, isolation condenser valves MO2-1301-1 and MO2-1301-4. These valves are normally open and are required to remain open for isolation condenser operation. The possible spurious closure of these valves due to fire damage of their control circuits would defeat isolation condenser operation. Since the valves are located inside the inerted drywell, a manual operation to rectify the spurious operation is not feasible. The new alternate feeds were installed to provide means to override the effects of spurious signals on these valves (see Figure 6.2-1).

These alternate feeds are routed through the Reactor Building torus area (Fire Zone 1.1.2.1) while the normal feeds to these valves are located on the next elevation up (Fire Zone 1.1.2.2). The alternate feeds are protected by a 1-hour fire wrap in Fire Zone 1.1.2.1 (see Subsection 6.3.1.3 for associated fire protection system modifications).

The alternate control panels for the two Unit 2 inboard valves are located in the 2/3 diesel generator room (Fire Zone 9.0.C). This location was chosen because an operator would normally be at the 2/3 diesel generator control panels in the 2/3 diesel generator room in the event of a fire requiring shutdown.

The alternate feeds for the Unit 2 valves are powered from Unit 3 480-V MCC 38-1, located in Fire Zone 1.1.1.2. A transfer switch has been installed in Fire Zone 1.3.2 (part of Fire Area RB2-I) where the cables to the inboard valves enter the drywell. This switch allows the valves to be opened if they spuriously close since it will select that power feed, normal or alternate, which is energized. (Assuming the Unit 2 electrical equipment has been damaged by the fire, the feed which would be energized would be the alternate feed from MCC 38-1.)

This modification is applicable to Fire Areas RB2-II, TB-I, TB-II, and TB-V where control cables to MO2-1301-1 and MO2-1301-4 are routed. Credit is taken for this modification in alternate shutdown paths B1 and A2.

An isolation switch is also installed in Fire Zone 1.3.2 to manually select the power feed to the inboard valves. If a fire in Unit 3 were to damage MCC 38-1 or the new controls in the 2/3 diesel generator room, a spurious signal could possibly close the Unit 2 valves via the newly installed alternate feed. To defend against this, an operator will enter Fire Zone 1.3.2 and set the isolation switch to its isolation position which will allow control to be established from the control room only. (A spurious signal from the 2/3 diesel generator room (Fire Area RB2/3) control panel or from MCC 38-1 (Fire Area RB3-II) would cause the transfer switch to take control away from the control room. The isolation position on the isolation switch would override the transfer switch thus returning control to the control room.) This capability is applicable to shutdown path E and Fire Areas RB2/3 and RB3-II where the alternate controls are located. This modification was identified in the Associated Circuits Report, June 1982 (F.P.P.D.P. Volumes 1 and 2).

6.2.1.5 (Deleted)

6.2.1.6 Provide Access to Valves in Isolation Condenser Pipe Chase

An access ladder was provided in the isolation condenser pipe chase (Fire Zones 1.1.2.5.B and 1.1.2.5.C) to facilitate the manual operation of isolation condenser valves MO2-1301-2 and MO2-1301-3 which are located in Fire Zones 1.1.2.5.B and 1.1.2.5.C, respectively. The ladder allows access to the valves from the isolation condenser floor (Fire Zone 1.1.2.5.A, Reactor Building elevation 589 feet 0 inches) which is part of Fire Area RB2-I along with the pipe chase.

The grating which acts as flooring between Fire Zones 1.1.2.5.A and 1.1.2.5.B and Fire Zones 1.1.2.5.B and 1.1.2.5.C was cut to allow installation of the ladder for access to the valves. Providing these means of access ensures that an operator can, if necessary, reach the valves without entering the area of the fire. This modification was identified in the 1984 reevaluation and is used in shutdown paths B1 and A2.

6.2.1.7 Provide Secondary CRD Pump Cooling Water

The isolation condenser is a closed shutdown system, therefore, the only reduction in reactor water level is caused by shrinkage and leakage. A maximum of 25 gpm leakage is specified by technical specification limits. The CRD pumps are used to inject makeup water into the reactor when shutdown is achieved by using isolation condenser paths A, A1, A2, or E.

The Unit 2 CRD pumps are located in Fire Zone 8.2.2.A on the 495-foot 0-inch elevation of the Turbine Building. The normal pump cooling water is supplied by the Turbine Building Closed Cooling Water (TBCCW) system. Upon loss of offsite power, several operator actions would be required to initiate the TBCCW system. Additionally, if the TBCCW system is damaged by a fire no CRD cooling water would be available. Therefore, an alternate source for cooling the CRD pumps has been installed from the service water system. The service water system is capable of being powered from the onsite emergency ac system. The hot shutdown analysis demonstrates at

least one of five pumps is available. Any one of the five service water pumps is capable of handling the necessary cooling loads for shutdown of both units.

In order to initiate the service water flow to a CRD pump, the service water system must be initiated and the locked-closed manual valve to the specific CRD pump must be opened. The valves are located in the CRD pump room (Fire Zone 8.2.2.A) and thus are accessible for opening whenever the CRD pumps are available. This modification is applicable to isolation condenser paths A, A1, A2, or E. It is applicable to fire areas RB3-II, RB-2/3, TB-II, TB-III, TB-IV, TB-V, Radwaste Building, and Crib House. This modification was identified in the Associated Circuits Report, June 1982 (F.P.P.D.P. Volumes 1 and 2).

6.2.1.8 Provide Inhibit Switch for Auto Blowdown

An ADS "Auto Blowdown Inhibit" switch has been added to MCB panel 902-3. This switch, if turned to "INHIBIT" while the previously existing key-operated ERV's "MANUAL-OFF-AUTO" switch is in the "OFF" position, will prevent a spurious blowdown from occurring due to a fire anywhere outside of the Control Room and Auxiliary Electrical Equipment Room (Zones 2.0 and 6.2, Fire Area TB-V). For a fire in Fire Area TB-V, it is possible for hot shorts to occur which would defeat these switches. However, credit is taken for the operators to actuate these switches immediately after scramming the reactor. Once outside Fire Area TB-V, the operators are directed by shutdown procedures to manually trip all 125-Vdc feeds to the auto blowdown logic. This action is performed at the 125-Vdc distribution panels in the Turbine Building.

This modification was identified in the 1984 reanalysis and is applicable to all fire areas.

6.2.2 Unit 3 Safe Shutdown System Modifications

6.2.2.1 Provide Local Isolation Condenser Water Level Indication

A sight glass was installed on the isolation condenser to provide the operator with the capability of local visual monitoring of the shell side water level if the control room indicator LI-3-1340-2 is disabled. The sight glass is located at the isolation condenser on Elevation 589 feet in the Reactor Building and made operable by opening two hand operated valves. Since no cable separation analysis was performed for LI-3-1340-2, credit for the sight glass is taken throughout Dresden 3. This modification is used for alternative shutdown paths A1 and B2. This modification was identified during the 1978 hot shutdown analysis (see F.P.P.D.P. Volumes 1 and 2).

6.2.2.2 Provide Local Breaker Control

Local breaker control is installed for the following Division I breakers:

1. 4-kV SWGR 2/3 diesel generator feed breaker to SWGR 33-1,
2. 4-kV SWGR normal feed breakers to SWGR 33-1 and SWGR 33,
3. 4-kV to 480-V SWGR feed breakers from SWGR 33-1 to SWGR 38,
4. Feeds from SWGR 33 to control rod drive pump 3A, and
5. Feeds from SWGR 33 to service water pump 3A.

These modifications were installed to allow the operator to isolate faults in the normal breaker controls and to locally control the breaker at the switchgear. These modifications together with the electrical isolation /control capability provided for the 2/3 diesel generator and its auxiliaries, (see Subsections 6.2.3.1 and 6.3.4.4), assure that onsite auxiliary electrical power is available to the control rod drive pump, the service water pump, and the condensate transfer pumps (the 2A and 3A pumps are no longer credited for SSD). These modifications are applicable to Fire Area TB-V which is composed of Fire Zones 2.0 (Control Room) and 6.2 (AEER). TB-V contains control cables for both Units 2 & 3. Credit is no longer taken for this modification in alternative shutdown path B2 for the above mentioned fire zones. This modification was identified as being needed during the 1978 hot shutdown analysis (see F.P.P.D.P. Volumes 1 and 2).

Local breaker isolation and control is also installed for the following Division II breakers:

1. 4-kV SWGR Unit 3 diesel generator feed breaker to 34-1,
2. 4-kV SWGR tie breakers between SWGR 34 and 34-1,
3. 4-kV to 480-V SWGR feed breaker from SWGR 34-1 to SWGR 39,
4. Feed from SWGR 34 to control rod drive pump 2B, and
5. Feed from SWGR 34 to the service water pump 3B.

However, no credit is taken in the current analysis for this capability.

6.2.2.3 Provide Local Control for Condensate Transfer Pump 3A

The local control capability has been provided for condensate transfer pump 3A. To locally control the pump, it is necessary to electrically isolate the pump. This isolation is accomplished by pulling one fuse at MCC 38-2 (see Exemption Requests, F.P.R. Volume 4).

This modification together with local control of diesel generators 2 & 3 (see Subsection 6.2.3.2) and local breaker control (see Subsection 6.2.2.2) assures that power and control capability is available to the condensate transfer pumps. This modification is applicable to Fire Area TB-V which is composed of Fire Zones 2.0 (Control Room) and 6.2 (AEER). This fire area contains control cables for both Units 2 & 3. Credit is no longer taken for this modification in alternate shutdown path B2 in the above mentioned fire zones. This modification was identified during the 1978 hot shutdown analysis (see F.P.P.D.P. Volumes 1 and 2). Similar isolation and control capability is installed for condensate transfer pump 3B. However, no credit is taken for either pumps' capability in the current analysis.

Note: The original 10CFR50 Appendix R analysis used the condensate transfer pump 3A to supply the initial makeup water to the isolation condenser. Initial makeup to the isolation condenser is now provided by the isolation condenser makeup pumps. Therefore, CST transfer pump 3A is no longer credited for SSD.

6.2.2.4 Provide Alternate Power Feeds to Inboard Isolation Condenser Valves

Alternate electrical power and control feeds have been installed to each of the two inboard, i.e., inside primary containment, isolation condenser valves MO3-1301-1 and MO3-1301-4. These valves are normally open and are required to remain open for isolation condenser operation. The possible spurious closure of these valves due to fire damage to their control circuits would defeat isolation condenser operation. Since the valves are located inside the inerted drywell, manual operation to rectify the spurious operation is not feasible. The new alternate feeds were installed to upgrade the reliability of the isolation condenser system and provide means to override the effects of spurious signals on these valves (see Figure 6.2-1).

These alternate feeds are routed through the Reactor Building torus area (Fire Zone 1.1.1.1) while the normal feeds to these valves are located on the next elevation up (Fire Zone 1.1.1.2). The alternate feeds are protected by a 1-hour fire wrap in Fire Zone 1.1.1.1 (see Subsection 6.3.2.3 for associated fire protection system modifications).

The alternate control panels for the two Unit 3 inboard valves are located in the 2/3 diesel generator room (Fire Zone 9.0.C). This location was chosen because an operator would normally be at the 2/3 diesel generator control panels in the 2/3 diesel generator room in the event of a fire requiring shutdown.

The alternate feeds for the Unit 3 valves are powered from Unit 2 480-V MCC 28-1, located in Fire Zone 1.1.2.2. A transfer switch has been installed in Fire Zone 1.4.1 (part of Fire Area RB3-I) where the cables to the inboard valves enter the drywell. This switch allows the valves to be opened if they spuriously close since it will select that power feed, normal or alternate, which is energized. (Assuming that Unit 3 electrical equipment has been damaged by the fire, the feed which would be energized would be the alternate feed from MCC 28-1.) This modification is applicable to Fire Areas RB3-II, TB-II, TB-III, and TB-V where control cables to MO3-1301-1 and MO3-1301-4 are routed. Credit is taken for this modification in alternate shutdown paths A1 and B2.

An isolation switch is also installed in Fire Zone 1.4.1 to manually select the power feed to the inboard valves. If a fire in Unit 2 were to damage MCC 28-1 or the new controls in the 2/3 diesel generator room, a spurious signal could possibly close the Unit 3 valves via the newly installed alternate feed. To defend against this, an operator will enter Fire Zone 1.4.1 and set the isolation switch to its isolation position which will allow control to be established from the control room only. (A spurious signal from the 2/3 diesel generator room (Fire Area 9.0.C) control panel or from MCC 28-1 (Fire Area RB2-II) would cause the transfer switch to take control away from the control room. The isolation position on the isolation switch would override the transfer switch thus returning control to the control room.) This capability is applicable to shutdown path F and Fire Areas RB2/3 and RB2-II where the alternate controls are located. These modifications

were identified in the Associated Circuits Report, June 1982 (F.P.P.D.P. Volumes 1 and 2).

6.2.2.5 (Deleted)

6.2.2.6 Provide Access to Valves in Isolation Condenser Pipe Chase

An access ladder was provided in the isolation condenser pipe chase (Fire Zones 1.1.1.5.B and 1.1.1.5.C) to facilitate the manual operation of isolation condenser valves MO3-1301-2 and MO3-1301-3 which are located in Fire Zones 1.1.1.5.B and 1.1.1.5.C, respectively. The ladder allows access to the valves from the isolation condenser floor (Fire Zone 1.1.1.5.A, Reactor Building elevation 589 feet 0 inches) which is part of Fire Area RB3-I along with the pipe chase. The grating which acts as flooring between Fire Zones 1.1.1.5.A and 1.1.1.5.B and Fire Zones 1.1.1.5.B and 1.1.1.5.C was cut to allow installation of the ladder for access to the valves. Providing these means of access ensures that an operator can, if necessary, reach the valves without entering the area of the fire. This modification was identified in the 1984 reevaluation and is used in shutdown paths A1 and B2.

6.2.2.7 Provide Secondary CRD Pump Cooling Water

The isolation condenser is a closed shutdown system, therefore, the only reduction in reactor water level is caused by shrinkage and leakage. A maximum of 25 gpm leakage is specified by technical specification limits. The CRD pumps are used to inject makeup water into the reactor when shutdown is achieved by using isolation condenser paths B, B1, B2, or F.

The Unit 3 CRD pumps are located in Fire Zone 8.2.2.B on the 495-foot 0-inch elevation of the Turbine Building. The normal pump cooling water is supplied by the Turbine Building Closed Cooling Water (TBCCW) system. Upon loss of offsite power, several operator actions would be required to initiate the TBCCW system. Additionally, if the TBCCW system is damaged by a fire, no CRD cooling water would be available. Therefore, an alternate source for cooling the CRD pumps has been installed from the service water system. The service water system is capable of being powered from the onsite emergency ac system. The hot shutdown analysis demonstrates at least one of the five pumps is available. Any one of the five service water pumps is capable of handling the necessary cooling loads for shutdown of both units.

In order to initiate the service water flow to a CRD pump, the service water system must be initiated and the locked-closed manual valve to the specific CRD pump must be opened. The valves are located in the CRD pump room (Fire Zone 8.2.2.B) and thus are accessible for opening whenever the CRD pumps are available. This modification is applicable to all isolation condenser paths B, B1, B2, and F that use the Unit 3 CRD pumps. It applies to Fire Areas RB2-II, RB-2/3, TB-I, TB-II, TB-IV, TB-V, Radwaste Building, and Crib House. This modification was identified in the Associated Circuits Report, June 1982 (see F.P.P.D.P. Volumes 1 and 2).

6.2.2.8 Provide Inhibit Switch for Auto Blowdown

An ADS"Auto Blowdown Inhibit" switch has been added to MCB panel 903-3. This switch, if turned to "INHIBIT" while the previously-existing key-operated ERV's "MANUAL-OFF-

AUTO" switch is in the "OFF" position, will prevent a spurious blowdown from occurring due to a fire anywhere outside of the Control Room and Auxiliary Electrical Equipment Room (Zones 2.0 and 6.2, Fire Area TB-V). For a fire in Fire Area TB-V, it is possible for hot shorts to occur which would defeat these switches. However, credit is taken for the operators to actuate these switches immediately after scramming the reactor. Once outside Fire Area TB-V, the operators are directed by shutdown procedures to manually trip all 125-Vdc feeds to the auto blowdown logic. This action is performed at the 125-Vdc distribution panels in the Turbine Building.

This modification was identified in the 1984 reanalysis and is applicable to all fire areas.

6.2.3 Units 2 and 3 Safe Shutdown System Modifications

6.2.3.1 2/3 Diesel Generator System Modifications

Several modifications are proposed for the 2/3 diesel generator and Division 1 electrical distribution system. These modifications have three main purposes:

1. To ensure that faults on 2/3 diesel generator control cabling will not interfere with local operation and control of the 2/3 diesel generator and its auxiliaries,

2. To ensure that a fire affecting the power feeds from the 2/3 diesel generator to one unit will not affect the ability of the 2/3 diesel generator to feed the other unit, and

3. To ensure that the 2/3 diesel generator can feed both units when necessary.

6.2.3.1.1 Bifurcate 2/3 Diesel Generator Bus Duct

The 2/3 diesel generator bus duct was bifurcated as shown in Figure 6.2-3. A new 4-kV SWGR has been installed in the diesel generator room and each branch is provided with breaker isolation. This modification prevents faults on one unit's 4-kV feed from affecting the feed to the other unit. Currently, a fault on the 4-kV feed to one unit could incapacitate the 2/3 diesel generator's ability to feed either unit. The Unit 2 bus duct branch was wrapped to an equivalent 1-hour level of protection for its entire routing in the Unit 3 Reactor Building (Fire Zone 1.1.1.2). (See Subsection 5.3.3.2.) This modification is necessary for alternate shutdown paths A1 and B1. It is applicable to Fire Areas RB2-II and RB3-II. This modification was identified in the Associated Circuits Report, June 1982 (F.P.P.D.P. Volumes 1 and 2).

6.2.3.1.2 Electrically Isolate 2/3 Diesel Generator and Auxiliaries

The power and control cables for the 2/3 diesel generator fuel oil transfer pump and the 2/3 diesel generator room vent fan run to MCC's located in Fire Areas RB2-II and RB3-II (Fire Zones 1.1.1.2 and 1.1.2.2). The control cables for the 2/3 diesel generator cooling water pump are routed through Fire Areas RB2-II and RB3-II and into Fire Areas TB-I, TB-II, and TB-III. The control cables from the main control room to the 2/3 diesel generator are routed through Fire Areas TB-V, TB-III, and RB3-II. The isolation condenser shutdown paths utilized by the above fire areas (A1, A2, B1, B2) all make use of the 2/3 diesel generator. A fire in one of the above

fire zones could cause a cable fault making the 2/3 diesel generator unavailable. To prevent this, the power and control cables from both units to the 2/3 diesel generator, the 2/3 diesel generator room vent fan, the 2/3 diesel generator fuel oil transfer pump, and the 2/3 diesel generator cooling water pump can be electrically isolated and locally controlled in the 2/3 diesel generator room. These modifications protect the diesel and its auxiliaries from faults on either unit's cabling. Additionally, these cables are wrapped in a 1-hour rated wrap as described in Subsection 5.3.3.3. This modification was identified in the Associated Circuits Report, June 1982 (F.P.P.D.P. Volumes 1 and 2).

6.2.3.1.3 Relocated Local Control Station for MCC 38-1 Main Feed

The 480-V MCC's 38-1 and 28-1 are each capable of controlling and powering the 2/3 diesel generator fuel oil transfer pump and the 2/3 diesel generator room vent fan. MCC 38-1 is located in the Unit 3 Reactor Building in Fire Zone 1.1.1.2. MCC 28-1 is located in the Unit 2 Reactor Building in Fire Zone 1.1.2.2. Since MCC 38-1 and MCC 28-1 each had a local control station located in the Central Zone Group of the Turbine Building (TB-II) in Fire Zones 8.2.6.C and 8.2.5.C, respectively, a fire in TB-II could affect both local control stations thus affecting the two MCC's in the Reactor Buildings and potentially resulting in the loss of availability of the 2/3 diesel generator vent fan and fuel oil transfer pump. Fire Area TB-II makes use of the isolation condenser shutdown paths A2 and B2.

In order to prevent such an event, the local control station for MCC 38-1 was relocated to the 2/3 diesel generator room (Fire Zone 9.0.C). This ensures that at least one source of power for the 2/3 diesel generator auxiliaries will be available for a fire in the Turbine Building. This modification was identified in the 1984 analysis.

6.2.3.1.4 Install Transfer Switch for 2/3 Diesel Generator Auxiliaries

The 2/3 diesel generator cooling water pump is located in the Crib House (Fire Zone 11.3) and has both Unit 2 and Unit 3 power feeds available to it. Currently, these two feeds are interconnected at a junction box near the cooling water pump. A fault on one feed would result in making the pump inoperable.

An automatic transfer switch was installed at the pump to eliminate the problem. The switch selects that feed which is energized and locks out the other feed. (See Figure 6.2-4.)

This modification along with associated fire protection modifications in the Crib House including a 1-hour barrier around the transfer switch and related conduit (see Subsection 6.3.5) will ensure that either the 2/3 diesel generator cooling water pump or both cooling water pumps for the dedicated diesels will be available for a fire in the Crib House. In addition, the transfer switch protects the 2/3 diesel generator cooling water pump from fire related faults in the pump power cable in the Turbine Building. The feeds from the two units run through this building but are located in separate fire areas or protected (see Subsections 6.3.5.1 and 6.3.5.2) so that a fire could not affect both feeds except in the 2/3 diesel generator room itself. (The dedicated diesels are used for a fire in the 2/3 diesel generator room.) This modification was identified in the 1984 analysis.

A transfer switch also has been installed in the power cable connections to Unit 2 and Unit 3 at both the 2/3 diesel generator vent fan and the 2/3 diesel generator fuel oil transfer pump. Previously, both the Unit 2 and the Unit 3 power feeds were joined at a junction box near the equipment such that a fault in the Unit 2 or Unit 3 power feed would disable the equipment. This modification was identified in the Associated Circuits Report, June 1982 (F.P.P.D.P. Volumes 1 and 2).

6.2.3.1.5 Reroute Unit 2 Cables for the 2/3 Diesel Generator and Auxiliaries

The Unit 2 power and control feeds to the 2/3 diesel generator and its auxiliaries (fuel oil transfer pump, cooling water pump, and vent fan) exit the 2/3 diesel generator room (Fire Zone 9.0.C) into Unit 3 Reactor Building Fire Zone 1.1.1.2. The cables were routed through this fire zone to approximately column L.5 before entering the Unit 2 Reactor Building. The cables have been rerouted so that they make a much shorter run through the Unit 3 Reactor Building thus entering the Unit 2 Reactor Building at approximately column N. In addition, these cables are protected by a 1-hour cable wrap (see Subsection 6.3.3.2) where they run on the Unit 3 side. These modifications ensure that a fire in RB3-II which would use shutdown path A1 will not prevent the 2/3 diesel generator from powering Unit 2 equipment which would in turn be used to shut down Unit 3. This modification was identified in the Associated Circuits Report, June 1982 (F.P.P.D.P. Volumes 1 and 2).

6.2.3.1.6 Modification to 2/3 Diesel Generator Breakers Feeding 4-kV SWGR

The 2/3 breaker's control logic has been modified to allow the operator to supply power to both Units' Division I, 4-kV SWGR simultaneously by overriding the unit selection interlocks. Local operator action at SWGR's 23-1 or 33-1 is necessary. For shutdown paths A2 and B2 in fire areas TB-II and TB-V credit is taken for using the 2/3 diesel generator to supply auxiliary electric power to CRD pumps 2A and 3A and condensate transfer pumps 2A and 3A(the 2A and 3A pumps are no longer credited for SSD) simultaneously because simultaneous use of CRD pumps 2A and 3A and Condensate Transfer Pumps 2A and 3A is necessary. This modification was identified in the Associated Circuits Report, June 1982 (F.P.P.D.P. Volumes 1 and 2).

6.2.3.2 CRD Pump Discharge Header Crosstie Piping

Since the isolation condenser is a closed cooling system for the reactor, large amounts of makeup water to the vessel are not needed. One of the control rod drive pumps taking suction from the condensate storage will provide all necessary makeup required due to primary coolant shrinkage or leakage. Crosstie piping was installed to connect the CRD pump discharge headers of the two units. This crosstie line is normally isolated by hand operated valves located in Fire Zone 8.2.6.C in the Central Zone Group. This valve is opened when the unaffected units CRD pumps are used for makeup to the affected unit's reactor vessel. This modification is necessary for alternate shutdown paths A1 and B1. It is applicable to Fire Areas RB2-I, RB3-II, TB-I, and TB-III. This modification was identified in the Associated Circuits Report, June 1982 (F.P.P.D.P. Volumes 1 and 2).

6.2.3.3 Provide Air Vent Valves for the MSIV Air Lines

MSIV supply air vent valves have been installed outside the exclusion area in the access corridor. These valves were installed to provide for positive closure of the MSIVs. The MSIVs are identified for immediate closure in the Appendix R safe shutdown procedures. This modification was identified as part of the 1984 analysis.

6.2.4 Modifications To Provide Access to Valves for Cold Shutdown

Access galleries are provided for the following motor-operated valves located above the Unit 2 and 3 shutdown Cooling Heat Exchangers.

MO2-1001-4A	MO3-1001-4A
MO2-1001-4B	MO3-1001-4B
MO2-1001-4C	MO3-1001-4C

Operation of these valves is required for cold shutdown. In the event a fire disables electrical feeds to these valves, cold shutdown can be achieved through manual valve operation. The galleries permit access to these valves for such operation. This modification was identified in the 1984 analysis.

6.2.5 Modification to Provide Alternate Access to the Unit 3 CRD Pumps

The CRD pumps are used to provide reactor makeup in the event of a fire for a majority of the plant's fire areas. For a fire affecting the Fire Area TB-II, both a Unit 2 and Unit 3 pump are required to be operated. Access to the Unit 2 pump would not be hindered by such a fire; however, access to the Unit 3 pump would. This modification provides an access ladder from the Unit 3 Turbine Building ground floor to the CRD pump elevation through the open equipment hatch. Emergency lighting has been provided for this access route. This modification was identified in the 1984 reevaluation evaluation and is used in shutdown paths B2.

6.3 Fire Protection System Modifications

6.3.1 Unit 2 Reactor Building Fire Protection System Modifications

6.3.1.1 Provide Fire Detection in Unit 2 Reactor Building

Fire detection systems are installed which provide coverage for virtually all areas of the Unit 2 Reactor Building except for the refuel floor level. The installation of this additional detection has a twofold purpose:

1. To provide the operators with information which will assist them in determining what shutdown paths are available in the event of a fire, and

2. To more closely conform to the criteria of Appendix R as clarified in NRC Generic Letter 83-33.

The type of detection system and the area of coverage are given below by Unit 2 Reactor Building elevation. (The inerted drywell which runs through all elevations is not described.) Justification for the lack of complete area suppression and detection is provided in Sections 3.4 and 3.5 of the Exemption Requests (F.P.R. Volume 4). The addition of this detection was identified in the 1984 analysis.

ELEVATION	DESCRIPTION OF FIRE DETECTION
476 feet 6 inches	There are three fire zones on this elevation. Fire Zone 1.1.2.1, the torus area, is provided with linear thermal detection in and under all the cable trays routed in this zone. Since the cabling represents the only significant combustible material in the zone, this method of detection is sufficient to ensure that any fire would be detected. Fire Zones 11.2.1 and 11.2.2, the southwest and southeast corner rooms, respectively, contain the LPCI and core spray equipment. They are also provided with a linear thermal fire detection system throughout.
517 feet 6 inches	Two fire zones, 1.1.2.2 and 1.3.2, are located on this elevation. Fire Zone 1.1.2.2 is provided with an ionization-type fire detection system. Photo electric detectors are used in Fire Zone 1.3.2 because of environmental conditions.
545 feet 6 inches	Two fire zones are located on this elevation, 1.1.2.5.C and 1.1.2.3.

ELEVATION	DESCRIPTION OF FIRE DETECTION
	Fire Zone 1.1.2.5.C, which is part of the isolation condenser pipe chase extending down from the 589-foot 0-inch elevation, does not contain any detection system. However, it is directly connected to Fire Zone 1.1.2.5.A at the 589-foot 0-inch elevation which is provided with ionization detection. Fire Zone 1.1.2.3 which occupies the remainder of this elevation is provided with an ionization-type fire detection system everywhere except in the regenerative and nonregenerative heat exchanger areas which are separated from the rest of the zone by substantial shield walls.
570 feet 0 inches	Fire Zones 1.1.2.5.B and 1.1.2.4 are located on this elevation. Fire Zone 1.1.2.5.B, which is part of the isolation condenser pipe chase extending down from the 589-foot 0-inch elevation, does not contain a detection system. However, it is directly connected to Fire Zone 1.1.2.5.A on the 589-foot 0-inch elevation which is provided with ionization detection. Fire Zone 1.1.2.4 occupies the remainder of this elevation except where the fuel pool extends down from the 613-foot 0-inch elevation. This fire zone is provided with an ionization-type detection system throughout except in the cleanup filter and demineralizer area which is separated from the rest of the zone by substantial shield walls. Fixed thermal linear detection which activates a preaction water spray system is provided around the open equipment hatch and stairwell in the ceiling. See Subsection 6.3.1.2.1.
589 feet 0 inches	Fire Zones 1.1.2.5.A and 1.1.2.5.D are located on this elevation. Fire Zone 1.1.2.5.A is provided with an ionization-type fire detection system throughout except for the small fuel pool demineralizer area which is separated from the rest of the zone by shield walls. Fixed thermal linear detection which activates a preaction water spray system is provided around the open equipment hatch and stairwell in the ceiling and floor. See Subsection 6.3.1.2.1. The rest of this elevation, exclusive of the areas occupied by the fuel storage pool and dryer separator storage area, is designated Fire Zone 1.1.2.5.D. This fire zone is currently provided with ionization detection over the standby liquid control area. Further detection was not deemed necessary due to the low combustible loading and lack of safe shutdown equipment and cabling in the zone.

ELEVATION	DESCRIPTION OF FIRE DETECTION
613 feet 0 inches	This elevation is common to both Unit 2 and Unit 3 and is designated as Fire Zone 1.1.1.6/1.1.2.6. No detection is proposed for the zone since the high ceiling (approximately 45 feet) severely limits the effectiveness of any possible detection system. A linear thermal detection system is installed around the open equipment hatch and stairwell in the floor.

6.3.1.2 Upgrade Fire Barriers in Unit 2 Reactor Building

Several barriers which separate areas containing equipment or cabling for different alternate shutdown paths have been upgraded to provide them with a complete (or equivalent) 3-hour fire rating. The subsections which follow describe the modifications made to upgrade these barriers. The modifications are grouped on the basis of which fire areas the modified barriers separate. These modifications were identified in the 1984 analysis.

6.3.1.2.1 Modifications to Barriers Separating Fire Areas RB2-I and RB2-II

Fire Area RB2-I contains equipment necessary to the four isolation shutdown paths (A, B1, A2, and E) and Fire Area RB2-II contains equipment and cabling necessary to the other shutdown method, the HPCI shutdown path C. Because of this, it is necessary to keep a fire in either of these fire areas from spreading to and causing damage in the other fire area. The Appendix R required method for preventing this fire spread is providing complete 3-hour barriers between the fire areas. Because of this and the importance of the two fire areas, modifications have been made for upgrading all of the barriers separating the fire areas to a 3-hour rating (or equivalent, in the case of the 20-foot x 20-foot equipment hatchway, HVAC penetrations, a ladder opening, one mechanical penetration, and stairway between Fire Zones 1.1.2.5.A and 1.1.2.4). Justification, for all areas where a literal 3-hour barrier is not used, is provided in Sections 3.2 and 3.3 of the Exemption Requests (F.P.R. Volume 4). The following list describes the modifications. The list presents the fire zones which are separated by the barrier being modified.

FIRE ZONES SEPARATED BY BARRIER (RB2-I ZONE/RB2-II ZONE)	DESCRIPTION OF BARRIER MODIFICATION
1.3.2/1.1.2.1, 1.1.2.2, 1.1.2.3	Penetrations in the barriers separating Fire Zone 1.3.2 from all other zones except for the louver to the steam chase and adjacent mechanical penetration, the mechanical penetration which contains three pipes and an HVAC duct in the ceiling and a 3' x 4' 3" opening in the floor, are sealed to a 3-hour fire rating. The mechanical penetration in the ceiling is protected by an automatic suppression system which provides a level of protection equivalent to a 3 hour barrier. Fire Zone 1.3.2 is the electrical Division I drywell cable penetration area. A fire in this zone could render the isolation condenser system inoperable if it resulted in the spurious closure of either valve MO2-1301-1 or MO2-1301-4. The primary and secondary electrical feeds to the valves are all Division I and located in the zone. Sealing the barriers surrounding Fire Zone 1.3.2 ensures that a fire inside, which could damage the four Unit 2 isolation condenser shutdown paths, could not damage the alternate HPCI shutdown path C which has no associated cabling or equipment inside Fire Zone 1.3.2. Conversely, a fire from outside could not enter Fire Zone 1.3.2 and damage both the inboard valve feeds.
1.1.2.5.C/1.1.2.3	All penetrations into the isolation condenser pipe chase are sealed to a 3-hour fire rating. This provides a complete 3-hour barrier between RB2-I and RB2-II at the 545-foot 6-inch elevation. This modification, in conjunction with others, ensures that: 1) isolation condenser valves in the pipe chase will not be damaged by a fire in RB2-II, and 2) an operator will be able to manually operate the isolation condenser valves in the pipe chase. Isolation condenser path B1 has been identified for use in the event of a fire in RB2-II.
1.1.2.5.B/1.1.2.4	All penetrations into the isolation condenser pipe chase are sealed to a 3-hour fire rating. This modification, in conjunction with others, ensures that: 1) isolation condenser valves in the pipe chase will not be damaged by a fire in RB2-II, and 2) an operator will be able to manually operate the isolation condenser valves in the pipe chase. Isolation condenser path B1 has been identified for use in the event of a fire in RB2-II.

FIRE ZONES SEPARATED BY BARRIER (RB2-I ZONE/RB2-II ZONE)	DESCRIPTION OF BARRIER MODIFICATION
1.1.2.5.A/1.1.2.4	HVAC ducts which penetrate the floor and connect Fire Zones 1.1.2.5.A and 1.1.2.4 are protected by sprinklers which will provide adequate protection in lieu of fire dampers. All penetrations from Fire Zone 1.1.2.4 to the isolation condenser floor above (Fire Zone 1.1.2.5.A) are sealed except for the 20-foot x 20-foot equipment hatch, a ladder opening, a mechanical penetration near the stairway, the stairway and three HVAC ducts. These openings are protected by an automatic preaction water suppression system actuated by a linear thermal detector or wet pipe sprinklers which provide a level of protection equivalent to a 3-hour barrier. These modifications, along with the sealing of the isolation condenser pipe chase, ensure that: 1) a fire in RB2-II will not affect RB2-I thus ensuring that at least one of the four isolation condenser shutdown paths will be available for a fire in RB2-II, and 2) that a fire in RB2-I will be contained in that fire area and will not affect the HPCI shutdown path C which has components located in RB2-II.
1.1.2.5.A/1.1.2.5.D	A 3-hour fire door is installed between these two zones. The doorway represents the only opening in the wall between the zones. Though Fire Zone 1.1.2.5.D contains no safe shutdown equipment or cabling, the zone is part of RB2-II and a fire could conceivably travel from Fire Zone 1.1.2.4 through unsealed penetrations into Fire Zone 1.1.2.5.D. However, the 3-hour fire door prevents any such fire from propagating to RB2-I.
1.1.2.5.A/1.1.2.6	An automatic preaction suppression system actuated by a linear thermal detector will be installed around the 20-foot x 20-foot equipment hatch and open stairway between the two zones. Other unsealed openings are three HVAC ducts which are afforded protection by an automatic water suppression system and mechanical penetrations. Fire Zone 1.1.2.6, which is part of the refueling floor level, contains no safe shutdown equipment or cabling.

6.3.1.2.2 Modifications to Barriers Separating Fire Areas RB2-II and RB-2/3

Fire Area RB-2/3 contains equipment and cabling required for shutdown path B1, in particular, the 2/3 diesel generator. This shutdown path has been identified for use in the event of a fire in RB2-II. Fire Area RB2-II contains electrical equipment used for the shutdown path E which has been identified for use in the event of a fire in Fire Area RB-2/3. Modifications were proposed to upgrade all of the barriers between these two fire areas to a 3-hour fire rating. The following list describes these modifications. The list presents the fire zones which are separated by the barrier being modified.

FIRE ZONES SEPARATED BY BARRIER (RB2-II ZONE/RB-2/3 ZONE)	DESCRIPTION OF BARRIER MODIFICATION
1.1.2.2/9.0.C	A Class "A" fire door is installed at the entrance to the access hall leading to the 2/3 diesel generator room (Fire Zone 9.0.C) from Fire Zone 1.1.2.2.
11.2.1/11.2.3	All penetrations from the southwest corner room (Fire Zone 11.2.1) to the Unit 2 HPCI room (Fire Zone 11.2.3) are sealed to a 3-hour fire rating except for an HVAC duct which does not contain a fire damper (see Exemption Requests F.P.R. Volume 4).

6.3.1.3 Provide Protection for Cables in the Unit 2 Reactor Building

The alternate power and control feeds to inboard isolation condenser valves MO2-1301-1 and MO2-1301-4 (see Subsection 6.2.1.4) are protected with a 1-hour fire barrier (i.e., 1-hour rated cable wrap) in Fire Area RB2-II. The alternate feeds are routed from MCC 38-1 to Fire Zone 1.1.2.1 of RB2-II (see Subsection 6.2.1.4). The feeds then run through Fire Zone 1.1.2.1 and up into Fire Zone 1.3.2, which is part of RB2-I. The protection for the cables is needed because both the normal feed and the new alternate feed are located in the same fire area. Even though the normal feeds are routed through RB2-II on elevations above Fire Zone 1.1.2.1, it is possible that a single fire, due to the presence of intervening combustibles, would damage the normal and alternate feeds if neither were protected. Because no automatic suppression is provided in Fire Zone 1.1.2.1, Appendix R requires that the cable be protected by a 3-hour barrier. However, the fire loading in the torus area (Fire Zone 1.1.2.1) is very light (less than 1,000 Btu/ft^2) and a 1-hour barrier provides adequate protection, ensuring that the alternate feeds are available to open the inboard isolation condenser valves should they spuriously close. An exemption has been requested for the use of a 1-hour rather than 3-hour barrier. (See Section 3.7 of the exemption requests package.) This modification was identified in the Associated Circuits Report, June 1982 (F.P.P.D.P. Volumes 1 and 2).

6.3.2 Unit 3 Reactor Building Fire Protection System Modifications

6.3.2.1 Provide Fire Detection in the Unit 3 Reactor Building

Fire detection systems are installed which provide coverage for virtually all areas of the Unit 3 Reactor Building except for the refuel floor. The installation of the additional detection has a twofold purpose:

1. To provide the operators with information which assists them in determining what shutdown paths are available in the event of a fire, and

2. To more closely conform to the criteria of Appendix R as clarified in NRC Generic Letter 83-33.

The type of detection system and the area of coverage are given below by Unit 3 Reactor Building elevation. (The inerted drywell which runs through all elevations is not described.) Justification for lack of complete area suppression and detection is provided in Sections 4.3 and 4.4 of the Exemption Requests (F.P.R. Volume 4). These modifications were identified in the 1984 analysis.

ELEVATION	DESCRIPTION OF FIRE DETECTION
476 feet 6 inches	There are three fire zones on this elevation. Fire Zone 1.1.1.1, the torus area, is provided with linear thermal detection in and under all the cable trays routed in this zone. Since the cabling represents the only significant combustible material in the zone, this method of detection is sufficient to ensure that any fire would be detected. Fire Zones 11.1.1 and 11.1.2, the southwest and southeast corner rooms, respectively, contain the LPCI and core spray equipment. They are also provided with a linear thermal fire detection system throughout.
517 feet 6 inches	Three fire zones, 1.1.1.2, 1.3.1, and 1.4.1, are located on this elevation. The general floor area (Fire Zone 1.1.1.2) is provided with an ionization fire detection system. Fire Zones 1.3.1 and 1.4.1 utilize photoelectric detectors because of the environmental conditions.
545 feet 6 inches	Two fire zones are located on this elevation, 1.1.1.5.C and 1.1.1.3.

ELEVATION	DESCRIPTION OF FIRE DETECTION
	Fire Zone 1.1.1.5.C, which is part of the isolation condenser pipe chase extending down from the 589-foot 0-inch elevation, does not contain a detection system. However, it is directly connected to Fire Zone 1.1.1.5.A at the 589-foot 0-inch elevation which is provided with ionization detection. Fire Zone 1.1.1.3, which occupies the remainder of this elevation, is provided with an ionization fire detection system everywhere except in the regenerative and nonregenerative heat exchanger areas, the cleanup recirculation pump rooms, and the cleanup decant pump phase separator room, which are separated from the rest of the zone by substantial shield walls.
570 feet 0 inches	Fire Zones 1.1.1.5.B and 1.1.1.4 are located on this elevation. Fire Zone 1.1.1.5.B, which is part of the isolation condenser pipe chase extending down from the 589-foot 0-inch elevation, does not contain a detection system. However, it is directly connected to Fire Zone 1.1.1.5.A on the 589-foot 0-inch elevation which is provided with ionization detection. Fire Zone 1.1.1.4 occupies the remainder of this elevation except where the fuel pool extends down from the 613-foot 0-inch elevation. It is provided with an ionization detection system throughout except in the cleanup filter and demineralizer area which is separated from the rest of the zone by substantial shield walls. Fixed thermal linear detection which actuates a preaction water spray system is provided around the open equipment hatch in the ceiling. (See Subsection 6.3.2.2.1.)
589 feet 0 inches	Fire Zones 1.1.1.5.A and 1.1.1.5.D are located on this elevation. Fire Zone 1.1.1.5.A is provided with an ionization fire detection system throughout except for the small fuel pool demineralizer area which is separated from the rest of the zone by shield walls. Fixed thermal linear detection which activates operation of a water spray system is provided around the open equipment hatch in the ceiling and the floor. (See Subsection 6.3.2.2.1.) The rest of this elevation, exclusive of the areas occupied by the fuel storage pool and dryer separator storage area, is designated Fire Zone 1.1.1.5.D. This fire zone is currently provided with ionization detection over the standby liquid control area. Further detection was not deemed necessary due to the low combustible loading and lack of safe shutdown equipment and cabling in the zone.

ELEVATION	DESCRIPTION OF FIRE DETECTION
613 feet 0 inches	This elevation is common to both Unit 2 and Unit 3 and is designated as Fire Zone 1.1.1.6/1.1.2.6. No detection is proposed for the zone since the high ceiling (approximately 45 feet) severely limits the effectiveness of any possible detection system. A linear thermal detection system is installed around the open equipment hatch in the floor.

6.3.2.2 Upgrade Fire Barriers in the Unit 3 Reactor Building

Several barriers which separate areas containing equipment or cabling for different alternate shutdown paths are being modified to provide them with a complete (or equivalent) 3-hour fire rating. The subsections which follow describe the modifications made to upgrade these barriers. The modifications are grouped on the basis of which fire areas the modified barriers separate. These modifications were identified in the 1984 analysis.

6.3.2.2.1 Modifications to Barriers Separating Fire Areas RB3-I and RB3-II

Fire Area RB3-I contains equipment necessary to the four isolation shutdown paths (B, A1, B2, and F) and Fire Area RB3-II contains equipment and cabling necessary to the other shutdown method, the HPCI shutdown path D. Because of this, it is necessary to keep a fire in either of these fire areas from spreading to and causing damage in the other fire area. The Appendix R required method for preventing this fire spread is providing complete 3-hour barriers between the fire areas. Because of this and the importance of the two fire areas, modifications have been made, upgrading all of the barriers separating these fire areas to a 3-hour rating (or equivalent, in the case of the 20-foot x 20-foot equipment hatch, HVAC penetrations and ladder opening between Fire Zones 1.1.1.5.A and 1.1.1.4). Justification, for all areas where a literal 3-hour rated barrier is not used, is provided in Section 4.2 of the Exemption Requests (F.P.R. Volume 4). The following list describes the modifications. The list presents fire zones which are separated by the barrier being modified.

FIRE ZONES SEPARATED BY BARRIER (RB3-I ZONE/RB3-II ZONE)	DESCRIPTION OF BARRIER MODIFICATION
1.4.1/1.1.1.1, 1.1.1.2, 1.1.1.3	Penetrations in the barriers separating Fire Zone 1.4.1 from all other zones are sealed to a 3-hour rating except an 8' 6" x 2' 3" opening in the floor covered by a steel plate with openings for pipe, and a mechanical penetration to the pipe chase. Fire Zone 1.4.1 is the electrical Division I drywell cable penetration area. A fire in this zone could render the isolation condenser system inoperable if it resulted in the spurious closure of either valve MO3-1301-1 or MO3-1301-4. The primary and secondary electrical feeds to the valves are all Division I and located in the zone. Sealing the barriers surrounding Fire Zone 1.4.1 ensures that a fire inside, which could damage the four Unit 3 isolation condenser shutdown paths, could not damage the alternate HPCI shutdown path D which has no associated cabling or equipment inside Fire Zone 1.4.1. Conversely, a fire from outside could not enter Fire Zone 1.4.1 and damage both the inboard valve feeds.
1.1.1.5.C/1.1.1.3	All penetrations into the isolation condenser pipe chase are sealed to a 3-hour fire rating. This provides a complete 3-hour barrier between RB3-I and RB3-II at the 545-foot 6-inch elevation. This modification, in conjunction with others, ensures that: 1) isolation condenser valves in the pipe chase will not be damaged by a fire in RB3-II, and 2) an operator will be able to manually operate the isolation condenser valves in the pipe chase. Isolation condenser path A1 has been identified for use in the event of a fire RB3-II.
1.1.1.5.B/1.1.1.4	All penetrations into the isolation condenser pipe chase are sealed to a 3-hour fire rating. This modification, in conjunction with others, ensures that: 1) isolation condenser valves in the pipe chase will not be damaged by a fire in RB3-II, and 2) an operator will be able to manually operate the isolation condenser valves in the pipe chase. Isolation condenser path A1 has been identified for use in the event of a fire in RB3-II.

FIRE ZONES SEPARATED BY BARRIER (RB3-I ZONE/RB3-II ZONE)	DESCRIPTION OF BARRIER MODIFICATION
1.1.1.5.A/1.1.1.4	All penetrations from Fire Zone 1.1.1.4 to the isolation condenser floor above (Fire Zone 1.1.1.5.A) are sealed except for the 20-foot x 20-foot equipment hatch, HVAC penetrations, and ladder opening. These openings are protected by an automatic preaction water suppression system activated by a linear thermal detector or automatic wet pipe sprinklers which provide a level of protection equivalent to a 3-hour barrier. These modifications, along with sealing the isolation condenser pipe chase, ensures that: 1) a fire in RB3-II will not affect RB3-I, thus ensuring that at least one of the four isolation condenser shutdown paths will be available for a fire in RB3-II, and 2) that a fire in RB3-I will be contained in that fire area and will not affect the HPCI shutdown path D which has components located in RB3-II.
1.1.1.5.A/1.1.1.5.D	A 3-hour rated fire door is installed between these two zones. The doorway represents the only opening in the wall between the zones. Though Fire Zone 1.1.1.5.D contains no safe shutdown equipment or cabling, the zone is part of RB3-II and a fire could conceivably travel from Fire Zone 1.1.1.4 through unsealed penetrations into Fire Zone 1.1.1.5.D. However, the 3-hour rated fire door will prevent any such fire from propagating to RB3-I.
1.1.1.6/1.1.1.5.A	An automatic preaction suppression system actuated by a linear thermal detector is installed around the 20-foot x 20-foot equipment hatch between the two zones. Other unsealed openings are HVAC ducts two of which are afforded protection by the suppression system around the hatch and mechanical penetrations. Fire Zone 1.1.1.6, which is part of the refueling floor level, contains no safe shutdown equipment or cabling.

6.3.2.2.2 Modifications to Barriers Separating Fire Areas RB3-II and RB-2/3

Fire Area RB-2/3 contains equipment and cabling required for shutdown path A1, in particular, the 2/3 diesel generator. This shutdown path has been identified for use in the event of a fire in RB3-II. Fire Area RB3-II contains electrical equipment used for the shutdown path F which has been identified for use in the event of a fire in Fire Area RB-2/3. Modifications were proposed to upgrade all of the barriers between these two fire areas to a 3-hour fire rating. The following list describes these modifications. The list presents the fire zones which are separated by the barrier being modified. These modifications were identified in the 1984 analysis.

FIRE ZONES SEPARATED BY BARRIER (RB3-II ZONE/RB-2/3 ZONE)	DESCRIPTION OF BARRIER MODIFICATION
11.1.2/11.2.3	All penetrations from the southeast corner room (Fire Zone 11.1.2) to the Unit 2 HPCI room (Fire Zone 11.2.3) are sealed to a 3-hour fire rating.
11.1.2/11.1.3	All penetrations from the southeast corner room (Fire Zone 11.1.2) to the Unit 3 HPCI room (Fire Zone 11.1.3) are sealed to a 3-hour fire rating and the access doorway between Fire Zones 11.1.2 and 11.1.3 is provided with a 3-hour rated fire door.

6.3.2.2.3 Modification to Barriers Separating Fire Zone 1.3.1 from Fire Area RB3-II

The shutdown cooling pump room (Fire Zone 1.3.1) contains equipment necessary for cold shutdown. To assure that this equipment is not damaged by fire in Fire Area RB3-II exclusive of this fire zone the barriers separating the two were upgraded to a 3-hour rating or equivalent. The modifications include sealing mechanical penetrations, provide a 3-hour rated fire door and a 3-hour rated fire damper in the wall on the 517-foot 6-inch elevation. Modifications were made to the floor above Fire Zone 1.3.1 at the 545-foot 6-inch elevation which sealed mechanical penetrations and provided a suppression system over the large mechanical penetration which contains three pipes and an HVAC duct.

6.3.2.3 Provide Protection for Cables in the Unit 3 Reactor Building

The alternate power and control feeds to inboard isolation condenser valves MO3-1301-1 and MO3-1301-4 (see Subsection 6.2.2.4) are protected with a 1-hour fire barrier (i.e., 1-hour rated cable wrap) in Fire Area RB3-II. The alternate feeds are routed from MCC 28-1 to Fire Zone 1.1.1.1 of RB3-II (see Subsection 6.2.2.4). The feeds then run through Fire Zone 1.1.1.1 and up into Fire Zone 1.4.1, which is part of RB3-1. The protection for the cables is needed because both the normal feeds and the new alternate feeds are located in the same fire area. Even though the normal feeds are routed through RB3-II on elevations above Fire Zone 1.1.1.1, it is possible that a single fire, due to the presence of intervening combustibles, could damage the normal and alternate feeds if neither were protected. Because no automatic suppression is provided in Fire Zone 1.1.1.1, Appendix R requires that the cable be protected by a 3-hour barrier. However, the fire loading in the torus area (Fire Zone 1.1.1.1) is very light (less than 1,000 Btu/ft^2) and a 1-hour barrier provides adequate protection, ensuring that the alternate feeds are available to open the inboard isolation condenser valves should they spuriously close. An exemption has been requested for the use of a 1-hour rather than 3-hour barrier (see Section 4.6 of the Exemption Requests, F.P.R. Volume 4). This modification was identified in the Associated Circuits Report, June 1982 (F.P.P.D.P. Volumes 1 and 2).

6.3.3 Unit 2 and Unit 3 Reactor Buildings Fire Protection System Modifications

6.3.3.1 Upgrade Barrier Between Unit 2 and Unit 3 Reactor Buildings

All penetrations in the common wall along column/row 44 separating the Unit 2 and Unit 3 Reactor Buildings are sealed to a 3-hour rating except for an unrated door between the Units 2 & 3 Reactor Building equipment drain tank rooms at elevation 476 feet 6 inches. This door is in the northwest corner of Unit 2 Fire Zone 1.1.2.1 and northeast corner of Unit 3 Fire Zone 1.1.1.1. This will prevent a fire from spreading from one Reactor Building to the other where alternate shutdown equipment and cabling are located. This modification was identified in the 1984 analysis.

6.3.3.2 Protect the 2/3 Diesel Generator Unit 2 Bus Duct in the Unit 3 Reactor Building with 1-Hour Barrier

The 2/3 diesel generator bus duct which feeds Unit 2 exits the 2/3 diesel generator room (Fire Zone 9.0.C) into Fire Zone 1.1.1.2 of the Unit 3 Reactor Building and runs through this zone before entering the Unit 2 Reactor Building. Since Unit 2 equipment powered by the 2/3 diesel generator would be used to shut down Unit 3 for a fire in Fire Area RB3-II (of which Fire Zone 1.1.1.2 is a part), the Unit 2 bus duct is protected against fire damage by a 1-hour fire barrier (cable wrap) where it is routed in the Unit 3 Reactor Building. (An exemption has been requested for the use of a 1-hour versus 3-hour barrier. See Section 4.7 of the Exemption Requests, F.P.R. Volume 4.) Thus, the Unit 2 feed from the 2/3 diesel generator will be unaffected by a fire in the Unit 3 Reactor Building. This modification was identified in the Associated Circuits Report, June 1982 (F.P.P.D.P. Volumes 1 and 2).

6.3.3.3 Protect Unit 2 Power and Control Cables for the 2/3 Diesel Generator and Auxiliaries in the Unit 3 Reactor Building with 1-Hour Barrier

The power and control cables for the 2/3 diesel generator, the 2/3 diesel generator cooling water pump, fuel oil transfer pump, and room vent fan from Unit 2 exit the 2/3 diesel generator room (Fire Zone 9.0.C) into Fire Zone 1.1.1.2 of the Unit 3 Reactor Building and run through only the southeast corner of this zone before entering the Unit 2 Reactor Building. Since Unit 2 equipment powered by the 2/3 diesel generator would be used to shut down Unit 3 for a fire in Fire Area RB3-II (of which Fire Zone 1.1.1.2 is a part), the Unit 2 power and control cables to the 2/3 diesel generator and its auxiliaries are protected with a 1-hour fire barrier (cable wrap) where they are routed in the Unit 3 Reactor Building. (An exemption has been requested for the use of a 1-hour versus 3-hour barrier. See Section 4.7 of the Exemption Requests, F.P.R. Volume 4). Thus, the Unit 2 feeds to the 2/3 diesel generator and its auxiliaries will be unaffected by a fire in the Unit 3 Reactor Building. This modification was identified in the Associated Circuits Report, June 1982 (F.P.P.D.P. Volumes 1 and 2).

6.3.4 Unit 2 and Unit 3 Turbine Building Fire Protection System Modifications

6.3.4.1 Provide Additional Fire Detection and Suppression Systems on the Ground and Mezzanine Floor Levels of the Turbine Building

Additional fire detection and suppression was installed on the ground and mezzanine floor levels of the Turbine Building. The type of detection and/or suppression and the area of coverage is given below for the two floor levels. Justification for the lack of complete area detection and suppression is provided in Section 5.3, 5.4, and 5.5 of the Exemption Requests (F.P.R. Volume 4). These modifications were identified in the 1984 analysis.

FLOOR LEVEL	DESCRIPTION OF PROPOSED FIRE DETECTION/ SUPPRESSION
Ground (517 feet 6 inches)	An ionization fire detection system and a wet pipe sprinkler system were installed which protect the region bounded by column/rows 43-46.5/F-H and the corridor along row line G from column line 40 to 48. These systems provide separation between Fire Zone 8.2.5.A, 8.2.5.C, and 8.2.5.E. The addition of these systems means that the entire ground floor of the Turbine Building is protected by fire detection and/or suppression except for: 1) the Unit 3 low pressure heater pull region, 2) the region bounded by column/ rows 45-48/C-E, and 3) the region bounded by 40-43/C-E. The latter two regions contain primarily condensate water treatment equipment and are not needed for safe shutdown.
Mezzanine (534 feet 0 inches and 538 feet 0 inches)	An ionization fire detection system is installed to protect all portions of Fire Zone 8.2.6.A not now covered by suppression or detection. An ionization fire detection system is also installed to protect all portions of Fire Zone 8.2.6.E not now covered by suppression or detection. The addition of these systems results in all portions of the mezzanine floor level being protected by fire detection and/or suppression except for the low pressure heater pull regions.

6.3.4.2 Provide Fire Suppression System on Unit 3 CRD Pump Floor

The Unit 3 CRD pump floor on Elevation 495-feet 0-inches, Fire Zone 8.2.2.B, was provided with a wet pipe sprinkler system. This additional suppression in Fire Area TB-III helps ensure that a fire will not spread from TB-III to TB-II. This modification was identified in the 1978 analysis.

6.3.4.3 Seal All Penetrations for Fire Area TB-V

Fire Area TB-V, the main control room and auxiliary electric equipment room, is the main control area for all functions of the plant. Although alternate shutdown paths have been identified to shut down Units 2 and 3, the loss of this fire area would require extensive manual operations.

Therefore, measures, have been taken which ensure that this fire zone remains free of damage caused by an exterior fire.

All penetrations in the boundary walls of Fire Area TB-V, which consists of Fire Zones 2.0 (control room) and 6.2 (auxiliary electrical equipment room), are sealed to a 3-hour fire rating. All ceiling penetrations from Fire Zone 2.0 (control room) are similarly sealed. This provides a 3-hour barrier between the Eastern Zone Group (TB-I) and TB-V. TB-I contains equipment and cabling for shutdown path A2 which would be used to shut down Unit 2 in the event of a fire in TB-V. Also, TB-V contains equipment and cabling to be used to shut down Unit 2 in the event of a fire in TB-I. This modification was identified in the 1984 analysis.

6.3.4.4 Protect Cable Tray in Ground Floor Access Corridor with 1-Hour Fire Barrier

The cable tray which runs from 44.5/H north to 44.5/G and then west to 48/G on the 517-foot 6-inch elevation is enclosed in a 1-hour fire rated cable wrap. The primary reason for protecting this section of cable tray is that the tray contains the bus tie cable from 4-kV switchgear 33-1 to 4-kV switchgear 33 and cables associated with the 2/3 diesel generator auxiliaries. This bus tie is utilized for shutdown path B2 which would be employed for shutdown of Unit 3 for a fire in TB-II. The protection will cover the cabling for its entire run in Fire Zone 8.2.5.C (part of TB-II) and approximately 25 feet into Fire Zone 8.2.5.E (part of TB-III). In conjunction with the suppression and detection systems covering this region, the cable protection ensures that the cable is available for use after a fire in TB-II. This modification was identified in the 1984 analysis.

6.3.4.5 Protect Cable Risers Adjacent to TB-V

The cable risers and pull boxes adjacent to TB-V contain Unit 3 control cables originating in either the control room or auxiliary equipment room and running into the Unit 3 cable tunnel. Some of the control cables contained in the risers are necessary to retain control room operability of several pieces of Unit 3 equipment. In order to assure the integrity of these control cables for a fire in the Unit 2 trackway area, a 1-hour fire wrap was installed over the risers and pull boxes. Automatic suppression and detection was also added in the area of the risers. The installation of this modification provides separation of alternative paths per the requirements of Section III.G.2.c of Appendix R to 10CFR50.

6.3.5 Unit 2 and Unit 3 Crib House Fire Protection System Modifications

6.3.5.1 Protect 2/3 Diesel Generator Cooling Water Pump Transfer Switch with 1-Hour Barrier

The transfer switch and related conduits for the 2/3 diesel generator cooling water pump (see Subsection 6.2.3.1.4) in the Crib House are protected with a 1-hour barrier. This modification, in conjunction with the addition of suppression and detection systems (discussed below), ensures that a fire affecting either of the dedicated diesel generator's cooling water pumps will not also disable the 2/3 diesel generator's cooling water pump. This was identified in the 1984 analysis.

6.3.5.2 Provide Automatic Suppression and Detection Systems and Curbing in the Lower Level of Crib House

The lower level of the Crib House (the circulating pump floor) contains all three diesel generator cooling water pumps. In order to accomplish safe shutdown without offsite power, the cooling water pumps for two diesels must be kept free of fire damage. This modification was identified in the Associated Circuits Analysis, June 1982 (F.P.P.D.P. Volumes 1 and 2).

In order to ensure that these conditions are met for a fire in the Crib House, the following modifications were instituted.

1. A curb was installed around the 2/3 diesel generator cooling water pump. This will prevent the spread of any flammable liquids either from the 2/3 pump to the dedicated cooling water pumps or circulating water pumps to the 2/3 pump.

2. An automatic, open-head water suppression system was installed over the 2/3 diesel generator cooling water pump. As with the curbing, this modification aids in preventing a fire originating at the 2/3 pump from spreading and also prevents a fire outside the 2/3 pump region from affecting the 2/3 pump.

3. A photoelectric fire detection system was installed throughout the lower elevation of the Crib House. This provides early warning of any fire in the region, allowing station personnel to respond rapidly in order to extinguish any fire before significant damage can occur.

4. A ceiling level wet pipe sprinkler system was installed to protect the entire central area of the lower level (column/row 3.5-4.5/A-B). This provides additional assurance that a fire in the lower level would be quickly controlled and damage limited to one side of the Crib House.

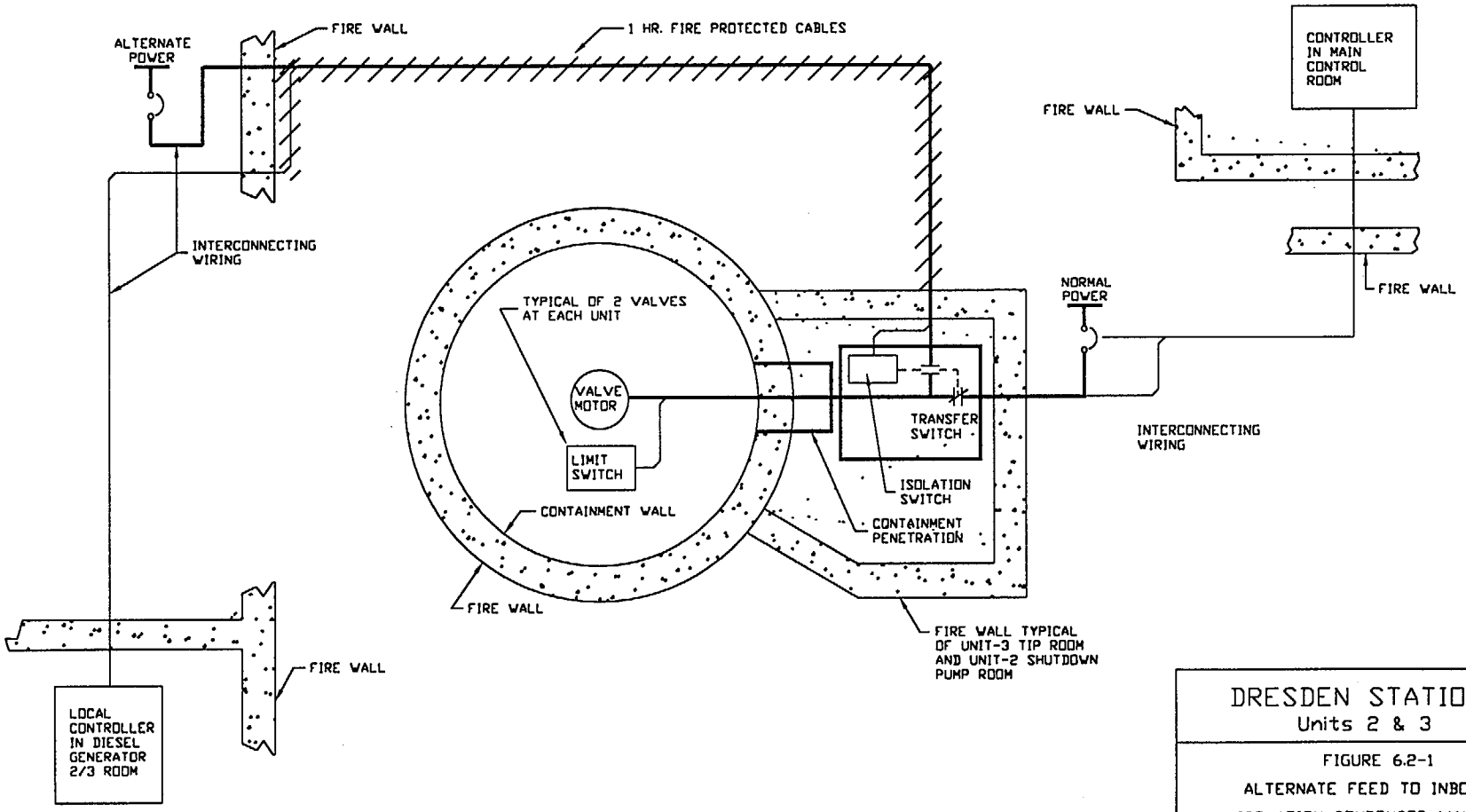
5. An open-head water spray system actuated by a linear thermal detector provides protection to all cable trays and conduit along the north, west, and east walls of the Crib House.

6.3.5.3 Provide Curbing and Automatic Suppression in the Upper Level of the Crib House

The upper level of the Crib House consists of two elevations: the 509-foot 6-inch elevation, where the five service water pumps are located, and the 517-foot 6-inch elevation, where the circulating water pump motors and service water pump cables are located. To achieve safe shutdown, at least two service water pumps and their associated cabling must be available. In order to ensure that this would be the case for a fire in Crib House, the following modifications were implemented to further augment the inherent separation between the five redundant service water pumps:

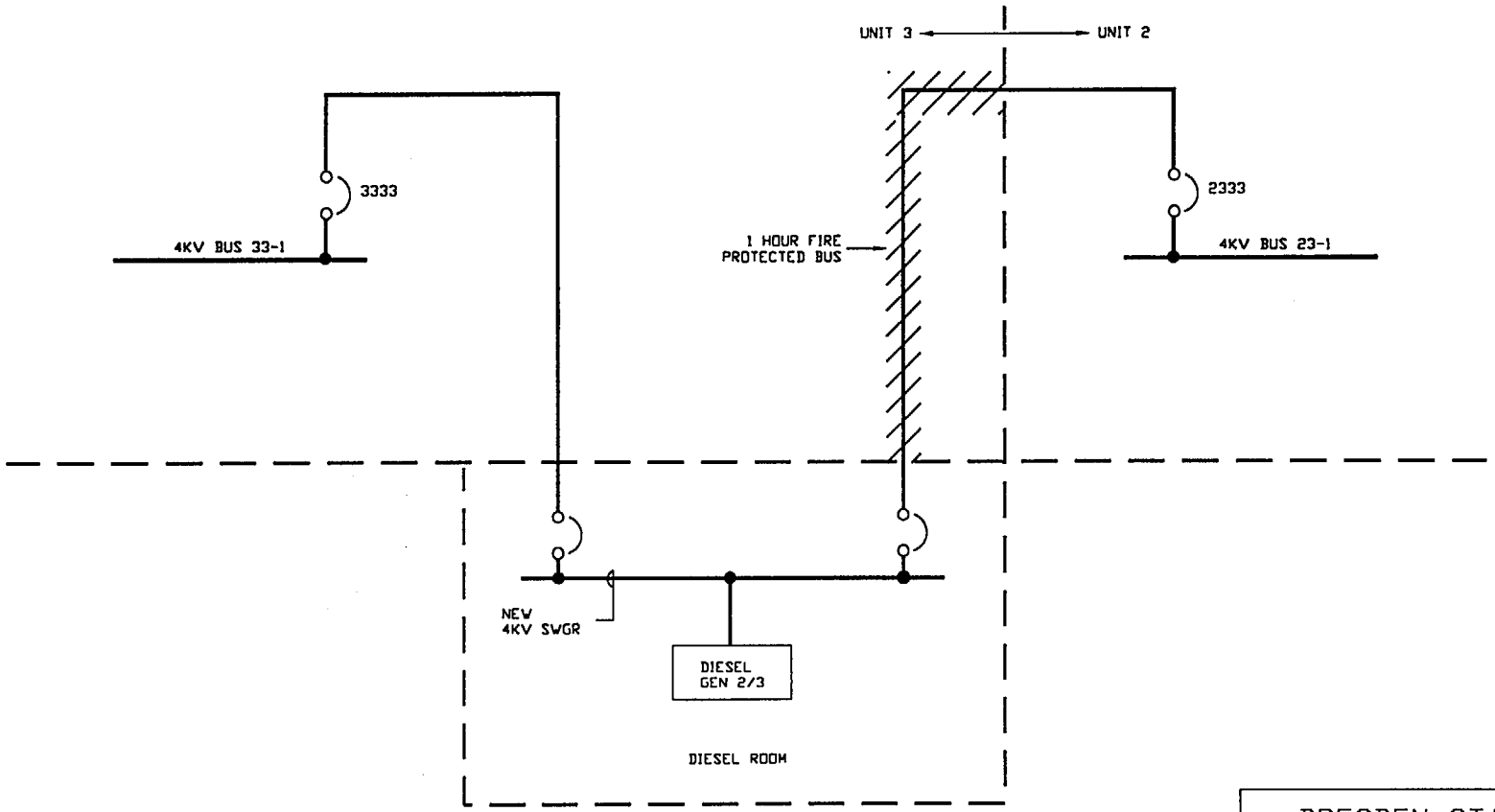
1. Curbs were installed along the entire length of column line B on the 509-foot 6-inch and 517-foot 6-inch elevations and along the entire length of column line 3.75 on the 509-foot 6-inch and 517-foot 6-inch elevations. The curbs prevent the spread of combustible liquids from the 517-foot 6-inch elevation of the upper level to the 509-foot 6-inch Elevation as well as preventing the spread of flammable liquids from one side to the other on both elevations. In addition, the diesel fire pump day tank is enclosed in a curb with a drain line to the yard drain system to prevent a diesel fuel oil spill from exposing the service water pumps.

2. A wet pipe sprinkler system was provided which covers the entire upper level of the Crib House. This ensures that, should a fire start, it will be quickly contained so that at least two service water pumps and their associated cabling will remain free of fire damage.



DRESDEN STATION
Units 2 & 3

FIGURE 6.2-1
ALTERNATE FEED TO INBOARD
ISOLATION CONDENSER VALVES

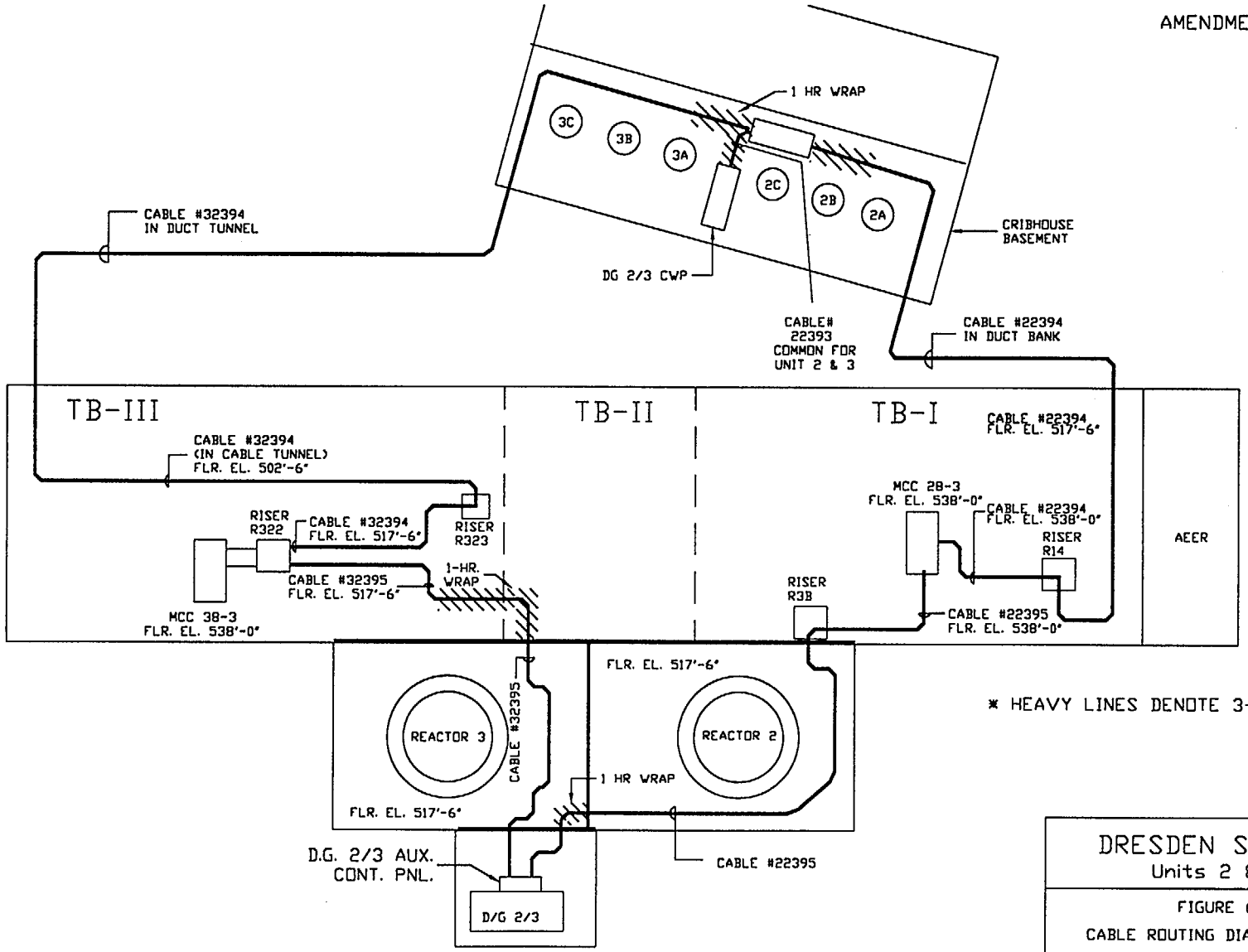


DRESDEN STATION
Units 2 & 3

FIGURE 6.2-3

DIESEL GENERATOR 2/3 BUS

AMENDMENT 12



* HEAVY LINES DENOTE 3-HR BARRIERS

DRESDEN STATION
Units 2 & 3

FIGURE 6.2-4
CABLE ROUTING DIAGRAM FOR 2/3
DIESEL GENERATOR COOLING WATER PUMP

7.0 Safe Shutdown Procedures

7.1 Introduction

The methods of achieving safe hot and cold shutdown at Dresden 2&3 are discussed in Section 3.0. Credit is taken for manual operation of pumps, valves, and electrical equipment for hot and cold shutdown. Procedures have been implemented to aid the operator in performing these actions as required by 10 CFR 50 Appendix R Section III.L.3 and III.L.5. These procedures are available at the station. The local and manual alternative shutdown actions for which credit is taken in the Safe Shutdown Analysis (Section 4.0 of this report) are listed in Table 7.3-1 by applicable fire zone. Cold shutdown repair procedures are identified in Section 4.0 on a fire area/zone basis. Cold shutdown repair procedures are identified in Sections 4.0 and 7.4. Materials necessary to make these repairs are delineated in Section 7.4. Emergency lighting in the form of 8-hour battery packs has been provided in areas where local operations occur and along access paths as described in Section 7.5. Communications capabilities for achieving alternative safe shutdown are discussed in Section 7.6. Access to safe shutdown equipment is discussed in Section 7.7.

Timeline data has been generated to support the alternative shutdown actions and is given in Section 7.2. Dresden Station personnel have walked down the procedures required for the alternative shutdown paths to ensure adequate manpower is available to accomplish the necessary manual actions in the time available. The minimum manpower available at the station is described in Section 7.2.

7.2 Timelines and Manpower Requirements

7.2.1 Timelines

The capability of the shutdown methods employed at Dresden 2 and 3 must meet Appendix R Section III.L.2 performance criteria. A calculation was performed to determine the amount of time available before the performance criteria were violated, specifically, the time available before the water level reaches top of active fuel.

7.2.1.1 HPCI

Credit is taken for the HPCI/LPCI system only in a limited number of fire areas (see Section 4.0). There are no cable discrepancies or equipment associated with this method of shutdown present in the areas of use. Therefore, normal initiation and control of the HPCI/LPCI systems from the control room is available for these areas.

An analysis performed by General Electric (see FPPDP Volume 6, Section X.12) demonstrates that active fuel will remain covered if the HPCI system is initiated in 30 minutes after reactor scram.

7.2.1.2 Isolation Condenser

The isolation condenser automatically initiates on RPV pressure at or above 1,070 psig for 15 seconds. The isolation condenser is sized to accommodate the full decay heat load 5 minutes after a scram. The isolation condenser can operate 20 minutes without shell makeup if the minimum level of 11,300 gallons is met. (See UFSAR Subsection 4.6.2.)

An analysis performed by General Electric (see FPPDP Volume 13) demonstrates that active fuel will remain covered if the CRD pumps are initiated 30 minutes after reactor scram.

7.2.2 Manpower

The required minimum number of operating staff on shift is addressed in the Dresden Technical Specifications.

7.3 Procedures Relevant to Hot Shutdown

There are five redundant and alternate, though not unrelated, shutdown methods available at Dresden 2 and 3 (see Section 3.0). Four of these methods use the specific unit's isolation condenser. The fifth method uses the HPCI system to inject water into the RPV and the LPCI system to cool the suppression pool.

The following is a comparison of shutdown paths used to shut down Units 2 and 3.

Unit 2	Unit 3	Method
A	B	Isolation Condenser
B1	A1	Isolation Condenser
A2	B2	Isolation Condenser
C	D	HPCI/LPCI
E	F	Isolation Condenser

All operations associated with shutdown paths A, B, C, D, E, and F can be accomplished by the operators from the main control room and are considered redundant shutdown paths.

No alternative shutdown modifications or manual actions are proposed for these methods except those actions inherent in the assumption used in the analysis (e.g., loss of offsite power or spurious operation) that are generic to all paths. These actions are listed in Table 7.3-1.

Shutdown paths A1, A2, B1 and B2 are alternative shutdown paths. Table 7.3-2 lists, by fire area, the alternate shutdown path available and the manual actions that may be required to implement a shutdown path. Table 7.3-3 specifically lists the alternate shutdown actions necessary for a fire causing control room evacuation.

TABLE 7.3-1

MANUAL ACTIONS INHERENT TO ASSUMPTIONS
OF ANALYSIS OR SPURIOUS OPERATIONS

(These actions are not associated with a particular path or fire location and generally apply to all fire areas.)

I. Manual Actions Inherent to Assumptions of Analysis

1. Establish the service water cooling for the CRD pumps. This action is necessitated by the assumption of loss of offsite power and the subsequent loss of TBCCW. It is applicable to all shutdown paths taking credit for using the CRD pumps for reactor makeup. (Paths A, A1, A2, B, B1, B2, E, F)

2. Verify valves 0302-6A, 0302-6B and 0302-8 are open. Valves 0302-6A & 6B fail close on loss of instrument air or due to a loss of off-site power. Valve 0302-8 could close due to a spurious signal, however CRD flow is still available with or without instrument air. The closure of these valves would cause loss of make-up water to the Reactor via the CRD cooling lines. However, the charging water line branches off of the main CRD line up stream of the FCV. Flow through this line is unaffected. Credit is taken in the analysis for the scram injection valves providing an alternate make-up water flow "Path" to the Reactor. An alternate make-up water "Source" is desirable (i.e. FW, HPCI) but NOT required.

   It is applicable to all shutdown paths taking credit for using the CRD pumps for reactor water makeup. (Paths A, A1, A2, B, B1, B2, E and F)

2.A Verify that either valve 0301-2A or B are open, or open cross connect valves 2/3-0301-162 and 163 to ensure that reactor water makeup capability exists. This may require taking local control of 0301-2A or 2B by de-energizing their respective power source and manually operating the valves. (Paths A, A1, A2, B, B1, B2, E and F).

3. Close normally open breakers to 2/3 250-V battery charger from either MCC 29-2(Path C) or MCC 39-2 (Path D)to ensure long term 250-V power to HPCI from the dedicated diesel generator if offsite power is lost and 2/3 diesel generator is inoperable. (Paths C&D)

4. Monitor day tank and 15,000 gallon fuel oil tank level to ensure adequate fuel supplies are on site and to secure replacement fuel in a timely manner. No associated circuits for tank level indicator were included in the analysis. (All paths if offsite power is lost.)

5. Monitor pump amperage at local control station (if indication is not available in the control room). Ensure CRD pump Amps do not exceed 34 Amps to ensure pump operability/discharge pressure. No associated circuits for pump flow or pressure indicators were included in the analysis. (All paths)

6. Monitor isolation condenser level. No associated circuits for the isolation condenser level indicator were included in the analysis. This is applicable to all paths that take credit for the isolation condenser.

7. Monitor condensate storage tank level. No associated circuits for the condensate storage tank level were included in the analysis. (This is applicable to all shutdown paths.)

8. Open diesel driven fire pump day tank refill line Valve 3-5299-301 except for a fire in area TB-II, TB-III, RB3-II and Crib House. Monitor the day tank level.

II Manual Actions to Address Potential Adverse Spurious Operations

1. Remove power to the ADS control circuit at the 125V distribution panels for a control room and AEER (TB-V) fire. An ADS inhibit switch can be manually operated in the control room to prevent spurious auto blowdown for a fire outside the control room or AEER. See Subsections 6.2.1.8 and 6.2.2.8. This is a valve spurious operation concern.

   For a fire in Fire Area TB-V, spurious blowdown is prevented by removing power to the ADS logic by opening circuit breakers at the 125-Vdc turbine building main bus 2A-1(3A-I) distribution panel and at the 125-Vdc turbine building reserve bus 2B-1 (3B-1) distribution panel. To prevent spurious operation of any single pressure relief valve for a fire in Fire Areas RB2-I, RB2-II, TB-I, TB-III, TB-V, RB3-I or RB3-II, 125-Vdc power to these valves is removed by either tripping breakers or pulling fuses.

2. Verify that the RWCU has automatically isolated. If necessary close normally open valve MO-2(3)-1201-2 and verify closed or close normally closed valve MO-2(3)-1201-3 or remove air to the main pressure control valve PCV-2(3)-1217. This is a valve spurious operation concern.

3. Verify MO-2(3)-2301-3 is closed. If necessary, trip HPCI turbine if 2301-3 is open and the HPCI pumps are not delivering water to the reactor. This is a valve spurious operation concern that is applicable to all paths which take credit for the isolation condenser.

4. Trip any unwanted loads off of buses and remove closing circuit fuse.

TABLE 7.3-2

REQUIRED MANUAL ACTIONS BY FIRE AREA

Fire Area	Shutdown Path	Alternative Shutdown Actions
General		See Table 7.3-1
RB2-I	C	Locally monitor reactor pressure and level on reactor building instrument racks. Monitor torus level locally at the sight-glass and torus temperature using a surface pyrometer.
RB2-II	B1	Trip breakers at 250-Vdc reactor building MCC 2A to prevent spurious closure of MO2-1301-2 and MO2-1301-3 or allow manual hand wheel operation. Manually open valve MO2-1301-3 in isolation condenser pipe chase (1.1.2.5.C) if automatic action has not occurred. Manually close isolation condenser steam line vent valve 2-1301-16 (1.1.2.5A) if valves 2-1301-17 and 2-1301-20 do not fail closed. Verify open MO2-1301-2, manually open (in 1.1.2.5.C) if closed by a spurious signal. Verify open MO2-1301-1 and MO2-1301-4, remotely open at alternate control switch in 2/3 DG room (9.0C) if closed by a spurious signal. Then de-energize circuit. If control has been lost, replace fuses in panel 2203-75 and then remotely open these valves. Verify Unit 2 isolation condenser flow by observing vented steam on shell side (outside reactor building). Verify breakers to SWGR 23-1 and 33-1 are open and remotely startup 2/3 diesel generator and auxiliaries in 2/3 DG room (9.0C) if automatic initiation has not occurred. Manually open valve MO2-4399-74 or MO2-1301-10 and MO2-4102 (1.1.2.5A). Open manual valve in TB-II to crosstie Unit 3 CRD pump to Unit 2 RPV.

TABLE 7.3-2

REQUIRED MANUAL ACTIONS BY FIRE AREA

Fire Area	Shutdown Path	Alternative Shutdown Actions
		Inherent to alternate shutdown path B1 is assumption that Unit 3 CRD pump 3A and service water pump 3A will provide water to Unit 2. Start Unit 3 CRD pump 3A remotely then open valve MO3-0301-2A, 3A CRD Pump Discharge Isolation Valve. All other actions to supply power to these pumps and control these pumps can be accomplished from the control room except startup of 2.3 DG. Trip breaker at 250-Vdc Reactor Building MCC 2B (1.1.2.4) if necessary to facilitate manual opening of MO2-1301-10 and prevent any subsequent spurious closure. Manually close the following valves to preclude run out of a service water pump: a. 2-3904-501 or M2-3904-500 b. 3-3904-501 or M3-3904-500 c. 2-3906-500 or 2-3906-501 d. 3-3906-500 or 3-3906-501 e. 2/3-3999-241 or 2/3-3999-240 ocally monitor isolation condenser makeup pump discharge flow. Monitor the isolation condenser makeup oil day tank level. Obtain fuel from offsite sources and manually refill the tanks as necessary. Note 1: For a fire in Fire Zone 1.1.2.2 (RB2-II) enter the Unit 3 T.I.P. (Fire Zone 1.4.1) room and change isolation switch from normal to isolation position to return control of the Unit 3 isolation condenser inboard valves to the control room.
RB3-I	D	Locally monitor reactor pressure and level or reactor building instrument racks. Monitor torus level locally at the sight-glass and torus temperature using a surface pyrometer.

TABLE 7.3-2

REQUIRED MANUAL ACTIONS BY FIRE AREA

Fire Area	Shutdown Path	Alternative Shutdown Actions
RB3-II	A1	Trip breakers at 250-Vdc reactor building MCC 3A (1.1.1.4) to prevent spurious closure of MO3-1301-2, MO3-1301-3 and MO3-4399-74 or allow manual handwheel operation. Manually open valve MO3-1301-3 in isolation condenser pipe chase (1.1.1.5.C) if automatic operation has not occurred. Verify open MO3-1301-2, manually open (1.1.1.5.C), if it is closed by a spurious signal. Verify open MO3-1301-1 and MO3-1301-4, remotely open at alternate control switch in 2/3 DG room (9.0C) if closed by spurious signal. Then de-energize circuit. If control has been lost, replace fuses in panel 2203-75 and then remotely open these valves. Manually close isolation condenser steam line vent valves 3-1301-16 (1.1.1.5.A) if valves 3-1301-17 and 3-1301-20 do not fail closed. Verify Unit 3 isolation condenser flow by observing vented steam on shell side (outside reactor building). Verify breakers to SWGR 23-1 and 33-1 are open and remotely startup 2/3 DG and auxiliaries in 2/3 DG room (9.0.C) if automatic initiation has not occurred. Manually open valve MO3-4399-74 or MO3-1301-10 and MO3-4102 (1.1.2.5.A). Manually open valve in TB-II to crosstie Unit 2 CRD pumps to Unit 3 RPV. Inherent to alternate shutdown path A1 is the assumption that Unit 2 CRD pump 2A, service water pump 2A, and isocondenser makeup pump will provide water to Unit 3. All actions to supply power to these pumps and to control these pumps can be accomplished from the control room except startup at the 2/3 DG. Manually operate valve 2-301-2A.

TABLE 7.3-2

REQUIRED MANUAL ACTIONS BY FIRE AREA

Fire Area	Shutdown Path	Alternative Shutdown Actions
		Trip breaker at 250-Vdc reactor building MCC 3B (1.1.1.4) if necessary to facilitate manual opening MO3-1301-10 and prevent any subsequent spurious closure. Manually operate the following valves to provide cooling for CRD pump 2A from the service water system: a. Open valves 2/3-3999-348, 2-3999-359, 2-3999-357, 2-3999-349, 2-3999-348, 2-3999-358. b. Close valves 2-3899-205, 2-3899-204, 2-399-360, 2-3999-361. Manually close the following valves to preclude run out of the service water pumps. a. 2-3904-501 or 2-3904-500 b. 3-3904-501 or 3-3904-500 c. 2-3906-500 or 2-3906-501 d. 3-3906-500 or 3-3906-501 e. 2/3-3999-241 or 2/3-3999-240 Locally monitor the isolation condenser makeup pump discharge flow. Note 1: For a fire in Fire Zone 1.1.1.2 enter the Unit 2 shutdown cooling room (Fire Zone 1.3.2) and change isolation switch from normal to isolate position to return control of the Unit 2 isolation condenser inboard valves to the control room.

TABLE 7.3-2

REQUIRED MANUAL ACTIONS BY FIRE AREA

Fire Area	Shutdown Path	Alternative Shutdown Actions
RB-2/3	E & F	Isolation switches for MO2-1301-1 and MO2-1301-4 (Path E), MO3-1301-1 and MO3-1301-4 (Path F) must be changed from normal to isolation position in Fire Zone 1.3.2 (Unit 2) and Fire Zone 1.4.1 (Unit 3), respectively, to open above valves if they spurious close. Close tie breakers between Unit 2 480-V Division I Switchgear 28 and 480-V Division II Switchgear 29 to provide power to inboard isolation valves MO2-1301-1 and MO2-1301-4 if they should spuriously close(Path E). Close tie breakers between Unit 3 480-V Division I Switchgear 38 and 480-V Division II Switchgear 39 to provide power to inboard isolation valves MO3-1301-1 and MO3-1301-4 if they should spurious close (Path F). Locally monitor the isolation condenser makeup pump flow.
TB-I	B1	See RB2-II Locally monitor reactor pressure and level on reactor building instrument racks. Locally start an isolation condenser makeup pump from on of the isolation condenser makeup pump rooms.

TABLE 7.3-2

REQUIRED MANUAL ACTIONS BY FIRE AREA

Fire Area	Shutdown Path	Alternative Shutdown Actions
TB-II	A2 & B2	See Table 7.3-3. All shutdown actions are the same as for the control room except 2/3 DG auxiliaries must be fed from Unit 3. Trip breaker at 250Vdc reactor building MCC 2A (3A) to prevent spurious closure of MO2-4399-74 (M)3-4399-74) or allow manual handwheel operation. Manually open valves MO2-4299-74 (1.1.2.5A.) And MO3-4399-74 (1.1.1.5.A.). Locally monitor isolation condenser makeup pump discharge flow. Monitor the isolation condenser makeup pump diesel oil day tank's level, obtain fuel from offsite sources and manually refill tanks as necessary.
TB-III	A1	See RB3-II Locally Monitor Reactor Pressure and level on reactor building instrument racks. Trip breakers at 250Vdc reactor building MCC 3A to prevent spurious closure of MO-4399-74 or allow manual handwheel operation. Manually open valve MO3-4399-74 (1.1.1.5.A) Locally monitor isolation condenser makeup pump discharge flow.
TB-IV	A,B,C,D E or F	Locally monitor the isolation condenser makeup pump discharge flow.
TB-V	A2 & B2	See Table 7.3-3. All shutdown actions must be performed either manually or remotely outside the control room.
Radwaste Building	A,B,C,D E,F	Locally monitor the isolation condenser makeup pump discharge flow.
Crib House 11.3	A,B,E,F	Locally monitor the isolation condenser makeup pump discharge flow.

TABLE 7.3-3

OPERATIONS REQUIRED FOR A CONTROL ROOM FIRE
USING THE ISOLATION CONDENSER METHOD OF SHUTDOWN

I In Control Room

A. Scram Units 2 and 3

B. Manually Close MSIV's

C. Set the ERV's "Auto Blowdown MANUAL-OFF-AUTO" switch to "OFF" and the ADS "Auto Blowdown Inhibit" switch to "INHIBIT."

D. Call 5 fire brigade members to fire scene

II Establish Decay Heat Removal and Reactor Water Makeup

A. Unit 2 Isolation Condenser Initiation

1) Open valve MO2-1301-3 and verify open MO2-1301-2 in Fire Zone 1.1.2.5.C

Note: Remove power to 250-Vdc reactor building MCC Bus 2A if necessary to prevent spurious closure of MO2-1301-2 and MO2-1301-3 or to allow manual/handwheel operation.

2) Verify open position of MO2-1301-1 and MO2-1301-4, remotely open at alternate control switch in 2/3 DG room if valves are closed by a spurious signal. Then de-energize circuit.

3) Verify closure of AO2-1301-17 and AO3-1301-20 (manually close 2-1301-16 if necessary)

4) Verify Unit 2 isolation condenser flow by observing vented steam on shell side (outside Rx building)

B. Unit 3 Isolation Condenser Initiation

1) Open valve MO3-1301-3 and verify open MO3-1301-2 in Fire Zone 1.1.2.5.C

Note: Remove power to 250-Vdc reactor building MCC Bus 3A if necessary to prevent spurious closure of MO3-1301-2 and MO3-1301-3 or to allow manual/handwheel operation.

TABLE 7.3-3

OPERATIONS REQUIRED FOR A CONTROL ROOM FIRE
USING THE ISOLATION CONDENSER METHOD OF SHUTDOWN

2) Verify open position of MO3-1301-1 and MO3-1301-4, remotely open at alternate control switch in 2/3 DG room if valves are closed by a spurious signal. Then de-energize circuit.

3) Verify closure of AO3-1301-17 and AO3-1301-20 (manually close 3-1301-16 if necessary)

4) Verify Unit 3 isolation condenser flow by observing vented steam on shell side (outside Rx building)

C. 2/3 DG Initiation (If Offsite Power is Unavailable)

1) Verify breakers to SWGR 23-1 (from DG 2/3 and SWGR 23) are open

2) Verify breakers to SWGR 33-1 (from DG 2/3 and SWGR 33) are open

3) Start 2/3 DG locally and verify proper operation

D. Supply Power to Unit 2

1) Close breaker from 2/3 DG to SWGR 23-1 (if open)

2) Strip the loads off of the 4-kV SWGR and the 480-V SWGR and pull the closing circuit fuses.

Notes:

1. The unit selection logic has been modified so that the operator can manually close 2/3 DG feed breakers at 4-kV SWGR 23-1 and 33-1 to allow both to be simultaneously fed.

2. Care must be taken when both units are simultaneously fed so that 2/3 DG is not overloaded.

3) Verify closed breaker from SWGR 23-1 to 480-V Bus 28

4) Verify closed breaker from 480-V Bus 28 to MCC 28-3

5) Verify closed breaker from 480-V Bus 28 to MCC 28-2

TABLE 7.3-3

OPERATIONS REQUIRED FOR A CONTROL ROOM FIRE
USING THE ISOLATION CONDENSER METHOD OF SHUTDOWN

6) Verify closed breaker from 480-V Bus 28 to MCC 28-1

7) Start 2/3 DG vent fan

8) Verify that 2/3 DG cooling water pump automatically starts

E. Supply Unit 3 Power

1) Close breakers from the 2/3 DG to SWGR 33-1 (if open)

Notes:

1. The unit selection logic has been modified so that the operator can manually close 2/3 DG feed breakers at 4-kV SWGR23-1 and 33-1 to allow both to be simultaneously fed.

2. Care must be taken when both units are simultaneously fed so that the 2/3 DG is not overloaded.

2) Strip the loads off of the 4-kV SWGR and the 480-V SWGR and pull the closing circuit fuses.

3) Verify closed breakers from SWGR 33-1 to 480-V Bus 38

4) Verify closed breaker from 480-V Bus 38 to MCC 38-3

5) Verify closed breaker from 480-V Bus 38 to MCC 38-2

6) Verify closed breaker from 480-V Bus 38 to MCC 38-1

7) Start 2/3 DG vent fan (2/3 DG vent fan can be fed from either Unit 2 or Unit 3)

8) Verify that 2/3 DG cooling water pump automatically starts.

F. Unit 2 RPV Makeup

1) Ensure breakers to SWGR 23 from unit auxiliary transformer are open

2) Close breakers from SWGR 23-1 to SWGR 23 at both ends

TABLE 7.3-3

OPERATIONS REQUIRED FOR A CONTROL ROOM FIRE
USING THE ISOLATION CONDENSER METHOD OF SHUTDOWN

3) Open manual valves in CRD pump room to provide alternate cooling from service water system for CRD pumps

4) Start service water pump 2A at SWGR 23

5) Verify service water flow on local instruments PI2/3-3941-29, PI2-3941-8A, B, and C, and PI3-3941-8A and B

6) Start CRD pump 2A at SWGR 23

6.A) Open CRD pump discharge valve MO2-0301-2A

7) Verify CRD pump flow on FI-2-302-64

8) Verify that a flow path to reactor is open. (i.e., either the scram injection valves are open or AO2-0302-6A or AO2-0302-6B and MO2-302-8 are open)

G. Unit 3 RPV Makeup

1) Ensure breakers to SWGR 33 from unit auxiliary transformer are open

2) Close between from SWGR 33-1 to SWGR 33 at both ends

3) Open manual valve in CRD pump room to provide alternate cooling from service water system for CRD pumps

4) Start service water pump 3A at SWGR 33

Note: If another service water pump is running, pump 3A need not be started.

5) Verify service water flow on PI2/3-3941-29, PI2-3941-8A, B, and C, and PI3-3941-8A and B

6) Start CRD pump 3A at SWGR 33

6.A) Open CRD pump discharge valve MO3-0301-2A.

TABLE 7.3-3

OPERATIONS REQUIRED FOR A CONTROL ROOM FIRE
USING THE ISOLATION CONDENSER METHOD OF SHUTDOWN

7) Verify CRD pump flow on FI-3-302-64

8) Verify that a flow path to the reactor is open (i.e., either scram injection valves are open or AO3-0302-6A or AO3-0302-6B and MO3-0302-8 are open).

III Maintain Decay Heat Removal Capability

A. Unit 2 Short Term Isolation Condenser Shell Makeup

1) Open Valve MO2-4399-74

Note: Remove power to 250-Vdc reactor building MCC Bus 2A if necessary to facilitate manual opening of MO2-4399-74 and prevent any subsequent spurious closure

2) Start isolation condenser makeup pump 2/3-43122A or 2/3-43122B.

3) Verify isolation condenser makeup flow or FI 2/3-4341-152.

4) Verify 480V Bus 29 and 480V MCC 29-2 are energized (Bus 29 is energized from Bus 28).

5) Monitor isolation condenser makeup pump diesel day tank level on LI2/3-5241-22 and L2/3-5241-24.

6) Verify proper operation of fuel oil transfer pump 2-5203.

B. Unit 3 Short Term Isolation Condenser Shell Makeup

1) Open Valve MO3-4399-74.

Note: Remove power to 250-Vdc Reactor Building MCC Bus 3A if necessary to facilitate manual opening of MO3-4399-74 and prevent any subsequent spurious closure.

2) Start isolation condenser makeup pump 2/3-43122A or 2/3-43122B.

3) Verify isolation condenser makeup flow on FI 2/3-4341-152.

4) Verify 480V Bus 29 and 480V MCC 29-2 are energized (Bus 29 is energized from Bus 28).

TABLE 7.3-3

OPERATIONS REQUIRED FOR A CONTROL ROOM FIRE
USING THE ISOLATION CONDENSER METHOD OF SHUTDOWN

5) Monitor isolation condenser makeup pump diesel day tank level on LI2/3-5241-22 and L2/3-5241-24.

6) Verify proper operation of fuel oil transfer pump 2-5203.

C. Unit 2 Cooldown

1) Control Unit 2 cooldown by throttling valve MO2-1301-3

2) Monitor Unit 2 isolation condenser level on local sightglass

3) Monitor RPV pressure and level at instrument racks 2202-5 and 2202-6 (instruments LIS2-263-58A & B, LI2-263-59B, LIS2-263-17B & D, PI2-263-52B and PI2-263-60B)

D. Unit 3 Cooldown

1) Control Unit 3 cooldown by throttling valve MO3-1301-3

2) Monitor Unit 3 isolation condenser level on local sightglass

3) Monitor RPV pressure and level at instrument racks 2203-5 and 2203-6 (instruments LIS3-263-58A & B, LI3-263-59B, PI3-263-52B and PI3-263-60B)

E. Monitor condensate storage tank level on LI2/3-3341-77A & B

F. Verify proper operation of Fuel Oil Transfer pump 2/3-5203

G. Monitor local pump discharge pressure indication instrumentation as necessary to ensure proper system operation.

H. Long Term Isolation Condenser Makeup

1) Ensure at least one service water pump operating.

2) Open valve MO2(3)-4102 and MO2(3)-1301-10.

IV Address Potential Adverse Valve Spurious Operations

A. Remove power to Units 2 & 3 ADS circuits at Units 2 & 3 125-Vdc distribution panels.

TABLE 7.3-3

OPERATIONS REQUIRED FOR A CONTROL ROOM FIRE
USING THE ISOLATION CONDENSER METHOD OF SHUTDOWN

B. Verify that valves AO-2(3)-0302-6A and 6B and MO-2(3)-0302-8 are open or verify another reactor water makeup source is available (e.g., FW, HPCI) before resetting the scram system (closing scram injection valves).

C. Verify that the RWCU has automatically isolated. If necessary, close remote manual valves 1201-135A, 1201-135B and 1201-205 to isolate system

D. Verify MO-2301-3 is closed. If necessary, trip HPCI turbine if MO-2301-3 is open and the HPCI pumps are not delivering water to the reactor.

E. Trip any unwanted loads off of buses and remove closing circuit fuses.

7.4 Procedures Relevant to Cold Shutdown

The procedures and materials needed to achieve cold shutdown are listed in this section. The cold shutdown analysis methodology and zone-by-zone analysis are discussed in Sections 4.0. Cold shutdown systems are described in Section 3.2.

7.4.1 Procedures

Repair procedures are potentially necessary to achieve cold shutdown as identified in Section 3.2. Repairs may be necessary in the following fire areas as identified in the applicable section or table listed below.

Fire Areas	Repairs Identified
RB2-I and RB2-II	Table 4.2-2 (All Fire Zones except 1.1.2.3 and 1.3.2)
	Table 4.2-3 (Fire Zones 1.1.2.3 and 1.3.2)
RB3-I and RB3-II	Table 4.5-2 (All Fire Zones except 1.1.1.3 and 1.3.1)
	Table 4.5-3 (Fire Zones 1.1.1.3 and 1.3.1)
1.2.1	None
1.2.2	None
RB-2/3	None
TB-I	Table 4.8-2
TB-II	Table 4.9-2
TB-III	Table 4.10-2
TB-IV	None
TB-V	Table 4.12-2
11.3	None
Radwaste	None

7.4.1.1 Dresden 2&3 Cold Shutdown Loads Requiring Temporary Cable Connections

Dresden 2&3 cold shutdown loads requiring temporary emergency feeds are listed below per unit.

Quantity (Per Unit)	Shutdown Cooling System		
2 of 3	Shutdown Cooling Pump	500 HP (ea) SWGR (ea)	75 A @ 4-kV
2 of 2	RBCCW Pump	300 HP (ea) SWGR (ea)	45 A @ 4-kV
2 of 4	Recirc. Loop Vlv (4A or 5A)	16 HP (ea)	20 A @ 480-V MCC (ea)
1 of 2	SDC Vlv 1A or 1B	5 HP	7 A @ 480-V MCC
1	Reactor Building 125-V Distribution Panel		Feed capable of original full capacity
	LPCI/CCSW Div.II		
2 of 2	LPCI Pump	700 HP (ea) SWGR (ea)	105 A @ 4-kV
1	LPCI Emg. Air Cooler	5 HP	7 A @ 480-V MCC
5	LPCI Emg. Air Cooler	8A/1A (ea) (pick up/holding)	40A/5A @ 125-Vdc (all)
2 of 2	CCSW Pumps	500 HP (ea)	75A @ 4-kV SWGR (ea)
2 of 2	CCSW Emg. Air Cooler fans (ea)	(2) - 3 HP (total)	20 A @ 480-V MCC

The cables necessary to establish the temporary feeds for the above loads are identified in Subsection 7.4.2 and are stored on site.

7.4.1.2 Control System Repair Procedures

The following types of control system repair procedures are necessary. Section 4.0 identifies which equipment must be repaired on a fire area basis.

1. Procedures have been developed for repair of damage to shutdown cooling, RBCCW, service water, main steam relief valves, LPCI/CCSW, auxiliary power, and diesel generator systems.

2. Cable repair procedures have been developed for the following situations:

   a. Attach temporary cable to penetrations,

   b. Attach temporary cable to motors,

   c. Attach temporary cable to switchgear breaker or MCC starter, and

3. Repair procedures to provide the ability to locally control key mechanical and electrical components:

   a. Repairs such that a unit dedicated diesel generator and its auxiliaries can be started independently of existing control cable or logic. Modifications to assure local isolation and control capability are made only for the 2/3 diesel generator. Repair procedures would be applicable to Unit 2 diesel generator and Unit 3 diesel generator.

   b. Actions in procedures are available to ensure that the diesel generator capacity is not exceeded (see Tables 3.2-3 and 3.2-6).

   c. Procedures are available to transfer from main to reserve 125-Vdc and 250-Vdc power sources.

7.4.1.3 Specific Repairs and Manual Actions Potentially Required for Cold Shutdown

A. Shutdown Cooling Pumps and RBCCW

   1. If control room start capability is lost, connect temporary cables from the required motors to spare breakers at the opposite unit, as detailed in Subsection 7.4.1.4.A.

   2. Jumper the breaker controls (or use local control) to force closure. Verify proper direction of rotation.

B. LPCI Pumps and Auxiliaries

1. If control room start capability is lost, connect temporary cables from the required motors and 480-V switchgear to breakers at the opposite unit as detailed in Subsection 7.4.1.4.B.

2. Jumper the breaker controls (or use local control) to force closure. Verify proper direction of motor rotation.

C. CCSW Pumps

If control room start capability is lost, connect temporary cables from the required motors to breakers in the opposite unit SWGR 23-1 and 24-1 or 33-1 and 34-1.

D. Relief Valves

If the valves are disabled, remove all relief valve cables from their penetrations, jumper at least three of the penetrations together, and connect a temporary cable from them to the 125-Vdc source at the nearest switchgear that has control power available. Use the opposite unit, if necessary. Verify energization.

(Note: The cable used for this purpose must first be used for repositioning the recirc loop valves, if necessary.)

E. LPCI Emergency Air Coolers/CCSW Emergency Air Cooler

Connect temporary cables to a spare breaker or starter at the nearest energized MCC (probably in the opposite unit). Close the breaker, or jumper the starter controls to force start.

F. Recirculation Loop Valves and Shutdown Cooling Valves (Inside Drywell)

Connect temporary cables from the drywell penetration to a spare breaker or starter at the nearest energized MCC. Detailed procedures exist to cover this action.

Once the valve has been repositioned as desired, the temporary cable can be used for other purposes (e.g., relief valves).

G. Reactor Building 125-V Distribution Panel

Detailed procedures exist for the installation of a temporary cable to the opposite units 125-Vdc reserve supply and to reconfigure that supply to be fed from the unaffected unit's batteries.

H. All Valves Outside Drywell

Manual handwheel operation is assumed. The power feed to the valve will be disabled and the valve manually positioned. The accessibility of these valves for manual operation was reviewed. The valves for which provisions must be made to assure accessibility are identified in Section 6.2.4.

I. Unit 2 and Unit 3 Diesel Generator Local Starting

Detailed procedures exist for isolating the unit's dedicated diesels from the control room and establishing local control.

J. Transfer From Main to Reserve 125-V and 250-Vdc Feeds

Detailed procedures exist for repositioning slugs and closing breakers to establish reserve dc feeds to distribution panels and switchgear.

K. Process Monitoring Instrumentation

Reactor Level and Pressure

Reactor level and pressure are normally monitored in the control room on various instruments, which are fed from two independent divisions. The operator can also locally monitor reactor level and pressure in the Reactor Building on instrument racks 2202(3)-5 and 2202(3)-6 at the 546-foot elevation or 2202(3)-7 and 2202(3)-8 at the 517-foot elevation. Reactor pressure is used to determine the saturation temperature in the vessel. When the vessel pressure is reduced, a meter will be attached to a drywell penetration to measure the recirculation loop temperature, vessel shell temperature and shell flange temperature if control room indication is unavailable.

7.4.1.4 4-kV Breakers to be Used for Temporary Feeds

A. Shutdown Cooling

4-kV Bus 23-1

2- Unassigned 1200 A frame w/150A CT's, bkrs 2328 and 2322

Use for 1 - Shutdown Cooling Pump @ Unit 3 and 1 - RBCCW Pump @ Unit 3

4-kV Bus 24-1

2 - Unassigned 1200 A frame w/150A CT's, bkrs 2423 and 2424

Use for 1 - Shutdown Cooling Pump @ Unit 3 and 1 - RBCCW Pump @ Unit 3

4-kV Bus 33-1

3 - Unassigned 1200 A frame w/150A and 75A CT's, - bkrs 3328, 3326, and 3321

Use for 1 - Shutdown Cooling Pump @ Unit 2* and 2 RBCCW Pumps @ Unit 2

*This load may be fed from the 4-kV cable penetration for the bus tie from bus 23 to 23-1 at the nearby wall, if the cable in the turbine building is intact and offsite power is available.

4-kV Bus 34-1

No unassigned breakers.

B. LPCI/CCSW Division II

4-kV Bus 24-1

2- Unassigned 1200 A frame w/150A CT's, bkrs 2423 and 2423

Use for 2 - LPCI Pump 3C and 3D (Div. II) @ Unit 3

4-kV Breaker 34-1

No unassigned breakers.

4-kV Bus 33-1

3- Unassigned 1200 A frame w/150A and 75A CT's, breakers 3328, 3326, and 3321

Use for LPCI Pump 2C.

7.4.2 Materials Needed

A. The following cables should be precut to the indicated lengths and maintained in a convenient location, ready for emergency use:

1. 500 feet of 3/c #2 AWG, 5-kV, Cable No. 78400, for any one of the following applications:

a. One shutdown cooling pump at Unit 2.

b. One shutdown cooling pump at Unit 3.

c. One LPCI pump at Unit 3.

2. 500 feet of 3/c #2 AWG, 5-kV, Cable No. 78401, for any one of the following applications:

   a. A second shutdown cooling pump at Unit 2.

   b. A second shutdown cooling pump at Unit 3.

   c. A second LPCI pump at Unit 3.

3. 300 feet of 3/c #2 AWG, 5-kV, Cable No. 78402, for any one of the following applications:

   a. One RBCCW pump at Unit 2.

   b. One RBCCW pump at Unit 3.

   c. One LPCI pump at Unit 2.

4. 300 feet of 3/c #2 AWG, 5-kV, Cable No. 78403, for any one of the following applications:

   a. second RBCCW pump at Unit 2.

   b. A second RBCCW pump at Unit 3.

   c. A second LPCI pump at Unit 2.

5. 350 feet of 3/c #10 AWG, 600-V, Cable No. 78413, for any one of the following applications:

   a. Unit 2 LPCI room cooler.

   b. Unit 3 LPCI room cooler.

   c. Unit 2 shutdown cooling valve.

   d. Unit 3 shutdown cooling valve.

6. 500 feet of 4/c #8 AWG, 600-V, Cable No. 78409, for use on the electromatic relief valves and the recirculating loop valves of either unit. The intent is to connect this cable to one loop valve, force it to the desired position, then remove the cable and proceed to the next valve until all are properly positioned. Finally, if necessary, the same cable can be used to

"hot wire" the electromatic relief valves.

7. 800 feet of 3/c #2 AWG, 5-kV, Cable No. 78404, for either of the following applications:

   a. One CCSW pump at Unit 2.

   b. One CCSW pump at Unit 3.

8. 800 feet of 3/c #2 AWG, 5-kV, Cable No. 78405, for either of the following applications:

   a. A second CCSW pump at Unit 2.

   b. A second CCSW pump at Unit 3.

9. 700 feet of 4/c #8 AWG, 600-V, Cable No. 78410, for either of the following applications:

   a. CCSW room coolers 3C and 3D.

   b. CCSW room coolers 2C and 2D.

10. Two 250-foot pieces of 1/c 250 MCM, 600-V, Cable No. 78408, for either of the following applications.

    a. Reactor Building 125-Vdc Distribution Panel 2.

    b. Reactor Building 125-Vdc Distribution Panel 3.

B. All precut cables have appropriate lugs on both ends to speed the installation of the temporary feeds in time of emergency. When the cables are put to use, any excess lengths should be left lying on the floor, not cut off. An adequate supply of splice kits is also kept on hand so that the lugs may be removed and splice connections made where necessary (e.g., containment penetrations).

7.5 Emergency Lighting

A fire at the Dresden facility could cause the loss of various lighting cabinets concurrent with the loss of offsite power. This resulting blackout of sections of the plant would make access to, and control of, safe shutdown equipment impossible. According to Section III.J of Appendix R, 8-hour battery powered emergency lighting packs shall be provided on all access and egress routes and in all areas where safe shutdown equipment needs to be operated.

In order to conform with the Appendix R requirements, a walkdown was performed at the station. This walkdown was performed on all the primary and alternate access routes that the station identified for each manual action in accordance to the guidelines of Dresden Station Special Procedure SP-84-7-62. The resulting 8-hour battery powered emergency lighting unit locations are shown on Drawings F-201-6 through F-214-6.

7.6 Communication Capabilities

The existing communication systems at Dresden Station consist of:

1. Public Address (PA)
2. Dial Telephones (PBX)
3. Sound Power Phones
4. Radio

7.6.1 Effects of Fire on Each Communication System

7.6.1.1 PA System

Dresden's PA system has a single 120-Vac power feed from lighting cabinet No. 21, located at Column G-43 on the ground floor of the turbine building (Fire Area TB-II, Central Zone Group). Lighting cabinet No. 21 is fed from MCC 29-2, located near Column D-32 (Fire Area TB-I, Eastern Zone Group). This MCC is fed from 480-V Bus 29, near Column N-41 at Unit 2 reactor building elevation 570 feet (Fire Area RB2-II). A fire in any of these areas (comprising most of Unit 2) could totally disable the PA system by damaging its only source of power.

The PA system equipment is interconnected by a seven-conductor cable that carries this same 120-Vac feed to all of the local amplifiers. Therefore, a fire anywhere in the plant has the potential to short out the PA power source, tripping the breaker at lighting cabinet No. 21. Recovery from this condition will require a repair to the damaged cable; this renders the existing PA system totally unavailable for an Appendix R hot shutdown.

7.6.1.2 PBX

Dresden's PBX originates in the administration building. A single trunk connects the central system to the main plant via an underground duct run. This trunk terminates in the Unit 2 turbine building. From there, two branches go out to the Unit 2 reactor building and Unit 3 turbine building. An additional branch runs from the Unit 3 turbine building to the Unit 3 reactor building.

Damage to any cable in the PBX system disables only the equipment downstream of the damage. Therefore, the most vulnerable area is in the vicinity of telephone terminal box

(TTB) 2-1, on the mezzanine floor of the Unit 2 turbine building (Fire Area TB-I, Eastern Zone Group). A fire at this location could disable all of the telephone equipment in the plant. In contrast, a fire affecting TTB 2-2 on Unit 2 reactor building elevation 545 feet 6 inches, or TTB 3-2 on the same elevation of Unit 3, can disable the PBX in the affected reactor building only. Minimal damage occurs when the fire is confined to a location distant from the TTB's, which are located along both sides of H-wall; in such a case, only the phones in the immediate vicinity of the fire can be affected. For most plausible fires, the telephones are much more likely to work than the PA system.

7.6.1.3 Sound Power Phones

The sound power phone system has the advantage of not requiring an external power source. It essentially consists of a number of jacks, located in (or near) control panels and instrument racks, all wired in parallel. Each jack offers multiple circuits. A matching box in the control room interfaces Units 2 and 3 with Unit 1.

Although it is possible that all of the sound power circuits could be shorted out by a single fire, it is probable that at least one circuit will remain operable. This is a good alternative to the PBX system for areas equipped with sound power jacks.

7.6.1.4 Radio

The radio system in use at Dresden is a 5 channel trunked system operating in the 900 MHz band. The base station transceiver is clustered on Turbine Building elevation 549 feet, Rows C-D, 44-45(Fire Area TB-IV, Zone 8.2.8.D, North Turbine Vent Floor). There are 400 handheld transceivers in use at Dresden. Each handheld is a 5 watt trunked walkie talkie capable of operating on any unused channel of the 5 channels in the system. Each handheld also has two channels of ATalk-Around@ which means that a handheld can talk directly to another handheld that is on the same ATalk-Around@ channel. There are remote consoles located in the Control Room, the Central Alarm Station (CAS), and the Secondary Alarm Station (SAS). The remote consoles communicate audio and channel select equipment information via modem on plant twisted pair wiring from each console to the base station equipment located in the Turbine Building. There are eight antennas fed by coaxial cable from the base station equipment located on the 549 level of the Turbine Building to the following locations throughout the plant:

Location	Elevation	Column
Turbine Bldg Roof U-3	622'	H-56
Turbine Bldg Roof U-2	622'	D-31
Turbine Bldg U-2	515'	C.D.- 4D
Turbine Bldg U-3	515'	C.D.- 4B
Turbine Bldg U-3	517'	F-56
Turbine Bldg U-3	517'	M - 45
Turbine Bldg U-2	517'	M - 43
Max Recycle Bldg	519'	70' North of C - 44

A fire in the area of the base station equipment on the 549' level of the plant could disrupt the operation of the entire system. A fire in the area of any of the remote consoles could disrupt communication only from that console in the area of the fire, while communications from the locations of the other remote consoles would not be affected. Communication from a handheld would not be affected by a fire in the vicinity of any of the remote consoles.

Most fires remote from the base station will have little or no impact. Some of the antennas are sufficiently isolated from the others so that short circuits on one antenna's coaxial cable will not significantly degrade the performance of the remaining antennas.

7.6.2 Communication System Availability in the Event of a Fire

The availability of each communication system for a fire in a given fire area is summarized in Table 7.6-1. For most conceivable fires, some portions of the existing communication systems can be expected to remain operational. Procedures allow for the attempted use of normal communication methods, with reliance upon alternate systems only when necessary. However, since there is a remote possibility that a major fire in the turbine building will disable all of the existing communication systems, a field test of hand-held radios communicating on simplex frequencies independent of the base station equipment was performed to determine if that communication mode was an acceptable alternative.

It was found by this test that, generally, hand-held radios on "talk-around" are a reliable means of direct communication between locations within the same building or from one building to another on nearby elevations. Direct communication is not achievable between widely separated points due to the many reinforced concrete walls and floors separating them. However, the test revealed that by the use of intermediate relay points, communication difficulties can be resolved for all Appendix R safe shutdown procedures. Therefore, modifications to the Dresden plant communication systems are not required.

TABLE 7.6-1

COMMUNICATION SYSTEM AVAILABILITY MATRIX

Area in Which Fire is Postulated	Prescribed Appendix R Shutdown Path	Anticipated Availability for Manual Actions			
		PA	PBX	Sound Power	Radio (Base)
RB2-I	C	N/A	N/A	N/A	N/A
RB2-II	B1	3	1*	2	1
RB3-I	D	N/A	N/A	N/A	N/A
RB3-II	A1	3	1*	2	1
RB2/3	E & F	N/A	N/A	N/A	N/A
TB-I	B1	3	3	2	3
TB-II	A2 & B2	3	2	2	3
TB-III	A1	3	1	2	1
TB-IV	A & B	N/A	N/A	N/A	N/A
TB-V	A2 & B2	3	1	2	3**
Crib House	A & B	N/A	N/A	N/A	N/A
Radwaste	A & B	N/A	N/A	N/A	N/A
Misc. Outside	A & B	N/A	N/A	N/A	N/A

Note: 1 - Probably available. Little or no damage is expected.
2 - Partially available. Some circuits may still work.
3 - Probably disabled. Crucial circuits are in fire area.
* - Except at 2/3 Diesel Generator.
** - Except repeaters.
N/A - Not applicable. Shutdown path does not require any local control or manual action.

7.7 Access to Safe Shutdown Equipment

In order to perform the safe shutdown procedure actions described in Sections 7.3 and 7.4, it is necessary to enter areas which are isolated from the rest of the plant by electrically-controlled or otherwise locked doors. These doors fall into four categories: secondary containment air locks, security doors, high radiation area doors, and miscellaneous locked doors. An evaluation was performed to determine the impact of these doors on access to safe shutdown equipment in the event of a fire. The results of the evaluation are presented in Subsections 7.7.1, 7.7.2, 7.7.3, and 7.7.4.

7.7.1 Secondary Containment Airlock Doors

Secondary containment door interlocks are powered by the 125-Vdc system, which is not postulated to be lost in most safe shutdown scenarios. Furthermore, an emergency bypass button is locked at each door, which could be used upon approval of the Shift Engineer to defeat the interlock. If a fire were to disable the 125-Vdc source to these interlocks, they would fail in such a manner that access would not be prevented.

7.7.2 Security Doors

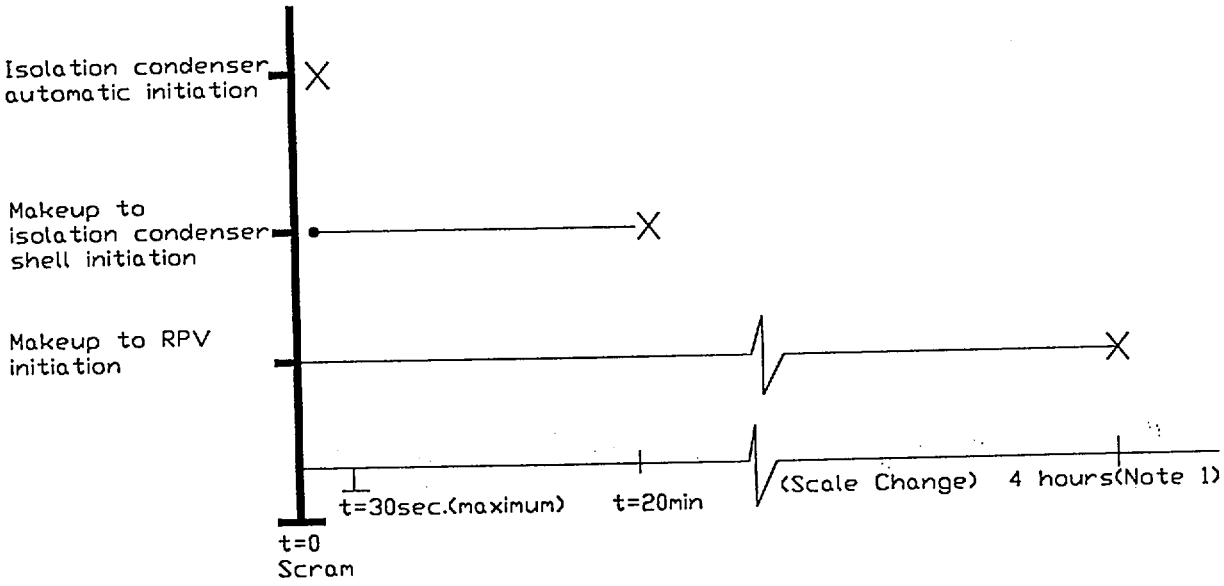
The card key system for the security doors would normally be available under a loss of offsite power incident, since the security diesel is designed to start and pick up these loads upon loss of bus 34-1. However, if the security diesel fails to start or if a fire damages the security multiplexer cables, the card key system could be impaired such that normal entrance through the security doors would be prevented. However, egress from the security areas would not be prevented. Therefore, in most cases, loss of the card key system would not hinder the operators from reaching safe shutdown locations. Current security force procedures call for the prompt posting of guards at certain locations to assist operations personnel by opening the doors, as necessary. Additionally, the Shift Engineer has keys assigned to him for use in the event that emergency access is needed prior to arrival of the security force personnel. A note is provided in the safe shutdown procedure package to caution the Shift Engineer that use of these keys may be necessary and to issue them as appropriate.

7.7.3 High Radiation Area Doors

High radiation area doors are kept locked in accordance with 10 CFR 20. The Radiation/Chemistry Department controls the normal issuance of high radiation area keys. However, a sufficient number of keys will remain assigned to the Shift Engineer exclusively for use during the performance of the safe shutdown procedures. For personnel safety reasons, a Caution will be provided in the safe shutdown procedure package such that a Radiation/Chemistry Technician or Radiation Protection Foreman should be contacted prior to entry into any high radiation areas. If necessary, he will accompany the Operator and assist him.

7.7.4 Miscellaneous Locked Doors

There are certain areas of concern which are kept locked (e.g., diesel generator rooms, battery rooms, and the auxiliary electric equipment room). Operations personnel are all assigned a key for the purpose of access to these areas. Additionally, the Shift Engineer is assigned keys which he can issue for this purpose.

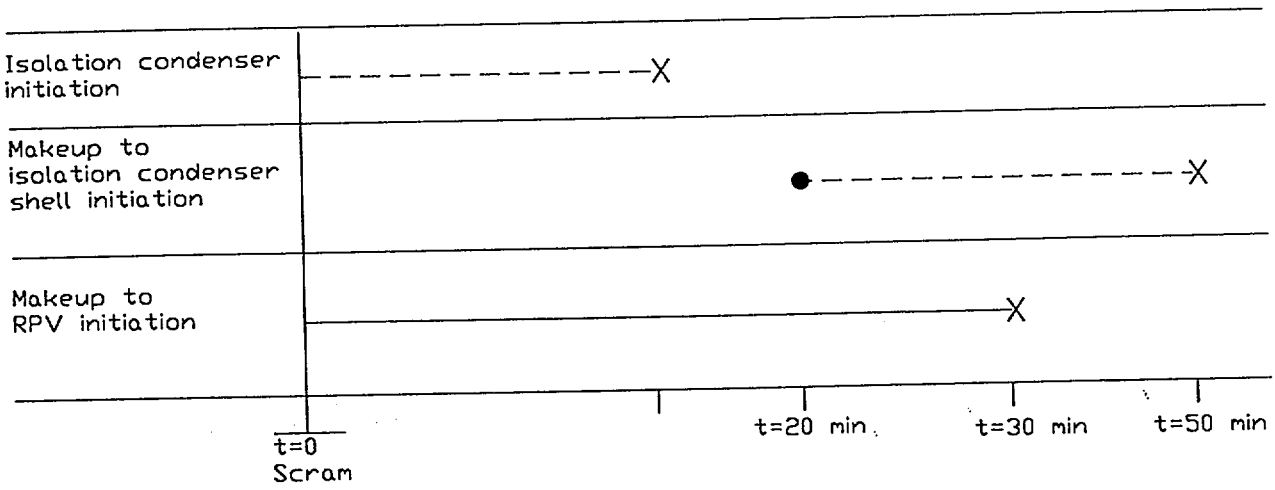


Note 1: Assumes 15°F/hr cooldowns

DRESDEN STATION
UNITS 2 & 3

FIGURE 7.2-1

TIME INTERVALS AVAILABLE FOR MAKEUP WATER INITIATION GIVEN AUTOMATIC INITIATION OF ISOLATION CONDENSER



DRESDEN STATION
UNITS 2 & 3

FIGURE 7.2-2
TIME INTERVALS AVAILABLE FOR MAKEUP WATER INITIATION GIVEN INITIATION OF ISOLATION CONDENSER 15 MINUTES AFTER SCRAM