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SHIELDS L. DALTROFF
VICE PRESIDENT
ELECTRIC PRODUCTION

July 3, 1979

Re: Docket Nos. 50-277
50-278

Mr. Thomas A. Ippolito, Chief
Operating Reactors Branch #3
Division of Operating Reactors
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Ippolito:

Enclosed is our supplement to the Peach Bottom Safe Shutdown Analysis related to the fire protection study, addressing staff positions presented in your letter of November 17, 1978. The supplement reconsiders the hot shutdown analysis in selected areas identified in your letter, as well as presents for all areas of the facility, your recently requested cold shutdown analysis. As a result of this re-analysis, we are proposing improvements in the fire protection design of the plant to further enhance safe shutdown capabilities.

The Fire Protection Safety Evaluation Report, transmitted on May 22, 1979, specifically requested that we evaluate the need to provide two double female adapters for use by a fire department pumper in pumping fire water directly from the inlet pond to a fire hydrant. We agree to obtain and store this equipment in a central location at the Peach Bottom facility in accordance with the schedule requested in your report.

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Should you have any questions regarding these matters, please do not hesitate to contact us.

Very truly yours,

Attachment

June, 1979

Supplement to of the Peach Bottom Safe Shutdown Analysis

Reference: Correspondence from T. A. Ippolito, Nuclear Regulatory Commission, to E. G. Bauer, Jr., Philadelphia Electric Company, dated November 17, 1979

This report provides additional details regarding the Peach Bottom safe shutdown analysis as related to fire protection, and addresses to specific questions presented in the NRC letter of November 17, 1978 referenced above. The Analysis will describe the capability to bring the plant to a cold shutdown condition following a fire in any area of the plant. The analysis will also describe the capability to get to a hot shutdown condition following a fire in the cable spreading room (PF-21d), primary containment (PF-34), general area in the reactor building elevations 135' and 165' (PF-43), or in the area of the remote shutdown panel (PF-46d).

The staff position outlined in PF-26 will be compared to the approach we used for the analysis on a point by point basis. Staff position will be stated, followed by how we propose to meet with its intent.

From NRC Staff Position PF-26

The licensee should reconsider its safe shutdown analysis assuming that offsite electrical power is not available in the event of a fire in any area of the plants.

Response

Our considerations regarding the loss of offsite power and their basis was presented in the February 16, 1979 submittal on fire protection. The equipment used for purposes of the analysis is capable of being supplied from onsite electrical supplies. For purposes of the analysis, it was assumed that at least one of the offsite a.c. supplies to the Emergency Bus would be available following any fire. The two offsite supplies enter the plant at different locations and are initially run in separate imbedded conduits. Near the switchgear rooms the cables are brought out of the imbedded conduits to junction boxes (still in separate fire zones) and connected to bus duct networks. The two bus ducts do not share the same fire zone until they reach the switchgear compartment, except for a brief excursion through the 4' corridor on elevation 135' behind the 4 kv switchgear rooms (part of fire zone 78A). At the corridor the ducts are 26 feet apart, the only fixed combustibles in this area are cable, and transient combustibles (as indicated in the combustible loading survey) will be administratively prohibited from the area. The trays containing the cables in this area do not communicate

between the two bus ducts; therefore, a fire in any tray or involving one bus duct would not affect the other bus duct.

From Staff Position PF-26

The following should be considered functional requirements for a safe shutdown.

1. Placing the reactor in a subcritical condition and maintaining the reactor subcritical indefinitely.

Response

Credit is assumed for a reactor trip. Any fire affecting the Reactor Protection System or the Control Rod Drive circuitry would not prevent the reactor from being placed and maintained in a subcritical condition. The RPS does not need power to trip, and the control rods are inserted when power is removed. The reactor can be tripped manually from the control room, automatically by the logic or by tripping the power supplies in the Emergency Switchgear rooms.

From Staff Position PF-26

The following should be considered functional requirements for a safe shutdown.

2. Bringing the reactor to hot shutdown conditions and maintaining it as hot shutdown for an extended period of time (i.e., longer than 72 hours) using only normal sources of cooling water.

3. Maintaining the reactor coolant system inventory indefinitely using only normal sources of makeup water.

Response

The response to this staff position was presented in our submittal of February 16, 1979. The NRC requested a reconsideration of the safe shutdown conditions in selected areas of the plant. This analysis is presented later in the report. We selected two methods of achieving hot shutdown for examination as part of the analysis. These two methods are not the preferred methods of establishing hot shutdown condition. They were selected due to their inherent physical separation, redundancy, onsite power supplied, and minimal equipment requirements. The availability of at least one of these two methods during the most extreme postulated fire demonstrates hot shutdown capability. In reality, many of the twenty-five safe shutdown methods identified in the Fire Protection Program Report, March 1977, would be operational following a fire in the areas discussed in this report.

One method uses the Main Steam Relief Valves to depressurize the reactor. Following depressurization, water is supplied to the reactor from the torus by a core spray pump. Energy is removed from the reactor via the relief valves to the torus. The torus is cooled by the RHR and HPSW pumps. Five of the relief valves are provided with accumulators that will allow several operations of these valves. In order to get into an extended operation period with this method, the air or nitrogen supply to any of the relief valves must be available. This can be done by operating the installed compressors or by connecting a compressed air bottle to an existing test connection on the valves. Either one of two air compressors per unit can provide the air supply requirmeents for these valves. There are sufficient operations in the accumulators to provide adequate time to secure a backup supply for the relief valves.

The other method uses the HPCI system to pump makeup water into the reactor from the torus. Energy is removed from the reactor to the torus using the HPCI turbine flow path. The torus is cooled by the RHR and HPSW pumps. This method lends itself to extended operation naturally. The amount of work being done by the turbine can be adjusted to establish the cooldown rate of the reactor.

From Staff Position PF-26

The following should be considered functional requirements for a safe shutdown.

4. Bringing the reactor to cold shutdown conditions within 72 hours.

Response

The method used to achieve cold shutdown is the normal method. Reactor water is circulated by one of the RHR pumps through an RHR/HPSW heat exchanger and back to the reactor. The HPSW system is used to remove the heat from the reactor water. With the exception of the suction line and its two series isolation valves, there are two independent flow paths for achieving shutdown cooling. The effects of the loss of the suction line on shutdown cooling was analyzed in the PBAPS FSAR Appendix G, Section G.5.3 Event 21. Essentially the analysis assumed that the reactor would be returned, or maintained, in a hot shutdown condition (core spray or RHR for make-up, relief valves for energy removal and RHR/HPSW for torus cooling) until the shutdown cooling line could be restored or conventional plant equipment be made available to provide a heat removal flow path. The Safe Shutdown Analysis is not going to attempt to provide a justification for a condition more restrictive than previously required. For

purposes of the analysis, it is assumed that the RHR shutdown cooling line can be made available.

From Staff Position PF-26

If all of the redundant equipment (including cable in conduit) available to perform any of the required functions is located in a single fire area, the specific separation that exists and any combustible material between the redundant equipment should be identified.

Response

This has been done for each of the areas identified in staff positions 21d, 34a, 43, and 46d for the hot shutdown case and for all fire zones for the cold shutdown case.

From Staff Position PF-26

No credit should be taken for actions by plant personnel to repair damage to equipment required for functions 1,2, and 3.

Response

As identified earlier, an extended operation using the relief valve method of hot shutdown may require the restoration of an air supply. This action can take place within the required time frame. Other actions may be required in some specific fire zones and will be discussed later.

Throughout the discussion the term "allowable time frame" is used. When used in conjunction with torus cooling for hot shutdown this time frame is assumed to be about an hour. With the aid of the prefire plans, the one or two remote valve operations required for some fire areas is realistic. When used in conjunction with cold shutdown this time frame is assumed to be 72 hours as a minimum. Again, this is ample time to manually operate three valves, at the most, or to effect some minor repairs. When used in conjunction with the repairs to the relief valve cables to permit depressurization for shutdown cooling, this time frame is again assumed to be 72 hours. The work involved in this instance is to establish an 125V DC feed to two or three relief valve cables, for the worst case, which would have to be done at the drywell penetrations. Again, this is ample time to effect these repairs.

From Staff Position PF-26

The capability to perform all control actions necessary - functions 1., 2., and 3., must be maintained in the control room or at the remote shutdown panels and all power requirements for these functions must be satisfied by onsite sources.

Response

The power requirements have been discussed previously. It is the intent of the analysis to comply with the requirement to operate from the control room or remote shutdown panel. Any deviations from this will be noted in the discussions of the specific fire zones and justifications will be provided on a case by case basis.

Additionally, the process of getting to cold shutdown for purposes of the Analysis is a two step process. The plant is first brought to and stabilized in a hot shutdown condition. When a cold shutdown flow path is verified, the plant can then be taken into the cold shutdown condition. If the only method available to achieve hot shutdown is the one that utilizes the HPCI system, manual actions might have to be taken by plant personnel to bridge the pressure difference gap from HPCI turbine trip on low vessel pressure (100 psig) to the opening of the shutdown cooling isolation valves (75 psig) so as to permit initiation of cold shutdown. The capability to perform this activity will be discussed individually for each area analyzed.

Staff Position 34a

The licensee should re-evaluate the affects on safe shutdown of a fire in the primary containment.

Response - Unit 2 - Primary Containment

Shutdown equipment located within the primary containment.

1. Relief valve method - all eleven relief valves and cables.
2. HPCI method - two motor operated valves, HPCI steam supply, and feedwater stop valves.
3. Cold shutdown - suction line and valves, recirculation discharge valves and water injection lines.

Hot shutdown capability (Unit 2): The two valves associated with the HPCI system are normally in their correct operating position (open). There are no credible failures to the cables that could cause either of these valves to go closed. This is based on the three phase nature of the power feed.

The relief valve cables are run in individual rigid steel conduits from the penetration splice box to the relief valves. Inside the penetration splice box the cables for all eleven relief valves are not provided any physical separation from each other or other instrument, control, or power cables.

The most probable fire inside containment would involve the lube oil associated with one of the recirculation pump motors. Oil on the floor of containment would pose no serious threat to the relief valves or cables. The oil would be collected by the drains. Any residual oil on the floor at eelevation 116' would not reach the relief valve cables, which do not extend below the 150' elevation. A fire at one of the motors (elev. 135) has the potential for damaging three or five of the relief valve cables. There would still be sufficient capacity to permit the relief valve method to be used for hot shutdown and depressurization to the cold shutdown pressure range following an oil fire.

The most detrimental fire would involve the insulation (PVC) on some instrumentation cables that are in proximity to the relief valve cables inside the penetration splice box. This fire could possibly involve all eleven relief valve cables. For this fire the plant must be maintained in the hot shutdown condition with HPCI method until repairs can be made to the relief valve cables.

Cold Shutdown Capability (Unit 2): The power and control cables for the shutdown cooling suction valve are also run through the same penetration box as the relief valves. A fire in this box or an oil fire in the correct recirculation pump motor could damage the power cable to this valve. This valve would have to be manually operated or the cables repaired, in order to establish a cold shutdown.

The RHR water is injected into the vessel via the discharge line of the recirculation pump. To prevent reverse rotation bearing damage on the recirculation pumps, the discharge valves should be closed. The valves are physically located 180° apart, the cables are in rigid steel conduit, and the penetration boxes are 180° apart. There is no path of combustibles between the two valves. Even if both valves were to become inoperable, water could be injected to the vessel by the Core Spray system which has no active components inside containment.

Summary (Unit 2): The above analysis did not take credit for the normally inerted atmosphere inside containment. A fire could not occur inside containment as long as the oxygen concetration is held at less than 4%. Even without an inerted environment, and assuming the most detrimental fire, the plant can be brought to hot shutdown with the HPCI method. For a fire in the penetration splice box, some repair work would be required in order to depressurize below 100 psig and establish cold shutdown.

Proposed Modifications (Unit 2): 311 321

1. The design of the existing primary containment smoke detectors will be reviewed, and if necessary upgraded; to ensure its effectiveness in detecting a recirculation pump motor oil fire and a penetration splice box cable fire.

2. The relief valve cables inside the penetration splice box will be provided with some form of fire protection. This will either be a suitable flame retardant coating, fire isolation seals between the relief valve cables and the PVC jacketed cables, or a combination of both.

3. The logic for the containment spray mode of the RHR system will be modified to provide manual initiation in the event that a fire is detected in containment.

Response - Unit 3 - Primary Containment

The safe shutdown analysis was performed for the Unit 3 Primary Containment, and the results for both the hot and cold shutdown is the same as for the Unit 2 analysis presented above. The equipment and cables design associated with the shutdown analysis is identical to the Unit 2 design.

Staff Position PF-43-1

The licensee should make whatever modifications are necessary to demonstrate by analysis that both plants can be safely shutdown regardless of damage to any equipment located in fire zone 5H, 5J (reactor building 135 ft. elevation)

Response - Unit 2 - Reactor Building 135 ft.

Shutdown equipment located in this area.

1. Control rod drive hydraulic control units.
2. Relief valve method - cables for relief valves
3. HPCI method - cables for valves
4. Cold shutdown - cables for motor operated valves.

Hot shutdown Capability (Unit 2): With a few exceptions all relief valve method cables and equipment are located in the south half of this floor and the HPCI method cables and equipment are located in the north half. All of the exceptions except one, would not prevent the components from fulfilling their functions. They are power and control cables for valves that are in their correct positions. Grounds, open circuits, or hot shorts, to these cables would not cause the valves to reposition themselves.

The one exception involves the power feed cable to the position modulator for the HPSW/RHR heat exchanger valve. This valve does not have to be opened immediately and it can

be opened by jumpering two terminals in the cable spreading room.

The north and south half of the area are separated by the reactor containment. There are two corridors between these areas. The east corridor is 36' long by 8' by 15' high. There are no combustibles located in this corridor. The west corridor is 5' wide at center expanding to 10' at the ends by 26' high by 42' long. There are five cable trays containing cables that run the length of this corridor and could be considered a potential path of combustibles. None of the cables in the trays are required for hot or cold shutdown. If this combustible path is sealed off, a fire in either the north or south halves of the area would not spread to the other and the plant could be placed in a hot shutdown condition by one of the two methods dependent upon the location of the fire.

Cold shutdown Capability (Unit 2): A similar situation exists for cold shutdown cables. One flow path (one RHR loop) utilizes equipment located in the north half of the area and the other flow path (other RHR loop) uses equipment located in the south half of the area. Again, with the exception of a few cables whose failure could not defeat system operation these two methods are completely separated. Again, there is the one cable that powers the HPSW/RHR heat exchanger valve that can be made operable from the cable spreading room. If the path of combustibles between these two areas can be eliminated, a fire in one half of the area would not spread to the other half and a method of cold shutdown could be guaranteed.

The power and control cables for the inboard and outboard suction line valves are located in this area. If these cables were to become damaged by a fire, repairs could be made to the cables, or the valves could be manually stroked, within the time frame for getting into cold shutdown.

Summary (Unit 2)

Due to the spatial separation that exists in this area, a fire would not involve both methods of hot shutdown or both methods of cold shutdown except in the unlikely event the fire was transmitted across the west corridor in the cable trays. There are no real concentration of combustibles in this area.

Proposed Modifications (Unit 2):

1. The cable trays in the west corridor will be modified so that a fire will not propogate along these trays. This will be a fire stop, flame retardant coating, or another acceptable method.

3. The HPSW/RHR heat exchanger valve controls will be modified to ensure sufficient cable routing separation.

Response - Unit 3 - Reactor Building 135 ft.

Hot shutdown capability (Unit 3) - With a few exceptions, all relief valve method cables and equipment are located in the south half of this floor and the HPCI method cables are located in the north half. The exceptions are seven HPCI method cables in conduits that are run through the south half. Six of these conduits contain cables whose failure (open, short, ground, or hot short) could not defeat system operation. The cables are power feeds to valves that are normally in their correct position, valve position indications, and logic inputs whose signals are not sufficient on themselves to defeat the system. The one conduit that contains some HPCI method cables whose failure could defeat the HPCI system run vertically, approximately one foot away from two horizontal trays containing control and power cables for five motor operated valves associated with the relief valve method (refer to modifications).

The two corridors discussed in the Unit 2 analysis also exist here. Again there is no path of combustibles in the east corridor while the west corridor contains six cable trays that run the length of the corridor. None of the cables in the trays are required for hot or cold shutdown. If this combustible flow path is sealed off, a fire in either the north or south halves of the area would not spread to the other half.

Cold shutdown capability (Unit 3) A similar situation exists for the cold shutdown equipment and cables located within this area. All the cables and equipment for one flow path is located in the south half of the area; all the cables and equipment for the other flow path is located in the north half. There are no exceptions to this separation. If combustible flow path between the two halves is sealed off, a fire in either the north or south halves of the area would not spread to the other half and a method of cold shutdown could be guaranteed.

The power and control cables for the inboard and outboard suction line isolation valves are located in this area. If these cables were to become damaged by a fire, repairs could be made to the cables, or the valves could be manually stroked, within the time frame for getting into cold shutdown.

Summary (Unit 3)

With one exception, due to the specific separation that exists in this area, a fire would not involve both methods of

hot shutdown or both flow paths of cold shutdown unless a fire was transmitted across the west corridor in the cable trays. If this path is blocked, then there is no means for a fire in this area to spread between the two halves of the floor. There are no real concentration of combustibles in the area.

The one exception involves a conduit containing some HPCI method cables that could upset HPCI operation. This conduit is in proximity to some relief valve method cables.

Modifications (Unit 3)

1. The cable trays in the west corridor will be modified to prevent a fire from being transmitted along their length. The modification may involve a fire stop, flame retardant coating or another acceptable method.

2. The relief valve method trays, in proximity to the HPCI method conduit, and the HPCI method conduit will be modified to prevent both from being involved in a fire. The modification may involve flame retardant coatings; fire barriers or relocations.

Staff Position: PF-43-2

The licensee should make whatever modifications are necessary to demonstrate by analysis that both plants can be safely shutdown regardliness of damage to any equipment located in fire zones 13 H and 13J (reactor building 165 ft elevation)

Response - Unit 2 - Reactor Building 165 ft.

Shutdown equipment located in this area: 480 volt emergency load centers, reactor level instrumentation, motor control centers.

Hot shutdown capability (Unit 2): Cables for both methods of hot shutdown are run through this area. The majority of the cables in this area are associated with the relief valve method. There are several cables in this area that are associated with the HPCI method. Some of these cables provide power for valves that are normally in the correct position and are therefore not require for system operation. There are four cases (seven cables) for the HPCI method in this area that do have the potential for interrupting HPCI shutdown cooling.

1) Two AC power cables and the load center that supply power for the RHR/HPSW heat exchanges valve position modulator. Without power these valves can not be opened from the control room. However, they can be opened with a jumper in the cable spreading room. Torus cooling is

not needed immediately and the remote operations can be made within the allowable time frame. The cables are located in conduit which should minimize the likelihood of this occurrence.

2) Two AC power cables and the load center that supply power to a motor control center that feeds five valves required for RHR/HPSW torus cooling. Two of the valves are normally in the correct position; the loss of power to these valves would have no effect. The other three valves would have to be manually stroked at the valve. One valve is located on elevation 116' in the RHR room and the other two valves are located on elevation 116' in the torus room. The valves are not needed immediately and the remote operation can be made within the allowable time frame. The cables are located in conduit which should minimize the likelihood of this occurrence.

3) There are two conduits that contain a high reactor water level signal that trips the HPCI turbine. If both of these cables became individually shorted the turbine would trip; either cable alone would not trip the turbine.

These two conduits leave the instrument rack and come within 42 inches horizontally of each other for a few feet. They both cross six feet over a lightly loaded tray that is not required for either method. All the cables in this tray are jacketed with flame retardant neoprene. The two conduits then turn and run two inches apart between three trays (6" and 3'6" above two trays containing relief valve method cables and 2'6" below a tray containing no cables required for hot shutdown) for fifty feet before leaving the zone.

In the event a fire would result in a HPCI turbine trip the turbine could be reset in the cable spreading room by removing a set of fuses and resetting the logic.

4) The control cable for the HPCI inboard isolation valve is run through this area in its own conduit. The correct two conductors of this twelve conductor cable shorting together could cause this valve to close from its normally open correct position. Once this occurs, the valve may be opened at the motor control center, however, the motor control center is located within this area.

The control cables for the relief valves are routed through this area. Manual operations could be made to these cables within the proper time frame to permit their use for depressurization to the level required for shutdown.

Cold shutdown capability (Unit 2): The power and control cables for the inboard isolation valve for the shutdown cooling suction line are routed through this area. The load center and motor control center feeding this valve are also located within this area. If these cables were to be damaged by a fire, repairs could be made to the cables or the valve could be manually stroked, within the time frame for getting into cold shutdown.

There are several power and control cables for the one flow path of cold shutdown located throughout the area. The other flow path receives the power for its valves from the load centers in this area. None of the pumps that are required for system operation are located within the area nor do they receive their power from this area. Both flow paths could be made operable following a fire in this area by opening the valves manually. The valves associated with cold shutdown are not located within this area.

Summary (Unit 2)

There are cables for both methods of hot shutdown located within this zone; most of them involved the relief valve method. There are four sets of HPCI method cables located in this area that could affect system operation. Two of the sets are not of immediate concern; they are operable manually with the allowable time frame. One set involves two different conduits whose shorting would trip the HPCI turbine. This condition can be bypassed in the cable spreading room. The fourth set involves a twelve conductor cable in its own conduit for a HPCI valve. A short between the correct two conductors could cause the valve to move from its normally open correct position. This is a low probability event, however, its remedying would involve entering this fire area rather expeditiously. These last two sets are the only significant concerns in this area and the following section proposes several modifications addressing this condition.

Manual operations could be performed to the relief valve cables to permit depressurization to cold shutdown.

With some local manual operations outside this area both flow paths of cold shutdown can be made available.

Modifications (Unit 2):

1. Smoke detectors will be provided along the western sector of this area. This is the area that contains three load centers, one motor control center, cables for both methods of hot and cold shutdowns and the control cable for the HPCI inboard isolation valve. These

detectors will provide an early warning of a fire in the area.

2. Detailed instructions of the indicated manual operations that might be required following a fire in this area will be provided on the prefire plans. These will include operations on the inboard isolation HPCI inboard isolation valve, the reactor high water level trip and valve stroking instructions.

3. The RHR/HPSW heat exchange valves' controls will be modified to ensure sufficient cable separation.

4. The relief valve method cables that are in proximity to the reactor high water level trip conduits or the HPCI isolation valve conduit will be modified so that both will not become involved in the same fire. The modification may involve isolation barriers, relocating, flame retardant coatings or a combinstion of these.

Response - Unit 3 Reactor Building - 165 ft.

Hot shutdown capability (Unit 3) - Cables for both methods of hot shutdown are run through this area. The majority of the cables in the area are associated with the HPCI method. There are five power cables run into this area that are associated with the valves for the relief valve method support equipment. Two of the power cables are the 4 Kv feeds to two load centers located within this area. The other three power cables are the 480 V feeds from the load centers (two from one, one from the other) that feed the motor control centers for the various valves. The motor control centers are not located within this area. The one motor control center supplies an instrument panel that feeds the position modulator for the RHR/HPSW heat exchanger valve. As discussed in the Unit 2 analysis and modifications, this mode of controlling the valve is going to be replaced with a conventional mode that will not require auxiliary power to the valve control circuit. Therefore, following the modification there will no longer be a need for this power feed for valve operation.

The second motor control center feeds three valves, one of the valves is normally in its correct position; and the loss of power to this valve will not cause it to reposition itself. The other two valves on this motor control center are used for torus cooling; and they can be manually stroked within the allowable time frame if required.

The third motor control center feeds five valves associated with the relief valve method. Four of these valves are normally in their correct position. The other valve is required for water makeup to the reactor for inventory lost

via the relief valves. This valve can be manually opened at the valve on elevation 135' in the reactor building if the feed becomes unavailable. Detailed instructions on operating these valves will be provided in the prefire plans.

The two load centers mentioned above are on opposite sides of the reactor building approximately 160 feet apart. There is no direct line of sight between them. While both load centers would not become immediately involved in the same fire; there is a disjointed tray system that does travel near both load centers that could serve as a path of combustibles, although this is very unlikely. Therefore, for a fire in one area of this building either one valve would have to be opened for water makeup or two valves would have to be opened for torus cooling. It would be unlikely that all three valves would have to be operated manually, however, all three valves could be opened if required within the time frame.

With these three operations the relief valve method could be made available. None of the cables for the relief valves are run through this area so the reactor can be depressurized to permit shutdown cooling.

Cold shutdown capability (Unit 3) - There are several power and control cables for the one flow path of cold shutdown located throughout the area. The other flow path receives the power for its valves from the load centers in this area. None of the pumps that are required for system operation are located within the area nor do they receive their power from this area. Both flow paths could be made operable following a fire in this area by opening the valves manually. The valves associated with cold shutdown are not located within this area.

The power for the inboard isolation valve for the shutdown cooling suction line is routed through this area. If this power feed was involved in a fire, the valve cables would have to be repaired or the valve would have to be manually stroked at the valve.

Summary - (Unit 3) - Several power and control cables for the HPCI method are located within this area. Two load centers feeding eight relief valve method motor operated valves are located within this area. Five of these valves are normally in their correct position. The other three valves can be manually operated at the valves within the allowable time frame to establish the relief valve method. None of the relief valves have cables in this area; and they can be used for hot shutdown and to depressurize to cold shutdown.

With some manual valve operations outside this area both flow paths of cold shutdown can be made available.

Modifications (Unit 3)

1. Some detectors will be provided along the eastern and western sectors of this area. These are the areas that house the load centers associated with the two methods of hot and cold shutdown and several of the control cables for the HPCI method. These detectors will provide an early warning of a fire in the area.

2. Detailed instructions of any manual operations that might be required following a fire in this area will be provided in the prefire plans. This will include operations on the three valves needed for the relief valve method.

3. The control of the RHR/HPSW heat exchanger valve will be changed to delete the auxiliary power requirement for the position modulator.

Staff Position PF-46d

The licensee should verify that the presently installed detection system in room 381 (Remote Shutdown Panel area - fan room 165 foot elevation) provides effective early warning indication of a fire.

Response - Unit 2 Remote Shutdown Panel Area

Hot shutdown capability - The fire zone involves several areas on elevations 116', 135', 150' and 165'. With the exception of elevation 165', and specifically in the area of the remote shutdown panel, the area is extremely lightly loaded with combustibles. The large combustible loading proximate to the remote shutdown panel is due to the concentration of cables. A fire originating on elevations 116', 135', or 150' would not be of sufficient intensity to spread to elevation 165'.

On elevation 135' there is one conduit that contains a power feed for several HPCI method valves (RHR/HPSW torus cooling valves). This conduit runs for 35' within the zone. This area is the solid radwaste drum capping control station. The loss of this power feed would not affect the relief valve method of safe shutdown. The valves powered from this feed could also be manually stroked within the require time frame. There are no cables required for either method of hot shutdown routed through this fire zone on elevations 116' or 150'.

Both methods of hot shutdown have cables routed on elevation 165'. The power cables to all the relief valves are run through this area along with several control and power cables

for motor operated valves that support this method of hot shutdown.

There are five sets of cables associated with the HPCI method of hot shutdown that are routed through this area. One set of cables is for power feeds to three valves that are required for RHR/HPSW torus cooling. Another set is a power feed for a position modulator on the RHR/HPSW heat exchanger valve. Torus cooling is not needed immediately; the three valves without feeds can be manually stroked and the position modulator can be bypassed with a jumper in the cable spreading within the allotted time frame. One set of cables is involved in the HPCI isolation system; these cables can be bypassed by removing a set of fuses in the cable spreading room. One cable is associated with the reactor high water level trip to the HPCI turbine. This cable supplies only one-half of a two-out-of-two trip so its failure has no effect on the method. The other half signal is not run through this area.

The last cable involved with HPCI is the control cable for the HPCI inboard isolation valve. The correct two conductors of this twelve conductor cable shorting together would cause this valve to close from its normally open correct position. Once this occurs, the valve may be opened at the motor control center located on elevation 165 of the reactor building.

All of the cables for the HPCI method routed through this area are in conduit. All operations are performed from the Control Room, or locally at the equipment as indicated in each response so access to the remote shutdown panel is not required.

The control cables for the relief valves are routed through this area. Manual operations could be performed to the relief valve controls within the proper frame to permit their use to depressurize to the level required for shutdown cooling.

Cold shutdown capability (Unit 2) - There is a cable used for cold shutdown located on elevation 135' in the solid radwaste drum capping control station and several cables located on elevation 165' in the area of the remote shutdown panel. These are all power and control cables for the various motor operated valves used in the two flow paths of cold shutdown; none of the cables feed or control the two pumps required for shutdown cooling in either flow path. Repairs can be made to the cables or the valves can be manually stroked within the proper time frame for system operation. None of the valves are located within this area.

Summary: (Unit 2)

There are cables for both methods of hot shutdown located within this zone; most of them associated with the relief valve method. There are three concerns with HPCI method cables in this area. One of the concerns has minimal impact; a loss of power cables to three valves would require manually stroking to correctly position these valves. The valves are needed for torus cooling and the positioning can be done in the proper time frame. The other two concerns involve cables whose failure could cause HPCI system misoperation. The failures could be remedied in the cable spreading room and on elevation 165' in the reactor building. Both sets of these cables are in conduits.

Manual operations would have to be made to some relief valve cables in order to depressurize to permit shutdown cooling. Some valve power and control cables are run through this area for both cold shutdown flow paths however the valves could be manually positioned in the proper time frame. The power and control cables for the pumps required for both methods of cold shutdown are not located in this area.

Modifications (Unit 2)

1. Smoke detectors will be added to the area on elevation 165'. They will be adequate to provide early detection of any fires in the area before there is significant damage.

2. The manual operations required for HPCI method operation will be included in the pre-fire plans.

3. The control of the RHR/HPSW heat exchanger valves will be modified to ensure sufficient cable separation in the event of a fire.

4. The relief valve method cables will be coated with a suitable flame retardant material and any cables in trays that are in proximity to the HPCI method conduits coated with a suitable flame retardant material.

Response - Unit 3 Remote Shutdown Panel Area

Hot shutdown capability Unit 3 - The fire zone involves several areas on elevations 116', 135'. 150', and 165'. With the exception of elevation 165' and specifically in the area of the remote shutdown panel, the area is extremely lightly loaded with combustibles. The large combustible loading proximate to the remote shutdown panel isdue to the concentration of cables. A fire originating on elevations 116', 135', or 150' would not be of sufficient intensity to spread to elevation 165' (the combustible loading on elevation 150' is 3160 BT u/ft^2).

On elevation 135' there is one room that contains three conduits. Two of these conduits carry the 4 KV power feeds to the load centers that feed several valves associated with the HPCI method. The other conduit contains a HPCI signal cable whose shorting could trip the HPCI system. The relief valve method does not have any cables in this room. There are no cables for either method of hot shutdown located within this fire zone on elevations 116' or 150'.

Both methods of hot shutdown have cables run on elevation 165' in the vicinity of the remote shutdown panel. The cables in this area are predominantly associated with the HPCI method, however, there are four conduits run through this area containing relief valve method cables. One conduit contains the cables for the three relief valves that are controlled from the remote shutdown panel. The remaining eight relief valves do not have their cables run through this zone. One conduit contains the power feed to the position modulator for the RHR/HPSW heat exchanger valve. This mode of control will be modified to delete the need for this cable. The other two conduits contain the power feed to the load center and from the load center to the motor control center for three motor operated valves associated with the relief valve method. One of the valves is associated with water makeup to the reactor and is normally in the correct position. The loss of power to this valve would not cause it to move from its correct position. The other two valves are associated with torus cooling. These two valves can be manually operated within the allowable time frame if their power supply becomes unavailable. Following the manual operation of these two values the relief valve method would be available assuming a fire in this zone.

Since the relief valve cables, at least eight of them, are not located within this zone, the relief valves can be used to depressurize to get into shutdown cooling.

Cold shutdown capability (Unit 3) - There are two power cables associated with one flow path located on elevation 135' in the filter aid tank & pump room and several cables located on elevation 165' in the vicinity of the remote shutdown panel. These are all power and control cables for the various motor operated valves used in the two paths; none of the cables feed or control the two pumps required for shutdown cooling in either flow path. Repairs can be made to the cables or the valves can be manually stroked within the proper time frame for system operation. None of the valves are located within this area.

Summary (Unit 3): There are cables for both methods of hot shutdown located within this zone; most of them associated with the HPCI method. There is a power feed to a motor control center in this area that supplies power to three

valves associated with the relief valve method. One valve is in the correct position; the other valves are used for torus cooling and could be manually operated if required during the required time frame to establish the relief valve method of hot shutdown. The relief valves would also be available to depressurize for shutdown cooling.

The power and controls for motor operated valves for both flow paths are run through this area. These valves would have to be manually operated if their cables were damaged By a fire to establish a path of cold shutdown.

Modifications (Unit 3)

1. Smoke detectors will be added to the area on elevation 165'. They will be adequate to provide early detection of any fire in this area before there is significant damage.

2. The manual operations required to establish torus cooling for the relief valve method will be included in the pre-fire plan for this area.

3. The position modulator control of theRHR/HPSW heat exchanger valves will be replaced with conventional controls, to ensure adequate separation.

Staff Position PF-21d - Cable Spreading Room

Provide modifications as necessary to assure that both plants can be safely shutdown regardless of damage to any equipment located in the cable spreading room.

Response - Unit 2 - Cable Spreading Room

Hot shutdown capability - Both methods of hot shutdown have control cables in this area routed in trays and conduits. The physical separation between the trays will be identified and possible improvements will be discussed in this response. The analysis was performed only on the trays. The conduits were not analyzed since the information regarding their physical separation is not complete at this time. A future analysis will consider the cables in conduits; however most standards recognize the use of conduit as an acceptable separation barrier where the only source of fire is of an electrical nature.

The HPSW discharge to river valve has its control cable in the cable spreading room. A short on this cable could cause the valve to close from its normally open position. If this were to happen, the valve would have to be opened either at the motor control center of at the valve. The valve is

required for torus cooling so there would be some time available to permit this remote operation.

The power feeds to the position modulators for the RHR/HPSW heat exchanger valves are located in this area. As discussed in responses to other positions we are going to modify the control to these valves so that the position modulator is no longer used. Following this modification the valves will be provided with physically separate independent controls.

The remainder of the cables required for operation of both methods are physically separate from each other. With three exceptions, all the trays required for HPCI method operation are at least five feet horizontally separated from trays containing relef valve method cables. There is one tray that contains many HPCI control cables that crosses two feet over a tray containing some relief valve method cables. This same HPCI trays runs two feet vertically over another tray containing some relief valve method control cables and it also runs two feet vertically and three feet horizontally from another tray containing relief valve cables. (refer to Modifications).

The control cables for the off-site power supplies to the emergency buses are located within this area and are run in non-safeguard designated trays. A spurious trip signal on these cables could cause the loss of offsite power to the emergency buses. If this occurred, the emergency diesels could be started to power the emergency buses. Each of the four diesels' power and control cables are physically separated from each other and from the offsite source control cables both in the cable spreading room and in the plant. (refer to Modifications).

Cold shutdown capability (Unit 2): Both flow paths of cold shutdown have control cables in this area in tray and conduit. The HPSW discharge to river valve and the RHR/HPSW heat exchanger valve position modulators are also required for cold shutdown. The discharge valve can be manually opened, if required, for hot shutdown and the position modulators are going to be changed out. Additionally, the controls for the inboard and outboard suction line isolation valves and the controls for the power supplies to these valves are located within this area. These valves can be opened at the motor control centers, if power is available, or at the valves, if power is not available.

The remainder of the cables required for operation of both flow paths are physically separated from each other. With three exceptions, all the trays associated with one flow are at least five feet horizontally separated from the trays containing cables for the other flow path. These three

exceptions are the same ones discussed in the section on hot shutdown.

Summary (Unit 2): Both methods of hot shutdown and cold shutdown have control cables in this area. With the exception of the HPSW discharge to river valve, which is common to both methods and following a modification to the RHR/HPSW heat exchanger position modulators the two methods of hot shutdown will be provided with physical separation at least in accordance with the separation criteria. The similar situation also exists for cold shutdown with the exception of the shutdown cooling suction line valves.

Following receipt of the Sandia test results, we will provide an analysis on the tray arrangement within the cable spreading room to determine what additional protection is required for the installation. The analysis will be based on the results of the Sandia tests for an established electrical fire and will address the use of conduit as a separation barrier. Following the analysis, modifications will be made to the trays and conduits to assure that both methods of hot shutdown and both flow paths of cold shutdown will not be damaged by a single fire. We will consider the use of flame retardant coatings, fire-proof isolation barriers and cable relocations.

We will also address an additional level of fire protection for the control cables common to both methods of hot or cold shutdown.

Some of the logic and relay panels have controls that could affect operation of both methods of hot shutdown. Physical separation and isolation barriers are provided within these panels to prevent damage to redundant equipment from a single occurrence inside the panel.

Proposed Modifications (Unit 2):

1. The detection system in the cable spreading room will be upgraded. The new detectors will be designed so as to be effective for the type of combustibles in the area, including the ECCS logic panels (C32,C33).

2. The carbon dioxide suppression system will be converted to automatic initiation.

3. The controls for the RHR/HPSW valves will be changed so that they will be physically separated.

4. Following further analysis of tray and conduit separation there may be proposed additional fire protection features in this area.

Response - Unit 3 Cable Spreading Room

Hot shutdown capability (Unit 3) - The contents of the first, second, third, and fifth paragraphs of the hot shutdown capability discussion above for the Unit 2 analysis of the Cable Spreading Room, also applies to Unit 3. The following paragraph addresses to the design aspects that are unique to the Unit 3 Cable Spreading Room.

The remainder of the cables required for operation of both methods are physically separated from each other. With five exceptions, all the trays required for HPCI method operation are separated at least five feet horizontally from the trays containing relief valve method cables. In these five cases the trays involved are separated at least three feet horizontally, five feet vertically or 18 inches on crossovers, or are provided with fire resistant isolation barriers.

Cold shutdown capability (Unit 3 - Both flow paths of cold shutdown have control cables in this area in tray and conduit. The HPSW discharge to river valve and the RHR/HPSW heat exchanger valve positio modulators are also required for cold shutdown. The discharge valve can be manually opened, if required, for hot shutdown and the position modulators are going to be changed out. Additionally, the controls for the inboard and outboard suction line isolation valves and the controls for the power supplies to these valves are located within this area. These valves can be opened at the motor control centers, if power is available, or at the valves.

The remainder of the cables required for operation of both flow paths are physically sepa[illegible]om each other in accordance with the Peach Bottom separation criteria.

Summary (Unit 3

Refer to the summary for Unit 2

Modifications (Unit 3)

The same modifications are proposed for Unit 3 as proposed for Unit 2.

Cold Shutdown Analysis for Remainder of the Plant

The following discussion will address the capability to get to cold shutdown for Unit 2 and 3. The only significant issue concerning cold shutdown is the availability of the RHR and HPSW pumps and their power supplies. All the valves that are required for either of the two flow paths can be operated by their

conventional controls in the control room if they are not involved in a fire, can be operated at the motor control centers if their control cables are involved in a fire, or can be manually opened at the valves if the power to the valves are involved in a fire. The analysis will address each area individually along with the capability for achieving cold shutdown following a fire in that area.

Reference: Fire zones are identified in the "Fire Protection Program Report", Philadelphia Electric Company, March, 1977

Fire Zone - Unit 2

1. The area contains one RHR pump and heat exchanger. The other flow path would be available.

2. The controls for one RHR/HPSW heat exchange valve run through this area in conduit. This valve could be opened from the motor control center to make this flow path available. The other flow path does not have equipment or cables in this zone.

3. Neither flow path has equipment or cables in this zone.

4A. This area contains one RHR pump and heat exchanger. The other flow path would be available.

4B. Several power and control cables for one flow path are run through this area. The other flow path would be available.

4C. Reactor Recirculation Pump MG Set Area. The suction line valves have power and control cables in this area. These valves would have to be opened to permit either method of cold shutdown. Both flow paths have power and control cables for several valves run through this area. None of the power or control cables for the RHR or HPSW pumps for either flow path are run through this area. With manual operation of the valves either flow path could be made operable following a fire in this area.

5A. One flow path has power and control cables for two valves run through this area. These two valves can be manually operated in order to establish this flow path.

5B. One flow path has a control cable for one valve run through this area. This valve can be operated from the motor control center outside this area to establish this flow path. The other flow path does not have equipment or cables in this zone.

5C. Both methods have power and control cables for a few valves, in addition to the valves, located within this zone. The cables and valves are on opposite sides of the torus and there is no combustible path between the redundant equipment. A fire would not involve both sets of valves and cables. The power and control cables for the pumps are not run through this zone.

5D. Neither flow path has cables or equipment in this zone.

5E. One flow path has a control and power cable for one valve run through this area. This valve can be operated at the valve. The other flow path does not have equipment or cables in this zone.

5F. Same response as for zone 5A.

5G. Same response as for zone 5A.

5H. See response to PF-43-1

5J. See response to PF-43-2

5K,L. Neither flow path has cables or equipment in these zones.

5M. The power supply for the inboard isolation valve on the shutdown cooling suction line is routed through this room. The power supply to several valves for one flow path is run through this room. The other flow path does not have cable or equipment in this room.

6,7, & 8 Neither flow path has cables or equipment in these zones.

18. Neither flow path has cables or equipment in this zone.

19. One flow path has power and control cables for two valves, in addition to the two valves located within this zone. The other flow path does not have cables or equipment in this zone.

20. The power and control for the shutdown cooling suction line inboard isolation valve is run through this zone. The control cable for a valve for one flow path is run through this zone. This valve can be operated from the motor control center. The other flow path does not have equipment or cables in this zone.

21 & 22 Neither flow path has cables or equipment in these zones.

23. The outboard isolation valve for the shutdown cooling suction lines is located within this zone. One flow path has power and control cables for two valves, in addition to the two valves, located within this zone. The other flow path does not have cables or equipment in this zone.

24. See response to PF-34.

25. Neither flow path has cables or equipment in this zone.

26. Neither flow path has cables or equipment in this zone.

41 &
42. Same response as for zone 5M.

43,44,45
&46 Neither flow path as cables or equipment in these zones.

47A,
47B. Neither flow path has cables or equipment in these zones.

51,52,57,
58 Neither flow path has cables or equipment in these zones.

65A,65B,65C,66A,66B,67,68,69A,69B,70
& 71 Neither flow path has cables or equipment in these zones.

72A. See Response to PF-46

72B,72C,72D,72E,72F,72G,72H,72J,73,
& 74 Neither flow path has cables or equipment in these zones.

75. The power feeds to motor control centers for both flow paths are run through this zone. The valves could be operated at the valves to establish either flow path. The power and control cables for the pumps do not run through this area.

76. Neither flow path has cables or equipment in these zones.

77. One flow path has a power feed to a motor control center run throught this zone. Some valves would have to be operated at the value to establish this flow path. The other flow path does not have cables or equipment in the zone.

78A. Turbine Building. This area encompasses several rooms at several elevations. There are only two rooms that contain any cold shutdown cables; none of the rooms contain any cold shutdown equipment. One room, the condensate demineralized piping tunnel, contains the power feeds to the RHR pumps for both flow paths. These cables are in rigid steel conduit, are 186 feet apart and one runs directly through the area (it is only in the tunnel for 24 feet). The combustible loading in this tunnel is low (4200 BUT/ft^2), predominantly cable, and there is no combustible path between the two conduits. This tunnel also contains the control cable for the HPSW discharge to river valve that is required for both flow paths and must also be open for hot shutdown. Since this valve must be kept open for hot shutdown, it is already available for cold shutdown.

The other room is the corridor behind the Emergency switchgear rooms on the 135' elevation. This corridor contains control and power cables for both flow paths but it does not contain any power or control cables for the pumps for either flow path. The valves would have to be operated at the valves to establish either one of the flow paths. Smoke detectors will be installed in this corridor (refer to our response to staff position PF-37(a) in correspondence dated December 20, 1978).

78B. Turbine Building, 116'-0" elevation. The power and control cable for the HPSW discharge to river valve is run through this area, however, the valve is available for hot shutdown. One flow path has the power cable for its HPSW pump run through this area. The power cables for the RHR pumps for both flow paths are run through this area in rigid steel conduits. They run 35' apart along a wall from the switchgear room above to the floor below. There are two tray systems 2 ft. off the wall that pass by both these conduits. These trays contain some power and control cables. There are no other combustibles in the area of these conduits and this area will be provided with smoke detectors. The two trays system between the conduits will be provided with a fire stop to prevent a fire from propagating along the length of the tray. There are no other power or control cables that are required for either flow path in this area.

78C,D,E,G
Neither flow path has cables or equipment in this zone.

78H Refer to response to PF-21d.

78J,P,R,S,U,W,XmAA,BB,CC
Neither flow path has cables or equipment in these zones.

79 The power feed for one RHR pump runs through this zone. The other flow path does not have equipment or cables in this zone.

80,81
Neither flow path has equipment or cables in these zones.

82. The power feed for one HPSW pump runs through this zone. The other flow path does not have equipment or cables in this zone.

83,84,85,86,87,88,90,91,92,99,100,101,102,103,104
Neither flow path has cable or equipment located within these zones.

108. Control Room. Both flow paths have controls in this area. The controls for the pumps required for each flow path are located in separate control panels or compartments. Controls for both flow paths would not be damaged by a fire in this area. Some valves may have to be operated from outside this area in order to establish one flow path for cold shutdown.

110,111,112,113,114,115,116
Neither flow path has cables or equipment in these zones.

117 The DC control power to one of the buses feeding an RHR and HPSW pump originates in this room. The other flow path does not have equipment or cables in this zone.

118. The DC control power to one of the buses feeding several valves for one flow path originates within this room. The loss of this control power would have no effect on the power required for system operation. The other flow path does not have equipment or cable in this zone.

120 An interlock for one RHR pump originates in this zone. This interlock can be bypassed with a jumper in the control room or in the switchgear room to establish this flow path. The other flow path does not have equipment or cables in this zone.

123. The power for one RHR pump and one HPSW pump comes from switchgear within this room. The other flow path does not have equipment or cables in this room.

124. The power to several valves for one flow path comes from this zone. These valves would have to be manually operated to establish this flow path. The RHR pump for the other flow path has one interlock run through this area in conduit. If this control cable were to become

open circuited, the pump could be started by jumping out this interlock in the control room or at the switchgear.

125. The power to several valves for one flow path comes from this zone. These valves would have to be manually operated to establish this flow path. The other flow path does not have cables or equipment in this area.

126. The power for the RHR and HPSW pumps for one flow path comes from this zone. The power for the shutdown cooling suction line inboard isolation valves come from this zone plus the power for the HPSW discharge to river valve. The loss of power to the discharge valve would not cause it to go closed from its normally open position. The suction valve would have to be locally operated to establish the suction line. The other flow path does not have equipment or cables in this zone.

127. Turbine Building, 135 ft elevation. The DC control power to one of the buses feeding several valves for one flow path originates within this zone. The loss of this DC would not effect the power supply to these valves. The shutdown cooling line outboard isolation valve gets its power from this area. It would have to be manually operated at the valve. The power feed for the shutdown cooling line inboard isolation valve, the normally open HPSW discharge to river valve and several valves for one flow path is run through this zone in conduit. The inboard valve must be operated for both methods and the loss of power to the HPSW valve will not cause it to move from its normally correct position. The flow path valves would have to be operated locally to establish that flow path. The other flow path does not have any cables or equipment that would be effected by a fire. In summary, the suction line valves may require manual operation following a fire in this area. Some valves for one flow path may require manual operation; the other flow path valves would remain operable from the control room. None of the pumps for both flow paths have power or control cables in this area.

128. The DC control power for the RHR and HPSW pumps for one flow path originates in this zone. The power feeds for the shutdown cooling suction line valves are run through this area; these valves would have to be manually operated. The other flow path does not have any power or control cables within this zone.

129. Neither flow path has equipment or cables in this zone.

1598

131 The power cable to one RHR pump is run through these zones in rigid steel conduit. The other flow path does not have cables or equipment in these zones.

132,133,134
Neither flow path has equipment or cables in this zone.

135. The power and control cable for the HPSW discharge to river valve are run through this zone. The valve may have to be manually opened at the valve if it receives a spurious signal to close. The valve has to be made available for purposes of hot shutdown. No other equipemt or cables for either flow path are in this zone.

136,137,138,139,140,141,142
Neither flow path has equipment or cables in this zone.

144. The HPSW pumps for both flow paths are located within this zone. They are 21 feet apart and there is no path of combustibles between them. In the extremely unlikely event that both pumps were involved in a fire, HPSW can be supplied to a Unit 2 RHR/HPSW heat exchanger by one of the Unit 3 HPSW pumps not located within this zone. Two manually operated valves, one within this fire zone, would have to be opened to permit this cross-connection. No other equipment or cables required for either flow path is located within this zone. There is a smoke detector in this area.

145. Neither flow path has equipment or cables in this zone.

146. The HPSW discharge to river valve is located within this zone. The valve is normally in its correct operating position. A spurious signal on the control cable to this valve could cause it to go closed. The valve would have to be manually opened at the valve in order to establish torus cooling for hot shutdown or for cold shutdown if it should go closed as the result of a fire. There are oil lines in this room for filling the diesel storage tanks and for the auxiliary boiler day tank transfer pump. The oil lines will be analyzed and provided with appropriate fire barrier, detection, and suppression to prevent an oil fire from spreading to the valve area.

Fire Zones - Unit 3

9. This area contains one RHR pump and heat exchanger. The other flow path would be available.

10,11 Neither flow path has equipment or cables in this zone.

12A This area contains one RHR pump and heat exchanger. The other flow path would be available.

12B The motor control center feeding the shutdown cooling suction line inboard isolation valve is located within this area. This valve has to be opened to establish either flow path of cold shutdown. One flow path has several power and control cables for valves run through this zone. These valves could be manually operated to establish this flow path. The other path does not have equipment or cables in this zone.

12C Reactor Recirculation Pump MG Set Area. The suction line inboard valve has power and control cables in this area. This valve would have to be opened to permit either method of cold shutdown. Both flow paths have power and control cables for several valves run through this area. None of the power or control cables for theRHR orHPSW pumps for either flow path are run through this area. With manual operation of the valves either flow path could be made operable following a fire in this area.

13A. Neither flow path has equipment or cables in this zone.

13B. One flow path has power and control cables for two valves run through this area. These two valves can be manually operated to establish this flow path. The other flow path does not have equipment or cables in this zone.

13C. Both methods have power and control cables for a few valves, in addition to the valves, located within this zone. The cables and valves are on opposite sides of the torus and there is no combustible path between the redundant equipment. A fire would not involve both sets of valves and cables. The power and control cables for the RHR and HPSW pumps are not run through this zone.

13D. One flow path has a control and power cable for one valve run through this area. This valve can be operated at the valve to establish this flow Path. The other flow path does not have any cables or equipment in this zone.

13F. Neither flow path has cables or equipment in this zone.

13G. Same response as for zone 13B.

13H. See response to PF-43-1 for Unit 3

13J. See response to PF-43-1 for Unit 3

13K, L, M
Neither flow path has cables or equipment in this zone.

14. One flow path has a control cable run through this zone. The valve could be operated from the motor control center to establish this flow path. The other flow path does not have cables or equipment in this zone.

15, 16, 17
Neither flow path has cables or equipment in these zones.

27. The outboard isolation valve for the shutdown cooling suction line is located within this zone. One flow path has power and control cables, in addition to the two valves located within this zone. The other flow path does not have cables or equipment in this zone.

28, 29, 30
The power and control cable for the shutdown cooling suction line inboard valve is run through this zone. The control cable for one flow path is run through this zone. This valve can be operated from the motor control center. The other flow path does not have equipment or cables in this zone.

31. One flow path has power and control cables for two valves, in addition to the two valves located within this zone. The other flow path does not have cables or equipment in this zone.

32. See response to PF-34, Unit 3

33, 34, 35, 36, 37, 38, 39, 40
Neither flow path has cables or equipment within this zone.

48A, 48B, 49, 50, 55, 56
Neither flow path has cables or equipment in these zones.

62, 63, 64, 65A, 65B, 65C, 66A, 66B, 67, 68, 69A, 69B, 70, 71
Neither flow path has cables or equipment in these zones.

72A. See response to PF-46 for Unit 3

72B, 72C, 72D, 72E, 72F, 72G, 72H, 72J, 73, 74
Neither flow path has cables or equipment in these zones.

75. The power feed to a motor control center for some valves for one flow path runs through this zone. These valves

could be operated at the valves to establish this flow path. The other flow path does not have cables or equipment within this zone.

76. The power feeds to the motor control centers for some valves for both flow paths run through this zone. The valves could be operated at the valves to establish either flow path. The power and control cables for the pumps do not run through this area.

77. Neither flow path has cables or equipment within this zone.

78A. Turbine building - This area encompasses several rooms on several locations. These are only three rooms that contain cold shutdown cables. None of the rooms contain any cold shutdown equipment. One room, the condensate demineralizer piping tunnel, contains the power feeds to the RHR pumps for both flow paths. At their closest point, these two rigid steel conduits are twenty feet apart. There are other RHR pumps that can accomplish the same shutdown cooling function. These conduits are also in this area but are 110' apart at their closest point. The combustible loading in this tunnel is low, predominately cable, and there is no combustible paths between the twoRHR pumps associated with the flow paths, or the other two RHR pump cables that are 110' apart.

Another room contains the control cable for the HPSW discharge to river valve that is required for both flow paths. This valve is also required for hot shutdown so its positioning has already been established prior to cold shutdown.

The third room is the corridor behind the Emergency Switchgear Rooms on the 135' elevation. This corridor contains power and control cables for the common HPSW discharge to river valve that has already been correctly positioned for hot shutdown. This corridor contains the power cables for valves for both flow paths and the controls for the pumps for one flow path. Shutdown cooling can be established following a fire by manually positioning three valves and using the flow path whose pump cables are not run through this area. Smoke detectors will be installed in this corridor (refer to our response to staff position PF-37(a) in correspondence dated December 20, 1978).

78B. Turbine Building, 116'-0" elevation. The power and control cable for the HPSW discharge to river valve is run through this area, however, the valve is available for hot shutdown. One flow path has the power cable for its HPSW pump run through this area. The power cables

for theRHR pumps for both flow paths are run through this area in rigid steel conduits. They run 35' apart along a wall from the switchgear room above to the floor below. There are two tray systems 2 ft. off the wall that pass by both these conduits. These trays contain some power and control cables. There are no other combustibles in the area of these conduits and this area system between the conduits will be provided with a fire stop to prevent a fire from propagating along the length of the tray. There are no other power or control cables that are required for either flow path in this area.

78C,D,E,F,
Neither flow path has cable or equipment in these zones.

78H. Refer to response to PF-21d for Unit 3

78K,L,M,N,T,V,Y,DD,EE,FF
Neither flow path has cables or equipment in these zones.

78. The power cables for the RHR pumps for both flow paths are run through this area in rigid steel conduit. There is another RHR pump that is redundant to these two that does not have its power cable run through this zone. There is no other safe shutdown equipment or cables located within this zone.

81,82, 86,87, 92,93,94,95,96,97,98,105,106,107
Neither flow path has cables or equipment located within these zones.

108. Control Room. Both flow paths have controls in this area. The controls for the pumps required for each flow path are located in separate control panels or compartments. Control for both flow paths would not be damaged by a fire in this area. Some valves may have to be operated from outside this area in order to establish a flow path for cold shutdown.

109,111,113
Neither flow path has cables or equipment in these zones.

114. The power feed for one HPSW pump runs through this zone. The other flow path does not have cables or equipment located within this zone.

115, 116
Neither flow path has cables or equipment in these zones.

117. The power for the shutdown cooling suction line outboard valve originates within this zone and the power for the inboard valve runs through this zone. Both valves may have to be manually opended to establish shutdown cooling. The DC control power for one of the buses feeding on RHR and HPSW pump for one flow path originates within this zone. The power supply to a motor control center for the other flow path runs through this room; and the valves may have to be manually operated to establish this flow path.

118. The DC control to one of the buses feeding several valves for one flow path originates within this room. The loss of this control power would have no effect on the power required for system operation. The power to the shutdown cooling outboard isolation is run through this zone. It may have to be manually operated to establish shutdown cooling.

The power feed to a motor control center supplying several valves for one flow path is run through this oven. These valves may have to be manually operated to establish this flow path. The other flow path does not have cables or equipment in this zone.

119. The power feed to the position modulator for the RHR/HPSW heat exchanger valve runs through this area. This mode of valve control is going to be modified to delete the need for this power cable. The power to several valves for one flow path comes from this zone. These valves would have to be manually operated to establish this flow path. The other flow path does not have cables or equipment in this area.

120. The power for the shutdown cooling suction line inboard isolation valve comes from this zone. This valve may have to be manually operated to establish cold shutdown. The power for the RHR and HPSW pump for one flow path comes from switchgear within this room. The other flow path has a power feed to a motor control center run through this zone. A few valves connected to this motor control center might have to be manaully operated in order to establish this flow path.

121. The power for one RHR pump and one HPSW pump comes from switchgear within this room. The other flow path does not have equipment or cables in this room.

122. The DC power supply for the switchgear supplying power for an RHR and HPSW pump for one flow path runs through this zone. Without this control power the circuit breakers cannot be automatically operated. The other flow path has a power feed to a motor control center for

a few valves originating from the switchgear in this zone. These valves could be manually operated to establish this flow path.

123. The power feed to the HPSW discharge to river valve comes from the switchgear in this zone. The loss of power to this valve will not cause it to move from its normally correct position. An interlock for one RHR pump originates within this zone. This interlock can be bypassed with a jumper in the control room or in the switchgear room to establish this flow path. There is no other equipment or cable for either flow path located within this zone.

124. The DC power to the bus that feeds an RHR AND HPSW pump for one flow path runs through this zone. Without this control power the pumps cannot be operated automatically. The DC power to another bus also runs through this area, however its loss will not disable the power to the valves that are fed from the bus. The flow path associated with these valves would be available following a fire in this zone.

125. Neither flow path has cables or equipment in this zone.

126. The DC power to the switchgear that feeds on RHR and HPSW pump for one flow path runs through this zone. Without this control power the circuit breakers cannot be operated automatically. The other flow path does not have equipment or cables in this zone.

127. The DC power to the switchgear that feeds several valves for one flow path originates from this zone. The loss of this control power would not affect the power supply to the valves. Both flow paths would be available following a fire in this area.

128. The DC power to the switchgear that feeds an RHR and HPSW pump for one flow path originates in this zone. Without this control power the circuit breakers cannot be operated automatically. The other flow path does not have equipment or cables in this zone.

129. Neither flow path has equipment or cables in this zone.

130,131.
The power cable to one RHR pump is run through these zones in rigid steel conduit. The other flow path does not have cables or equipment in these zones.

132,133
Neither flow path has equipment or cables in this zone.

134. The power and control cable for the HPSW discharge to river valve are run through this zone. The valves may have to be manually opened at the valve if it receives a spurious signal to close. The valve has to be made available for purposes of hot shutdown. No other equipment or cables for either flow path are in this zone.

135. Neither flow path has cables or equipment in this zone.

136,137,138,139,140,141,142
Neither flow path has cables or equipment in these zones.

143. The HPSW pumps for both flow paths are located within this zone. They are 21 feet apart and there is no path of combustibles between them. In the extremely unlikely event that both pumps were involved in a fire, HPSW can be supplied to a Unit 3 RHR/HPSW heat exchanger by one of the Unit 2 HPSW pumps not located within this zone. Two manually operated valves, one within this fire zone, would have to be opened to permit this cross-connection. No other equipment or cables required for either flow path is located within this zone. There is a smoke detector in this area.

144,145
Neither flow path has equipment or cables in this zone.

146. The HPSW discharge to river valve is located within this zone. The valve is normally in its correct operating position. A spurious signal on the control cable to this valve could cause it to go closed. The valve would have to be manually opened at the valve in order to establish torus cooling for hot shutdown or for cold shutdown if it should go closed as the result of a fire. There are oil lines in this room for filling the diesel storage tanks and for the auxiliary boiler day tank transfer pump. The oil lines will be analyzed and provided with appropriate fire barrier, detection, and suppression to prevent an oil fire from spreading to the valve area.