CHAPTER 1

INTRODUCTION

The licensee was requested by the Nuclear Regulatory Commission (NRC) in 1976 to provide a fire hazards analysis (FHA) and to propose Technical Specification changes addressing increased fire protection at Peach Bottom Atomic Power Station (PBAPS), Units 2 and 3. The licensee prepared an FHA and submitted it to the NRC in 1977. The FHA summarized the evaluation of combustible loading as well as the comparison of the fire protection program to Appendix A to Branch Technical Position APCSB 9.5-1, "Guidelines for Fire Protection for Nuclear Power Plants Docketed Prior to July 1, 1976." On May 23, 1979, the NRC issued a Safety Evaluation Report (SER) addressing the Fire Protection Program at Peach Bottom, with Supplement No. 1 to the SER issued August 14, 1980; Supplement No. 2 issued September 15, 1980; Supplement No. 3 issued October 10, 1980; and Supplement No. 4 issued November 24, 1980. On October 10, 1985, the NRC issued an SER for the installation of carpeting in the control room.

The Fire Protection Program (FPP) updates the 1977 FHA and evaluates the existing fire protection features for compliance with NRC requirements. The FPP also incorporates analysis performed in response to issues identified since the initial 1986 submittal of the FPP. Additional analyses were performed in response to: 1) Generic Letter 88-20 Supplement 4, “Individual Plant Examination for External Events (IPEEE) for Severe Accident Vulnerabilities” Section 4 “Internal Fires Analysis”; and 2) Generic Letter 92-08 which raised 3 primary concerns with the Thermo-Lag 330-1 raceway encapsulation material; 1) the fire endurance capability of Thermo-Lag 330-1 barriers, 2) the ampacity derating of cables enclosed in Thermo-Lag 330-1 barriers, and 3) the evaluation and application of the results of tests conducted to determine the fire endurance ratings and the ampacity derating factors of Thermo-Lag 330-1 barriers. The FPP is a summary of all aspects of the Peach Bottom fire protection program. On September 16, 1993, the NRC issued an SER for the PBAPS FPP through revision 4.

It is the philosophy of the licensee that fire protection be provided for all company facilities to minimize the effects of a fire. At Peach Bottom, fire protection was an original design objective and has evolved as the state of the art for fire protection in nuclear power plants changed. Responsibility for the fire protection program is vested in licensee managerial personnel in the same manner as other operating and design responsibilities. To support these responsibilities, the licensee employs qualified fire protection personnel to ensure that an adequate fire protection program is provided.

The term "fire protection system" refers to the integrated complex of components and equipment provided for detection and suppression of fires. In addition to this system, the "fire protection program" includes the concepts of design and layout implemented to prevent or mitigate fires, administrative controls and procedures, and personnel training. The fire protection program uses a defense-in-depth approach aimed at preventing fires, minimizing the effect of any fires that occur, providing appropriate fire detection and suppression equipment, and training personnel in fire prevention and fire fighting.

The FPP has been prepared by qualified personnel, including registered fire protection engineers. The fire protection program has been reviewed to verify compliance with fire protection requirements.

Safe and Alternative Shutdown Methods have been analyzed and documented by qualified personnel. The analysis has been reviewed to verify conformance to FSAR analyses.

Chapter 2 of the FPP provides a general description of the fire detection and suppression systems. Chapter 3 presents an item by item comparison of the Peach Bottom Atomic Power Station, Units 2 and 3, fire protection program with the guidelines set forth in Branch Technical Position APCSB 9.5-1, Appendix A, the requirements of Appendix R to 10 CFR 50, and the requirements of the Safety Evaluation Report. Chapter 4 provides a tabulation of the combustible loadings in plant fire areas; describes fire barriers in each area; and fire detection and suppression systems. The plant is divided into 47 fire areas. Fire areas are not numbered sequentially. Chapter 5 provides an evaluation of the ability to safely shut the plant down in the event of a fire in any plant fire area. Chapter 6 addresses special topics. Chapter 7 describes the fire protection requirements formerly contained in the plant technical specifications.

CHAPTER 2

FIRE PROTECTION SYSTEM DESCRIPTION

This chapter describes the fire suppression and fire detection systems. The specific guidelines and requirement contained in Branch Technical Position APCSB 9.5-1, Appendix A; 10CFR50, Appendix R; and the Safety Evaluation Report (SER) are addressed in Chapter 3.

PBAPS Drawing M-300, Sheets 1 and 2, provided the legend and symbols for the P&Ids. The P&IDs for the fire protection system are provided on PBAPS Drawing M-318, Sheets 1 through 10.

2.1 FIRE PROTECTION WATER SUPPLY SYSTEMS

2.1.1 Water Source

The source of water for the PBAPS fire protection system is Conowingo Pond, which has an unlimited capacity. This source allows continuous operation of either pump as long as required. The fire pumps take suction from independent, isolatable intake wells. Check valves are installed at the pump discharges to prevent water from one source from being pumped into the other source.

2.1.2 Pumps

There are two vertical turbine fire pumps, each rated for a minimum of 2,500 gpm at 125 psig total head. The lead pump is electric-motor-driven, and the 100 percent capacity backup pump is diesel-engine-driven. The pumps and their controllers are UL-listed.

The fire water system is capable of supplying water at the required pressure for the largest sprinkler flow plus 500 gpm. When the fire pumps are not running, the system is normally pressurized by a 2-inch connection to the high pressure lube water system, which takes its suction from the clarified water storage tank and is capable of replenishing 30 to 50 gpm for leakage. The lube water connection is equipped with a relief valve to prevent over-pressurization of the fire main. When a portion of the fire water system is activated, upon a decrease of main header pressure, a low pressure switch set at 140 psig starts the motor driven pump automatically. If the motor driven pump fails to start, the diesel driven pump starts upon a lower pressure signal setpoint of 130 psig. Both pumps are stopped manually.

Power supplies and controls for each pump are independent. The electric power for the motor driven fire pump is taken from the

normal AC power supply and can be taken from an emergency auxiliary bus. Automatic start capability is blocked following a total loss of offsite power to preclude the pump from spuriously loading onto its emergency auxiliary bus. Manual start capability still exists in the control room. Automatic start capability can be reset at the motor controller. Control room alarm displays for the electric-motor-driven pump are: Motor Driven Fire Pump Trouble (i.e., AC power not available, auto start not available, and discharge valve not full open), Motor Driven Fire Pump Running, and Motor Driven Fire Pump Auto Start.

The diesel-engine-driven fire pump is used for standby and loss of AC power. The diesel fuel supply tank for the diesel engine has a capacity of 500 gallons, in addition to the 120-gallon capacity of the diesel fire pump day tank. This fuel volume is more than sufficient to allow operation of the diesel driven fire pump for a period of two hours at the maximum expected water demand as required by applicable regulatory requirements. Control room alarm displays for the diesel driven pump are: Diesel Fire Pump Trouble (i.e. low lube oil pressure, high engine temperature, engine fail to start, overspeed shutdown, low fuel and discharge valve not full open). Diesel Fire Pump Cont Sw Not In Auto, Diesel Fire Pump Running, and Diesel Fire Pump Raw Water Hi Temp.

The fire pumps are located in the Conowingo Pond intake structure in separate seismic Category I rooms. The diesel driven pump is enclosed in a 2-hour fire rated masonry walled room within the Unit 2 high pressure service water pump compartment. Penetrations through the north and west walls have been sealed to provide the required fire resistance in accordance with Appendix R. The motor driven pump is located in the Unit 3 high pressure service water pump compartment. The Units 2 and 3 high pressure service water pump rooms are separated by a steel plate fire wall (refer to Chapter 5, fire area 48 for exemption request).

2.1.3 Yard Piping

Fire protection water is distributed to the various areas of the plant from a yard fire main loop which completely encircles the power block. The connections to the yard fire main loop from the two fire pumps located in the Conowingo Pond intake structure are spaced approximately 24 feet apart and are provided with valving so that either connection can be isolated while retaining 100 percent water supply capacity to the yard fire main. The routing of the yard fire main loop and its branch piping is shown in Figure B-3.

The yard fire main loop consists of 12-inch, with 10-inch reductions at sleeve locations, cement-lined, cast iron piping which is buried below the frost line. The north and south ends of

the loop are cross-connected by piping which traverses the Units 2 and 3 turbine enclosures. Locked-open post-indicator valves and underground gate valves provide sectionalized control and isolation of portions of the fire main loop. Hydrants with curb valves are installed, in general, at design intervals of approximately 250 feet with a 290-foot maximum, with the exception of hydrant spacing between hydrants H7 and H9. Each hydrant is provided with a 6-inch gate valve. Four hose houses are located in the yard area at 1,150 feet maximum spacing in the vicinity of the hydrants, each enclosing a hose cart which can be manually moved to any hydrant where it is needed. The system of hydrants connected to the fire main loop is designed in accordance with NFPA 24. Hydrant threads are National Standard and are compatible with local fire department equipment.

Wet pipe sprinkler systems are provided to protect the following areas and equipment:

a. Turbine building - generator equipment area - elevation 135 feet

b. Turbine building - lube oil storage room - elevation 116 feet and turbine lube oil rooms - elevations 135 feet and 150 feet

c. Turbine building - condenser pits - elevation 102 feet

d. Turbine building - moisture separator area -elevation 116 feet

e. Turbine building - lube oil tank area and lube oil equipment area - elevations 116 feet and 135 feet

f. Turbine building - reactor feed pump turbine area - elevation 165 feet

g. Turbine building - turbine bearings, generator bearings and front standard - elevation 165 feet

h. Turbine building - NMD and blocking/tagging offices - elevation 165 feet

i. Radwaste building - **drummed waste/storage** area - elevation 135 feet

j. Circulating water diesel fire pump structure - diesel fire pump room - elevation 112 feet

k. Turbine building hatchway area at elevations 116 feet and 135 feet and clean clothes room at elevation 116 feet

Wet pipe sprinkler systems are normally filled with pressurized water. Local pressure indicators are provided above and below alarm check valve seats to provide system status. Wet pipe sprinklers actuate automatically when ambient temperature exceeds the melting point of the fusible element at the sealed sprinkler heads, allowing pressurized water to discharge through the open sprinkler heads. The actuation temperature of sprinkler heads varies by application.

System actuation is detected by an alarm check valve assembly (via a pressure switch) or by a flow switch. These devices initiated an alarm in the main control room. Each wet pipe sprinkler system has an isolation valve, which is either monitored by a tamper switch, or locked in the open position. Wet pipe sprinkler system operation is terminated manually by shutting the manual isolation valve.

2.3 PRE-ACTION SPRINKLER SYSTEMS

Pre-action sprinkler systems are provided to protect the following areas and equipment:

a. Radwaste building - reactor recirculation pump motor - generator sets.

b. Radwaste building - above recirculation pump motor generator set lube oil pump motor base in the cooling water equipment rooms **(Unit 2).**

c. Radwaste building - Fan Room (Room No. 381).

d. Turbine building - Emergency Switchgear and Battery Rooms and Corridor 262 – elevation 135 feet.

e. Turbine building - 13 kV Switchgear Area – elevation 116 feet.

Each pre-action sprinkler system consists of a deluge valve, a piping system pressurized with nitrogen gas, a nitrogen pressure detection system, and fusible-element sprinkler heads. The sprinkler heads will open upon a rise in ambient temperature to the melting point of each individual fusible element. The actuation temperature of sprinkler heads varies by application.

The protected areas, “a” through “e”, listed above, are monitored by smoke detectors that alarm in the control room and provide input to open the deluge valves. Upon automatic or manual deluge valve operation, a flow switch energizes a local alarm and

initiates an alarm condition on the fire protection panels in the Main Control Room.

Single interlocked systems (items “a”, “b”, and “c”, above) are automatically actuated by a fire detection signal, which sends a signal to open the deluge valve, thus supplying water to the sealed sprinkler heads. Once the ambient temperature melts one or more fusible elements, water, under pressure, will flow out of the open sprinkler heads.

Double interlocked systems (items “d” and “e”, above) are automatically actuated by the combined fire detection signal (smoke detector) and low-pressure nitrogen signal (loss of nitrogen pressure through the open sprinkler). Upon receiving both signals, the deluge valve will open and water, under pressure, will flow out of the open sprinklers. A loss of nitrogen pressure will occur as a result of the open sprinkler head, initiating both a local alarm and an alarm condition in the control room.

Manual pre-action systems protect the turbine lagging (under the skirt area) for each unit. These systems are similar to the pre-action systems described above, except there are not any smoke or heat detectors associated with this system. Once the ambient temperature under the turbine lagging increases to melting point of the fusible elements, the nitrogen will flow out of the open sprinkler heads. The decrease in nitrogen pressure will result in an alarm condition in the control room. The deluge valve, however, must be manually actuated in order to indicate water flow to the open sprinkler heads.

A manual isolation valve is located upstream of the deluge valve. The isolation valve is either locked in the open position or provided with a monitored tamper switch. System operation can only be terminated manually by shutting the manual isolation valve.

2.4 DELUGE SYSTEMS

Deluge systems are provided to protect the following areas and equipment:

a. Turbine building - Elevation 116 feet – hydrogen seal oil units

b. Yard - main transformers, unit auxiliary transformers, start-up and emergency transformers, and condensate pump transformers

c. Reactor building - Elevation 135 feet – west corridor water curtain

Operation of a deluge sprinkler system or water-spray nozzle system is automatically initiated by a rate of temperature rise or high temperature signal from heat-actuated devices. This signal opens the deluge valve, thus supplying water under pressure to the system. Since all deluge-type sprinkler heads and spray nozzles are always open, water will flow out of each of the sprinkler heads or spray nozzles for the affected system upon opening of the deluge valve. Actuation of the deluge valve also initiates a local alarm and registers the alarm condition on the fire protection panel in the control room. The deluge valve can also be manually actuated.

There is a manual isolation valve prior to each deluge valve. The isolation valve is either locked open or provided with a tamper switch. System operation is terminated manually by shutting the isolation valve.

2.5 WATER SPRAY FOR CHARCOAL FILTERS

The charcoal filters in each redundant train of the standby gas treatment system are provided with a manually initiated water spray fire suppression system.

The charcoal filters in the recombiner building ventilation system are provided with an automatically initiated water sprinkler fire suppression system. The water is supplied to the filters through a fixed piping system.

A signal from a heat detector activates and opens a deluge valve for the recombiner building system. Thus water is supplied under pressure to open spray heads for both the recombiner building system and standby gas treatment systems producing a water spray. Manual release of the deluge valve is possible causing a local and remote alarm to actuate. System operation is terminated manually by shutting the OS&Y gate valve.

For the standby gas treatment system, a signal from a heat detector located in the standby gas treatment system filter plenum will alarm in the control room. The plant fire brigade will be dispatched to investigate and manually activate the system as required.

2.6 WET STANDPIPES AND HOSE STATIONS

Wet standpipes for hose stations and portable fire extinguishers are located throughout the plant. All areas on each elevation in the power block are within 30 feet of a nozzle attached to 100 feet of hose. Each hose station has 100 feet of 1-1/2 inch UL Listed fire hose specifically designed for industrial fire

protection. Hose reel carts are located on elevations 165 feet and 195 feet of each reactor building and are each equipped with an additional 200 feet of hose. Standpipes are a minimum of 3 inches in diameter for one or two hose station connections and a minimum of 4 inches in diameter for three or more hose station connections.

The following exceptions have been verified by a hydraulic simulation:

- Hose reels HR-88-5, HR-135-57, and HR-135-54 each have 2½ inch diameter feeder piping.

- Hose reels HR-116-60, HR-135-65, and HR-165-77 share the same 3 inch diameter feeder piping.

Hose stations are located outside the entrances to the control room, and at the two entrances to the cable spreading room. Except as noted in Section 3.3-2, Item No. 25, ALFCO spray nozzles are provided for all hose stations.

2.7 FOAM EXTINGUISHING STATIONS

A fixed foam system is provided for the protection of the fuel oil storage tank supplying the auxiliary boiler, a nonsafety-related area. The foam is educed from a 125-gallon foam solution tank by water from the main fire water header.

The fuel oil storage tank is provided with a fixed foamer at the tank. Foam making is initiated manually from a local station. Fire protection inside the auxiliary boiler building is provided by a foam playpipe with hose rack. A valve is manually opened to add water to the foam tank. A second valve is then opened to direct the foam solution to either the hose or the fixed system for the fuel oil storage tank.

The fuel oil storage tank is equipped with a foam nozzle and chamber with a vapor seal. The vapor seal prevents oil from mixing, solidifying, and blocking the foam line. The fuel oil storage tank is also equipped with a foam deflector to forward the foam gently down the inside of the tank for efficient foam distribution and protection.

2.8 LOW PRESSURE CARBON DIOXIDE SYSTEM

The low pressure carbon dioxide system (CO_2) system is designed in accordance with NFPA 12. In addition to the total flooding CO_2 system provided for the areas described below, CO_2 fire protection is provided by CO_2 hose reels along the east side of the center of the turbine enclosure operating deck.

The CO_2 systems for the cable spreading room, computer room, high pressure coolant injection (HPCI) pump rooms, and high pressure turbine bearing lube oil pumps are supplied from two 6-ton storage tanks. The CO_2 systems for the diesel generator bays are supplied by one 2.75-ton storage tank. The design concentrations for the total flooding CO_2 systems are 34 percent for the HPCI pump rooms, and diesel generator bays, and 50 percent for the cable spreading room, **computer room.**

The fixed total flooding CO_2 system in each of the four Emergency Diesel Generator (EDG) Rooms is a manually actuated system. Upon receipt of a fire alarm, a fire brigade member is dispatched to the respective room to evaluate the severity of the fire. If required, the CO_2 system for any room can be manually initiated by operating the EMPC for the respective room. The EMPC's are located inside the EDG Cardox Room. In order to prevent inadvertent operation of the CO_2 fire suppression system due to a seismic event, the system control devices are qualified in accordance with the requirements for safety related components.

The total flooding CO_2 system in both the Unit 2 and Unit 3 HPCI Pump Rooms are manually actuated systems. These systems can be manually actuated by manipulation of the EMPC located in the adjacent RCIC Pump Room of the corresponding unit. Heating and ventilating openings contain fusible link fire dampers which close at a temperature of 165°F. HVAC system supply ducts are provided with fire dampers automatically actuated by electric release devices.

The fixed total flooding CO_2 system for the Cable Spreading Room (CSR) is a manually actuated system. Smoke detection in the CSR annunciates alarms in the Control Room in the event of a fire. If required, the system is manually actuated by manipulation of the EMPC located outside the CSR. HVAC system ducts contain fire dampers provided with automatic electric release devices and fusible links. Ventilation ducts above the doors contain fire dampers provided with fusible links.

The total flooding CO_2 system in the computer room is similar to the cable spreading room.

All total flooding CO_2 systems are equipped with predischarge alarms, odorizers, and manually operated block valves. All systems alarm in the control room.

CO_2 hose reels are activated by removing a playpipe from its holder. An electric switch, located in the playpipe holder, actuates a control valve to allow CO_2 into the hose. A squeeze-

type playpipe valve enables the operator to control the flow of the CO_2 discharge.

2.9 DRY CHEMICAL SYSTEMS

Portable dry chemical fire extinguishers are provided in the vicinity of the reactor feed pump turbines. The dry chemical system on the main turbine bearings has been replaced with an automatic wet pipe sprinkler system.

2.10 WATER CURTAIN SYSTEMS

Water curtain suppression systems are provided to establish a division of each reactor enclosure at the west corridor on elevation 135 feet.

Each corridor is protected by an individual water curtain system. Each water curtain system consists of an OS&Y gate valve, a deluge valve, a local pull station, piping, and open spray heads. The distribution piping is located at the floor and arranged along one side of the corridor, with sprinklers spaced evenly from the floor to the ceiling. Each water curtain system is actuated by a cross zoned detection system in which a signal must be received from both heat detectors for the system to be initiated. Each system can also be actuated manually at either one of two locations on each unit. The Unit 2 water curtain can be actuated by the remote control actuation station located in the northeast corner, stairwell 19 elevation 135 feet reactor building by the stairwell 26 elevation 135 feet reactor building. The Unit 3 water curtain can be actuated by the remote control actuation station located in the southeast corner, stairwell 22 elevation 135 feet reactor building by the elevator, or the manual pull station in the northwest corner, stairwell 27 elevation 135 feet reactor building. Operation of the system is terminated manually by shutting the OS&Y gate valve, which is located in stairwells 26 and 27 for Units 2 and 3, respectively.

Water curtain suppression systems are provided over each of the two access portals located between column lines J and K at column line 18 (between Unit 2 valve operating area and the 13.kV switchgear area) and at column line 23 (between Unit 3 valve operating and the 13.8kV switchgear area) on the 166’-0” elevation of the Turbine Building. Each system consists of piping and closed spray heads. Heat generated by a fire near the 116’-0” elevation Access Portals will melt the fusible link on the affected sprinkler heads at a predetermined temperature, causing the sprinkler head to open. Water in the wet pipe sprinkler system will flow out of the opened heads forming a water curtain to prevent the propagation of the fire through the portals. The source of fire protection water is from the existing Turbine

Building area sprinkler system. Operation of the system is terminated manually by closing the OS&Y gate valve HV-0-37B-12406.

Water curtain suppression systems are provided to the HELB vent path openings over doorways 87 and 171 by extending the existing sprinkler systems in the Unit 2 (Room 139) and Unit 3 (Room 179) main turbine lube oil storage tank rooms to provide water curtain protection to the HELB vent path openings. These openings are located above the doors (Door 87 and 171) leading from the main turbine lube oil storage tank rooms to the moisture separator areas on Elevation 116'-0". Heat generated by a fire on either side of the doorways will melt the fusable link on the sprinkler heads at a predetermined temperature, causing the sprinkler heads to open. Water in the wet pipe sprinkler system will flow out of the opened heads forming a water curtain to prevent the propagation of the fire through the openings. Operation of the system is terminated manually by closing the OS&Y gate valve HV-2-37B-42025 or HV-3-37B-52025.

2.11 PORTABLE FIRE EXTINGUISHERS

Portable fire extinguishers, using extinguishing agents compatible with the combustible material in the area in which they are located, are provided throughout the plant. Portable fire extinguishers are installed in accordance with NFPA 10 and 10A.

2.12 FIRE AND SMOKE DETECTION SYSTEM

2.12.1 Fire Detection Signaling System

The fire detection signaling system complies with the requirements of NFPA 72D, with the following exceptions and clarifications:

a. Paragraph 4-7.3 - Tests are not presently conducted at the frequencies specified. (Testing is performed in accordance with the frequency and requirements stated in the Technical Requirements Manual. The TRM specifications recognize the inaccessibility of certain fire protection equipment due to inerting or radiation levels.)

b. Paragraph 4-7.2 - The fire department is not notified immediately upon receipt of a fire alarm signal. (Upon receipt of a fire alarm signal, the plant Fire Brigade is dispatched to the fire location, and Shift Supervision is informed as to the extent and nature of the fire. Based on this information, a decision is made concerning the need for offsite firefighting support.)

There is no supervised circuit to transmit a signal to the fire department. (The fire department may be notified either by using the telephone or indirectly using the radio system to other company locations.)

An operator is not assigned sole responsibility for fire protection services. (For the operator, operation of the reactor and plant system should take precedence over fire protection service.)

A device is provided that will permanently record fire alarms with the date and time of receipt.

2.12.2 Fire Detection System

The fire detection system complies with the requirements of NFPA 72E-1984 with deviations as noted in Section 3.3.2, Item Nos. 1, 2, 5 and 47 except for the Fan Room (no. 381). The Fan Room complies with NFPA 72-1996 and uses the guidelines of Section A-5.3.4.6.1 instead of Section 5-3.4.6 for smoke detector spacing. The heat and smoke detection sections of the system (with the exception of the hydrogen water chemistry (HWC) heat detectors) are a "Class B" Installation, utilizing a two-wire system with a resistor or capacitor between the wires at the end of the circuit (end-of-line device). Each system (with the exception of the HWC faults, circuit breaks, or a power failure. Fire alarms activate a dedicated Main Control Room annunciator horn and printer to record the event. After acknowledging the fire alarm it will be the responsibility of the control room operator to make the appropriate public address announcement. Upon confirmation of a fire condition the fire brigade will be dispatched to the location of the fire. The fire detection and activation systems are connected to the emergency AC power bus.

Heat and smoke detection is accomplished by the appropriate detectors installed in areas where fire potential exists and in all areas containing safety-related equipment except where a specific exemption was granted by the NRC. The circuits of these installations go directly to local system panels which contain:

- Detector circuits for supervisory and alarm functions (except for the HWC heat detectors)
- Trouble circuits for local panel indication (except for the HWC heat detectors)
- Alarm circuits for local and remote alarming
- Pulse circuits for faulty detector and local indication. (except for the HWC heat detectors)

These circuits and annunciation are physically separated from those circuits that actuate the fire extinguishing systems (water suppression/Cardox). However, the 13.8 kV switchgear preaction sprinkler system does not specifically have complete physical separation. Although each circuit is routed in separate conduits, this system utilizes a releasing control panel in which detection, suppression and alarm circuits coexist by way of individual system modules.

The Hydrogen Water Chemistry (HWC) system heat detectors which are located in the Reactor Feed Pump A, B, and C Bays and hallway areas are not installed as "Class B" detectors. The heat detector circuits are not supervised by the emergency AC power bus. These heat detectors are part of the HWC system hydrogen leak detection scheme. The circuit goes from a series of heat detectors to the HWC local control panel, 2(3)0C810, which houses the HWC Programmable Logic Controller (PLC). The HWC PLC then activates an auxiliary relay which ties the circuit to fire protection board 00C001 for annunciation on 00C201. The HWC heat detector circuits are designed such that any HWC heat detector, PLC, circuit break or power failure will result in alarms at both the local HWC panel and the remote Fire Alarm System panel. The detectors are physically located in fire area 50-fire zone 78A, which is equipped with an adequate fire detection and signaling system.

Circuits from the local system panels to the fire terminal cabinets, auxiliary terminal cabinet (00C727), and main terminal cabinet (00C728), and from the main terminal cabinet (00C728) to the main control room fire control cabinet (00C01), are electrically supervised.

Detection of smoke by any smoke detector will activate a control room horn, a dedicated control room printer to record the event, and the appropriate alarm panel (00C201). The activated detector can be identified by the flashing neon lamp on its base. Reset of a detector can be initiated by inserting a key into the reset lock on the panel or by depressing a reset button and confirmed by resetting the alarm window.

With exception of the diesel generator rooms, detection of fire by any heat detector will activate a dedicated control room printer to record the event and the appropriated alarm window will light at the main control room fire alarm annunciator (00C201). Heat detectors are activated by high temperature (190°F) or rate-of-rise in temperature (+15°F/minute). If activated by high temperature, the detector must be replaced (or isolated) before the audible signal will silence or the control room annunciator will reset. If activated by rate-of-rise in temperature, each heat detector will reset itself once the heat source is removed.

In the diesel generator rooms, detection of a fire by a correct two-out-of-sixteen detection logic will activate a control room horn, a dedicated control room printer to record the event, and the appropriate alarm window will light in the main control room fire alarm annunciator (00C201). Heat detectors are activated by high temperature (190°F). If activated, the detector will reset itself once the heat source is removed.

This detection scheme utilizes two detectors at each of eight locations. The circuitry between each of the pair of detectors located in close proximity of each other is not electrically supervised.

Detection of trouble with the fire detection system's automatic code transmitting box by the supervisory circuit will initiate an annunciator with the fire alarm control cabinet (00C01). Confirmation of trouble within the supervisory circuit can be confirmed by a zero reading on a milliammeter within the control cabinet (00C01). Silencing of an alarm is possible by placing the "DET CKT TBL SIL" switch in the down position.

A Notifier SFP-2404 Fire Alarm Control Panel that uses microprocessor technology is installed within the ASD PDC structure. The SFP-2404 is connected to an audible device, smoke detectors, and other system sensors in the PDC. As required by NFPA 72, the notification appliance circuit strobes are synchronized as well as synchronization of standard ANSI audible signals. Activation of a smoke detector activates an audible device, illuminates an indicating LED, and activates an alarm device and annunciator to notify the MCR. The MCR annunciation is provided on panel 30C204L. Additional discussion relating to the annunciation functions and respective windows on panel 30C204L is provided in Section 3.31.6. Refer to ECR markup to drawing E-332, Sht. 2 and drawings B-015-VC-50, Sht. 2 and 8-015-VC-49, Sht. 1.

CHAPTER 3

COMPARISON BETWEEN PBAPS FIRE PROTECTION PROGRAM AND NRC GUIDELINE DOCUMENTS

3.1 NRC BRANCH TECHNICAL POSITION APCSB 9.5-1, APPENDIX A

The purpose of this section is to compare the fire protection provisions of Peach Bottom Atomic Power Station (PBAPS) Units 2 and 3 with the guidelines in Branch Technical Position (BTP) APCSB 9.5-1, Appendix A, and the response made to each guideline in the 1977 Fire Hazards Analysis.

To identify areas of potential impact and to facilitate comparison, a matrix addressing each guideline of the BTP and relating to the plant systems, equipment, and components, is included as Section 3.1.1. The matrix has extracted all suggested guidelines from the BTP and given each an item number, 1 through 86. Each item has condensed a particular guideline and makes reference to the section in the BTP where that guideline can be found. The general degree of conformance to the guideline is indicated in the "Comparison" column, using codes defined as follows:

C - indicates conformance to the guideline response or conformance to its intent. Substantiating statements may be included as part of the matrix or in Section 3.1.2. (See Note 1.)

AC - indicates conformance to the guideline response by alternative means or methods. The manner of conformance is included in the matrix or discussed in Section 3.1.2 (See Note 1.)

WC - indicates that design changes, means, or methods are planned in order to conform, or conform to the intent of the guideline response. The planned design changes, means, or methods and the manner of conformance may be discussed in the matrix or in Section 3.1.2. (See Note 1.)

NC - indicates that the plant is not in conformance and no design changes are planned. The basis for nonconformance to the guideline response is included in the matrix or discussed in Section 3.1.2. (See Note 1.)

NA - indicates that the guideline is not applicable to Peach Bottom Atomic Power Station Units 2 and 3. Substantiating statements are included as part of the matrix in Section 3.1.1.

In the "Remarks" column, additional information is provided to explain or expand on the degree of conformance. Alternatively,

reference may be made to Section 3.1.2 (or other sections in this report) for a more detailed discussion.

Note 1: Section 3.1.2 includes for each item the complete Appendix A guideline as it existed and the 1977 response to the guideline modified to reflect the present day plant conditions. The item numbers in Section 3.1.2 correspond to the applicable sections of the BTP.

DETAILED COMPARISON TO BRANCH TECHNICAL POSITION APCSB 9.5-1, APPENDIX A

Item No.	APCSB 9.5-1, Appendix A Guideline	APCSB 9.5-1 Appendix A Item No.	Comparison	Remarks
	Overall Requirements of Fire Protection Program			
1.	Personnel	A.1	AC	See Section 3.1.2.
2.	Design basis	A.2	C	
3.	Backup	A.3	C	See Section 3.1.2.
4.	Single failure criterion	A.4	C	See Section 3.1.2.
5.	Fire suppression systems	A.5	C	See Section 3.1.2.
6.	Fuel storage areas	A.6	NA	PBAPS is an operating plant.
7.	Fuel loading	A.7	NA	PBAPS is an operating plant.
8.	Multiple reactor sites	A.8	NA	PBAPS is an operating plant.
9.	Simultaneous fires	A.9	C	See Section 3.1.2.
10.	Administrative Procedures, Controls, and Fire Brigade	B	C	See Section 3.1.2 for details.
10.a	Personnel	B.1	C	
10.b	Bulk Storage of Combustibles	B.2	C	
10.c	Management of Plant Conditions	B.3	C	
10.d	Self-Sufficient Fire Fighting Activities	B.4	C	
10.e	Organization, Training, and Equipping of Fire Brigades	B.5	AC	
11.	Quality Assurance Program	C	C	See Section 3.1.2 for details.
	General Guidelines for Plant Protection Building Design			
12.	Plant layout	D.1.a	C	
13.	Fire hazards analysis	D.1.b	C	
14.	Cable spreading room	D.1.c	AC	Cable spreading room is part of a common fire area between units. See Item Nos. 66 and 67 for further details.
15.	Noncombustible interior components	D.1.d	C	
16.	Metal deck roof construction	D.1.e	C	
17.	Suspended ceiling construction	D.1.f	C	
18.	Transformers inside buildings	D.1.g	C	
19.	Building openings near transformers	D.1.h	AC	See Section 3.1.2.
20.	Floor drains	D.1.i	AC	See Section 3.1.2.
21.	Fire barrier ratings	D.1.j	AC	See Section 3.1.2.

Item No.	APCSB 9.5-1, Appendix A Guideline	APCSB 9.5-1 Appendix A Item No.	Comparison	Remarks
22.	Separation from safety-related systems	D.2.a	C	See Section 3.1.2.
23.	Bulk gas storage	D.2.b	C	
24.	Plastics	D.2.c	NC	See Section 3.1.2.
25.	Flammable liquids	D.2.d	C	See Section 3.1.2 for description of tanks.
	Electric Cable Construction, Cable Trays, and Cable Penetrations			
26.	Cable tray material and cable penetrations	D.3.a	C	
27.	Fire protection guidelines for cable rooms	D.3.b	NA	See Section 3.1.2, Item Nos. 66 and 67.
28.	Automatic water sprinkler systems for cable trays	D.3.c	C	
29.	Cable and cable tray penetrations	D.3.d	AC	See Section 3.2.1 and Section 3.2.1, Item Nos. 38 and 39.
30.	Fire breaks in cable trays	D.3.e	C	
31.	Electrical cable and IEEE 383 flame test	D.3.f	C	
32.	Cable construction	D.3.g	C	
33.	Cable supporting structures should be used only for cable	D.3.g	C	
34.	cable supporting structures, provided with smoke venting capability	D.3.i	C	
35.	Cables in the control room	D.3.j	AC	See Section 3.1.2, Item 35.
	Ventilation			
36.	Evaluation of combustible products	D.4.a	C	
37.	Single failure-proof ventilation	D.4.b	C	
38.	Power and control for ventilation	D.4.c	C	
39.	Charcoal filter per Reg. Guide 1.52	D.4.d	C	
40.	Air supply intakes to be located remote from outlets	D.4.e	C	
41.	Stairwells	D.4.f	C	See Section 3.1.2 and Section 3.3.2, Item No. 20.
42.	Smoke and heat vents	D.4.g	C	
43.	Self-contained breathing apparatus	D.4.h	C	
44.	Total flooding gas rooms	D.4.i	AC	See Section 3.1.2.
	Lighting and Communication			
45.	Emergency lighting and communication	D.5.a, b, c, d	C	See Section 3.1.2, Item No. 45 and Section 3.2.2, Item No. 23

Section 3.1.1 (Cont'd)

Item No.	APCSB 9.5-1, Appendix A Guideline	APCSB 9.5-1 Appendix A Item No.	Comparison	Remarks
	Fire Detection and Suppression			
46.	Fire detection system	E.1.a, b, c, d	C	See Section 3.1.2
47.	Installation of private fire service	E.2.a	C	See Section 3.1.2.
48.	Yard fire main loop	E.2.b	C	
49.	Fire pump design and layout	E.2.c	C	See Section 3.1.2.
50.	Water source reliability	E.2.d	C	
51.	Capacity and flowrate	E.2.e	C	
52.	Common water supply	E.2.f	C	
53.	Outdoor hoses and hydrants	E.2.g	AC	See Section 3.1.2.
	Water Sprinkler and Hose Standpipe Systems			
54.	Connections to water main	E.3.a	C	See Section 3.1.2.
55.	Supervision of valves	E.3.b	C	
56.	Sprinkler systems conformance	E.3.c	AC	See Section 3.1.2.
57.	Interior standpipes and hose stations	E.3.d	AC	See Section 3.1.2.
58.	Nozzles	E.3.e	AC	See Section 3.3.2, Item No. 14.
59.	Foam suppression	E.3.f	C	
60.	Halon suppression systems	E.4	NA	See Section 3.1.2, Item 60.
61.	Carbon dioxide systems	E.5	AC	See Section 3.1.2, Item 61
62.	Portable extinguishers	E.6	AC	See Section 3.1.2.
	Guidelines for Specific Areas			
63.	Normal operation	F.1.a	C	
64.	Refueling and maintenance	F.1.b	C	
65.	Control room	F.2	AC	Control room ventilation does not have smoke detection capability to alarm and 3-hour isolate rating for walls, floor, ceiling. Halon system is not provided for floor and ceiling spaces. See Section 3.1.2 and Section 3.3.2, Item No. 25.
66.	Cable spreading room	F.3.a	AC	An automatic water system is not installed; however a manual CO_2 system is installed. See Section 3.1.2.
67.	Alternatives to divisional cable separation	F.3.b	AC	Backup fixed-water system is not installed; however hose stations are located immediately outside the cable spreading room doors. See Section 3.1.2.

Item No.	APCSB 9.5-1, Appendix A Guideline	APCSB 9.5-1 Appendix A Item No.	Comparison	Remarks
68.	Plant computer room	F.4	NA	PBAPS computers are not safety related. See Section 3.1.2.
69.	Switchgear rooms	F.5	AC	Automatic fire suppression is provided in safety-related switchgear room; not all cables are in conduit. Barriers are 2-hour rated. See Section 3.1.2.
70.	Remote safety-related panels	F.6	C	
71.	Station battery rooms	F.7	C	
72.	Turbine lubrication and control oil storage and use areas	F.8	AC	See Section 3.1.2.
73.	Diesel generator areas	F.9	AC	See Section 3.1.2 and Item No. 22.
74.	Diesel fuel oil storage areas	F.10	NA	See Section 3.1.2.
75.	Safety-related pumps	F.11	C	See Section 3.1.2 and Item No. 62.
76.	New fuel area	F.12	AC	Automatic detection is not provided for the entire area; however, two smoke detectors have been installed in the vicinity of the only safety-related equipment. See Section 3.1.2 and Section 3.3.2, Item No. 2.
77.	Spent fuel pool area	F.13	AC	See Item 76 above. See Section 3.1.2 and Section 3.3.2, Item No. 2.
78.	Radwaste building	F.14	AC	Automatic detection is provided. Fire detectors have been installed throughout the radwaste building, including the ECCS pump rooms. See Section 3.1.2 and Section 3.3.2, Item No. 1.
79.	Decontamination areas	F.15	AC	All areas of the plant are provided with fire detection in accordance with the requirements of Appendix R. See Section 3.1.2 and Section 3.3.2, Item No. 1.
80.	Safety-related tanks	F.16	C	
81.	Cooling towers	F.17	C	
82.	Miscellaneous areas	F.18	C	Outside storage areas have been inspected to ensure adequate distance between combustible fuels such as propane fuel cylinders and adjacent diesel fuel oil storage tanks. Also the diked areas surrounding the auxiliary boiler diesel fuel oil storage and day tank complies with the NFPA Code.

Item No.	APCSB 9.5-1, Appendix A Guideline	APCSB 9.5-1 Appendix A Item No.	Comparison	Remarks
83.	Welding and cutting acetylene-oxygen systems	G.1	C	
84.	Storage areas for dry ion exchange	G.2	AC	Automatic sprinkler system are not provided. Smoke and heat detectors are not provided. See Section 3.1.2.
85.	Hazardous chemicals	G.3	C	
86.	Materials containing radioactivity	G.4	C	

3.1.2 Explanatory Notes for Comparison to Branch Technical Position APCSB 9.5-1

Overall Requirements of Nuclear Plant Fire Protection Program (A)

Item No. 1 - Personnel (A.1)

Responsibility for the overall fire protection program should be assigned to a designated person in the upper level of management. This person should retain ultimate responsibility, even though formulation and assurance of program implementation is delegated. Such delegation of authority should be to staff personnel prepared by training and experience in fire protection and nuclear plant safety to provide a balanced approach in directing the fire protection programs for nuclear power plants. The qualification requirements should be stated for the fire protection engineer or consultant who will assist in designing and selecting equipment, will inspect and test the completed physical aspects of the system, will develop the fire protection program, and assist in the fire-fighting training for the operating plant. Subsequently, the FSAR should discuss the training and the updating provisions, such as fire drills, provided for maintaining the competence of the station fire-fighting and operating crew, including personnel responsible for maintaining and inspecting the fire protection equipment.

The fire protection staff should:

(a) Coordinate building layout and systems design with fire area requirements, including consideration of potential hazards associated with postulated design basis fires.

(b) Design and maintain fire detection, suppression, and extinguishing systems.

(c) Develop fire prevention activities.

(d) Train plant personnel and the fire brigade for manual fire-fighting.

(NOTE: NFPA 6, Recommendations for Organization of Industrial Fire Loss Prevention, contains useful guidance for organization and operation of the entire fire loss prevention program.)

Response

The Vice President, PBAPS, is responsible for the overall fire protection and fire safe shutdown program for PBAPS. Program formulation and implementation are delegated to staff and line personnel within the licensee’s organization who are qualified by

education, training, and experience for fire protection and fire safe shutdown program activities. The responsibilities contained within each organization are delineated in the administrative procedures for the PBAPS fire protection program.

Item No. 2 - Design Bases (A.2)

The overall fire protection program should be based upon evaluation of potential fire hazards throughout the plant and the effect of postulated design basis fires relative to maintaining ability to perform safety shutdown functions and minimize radioactive releases to the environment.

Response

The nature and general quantity of combustibles were considered during plant design; fire barriers and fire protection were provided as appropriate. Fire barriers are provided to satisfy the requirements of appendix R to 10 CFR 50. A fire hazards analysis is included in the Fire Protection Program.

Item No. 3 - Backup (A.3)

Total reliance should not be placed on a single automatic fire suppression system. Appropriate backup fire suppression capability should be provided.

Response

Backup fire suppression capability is provided by manual hose stations and portable fire extinguishers in areas equipped with fixed CO^2 and water sprinkler fire suppression systems. The diesel generator rooms have backup fire suppression capability provided by hose attached to outside hydrants.

Item No. 4 - Single Failure Criterion (A.4)

A single failure in the fire suppression system should not impair both the primary and backup fire suppression capability. For example, redundant fire suppression water pumps with independent power supplies and controls should be provided. Postulated fires or fire protection system failures need not be considered concurrent with other plant accidents or the most severe natural phenomena.

The effect of lightning strikes should be included in the overall plant fire protection program.

Response

The fire pumps meet the single failure criterion. (See response to Guideline E.2.c, Item 49.) Sectionalizing valves in the underground fire main provide protection against the effects of a fire main break.

Lightning rods, connected to the site grounding system, are provided.

Item No. 5 - Fire Suppression Systems (A.5)

Failure or inadvertent operation of the fire suppression system should not incapacitate safety related systems or components. Fire suppression systems that are pressurized during normal plant operation should meet the guidelines specified in Branch Technical Position APCSB 3-1, "Protection Against Postulated Piping Failures in Fluid Systems Outside Containment."

Response

In some cases, inadvertent operation of failure of a fire suppression system would incapacitate safety-related components. For example:

1. Each diesel generator is provided with a manually initiated CO_2 fire suppression system. A CO_2 discharge signal trips associated diesel generator. The CO_2 fire suppression system control devices are seismically qualified and safety related to preclude inadvertent actuation.

2. The Cable Spreading Room is provided with a manually initiated CO_2 fire suppression system. A CO_2 discharge could affect components associated with the following systems: Turbine Electro-Hydraulic Control, HPCI and RCIC. However, station procedures are in place to mitigate the potential consequences of a CO_2 discharge.

In these cases, inadvertent operation of a fire suppression system would result in the loss of a safety-related component or single train safety system (e.g. HPCI). However, due to redundancy, safety-related system function availability is maintained.

The alternative Control Stations are provided with station battery-backed lights. The batteries are their chargers are protected from a fire in the control room, the cable spreading room, the computer room, or the emergency shutdown panel area. The lights are maintained in the “off” position to reduce loading on the safety-related batteries during non-fire events. They are

switched to the "on" position as part of the Alternative Shutdown procedure when required.

Information on the effects oil high-energy piping system failures outside primary containment is presented in Appendix A of the UFSAR.

Safe shutdown will be assured in accordance with the requirements of Appendix R.

Item No. 6 - Fuel Storage Areas (A.6)

The fire protection program (plans, personnel, and equipment) for buildings storing new reactor fuel and for adjacent fire zones that could affect the fuel storage zone should be fully operational before fuel is received at the site.

A schedule for implementation of modifications, if any, will be established on a case-by-case basis.

Response

This guideline is not applicable to PBAPS since it is an operating plant.

Item No. 7 - Fuel Loading (A.7)

The fire protection program for an entire reactor unit should be fully operational prior to initial fuel loading in that reactor unit.

Schedule for implementation of modifications, if any, will be established on a case-by-case basis.

Response

This guideline is not applicable to PBAPS since it is an operating plant.

Item No. 8 - Multiple-Reactor Sites (A.8)

On multiple-reactor sites where there are operating reactors and units being constructed, the fire protection program should provide continuing evaluation and include additional fire barriers, fire protection capability, and administrative controls to protect the operating units from construction fire hazards. The superintendent of the operating plant should have the lead responsibility for site fire protection.

Response

This guideline is not applicable to PBAPS since both units are operating.

Item No. 9 - Simultaneous Fires (A.9)

Simultaneous fires in more than one reactor need not be postulated, where separation requirements are met. A fire involving more than one reactor unit need not be postulated, except for facilities shared between units.

Response

The safe shutdown analysis (see Chapter 5) is based on a fire in only one fire area. A fire involving more than one reactor unit has not been postulated except for facilities shared between units and located in the same fire area, e.g., the control room or cable spreading room. The ability to safely shut down both units in the event of a fire is provided for in the safe shutdown analysis.

Administrative Procedures, Controls, and Fire Brigade (B)

Item No. 10.a - Personnel (B.1)

Administrative procedures consistent with the need for maintaining the performance of the fire protection system and personnel in nuclear power plants should be provided.

Guidance is contained in the following publications:

1. NFPA 4, "Organization for fire Services" (now NFPA 1201)

2. NFPA 4A, "Organization for Fire Department" (now NFPA 1202)

3. NFPA 6, "industrial Fire Loss Prevention (since deleted)

4. NFPA 7, "Management of fire Emergencies" (since deleted)

5. NFPA 8, "Management Responsibility for Effects of Fire on Operations" (since deleted)

6. NFPA 27, "Private Fire Brigade" (now titled "NFPA 600, Standard on Industrial Fire Brigades")

Response

Administrative procedures for maintaining the performance of the fire protection system and personnel are provided. As part of the periodic review of these procedures, the guidance contained in the NFPA publications is reviewed and incorporated into the procedures when appropriate.

More than 70 plant surveillance and operation procedures have been implemented to ensure that plant technical requirements are satisfied and that fire protection systems are maintained and used properly. The procedures can be found in the indices for ST, RT, and SO procedures.

Item No. 10.b - Bulk Storage of Combustibles (B.2)

Effective administrative measures should be implemented to prohibit bulk storage of combustible materials inside or adjacent to safety-related buildings or systems during operation or maintenance periods. Regulatory Guide 1.39, "Housekeeping Requirements for Water-Cooled Nuclear Power Plants," provides guidance on housekeeping, including the disposal of combustible materials.

Response

Combustible materials are controlled in accordance with the requirements of Appendix R to 10 CFR 50, Section III.k and applicable administrative procedure.

Item No. 10.c – Management of Plant Conditions (B.3)

Normal and abnormal conditions or other anticipated operations, such as modifications (e.g., breaking fire stops and impairment of fire detection and suppression systems) and refueling activities, should be reviewed by appropriate levels of management and appropriate special actions and procedures such as fire watches or temporary fire barriers implemented to assure adequate fire protection and reactor safety. In particular:

(a) Work involving ignition sources such as welding and flame cutting should be done under closely controlled conditions. Procedures governing such work should be reviewed and approved by persons trained and experienced in fire protection. Persons performing and directly assisting in such work should be trained and equipped to prevent and combat fires. If this is not possible, a person qualified in fire protection should directly monitor the work and function as a fire watch.

(b) Leak testing, and similar procedures such as air flow determination, should use one of the commercially available aerosol techniques. Open flames or combustion generated smoke should not be permitted.

(c) Use of combustible material, e.g., HEPA and charcoal filters, dry ion exchange resins or other combustible supplies, in safety-related areas should be controlled. Use of wood inside buildings containing safety-related systems or equipment should be permitted only when suitable noncombustible substitutes are not available. If wood must be used, only fire retardant treated wood (scaffolding, laydown blocks) should be permitted. Such materials should be allowed into safety-related areas only when they are to be used immediately. Their possible and probable use should be considered in the fire hazard analysis to determine the adequacy of the installed fire protection systems.

Response

1. Work involving the use of ignition sources or work where a potential fire hazard exists is performed in accordance with applicable administrative procedures. These procedures specify the requirements for approval prior to starting work, fire watch considerations, special precautions, etc., and address training requirements necessary to perform hot work.

2. Leak testing is performed using chemically generated smoke or Freon detection.

3. Use and storage of combustible materials is controlled by applicable administrative procedures. Plant inspections are performed, as appropriate, by the shift supervisor and the licensee's fire marshal, or by their designee. Plant policy is that only fire-retardant-treated wood be used inside the plant.

All modifications are reviewed for impact on fire protection in accordance with plant procedures. Breaches of fire barriers are controlled in accordance with plant administrative controls and the Technical Requirements Manual. Activities requiring that a fire protection system be rendered temporarily inoperable are performed in accordance with the Technical Requirements Manual requirements.

Item No. 10.d - Self-Sufficient fire Fighting Activities (B.4)

Nuclear power plants are frequently located in remote areas, at some distance from public fire departments. Also, first response fire departments are often volunteer. Public fire department response should be considered in the overall fire protection program; however, the plant should be designed to be self-sufficient for fire-fighting activities and rely on the public response only for supplemental or backup capability.

Response

The training of plant personnel, coupled with the installed and portable fire protection systems and equipment provided, is considered sufficient to extinguish or contain a fire in a given fire area. Arrangements have been made with the local public fire department to assist plant forces, if requested. Public fire department personnel have been exercised at the site and are considered capable of providing reliable supplemental and backup fire protection.

Item No. 10.e - Organization, Training, and Equipping of Fire Brigades (B.5)

The need for good organization, training, and equipping of fire brigades at nuclear power plant sites requires effective measures be implemented to assure proper discharge of these functions. The guidance in Regulatory Guide 1.101, "Emergency Planning for Nuclear Power Plants," should be followed as applicable.

(a) Successful fire fighting requires testing and maintenance of the fire protection equipment, emergency lighting, and communication, as well as practice as brigades for the people who must use the equipment. A test plan that lists the individuals and their responsibilities in connection with routine tests and inspections of the fire detection and protection systems should be developed. The test plan should contain the types, frequency, and detailed procedures for testing. Procedures should also contain instructions on maintaining fire protection during those periods when the fire protection system is impaired or during periods of plant maintenance, e.g., fire watches or temporary hose connections to water systems.

Response to (a)

Surveillance test procedures have been instituted to ensure that fire protection systems are operable and, if found to be impaired, to ensure that appropriate compensatory measures are taken.

(Refer to response in Section B.1, Item No. 10.a.) A prefire plan, outlining fire protection strategies, has been provided.

(b) Basic training is a necessary element in effective fire-fighting operation. In order for a fire brigade to operate effectively, it must operate as a team. All members must know what their individual duties are. They must be familiar with the layout of the plant and equipment location and operation in order to permit effective fire-fighting operations during times when a particular area is filled with smoke or is insufficiently lighted. Such training can only be accomplished by conducting drills several times a year (at least quarterly) so that all members of the fire brigade have had the opportunity to train as a team, testing itself in the major areas of the plant. The drills should include the simulated use of equipment in each area and should be preplanned and post-critiqued to establish the training objective of the drills and determine how well these objectives have been met. These drills should periodically (at least annually) include local fire department participation where possible. Such drills also permit supervising personnel to evaluate the effectiveness of communications within the fire brigade and with the on-scene fire team leader, the reactor operator in the control room, and the offsite command post.

(c) To have proper coverage during all phases of operation, members of each shift crew should be trained in fire protection. Training of the plant fire brigade should be coordinated with the local fire department so that responsibilities and duties are delineated in advance. This coordination should be part of the training course and implemented into the training of the local fire department staff. Local fire departments should be educated in operational precautions for fighting fires on nuclear power plant sites. Local fire departments should be made aware of the need for radioactive protection of personnel and the special hazards associated with a nuclear power plant site.

Response to (b) and (c)

The station fire and damage team is composed of on-shift station personnel and is directed by the shift supervisor. The team leader and team members receive periodic training in fire fighting. Fire drills are conducted quarterly. These drills include the simulated use of fire protection equipment and require post-critiquing through the use of a fire drill report form. Fire

drills involving local fire department participation are not conducted; however, personnel from the local fire department are given periodic briefings on fire-fighting aspects at PBAPS. These briefings include reviews of radiation protection practices, organizational responsibilities, and plant familiarization. One of the quarterly fire brigade drills (for each shift team) may be conducted at the corporate fire school.

(d) NFPA 600, "Standard on Industrial Fire Brigades," should be followed in organization, training, and fire drills. This standard also is applicable for the inspection and maintenance of fire-fighting equipment. Among the standards referenced in this document, the following should be used: NFPA 194, "Standard for Screw Threads and Gaskets for Fire Hose Coupling," NFPA 196, "Standard for Fire Hose," NFPA 197, "Training Standard on Initial Fire Attacks," NFPA 601, "Recommended Manual of Instructions and Duties for the Plant Watchman on Guard." NFPA booklets and pamphlets listed on page 27-11 of Volume 8, 1971-72, are also applicable for good training references. In addition, courses in fire prevention and fire suppression which are recognized and/or sponsored by the fire protection industry should be used.

Response to (d)

As part of the periodic review of existing plant procedures and the generation of fire plan implementing procedures, the guidance provided in NFPA standards is reviewed and incorporated when appropriate. Fire hose and equipment at PBAPS use National Standard Thread which is compatible with local fire department equipment. Plant personnel are trained by the company's Fire Fighting School.

Item No. 11 - Quality Assurance Program (C)

Quality assurance (QA) programs of applicants and contractors should be developed and implemented to ensure that the requirements for design, procurement, installation and testing, and administrative controls for the fire protection program for safety-related areas as defined in this Branch Position are satisfied. The program should be under the management control of the QA organization. The QA program criteria that apply to the fire protection program should include the following:

1. Design Control and Procurement Document control

   Measures should be established to assure that all design related guidelines of the Branch Technical

Position are included in design and procurement documents and that deviations, therefore, are controlled.

2. Instructions, Procedures, and Drawings

Inspections, tests, administrative controls, fire drills, and training that govern the fire protection program should be prescribed by documented instructions, procedures, or drawings and should be accomplished in accordance with these documents.

3. Control of Purchased Material, Equipment, and Services

Measures should be established to assure that purchased material, equipment, and services conform to the procurement documents.

4. Inspection

A program for independent inspection of activities affecting fire protection should be established and executed by, or for, the organization performing the activity to verify conformance with documented installation drawings and test procedures for accomplishing the activities.

5. Test and Test Control

A test program should be established and implemented to assure that testing is performed and verified by inspection and audit to demonstrate conformance with design and system readiness requirements. The tests should be performed in accordance with written test procedures; test results should be properly evaluated and acted on.

6. Inspection, Test and Operating Status

Measures should be established to provide for the identification of items that have satisfactory passed required tests and inspections.

7. Non-Conforming Items

Measures should be established to control items that do not conform to specified requirements to prevent inadvertent use or installation.

8. Corrective Action

Measures should be established to assure that conditions adverse to fire protection, such as failures, malfunctions, deficiencies, deviations, defective components, uncontrolled combustible material and non-conformance, are promptly identified, reported, and corrected.

9. Records

Records should be prepared and maintained to furnish evidence that the criteria enumerated above are being met for activities affecting the fire protection program.

10. Audits

Audits should be conducted and documented to verify compliance with the fire protection program including design and procurement documents; instructions; procedures and drawings; and inspection and test activities.

Response

A QA program for Fire Protection was issued to control activities associated with the fire protection program. Each item required by Appendix A has been applied to fire protection at PBAPS.

General Guidelines for Plant Protection (D)

Building Design (d.1)

Item No. 12 - Plant Layout (D.1.a)

Plant layouts should be arranged to:

1. Isolate safety-related systems from unacceptable fire hazards

2. Separate redundant safety-related systems from each other so that both are not subject to damage from a single fire hazard

   Alternatives:

   a. Redundant safety-related systems that are subject to damage from a single fire hazard should be protected by a combination of fire retardant

coatings and fore detection and suppression systems, or

b. A separate system to perform the safety function should be provided.

Response

1. Safety-related systems are isolated from unacceptable fire hazards.

2. Redundant safety-related systems are separated from each other so that both are not subject to damage from a single fire. Redundant safe shutdown equipment is in compliance with the requirements of Appendix R, Section III.G and III.L.

Item No. 13 - Fire Hazards Analysis (D.1.b)

To accomplish D.1.a above, safety-related systems and fire hazards should be identified throughout the plant. Therefore, a detailed fire hazard analysis should be made. The fire hazards analysis should be reviewed and updated as necessary.

Additional fire hazards analyses should be done after any plant modification.

Response

See Chapter 4 for the fire hazards analysis and Chapter 5 for the safe shutdown analysis.

Procedures concerning modification of system designs require consideration of the impact of such modifications on fire protection. If the modification results in changes which impact the fire hazards analysis or the safe shutdown analysis (re-routing of cables from one fire area or fire zone to another, or significant increases in combustible loadings), the impact of such changes on the analyses will be evaluated. Administrative procedures require that a fire protection review checklist be completed for each modification. The checklist addresses both safe shutdown and fire protection concerns and is the vehicle by which both are evaluated for each modification.

Item No. 14 - Cable Spreading Room (D.1.c)

For multiple-reactor sites, cable spreading rooms should not be shared between reactors. Each cable spreading room should be separated from other areas of the plant by barriers (walls and floors) having a minimum fire resistance of 3 hours. Cabling for

redundant safety divisions should be separated by walls having 3-hour fire barriers.

Alternative guidance for constructed plants is shown in Section F.3, "Cable Spreading Room."

Response

Peach Bottom is a multiple-reactor site with a shared cable spreading room for the two units. Due to the fact that certain plant equipment (diesel generators, etc.) is shared between units, it was necessary to route cables between units. When cables were routed across the centerline of the cable spreading room, they were run in tray to the room centerline and then routed to the other unit in conduit.

There are a few common control cabinets in the control room that are located on the plant centerline. In order to route cables to these cabinets, six Unit 2 tray sections were extended 5 to 10 feet across the centerline of the cable spreading room into the Unit 3 area.

In summary, the cables in tray sections crossing the cable spreading room centerline either go to a common control cabinet or leave a tray section in conduit to continue the routing to Unit 3. None of the cables leave a tray section to go to another tray section in the other unit.

Item No. 15 - Noncombustible Interior Components (D.1.d)

Interior wall and structural components, thermal insulation materials, and radiation shielding materials and sound-proofing should be noncombustible. Interior finishes should be noncombustible or listed by a nationally recognized testing laboratory, such as Factory Mutual or Underwriters' Laboratory, Inc., for flame spread, smoke, and fuel contribution of 25 or less in its use configuration (ASTM E-84 Test), "Surface Burning Characteristics of Building Materials."

Response

Interior wall and structural components, thermal insulation materials, radiation shielding materials, sound-proofing, and interior finishes are noncombustible or have a flame spread of 25 or less.

Item No. 16 - Metal Deck Roof Construction (D.1.e)

Metal deck roof construction should be noncombustible (see the building materials directory of the Underwriters Laboratory, Inc.)

or listed as Class I by Factory Mutual System Approval Guide. Where combustible material is used in metal deck roofing design, acceptable alternatives are (i) replace combustibles with noncombustible materials, (ii) provide an automatic sprinkler system, or (iii) provide ability to cover roof exterior and interior with adequate water volume and pressure.

Response

Metal deck roof construction complies with Factory Mutual Class I requirements.

Item No. 17 - Suspended Ceiling Construction (D.1.f)

Suspended ceilings and their supports should be of noncombustible construction. Concealed spaces should be devoid of combustibles. Adequate fire detection and suppression systems should be provided where full implementation is not practicable.

Response

Suspended ceilings and their supports in safety-related areas are of noncombustible construction. The ceiling above the peripheral rooms in the control room provides a 1-hour fire resistance. Also see Item 35.

Item No. 18 - Transformers Inside Buildings (D.1.g)

High voltage/high amperage transformers installed inside buildings containing safety-related systems should be of the dry type or insulated and cooled with noncombustible liquid.

Safety-related systems that are exposed to flammable oil filled transformers should be protected from the effects of a fire by:

(i) Replacing with dry transformers that are insulated and cooled with noncombustible liquid

(ii) Enclosing the transformer with a 3-hour fire barrier and installing automatic water spray protection

Response

With two exceptions, all transformers located inside buildings containing safety-related systems are of the gas-filled, sealed, dry type. Two neutral ground transformers located in the turbine building at elevation 135 feet in the vicinity of the equipment hatchway are oil-filled. A wet pipe sprinkler system is provided in the area.

Item No. 19 - Building Openings Near Transformers (D.1.h)

Buildings containing safety-related systems and having openings in exterior walls closer than 50 feet to flammable oil filled transformers should be protected from the effects of a fire by:

(i) Closing the opening to have fire resistance equal to 3 hours

(ii) Constructing a 3-hour fire barrier between the transformers and the wall openings

(iii) Closing the opening and providing the capability to maintain a water curtain in case of a fire

Response

The circulating water pump and service water pump transformers (oil-filled) are located approximately 6 feet from a structure containing safety-related equipment. The wall of this structure is 3-hour fire rated and sealed as part of the penetration seal upgrade program. Several transformers are located outside the turbine building. These transformers are protected with a fixed water spray system.

Item No. 20 - Floor Drains (D.1.i)

Floor drains sized to remove expected fire-fighting water flow should be provided in those areas where fixed water fire suppression systems are installed. Drains should also be provided in other areas where hand hose lines may be used if such fire-fighting water could cause unacceptable damage to equipment in the area. Equipment should be installed on pedestals, or curbs should be provided as required to contain water and direct it to floor drains. Drains in areas containing combustible liquids should have provisions for preventing the spread of the fire throughout the drain system. Water drainage from areas which may contain radioactivity should be sampled and analyzed before discharge to the environment.

In operating plants or plants under construction, if accumulation of water from the operation of new fire suppression systems does not create unacceptable consequences, drains need not be installed.

Response

Floor drains are provided in areas equipped with fixed water fire suppression systems except as noted below. Floor drains are not provided in all areas housing safety-related equipment due to

protection in the event of the probable maximum flood (PMF). Drainage paths in these areas would be through the room doors to external drains. Drain lines from separate safeguards areas containing combustible liquids are not interconnected. The following areas are considered oil storage areas:

1. Lube oil storage tanks, fire zones 50-88 and 50-89, elev. 116 feet, Units 2 and 3 turbine buildings

2. Lube oil storage room, fire zone 50-87, elev. 116 feet, Unit 3 turbine building

3. Lube oil reservoirs, fire zones 50-90 and 50-93, elev. 150 feet, Units 2 and 3 turbine buildings

4. Reactor feed pump turbine lube oil reservoirs, fire zones 50-78G and 50-78F, elev. 135 feet, Units 2 and 3 turbine buildings

5. Reactor feed pump turbine lube oil reservoir, fire zones 50-78J and 50-78K, elev. 150 feet, Units 2 and 3 turbine buildings

The drain lines from inside the dikes in these areas contain normally closed valves or plugged drains. The liquid radwaste effluent is sampled prior to discharge to the environment.

Floor drains are not provided in the Switchgear and Battery Rooms. A fire in any one of these rooms may result in the loss of the equipment in that room. However, redundant equipment or components are available in other Switchgear and Battery Rooms for safe shutdown. Accumulation of water in the affected room will not result in greater damage than that caused by the postulated fire. Accumulation of water will be limited to less than 1" in other rooms and will not result in damage since the equipment and components are mounted on either floor standing cabinets or raised off the floor by metal frames or pedestals. Water accumulation is limited to less than 1", since the doors separating the rooms are not water tight and each room has two doors that would permit water entering a room to leave by the other door and thereby prevent a significant buildup.

The floor drains in each MG Set room have been blocked (as was noted in the May 1979 Fire Protection Safety Evaluation Report, Sections 4.5 and 5.14.7). **Curbing has been removed from around the doors of each MG Set Room per EC 619391. All oil has been removed from the MG sets which have been abandoned in place. Pre-action sprinkler systems remain in both areas. Based on the only remaining hazard present (cable insulation) operation of multiple sprinklers is not expected. Water discharge from sprinkler**

operation will not result in unacceptable consequences.. Water from a sprinkler discharge in the turbine hatch area sprinkler system, the 13kV pre-action system or the hydrogen seal oil unit will collect on the floor of the 116’ elevation of the turbine building. Most of the water from the hydrogen seal oil unit will be collected with in the install dike. Given the large floor area of the 116’ elevation the water level will remain low, below 1”. In addition, water will flow under the doors of the condensate pump pit and drain to the pit itself. The water will also be able to flow out of the roll-up door opening to the exterior.

Item No. 21 - Fire Barrier Ratings (D.1.j)

Floors, walls, and ceilings enclosing separate fire areas should have a minimum fire rating of three hours. Penetrations in these fire barriers, including conduits and piping, should be sealed or closed to provide a fire resistance rating at least equal to that of the fire barrier itself. Door openings should be protected with equivalent rated doors, frames, and hardware that have been tested and approved by a nationally recognized laboratory. Such doors should be normally closed and locked or alarmed with alarm and annunciation in the control room. Penetrations for ventilation system should be protected by a standard "fire door damper" where required. (Refer to NFPA 80, "Fire Doors and Windows.")

The fire hazard in each area should be evaluated to determine barrier requirements. If barrier fire resistance cannot be made adequate, fire detection and suppression should be provided, such as:

(i) Water curtain in case of fire
(ii) Flame retardant coatings
(iii) Additional fire barriers

Response

Fire areas containing redundant safe shutdown components are separated from each other in accordance with the requirements of Appendix R to 10 CFR 50. (See Section 3.2, Item Nos. 37, 38, and 39.) Fire barriers identified in the 1977 PBAPS Fire Protection Program are maintained only if they meet the above criteria or have been found to significantly reduce plant fire risk, as identified by the IPEEE fire risk analysis (see reference 22).

Control of Combustibles (D.2)

Item No. 22 - Separation of Safety-Related Systems (D.2.a.)

Safety-related systems should be isolated or separated from combustible materials. When this is not possible because of the

nature of the safety system or the combustible material, special protection should be provided to prevent a fire from defeating the safety system function. Such protection may involve a combination of automatic fire suppression and construction capable of withstanding and containing a fire that consumes all combustibles present. Examples of such combustible materials that may not be separable from the remainder of its system are:

1. Emergency diesel generator fuel oil day tanks

2. Turbine generator oil and hydraulic control fluid systems

3. Reactor coolant pump lube oil system

Response

To the extent practicable, safety-related systems are separated from combustible materials or are provided with appropriate fire suppression, specifically:

1. The emergency diesel generator fuel oil day tanks are located in a separate enclosure inside the associated diesel generator compartment. Each diesel generator compartment is equipped with a manual CO_2 fire suppression system. The diesel generator system is single failure proof (four diesels provided, three required), so that in the event of a fire occurring within an individual compartment, and assuming failure of the fire suppression system, system function is maintained.

2. See Response to Guideline F.8, Item No. 72.

3. The reactor recirculation pump lube oil systems are located within primary containment, which is inerted during normal operation.

4. In all cases, safe shutdown of the plant in the event of a fire is assured in accordance with the requirements of Appendix R.

Item No. 23 - Bulk Gas Storage (D.2.b)

Bulk gas storage (either compressed or cryogenic), should not be permitted inside structures housing safety related equipment. Storage of flammable gas, such as hydrogen, should be located outdoors or in separate detached buildings so that a fire or explosion will not adversely affect any safety related systems or equipment. (Refer to NFPA 50A, "Gaseous Hydrogen Systems.")

Care should be taken to locate high pressure gas storage containers with the long axis parallel to building walls. This will minimize the possibility of wall penetration in the event of a container failure. Use of compressed gases (especially flammable and fuel gases) inside buildings should be controlled. (Refer to NFPA 6, "Industrial Fire Loss Prevention.")

Response

The following bulk gas storage is provided inside structures housing safety-related equipment:

1. The liquid nitrogen storage tank for the containment atmosphere dilution (CAD) system is located in the CAD building (safety-related).

2. The carbon dioxide storage tank (low pressure) for the diesel generator fire suppression system is located in a structure housing the emergency service water booster pumps (safety-related).

3. Two carbon dioxide storage tanks for the HPCI pump rooms, cable spreading room, computer room, and control room fire suppression systems are located in the turbine building, elevation 116 feet, in the vicinity of the open hatchway.

Permanent storage of flammable gas (including hydrogen and propane) cylinders is provided in the gas storage shed adjacent to the east wall of the administration building. A permanent hydrogen tank farm exists outside of the south end of the Unit 2 turbine building, elevation 116 feet. Propane canisters, acetylene tanks are oxygen tanks are stored outdoors in the vicinity of the east wall of the administrative building. Bulk gas storage is controlled by applicable administrative procedures.

Item No. 24 - Plastics (D.2.c)

The use of plastic materials should be minimized. In particular, halogenated plastics such as polyvinyl chloride (PVC) and neoprene should be used only when substitute noncombustible materials are not available. All plastic materials, including flame and fire retardant materials, will burn with an intensity and BTU production in a range similar to that of ordinary hydrocarbons. When burning, they produce heavy smoke that obscures visibility and can plug air filters, especially charcoal and HEPA. The halogenated plastics also release free chlorine and hydrogen

chloride when burning which are toxic to humans and corrosive to equipment.

Response

The cable construction used for control and power circuits consists of cross-linked polyethylene insulation with a flame-retardant neoprene jacket. The flame test standard for cables, IEEE-383-1974, was not in effect at the time these cables were initially purchased and installed. These cables were, however, required to pass a special flame-resistance test detailed in the purchase specification. This test is essentially the oily rag test outlined in IEEE-383-1974. Therefore, the power and control cables used at Peach Bottom are capable of passing IEEE-383-1974.

Some cables are jacketed with PVC. These are cables that are used for low-level instrument signals. The cables are predominantly routed in trays dedicated to instrument cables. Less than 0.3 percent (by volume) of the cables in all the safeguard trays are jacketed with PVC.

All new cables installed at Peach Bottom are qualified to IEEE-383.

Electrical components located throughout the plant, such as control panels, relay panels, motor control centers, and power distribution panels, contain relatively small amounts of plastic in the form of terminal blocks, relay cases, circuit breaker cases, and other small items. The use of plastic in these applications is necessary because of its electrical insulating properties.

Plastic materials are also used for electrical conduit, but only when embedded within poured concrete walls and floor slabs.

Item No. 25 - Flammable Liquids (D.2.d)

Storage of flammable liquids should, as a minimum, comply with the requirements of NFPA 30, "Flammable and Combustible Liquids Code."

Response

The following tanks contain combustible liquids and meet the requirements of NFPA 30:

Tank No.	Tank Description	Location	Fire Zone
2/3S02	Hydrogen Seal Oil Reservoirs	Turbine Bldg. Elev. 116'	50-78B
	Recirc. Pump M-G Set Fluid Drive Unit 3 MG Set abandoned in place with oil removed	Radwaste Bldg. Elev. 135'	4-4C 58
	Diesel Fire Pump Fuel Oil Day	Circ. Water Pump Structure	53-145
	Diesel Fire Pump Lube Oil Reservoir	Circ. Water Pump Structure	53-145
00T041	Diesel Fire Pump Fuel Oil Storage	Unit 2 Circ Water Pump Structure	53-142
2/3AT05 2/3BT05 2/3CT05	Reactor Feed Pump Pump Turbine Reservoirs	Turbine Bldg.	50-78G/F 50/78J 50/78K
2/30T04	Main Turbine Lube Oil Storage	Turbine Bldg.	50-90 50-93
0AT40 0BT40 0CT40 0DT40	Diesel Generator Fuel Oil Day	Diesel Gen. Bldg.	43-132 44-133 45-134 46-135
0AT96 0BT96 0CT96 0DT96	Diesel Gen. Lube Oil Storage	Diesel Gen. Bldg.	43-132 44-133 45-134 46-135
0AT38 0BT38 0CT38 0DT38	Diesel Fuel Oil Storage	Underground in yard	
00T39	Aux Boiler Diesel Oil Day	Aboveground in yard	
00T09	Fuel Oil Storage	Aboveground in yard	
2/3AT43	Clean Lube Oil Storage	Turbine Bldg.	50-88 50-89

2/3BT43	Reclaimed Lube Oil Storage	Turbine Bldg.	50-88 50-89
	Dirty Lube Oil Storage	Turbine Bldg.	50-88 50-89
00T92	Gasoline Storage	Underground in yard	
0AT93 0BT93	Dirty Oil Storage	Underground in yard	

The auxiliary boiler (No. 2 fuel oil) storage tank, 00T-009 (200,000 gallons), and the auxiliary boiler diesel fuel oil day tank, 00T-039 (1,000 gallons) are located in the same diked area in the yard. Section 2-2.3.3 of NFPA 30-1984 requires that intermediate dikes be provided between adjacent tanks in a common area when any one tank is greater than 150 feet in diameter. Since the largest tank is only **35** feet in diameter, this requirement does not apply.

Electric Cable Construction, Cable Trays, and Cable Penetrations (D.3)

Item No. 26 - Cable Tray Material (D.3.a)

Only noncombustible materials should be used for cable tray constructions.

Response

Only noncombustible materials are used for cable tray construction.

Item No. 27 - Fire Protection Guidelines for Cable Spreading Rooms (D.3.b)

See Section F.3.a and F.3.b (Item Nos. 66 and 67) for fire protection guidelines for cable spreading rooms.

Item No. 28 - Automatic Water Sprinkler Systems for Cable Trays (D.3.c)

Automatic water sprinkler systems should be provided for cable trays outside the cable spreading room. Cables should be designed to allow wetting down with deluge water without electrical faulting. Manual hose stations and portable hand extinguishers should be provided as backup. Safety-related equipment in the vicinity of such cable trays, that does not itself require water fire protection but is subject to unacceptable damage from the

sprinkler water discharge, should be protected from sprinkler system operation of malfunction.

When safety-related cables do not satisfy the provisions of Regulatory Guide 1.75, all exposed cables should be covered with an approved fire retardant coating and a fixed automatic water fire suppression system should be provided.

Response

Because the cables used at PBAPS are capable of passing the IEEE No. 383 flame test, fixed automatic water fire suppression systems are not provided for cable trays. Hose stations and portable fire extinguishers are located throughout the plant. The PBAPS separation criteria prohibit a nonsafety-related cable from being run in more than one safeguard channel tray; however, it does permit two nonsafety-related cables that have been partially routed in separate safeguard channel trays to be run in the same non-safeguard tray. With this exception, the divisional cable separation in the cable spreading room meets the guidelines of Regulatory Guide 1.75. The cables used at PBAPS are of flame retardant construction. Therefore, the cable meets the intent of this guideline.

Item No. 29 - Cable and Cable Tray Penetrations (D.3.d)

Cable and cable tray penetration of fire barriers (vertical and horizontal) should be sealed to give protection at least equivalent to that fire barrier. The design of fire barriers for horizontal and vertical cable trays should, as a minimum, meet the requirements of ASTM E-119, "Fire Test of Building Construction and Materials," including the hose stream test.

Where installed penetration seals are deficient with respect to fire resistance, these seals may be protected by covering both sides with an approved fire retardant material. The adequacy of using such material should be demonstrated by suitable testing.

Response

Penetrations are sealed in accordance with the requirements of Appendix R to 10CFR50. (See Section 3.2, Item Nos. 38 and 39 for a description of penetration seals. See Section 3.1.2, Item 21 for a discussion of which walls and floors are required to be fire barriers.)

Item No. 30 - Fire Breaks in Cable Trays (D.3.e)

Fire breaks should be provided as deemed necessary by the fire hazards analysis. Flame or flame retardant coatings may be used as

a fire break for grouped electrical cables to limit spread of fire in cable ventings. (Possible cable derating owing to use of such coating materials must be considered during design.)

Response

Fire breaks are provided in vertical trays at 20-foot intervals or less. Fire breaks are not provided in horizontal trays since flame retardant cable is used. Cables are thermally sized and derated in accordance with the methods outlined in Insulated Power Cable Engineers Association (IPCEA) Standards. Power Cables installed in conduit are derated in accordance with IPCEA standard P-46-426, Power Cable Ampacities, Volume I or II. Power Cables installed in open-top cable trays are derated in accordance with ICEA standard P-54-440, Ampacities Cables in Open-top Cable Trays. For special cases where the use of these standards is restrictive, cables are derated using a heat transfer model which considers load diversity among cables (actual loading of cables) installed in the raceway.

Item No. 31 - Electrical Cable and IEEE 383 Flame Test (D.3.f)

Electric cable constructions should, as a minimum, pass the current IEEE No. 383 flame test. (This does not imply that cables passing this test will not require additional fire protection.) For cable installation in operating plants and plants under construction that do not meet the IEEE No. 383 flame test requirements, all cables must be covered with an approved flame retardant coating and properly derated.

Response

The power and control cables used at PBAPS are capable of passing the IEEE No. 383 flame test. (See Item No. 24)

Item No. 32 - Cable Construction (D.3.g)

To the extent practical, cable construction that does not give off corrosive gases while burning should be used. Applicable to new cable installations.

Response

All new cable is flame retardant and satisfactorily meets the requirements of IEEE Standard No. 383.

Item No. 33 - Cable Supporting Structures Should be Used Only for Cables (D.3.h)

Cable trays, raceways, conduit, trenches, or culverts should be used only for cables. Miscellaneous storage should not be permitted, nor should piping for flammable or combustible liquids

or gases be installed in these areas. Installed equipment in cable tunnels or culverts need not be removed if it presents no hazard to the cable runs as determined by the fire hazards analysis.

Plant design and operating practices do not allow storage of combustibles in cable trays, raceways, conduits, trenches, or culverts. Piping for the hydrogen supply to the turbine generators is routed through the turbine building and, at certain locations, may be located in the general area of cable trays.

Item No. 34 - Cable Supporting Rooms Provided Smoke Venting Capability (D.3.i)

The design of cable tunnels, culverts, and spreading rooms should provide for automatic or manual smoke venting as required to facilitate manual fire-fighting capability.

Response

The normal ventilating system supply and exhaust fans for the cable spreading room can be utilized for smoke venting. Fire dampers will have to be manually reset to exhaust the air in the event of their closure during a fire.

Item No. 35 - Cables in the Control Room (D.3.j)

Cables in the control room should be kept to the minimum necessary for operation of the control room. All cables entering the control room should terminate there. Cables should not be installed in floor trenches or culverts in the control room.

Existing cable installed in concealed floor and ceiling spaces should be protected with an automatic total flooding Halon system.

Response

Cables which enter the control room terminate there. Some cable trays are located above the ceiling of the control room. The majority of the cables in these trays are routed to the annunciation panels. The remaining cables (three) are associated with the containment atmospheric dilution (CAD) system. All of the cables are of flame retardant construction. These trays are provided with line type heat detectors.

The control room is protected by portable fire extinguishers (CO_2 and Ansul) within the control room and manual hose stations adjacent to the control room entrances. Nine Clean Agent portable fire extinguishers have been installed in the control room.

Therefore, existing fire protection in the control room is adequate in spite of the absence of a Halon system.

Ventilation (D.4)

Item No. 36 - Evaluation of Combustible Products (D.4.a)

The products of combustion that need to be removed from a specific fire area should be evaluated to determine how they will be controlled. Smoke and corrosive gases should generally be automatically discharged directly outside to a safe location. Smoke and gases containing radioactive materials should be monitored in the fire area to determine if release to the environment is within the permissible limits of the plant Technical Specifications.

Response

Products of combustion which may contain radioactive material would be monitored by portable instrumentation in the event of fire. Area radiation monitors are also permanently installed. The operation of ventilation components and systems would be based on information from these instruments.

The purge mode of operation of the control room ventilation system discharges directly to the outside. In other areas, the normal ventilation systems would be used for smoke removal. Monitoring of ventilation system releases for compliance with Technical Specification limits is performed at the point of release to the environment.

Item No. 37 - Single Failure-Proof Ventilation (D.4.b)

Any ventilation system designed to exhaust smoke or corrosive gases should be evaluated to ensure that inadvertent operation or single failures will not violate the controlled areas of the plant design. This requirement includes containment functions for protection of the public and maintaining habitability for operations personnel.

Response

The purge mode of operation of the control room ventilation system is the only system specifically designed for smoke removal and its isolation is single failure proof in the event of a design basis accident.

Item No. 38 - Power and Control of Ventilation (D.4.c)

The power supply and controls for mechanical ventilation systems should be run outside the fire areas served by the system.

Response

The controls for the reactor building ventilation systems are located in the reactor building. The power for most of the fans is supplied from motor control centers located in the areas served. The controls for the turbine building and compartment ventilation systems are located outside the areas served; however, some power feeds originate in the areas served. The majority of the fans have sufficient spatial separation and redundancy to provide the necessary ventilation.

Item No. 39 - Charcoal Filter Per Regulatory Guide 1.52 (D.4.d)

Fire suppression systems should be installed to protect charcoal filters in accordance with Regulatory Guide 1.52, "Design Testing and Maintenance Criteria for Atmospheric Cleanup Air Filtration."

Response

The charcoal filters in each redundant train of the standby gas treatment system are provided with a manually initiated water sprinkler fire suppression system.

The charcoal filters in each redundant train of the recombiner building ventilation system are provided with automatically initiated water sprinkler fire suppression systems. The charcoal filters installed in the control room ventilation system are normally isolated and they are not protected by a fixed fire suppression system. These filters are intended for use under accident (high radiation) conditions. Hose stations and portable extinguishers are provided.

Item No. 40 - Air Supply Intakes to be Located Remote from Outlets (D.4.e)

The fresh air supply intakes to areas containing safety related equipment or systems should be located remote from the exhaust air outlets and smoke vents of other fire areas to minimize the possibility of contaminating the intake air with the products of combustion.

Response

Ventilation system intakes and exhausts are located as follows:

1. Reactor buildings: intake - river side elev. 216 feet
   exhaust - river side elev. 305 feet

2. Radwaste buildings: intake - inshore elev. 167 feet
   exhaust - river side elev. 305 feet

3. Turbine building control room, cable spreading room, and switchgear rooms: intake - inshore elev. 167 feet exhaust - inshore elev. 195 feet

Item No. 41 - Stairwells (D.4.f)

Stairwells should be designed to minimize smoke infiltration during a fire. Staircases should serve as escape routes and access routes for fire fighting. Fire exit routes should be clearly marked. Stairwells, elevators, and chutes should be enclosed in masonry towers with minimum fire rating of 3 hours and automatic fire doors at least equal to the enclosure construction at each opening into the building. Elevators should not be used during fire emergencies.

Where stairwells or elevators cannot be enclosed in 3-hour fire rated barriers with equivalent fire doors, escape and access routes should be established by prefire plan and practices in drills by operating and fire brigade personnel.

Response

Building exit doors are marked; lighting is provided to meet the Pennsylvania Department of Labor and Industry Fire and Panic Code requirements. Stairwells, except those which are not fire egress routes, are enclosed in a 2-hour fire rated barrier with Class B door (1.5-hour fire rating). Exterior walls are not rated. All stairwell doors except watertight doors are automatic fire doors. Only those barriers required to separate redundant safe shutdown methods or that have been found to significantly reduce plant fire risk, as identified by the IPEEE fire risk analysis (see reference 22) have had penetrations sealed to provide equivalent fire resistance (see Item No. 21).

Item No. 42 - Smoke and Heat Vents (D.4g)

Smoke and heat vents may be useful in specific areas such as cable spreading rooms and diesel fuel oil storage areas and switchgear rooms. When natural-convection ventilation is used, a minimum ratio of 1 square foot of venting area per 200 square feet of floor area should be provided. If forced-convection ventilation is used, 300 cfm should be provided for every 200 sq. ft. of floor area. See NFPA No. 204M for additional guidance on smoke control.

Response

Power venting is provided by the normal ventilation systems. Additionally, portable ventilation equipment in the form of smoke ejectors can be used to supplement the in-place ventilation system in order to supplement removing smoke after a fire event.

Item No. 43 - Self-Contained Breathing Apparatus (D.4.h)

Self-contained breathing apparatus, using full face positive pressure masks, approved by NIOSH (National Institute for Occupational Safety and Health - approval formerly given by the U.S. Bureau of Mines) should be provided for fire brigade, damage control, and control room personnel. Control room personnel may be furnished breathing air by a manifold system piped from a storage reservoir if practical. Service or operating life should be a minimum of one hour for the self-contained units.

At least two extra air bottles should be located on the site for each self-contained breathing unit. In addition, an onsite 6-hour supply of reserve air should be provided and arranged to permit quick and complete replenishment of exhausted supply air bottles as they are returned. If compressors are used as a source of breathing air, only units approved for breathing air should be used. Special care must be taken to locate the compressor in areas free of dust and contaminants.

Response

Self-contained breathing apparatus Scott 4.5 packs are provided for use by both fire-fighting and control room personnel. These packs are located at the main fire brigade equipment locker.

Item No. 44 - Total Flooding Gas Rooms(D.4.i)

Where total flooding gas extinguishing systems are used, area intake and exhaust ventilation dampers should close upon initiation of gas flow to maintain necessary gas concentration. (See NFPA 12, "Carbon Dioxide Systems," and 12A "Halon 1301 Systems.")

Response

Total flooding CO_2 gas extinguishing systems are used for the diesel generators (four rooms), HPCI rooms (two rooms), and the cable spreading room and computer room. Ventilation system dampers in these rooms are closed upon system initiation. Fusible link fire dampers in vents above the cable spreading room doors close at a temperature of 165°F.

Lighting and Communication

Item No. 45 - Emergency Lighting and Communication (D.5)

Lighting and two-way voice communication are vital to safe shutdown and emergency response in the event of fire. Suitable fixed and portable emergency lighting and communication devices should be provided to satisfy the following requirements:

(a) Fixed emergency lighting should consist of sealed beam units with individual 8-hour minimum battery power supplies.

(b) Suitable sealed beam battery-powered portable hand lights should be provided for emergency use.

(c) Fixed emergency communication should use voice powered head sets at preselected stations.

(d) Fixed repeaters installed to permit use of portable radio communication units should be protected from exposure fire damage.

Response

Response #1

Fixed self-contained, normally 8 hours rated, dc emergency battery lighting units are provided in all Plant areas, with the exception of the Control Room and the alternative control station (ACS) locations, where post-fire safe shutdown manual actions must be performed and in access and egress routes thereto. Fixed ac emergency lighting in the Control Room is provided by two subsystems of 8-hour, non-safety related, dedicated stationary batteries along with their associated chargers and dc to ac inverters. Fixed dc emergency lighting for the Alternative Control Stations is powered by the Station's safety related batteries.

Refer to Section 3.2, Item No. 23 and Section 5.2 for additional emergency lighting details.

Response #2

Battery-powered, halogen bulb, portable lanterns are provided for post-fire safe shutdown and emergence use.

Response #3

The communication systems available for use during fire emergencies are the Private Automatic Branch Exchange (PABX) Telephone System, the In-Plant Radio System, and the Public Address (PA) System. These independent, two-way voice communication systems are shared between units and have been designed and installed to provide assurance that any single event will not cause a complete loss of intrasite communication. The PA, PABX, and In-Plant Radio systems utilize diverse technologies, are physically independent, spatially separated systems that are powered by non-Class IE ac and dc power sources and by Class IE ac power sources. The PA system cabinets are installed in the Cable Spreading Room; the PABX cabinets are installed in the Administration Building; and the In-Plant radio system base station repeaters and distributed antenna system combiners/receivers/splitters are installed in the Turbine Building.

A dedicated radio communication channel is provided for emergency response and post-fire safe shutdown in the event of a fire. Fire Brigade members carry a portable radio at all times while performing their normal activities during the course of their shift. Each of the portable radios has multiple radio channels, one of which is for the ACS/FIRE repeater. A fixed radio console is installed at three alternative control station (ACS) locations on Unit 2 and three ACS locations on Unit 3. The fixed, radio-linked ACS radio consoles and portable radios share the same base station repeater identified as "ACS/FIRE". The ACS/FIRE radio system is a sub-system of the In-Plant radio system.

A voice/sound powered communication system (including head sets) is not provided.

See UFSAR Section 10.21 for additional communication system details.

Response #4

The In-Plant radio system base station repeaters and distributed antenna system combiners/receivers/splitters are installed in the Unit 2 Turbine Building ventilation equipment area (Room 512), 195'0" elevation. A fire that originates outside the Turbine Building will not threaten the radio equipment with exposure fire damage because other plant areas are separated from the Turbine Building fire area by rated barriers. A fire that originates on the 195'0" elevation of the Turbine Building will not create an exposure to the radio equipment due to the low level of combustibles (primarily fire retardant cable insulation in trays) in the area and due to no combustibles located in the immediate vicinity of the radio repeaters.

The exposure fire of concern is a turbine/generator or reactor feedwater pump bearing lube oil fire. The fire suppression systems on the bearings should control a lube oil fire. The physical distance from the turbine or feedwater pump bearings to the area where the radio equipment is located is sufficient to prevent flame impingement. It is expected that a lube oil fire will create copious amounts of smoke. The radio equipment is not located in the direct path of expected smoke and heat flow (the smoke and heat is expected to rise up to the Turbine Building roof, 218'10" elevation). The immediate impact of smoke on the radio equipment is not known, but the radio equipment is expected to remain functional while the fire brigade is fighting the fire.

The installed configuration of the radio equipment is consistent with the requirement of being protected from damage due to an exposure fire.

Fire Detection and Suppression (E)

Item No. 46 - Fire Detection (E.1)

(a) Fire detection systems should, as a minimum, comply with NFPA 72D, "Standard for the Installation, Maintenance and Use of Proprietary Protective Signaling Systems."

Deviations from the requirements of NFPA 72D should be identified and justified.

(b) Fire detection system should give audible and visual alarm and annunciation in the control room. Local audible alarms should also sound at the location of the fire.

(c) Fire alarms should be distinctive and unique. They should not be capable of being confused with any other plant system alarms.

(d) Fire detection and actuation systems should be connected to the plant emergency power supply.

Response

Deviations from the requirements of NFPA 72D are as follows:

1. Paragraph 2-4.3 - Tests are not presently conducted at the frequencies specified.

2. Paragraph 4-7.2 - The fire department is not notified immediately upon receipt of a fire alarm signal.

The requirements of NFPA 72D are not wholly consistent with the design or operation of a nuclear power plant. The deviations listed above are addressed below:

1. Testing will be performed in compliance with technical specification requirements. The proposed technical specifications recognize the inaccessibility of certain fire protection equipment because of inerting or radiation levels.

2. Upon receipt of a fire alarm signal, the plant fire and damage team is dispatched to the fire location and shift supervision is informed of the extent and nature of the fire. Based on this information, a decision is made as to the need for offsite fire-fighting support.

The fire detection system alarm and annunciation panel is located in the control room. Fire alarms activate a dedicated Main Control Room annunciator horn and printer to record the event. After acknowledging the fire alarm it will be the responsibility of the control room operator to make the appropriate public address announcement. The fire detection and actuation systems are connected to the emergency ac power buses.

Notification of the fire department may be performed either using the telephone or indirectly using the radio system to other company locations.

The H_2 Water Chemistry system uses heat detectors as a backup to the leak detection system. The primary function of these heat detectors is to detect a H_2 leak and shutdown the H_2 Water Chemistry system, not to provide fire alarm, therefore, they are not installed in accordance with NFPA 72.

Operation of the reactor and plant systems should take precedence over fire protective service.

Fire Protection Water Supply Systems (E.2)

Item No. 47 - Installation of Private Fire Service Mains and Their Appurtenances (E.2.a)

An underground yard fire main loop should be installed to furnish anticipated fire protection water requirements. NFPA 24 - Standard for Outside Protections, - gives necessary guidance for such installation. It references other design codes and standards developed by such organizations as the American National Standards Institute (ANSI) and the American Water Work Association (AWWA). Lined steel or cast iron pipe should be used to reduce internal

tuberculation. Such tuberculation deposits in an unlined pipe over a period of years can significantly reduce water flow through the combination of increased friction and reduced pipe diameter. Means for treating and flushing the systems should be provided. Approved visually indicating sectional control valves, such as post indicator valves, should be provided to isolate portions of the main for maintenance or repair without shutting off the entire system.

Visible location marking signs for underground valves is acceptable. Alternative valve position indicators should also be provided.

The fire main system piping should be separate from service or sanitary water system piping.

For operating plants, fire main system piping that can be isolated from service or sanitary water system piping is acceptable.

Response

The underground yard fire main loop conforms to the guidelines of NFPA 24 and consists of 12-inch cast iron pipe in accordance with USASI A21.6, Class 23, with a cement lining in accordance with USASI A21.4 to reduce tuberculation. Treatment of the system can be accomplished by temporarily installed piping. Flushing can be performed through fire hydrants. Sectionalizing capability is provided by post indicator valves and underground isolation valves.

The fire main system piping is separate from service and sanitary water system piping. The fire main is pressurized by the lube water system.

Some PIVs are closer than 40 feet to the protected building but are next to blank walls which will adequately separate them from a fire. Some PIVs are about 18 inches above grade but are operated by a horizontal turning of spanner wrench so the clearance will not prohibit operability. One sectional PIV is used to isolate the reactor building and auxiliary boiler building and no sectional valves are provided for isolating individual floors in the Unit 2 and 3 reactor buildings.

Item No. 48 - Yard Fire Main Loop (E.2.b)

A common yard fire main loop may serve multiunit nuclear power plant sites, if cross-connected between units. Sectional control valves should permit maintaining independence of the individual loop around each unit. For such installations, common water supplies may also be utilized. The water supply should be sized

for the largest single expected flow. For multiple reactor sites with widely separated plants (approaching 1 mile or more) separate yard fire main loops should be used.

Sectionalized systems are acceptable.

Response

Sectionalizing valves in the fire system piping provide the capability of maintaining system operability with portions out of service. See PBAPS Drawing M-318, Sheets 1 through 10, for the fire protection system piping and instrumentation diagrams.

Item No. 49 - Fire Pump Design and Layout (E.2.c)

If pumps are required to meet system pressure or flow requirements, a sufficient number of pumps should be provided so that 100 percent capacity will be available with one pump inactive (e.g., three 50 percent pumps or two 100 percent pumps). The connection to the yard fire main loop from each fire pump should be widely separated, preferably located on opposite sides of the plant. Each pump should have its own driver with independent power supplies and control. At least one pump (if not powered from the emergency diesels) should be driven by nonelectrical means, preferably diesel engine. Pumps and drivers should be located in rooms separated from the remaining pumps and equipment by a minimum 3-hour fire wall. Alarms indicating pump running, driver availability, or failure to start should be provided in the control room.

Details of the fire pump installation should as a minimum conform to NFPA 20, "Standard for the Installation of Centrifugal Fire Pumps.

Response

The source of water for fire protection is Conowingo Pond. The fire pumps are located in the intake structure in separate seismic Class I rooms and are separated by walls which provide fire resistance commensurate with combustible loading in the rooms. The fire pumping equipment consists of two 100 percent 2,500 gpm pumps. One pump is electric motor driven (powered from an emergency bus); the other pump is driven by a diesel engine. Power supplies and controls for each pumps are independent. Control room alarm displays for the diesel-driven pump are: engine running, control switch other than "auto" position, engine trouble (low lube oil pressure, high engine temperature, engine failed to start, overspeed shutdown). Control room alarm displays for the electric motor driven pump are: motor running, motor automatic start, ac power not available, motor not in automatic. Separate

supply lines to the yard fire main loop are provided from each pump. The connection points are approximately 10 feet apart with an isolation valve between. The fire pump installation conforms to NFPA 20.

A local indication pressure gauge is installed on the fire pump discharges. A relief valve was not required on the discharge of the electric motor driven fire water pump because the piping is rated for greater than the maximum pump discharge pressure, but one has been installed by Mod 5007. A relief valve conforming to NFPA 20 requirements is provided on the discharge of the diesel driven pump. Suction pressure alarms are not provided since the Conowingo Pond is not a stored water supply.

Item No. 50 - Water Source Reliability (E.2.d)

Two separate reliable water supplies should be provided. If tanks are used, two 100 percent (minimum of 300,000 gallons each) system capacity tanks should be installed. They should be interconnected so that pumps can take suction from either or both. However, a leak in one tank or its piping should not cause both tanks to drain. The main plant fire protection water supply capacity should be capable of refilling either tank in a minimum of 8 hours.

Common tanks are permitted for fire protection and sanitary or service water storage. When this is done, however, minimum fire protection water storage requirements should be dedicated by means of a vertical standpipe for other water services.

Response

The fire pumps take suction from independent, isolatable intake wells. The water source is Conowingo Pond. The guidelines for tanks are not applicable to PBAPS since storage tanks are not installed.

Item No. 51 - Capacity and Flowrate (E.2.e)

The fire protection water supply (total capacity and flow rate) should be calculated on the basis of the largest expected flow rate for a period of two hours, but not less than 300,000 gallons. This flow rate should be based (conservatively) on 500 gpm for manual hose streams plus the greater of:

1. All sprinkler heads opened and flowing in the largest designed fire areas; or

2. The largest open head deluge system(s) operating.

Response

The fire pumps are rated at 2,500 gpm at 125 psi and are capable of supplying water at the required pressure for the largest sprinkler flow plus 500 gpm.

Item No. 52 - Common Water Supply (E.2.f)

Lakes or freshwater ponds of sufficient size may qualify as sole source of water for fire protection, but require at least two intakes to the pump supply. When a common water supply is permitted for fire protection and the ultimate heat sink, the following conditions should also be satisfied:

1. The additional fire protection water requirements are designed into the total storage capacity; and

2. Failure of the fire protection system should not degrade the function of the ultimate heat sink.

Response

The fire pumps take suction from independent, isolatable intake wells. The water source is Conowingo Pond. The high pressure service water pumps (RHR heat exchanger cooling) take suction from the same intake well as the fire pumps. Since the fire pumps take suction from independent, isolatable, intake wells, and there is no stored water supply, there is no need for level alarms for the suction of the fire pumps. Water levels of the river and pond are monitored.

Item No. 53 - Outdoor Hoses and Hydrants (E.2.g)

Outside manual hose installations should be sufficient to reach any location with an effective hose stream. To accomplish this, hydrants should be installed approximately every 250 feet on the yard main system. The lateral to each hydrant from the yard main should be controlled by a visually indicating or key operated (curb) valve. A hose house, equipped with hose and combination nozzle, and other auxiliary equipment recommended in NFPA 24, "Outside Protection," should be provided as needed but at least ever 1,000 feet.

Threads compatible with those used by local fire departments should be provided on all hydrants, hose couplings, and standpipe risers.

Response

Hydrants with curb valves are installed, in general, at design intervals of approximately 250 feet with a 290-foot maximum. Fire hydrant H-8 was removed in 1971 to accommodate installation of the condensate storage tank. The distance between the two hydrants on either side of hydrant H-8's former location is 430 feet. An analysis performed in 1982 indicated that 300-foot sections of hose from the two existing hydrants provide coverage for the area previously protected by hydrant H-8 except for the area northeast of the access road which contains no equipment or structures and is not used for storage. Since there are no combustibles or ignition sources in this area the probability of a fire is extremely remote. MOD P00248 moved hydrant H-9 such that the distance between hydrant H-7 and H-9 is less than 430 ft. This analysis is still bounding. All hydrants were inspected for 18 inches of clearance. The area around two hydrants is less than the specified clearance. These hydrants can still be operated by removing the hose cap one-quarter turn with a wrench and the rest by hand. One hydrant is located within 40 feet of a building; however, the building has blank concrete walls which will not be a source of smoke or heat and are not likely to fall. Four hose houses (with NFPA 24 recommended equipment) are provided (1,150-foot maximum spacing). Hydrant threads are National Standard and are compatible with local fire department equipment.

Water Sprinklers and Hose Standpipe Systems (E.3)

Item No. 54 - Connections to Water Mains (E.3.a)

Each automatic sprinkler system and manual hose station standpipe should have an independent connection to the plant underground water main. Headers fed from each end are permitted inside buildings to supply multiple sprinkler and standpipe systems. When provided, such headers are considered an extension of the yard main system. The header arrangement should be such that no single failure can impair both the primary and backup fire protection systems.

Each sprinkler and standpipe system should be equipped with OS&Y (outside screw and yoke) gate valve, or other approved shutoff valve, and water flow alarm. Safety-related equipment that does not itself require sprinkler water fire protection, but is subject to unacceptable damage if wetted by sprinkler water discharge should be protected by water shields or baffles.

Response

Separate interior headers are not provided within the plant for fixed water extinguishing systems and manual hose stations. However, the main headers are fed from both ends and cross connections are provided, thus satisfying the requirement for Appendix A to BTP 9.5-1 for combined systems.

Shutoff valves (175 lb, Underwriters Pattern) are provided for each sprinkler system. Flow alarms or supervised valves are provided in the sprinkler lines but not in the manual hose station standpipes.

Item No. 55 - Supervision of Valves (E.3.b)

All valves in the fire protection water systems should be electrically supervised. The electrical supervision signal should indicate in the control room and other appropriate command locations in the plant (see NFPA 26, "Supervision of Valves").

When electrical supervision of fire protection valves is not practicable, an adequate management supervision program should be provided. Such a program should include locking valves open with strict key control; tamper proof seals; and periodic, visual check of all valves.

Response

The method of supervision of fire protection valves is described in Chapter 2.

Item No. 56 - Sprinkler Systems Conformance to Standards (E.3.c)

Automatic sprinkler systems should as a minimum conform to requirements of appropriate standards such as NFPA 13, "Standard for the Installation of Sprinkler Systems," and NFPA 15, "Standard for Water Spray Fixed Systems."

Response

Automatic sprinkler systems generally conform to the requirements of NFPA 13 and 15. Minor deviations have been addressed separately. Dikes of 3.5-inch height with two sumps have been provided to contain oil from each turbine building lube oil tank area (rooms 139 and 179). The floor drains in room 105 have been plugged as requested by the NRC in the SER (See Section 3.3).

Item No. 57 - Interior Standpipes and Hose Stations (E.3.d)

Interior manual hose installation should be able to reach any location with at least one effective hose steam. To accomplish this, standpipes with hose connections equipped with a maximum of 75 feet of 1.5-inch woven jacket, lined fire hose and suitable nozzles should be provided in all buildings, including containment, on all floors and should be spaced at not more than 100-foot intervals. Individual standpipes should be at least 4 inches in diameter for multiple hose connections and 2.5 inches in diameter for single hose connections. These systems should follow the requirements of NFPA No. 14 for sizing, spacing, and pipe support requirements (NELPIA).

Hose stations should be located outside entrances to normally unoccupied areas and inside normally occupied areas. Standpipes serving hose stations in areas housing safety-related equipment should have shutoff valve and pressure-reducing devised (if applicable) outside the area.

Response

Standpipes for interior manual hose stations are placed so that all portions on each elevation (except primary containment) are within 30 feet of a nozzle attached to 100 feet of hose (NFPA 14). In each of the RHR rooms, a fire hose from elevation 116 feet can be used to reach the lower elevation of the room with an effective hose stream by directing the hose stream downward through the grating at elevation 116 feet. Water from the hose will cool the room and control the fire. Final fire extinguishment may be accomplished with portable extinguishers. Hose stations are equipped with 100 feet of woven jacket, rubber-lined hose. Standpipes are 3 inches in diameter for one or two hose station connections and 4 inches in diameter for three or more hose station connections. The following exceptions have been verified by a hydraulic simulation:

- Hose reels HR-88-5, HR-135-57, and HR-135-54 each have 2½ inch diameter feeder piping.

- Hose reels HR-116-60, HR-135-65, and HR-165-77 share the same 3 inch diameter feeder piping.

A 3.5 -inch pressure gauge is not provided at the top of each standpipes; however, in all cases except two, the interconnected standpipes have an adjacent standpipe of equal or greater height which has an installed pressure gauge near the top with no intervening gauges by valves which are normally locked open allowing pressure to be monitored at other pressure gauges.

Item No. 58 - Nozzles (E.3.e)

The proper type of hose nozzles to be supplied to each area should be based on the fire hazard analysis. The usual combination spray/straight-stream nozzle may cause unacceptable mechanical damage (for example, the delicate electronic equipment in the control room) and be unsuitable. Electrically safe nozzles should be provided at locations where electrical equipment or cabling is located.

Response

Hose stations nozzles are of the adjustable-spray straight-stream type. Hose stations are not provided in the control room.

Item No. 59 - foam Suppression (E.3.f)

Certain fires, such as those involving flammable liquids, respond well to foam suppression. Consideration should be given to use of any of the available foams for such specialized protection application. These include the more common chemical mechanical low expansion foams, high expansion foam, and re relatively new aqueous film forming foam (AFFF).

Response

Foam suppressions provided for the auxiliary boiler fuel oil storage tank. A portable foam nozzle with pickup tube and 5-gallon containers of foam are available to the fire brigade.

Item No. 60 - Halon Suppression Systems (E.4)

The use of Halon fire extinguishing agents should as a minimum comply with the requirements of NFPA 12A and 12B, "Halogenated fire Extinguishing Agent Systems - Halon 1301 and Halon 1211." Only UL or FM approved agents should be used.

In addition to compliance with the guidelines of NFPA 12A and 12B, preventive maintenance and testing of the systems, including check weighing of the Halon cylinders, should be done at least quarterly.

Particular consideration should also be given to:

(a) Minimum required Halon concentration and soak time

(b) Toxicity of Halon

(c) Toxicity and corrosive characteristics of thermal decomposition products of Halon

Response

Halon suppression systems are not provided in safety-related areas at PBAPS.

Item No. 61 - Carbon Dioxide Suppression Systems (E.5)

The use of carbon dioxide extinguishing systems should as a minimum comply with the requirements of NFPA 12, "Carbon Dioxide Extinguishing Systems."

Particularly consideration should also be given to:

(a) Minimum required CO_2 concentration and soak time

(b) Toxicity of CO_2

(c) Possibility of secondary thermal shock (cooling) damage

(d) Offsetting requirements for venting during CO_2 injection to prevent over pressurization versus sealing to prevent loss of agent

(e) Design requirements from over pressurization

(f) Possibility of probability of CO_2 systems being out of service because of personnel safety consideration. CO_2 systems are disarmed whenever people are present in an area so protected. Areas entered frequently (even though duration time for any visit is short) have often been found with CO_2 systems shut off.

Response

The CO_2 suppression systems comply with the requirements of NFPA 12.

(a) System discharge tests were performed prior to unit startup. CO_2 concentrations were acceptable.

(b) A manually initiated system is provided in the computer room and both the Unit 2 and Unit 3 HPCI Rooms. Automatically initiated systems with predischarge alarms are provided for HPCI rooms. These systems alarm in the control room when the system is disarmed. Manually initiated systems with pre-discharge alarms

are provided for the diesel generator rooms and Cable Spreading Room.

(c) An evaluation of the cable spreading room CO_2 system was made that has determined components associated with the following systems could be affected by thermal shock: Turbine Electro-Hydraulic Control, HPCI and RCIC.

However, the discharge of the CO_2 system into the cable spreading room will not have a significant affect on the ability to safely shut down the plant. In the extreme, the effects of the discharge are no worse than the effects of a fire which assumes loss of all equipment in the room. Station procedures are in place to mitigate the potential consequences of a CO_2 discharge.

(d) See item (a) above.

(e) See item (a) above.

(f) See item (b) above.

Item No. 62 - Portable Extinguishers (E.6)

Fire extinguishers should be provided in accordance with guidelines of NFPA 10 and 10A, "Portable Fire Extinguishers, Installation, Maintenance, and Use." Dry chemical extinguishers should be installed with due consideration given to cleanup problems after use and possible adverse effects on equipment installed in the area.

Response

Portable fire extinguishers are installed and maintained in accordance with NFPA 10. Refer to Section 3.3 for information on the type of fire extinguishers provided for each area.

Fire extinguisher maintenance consists of visual inspections for all extinguishers. In addition, for chemical extinguishers, cartridges are weighed periodically and lids are removed to verify the presence of chemicals. Carbon dioxide extinguishers are also weighed periodically to verify that adequate quantity of extinguishing agent exists.

Guidelines for Specific Plant Areas (F)

Item No. 63 - Normal Operation (F.1.a)

Fire protection requirements for the primary and secondary containment areas should be provided on the basis of specific identified hazards. For example:

* Lubricating oil or hydraulic fluid system for the primary coolant pumps

* Cable tray arrangements and cable penetrations

* Charcoal filters

Because of the general inaccessibility of these areas during normal plant operations, protection should be provided by automatic fixed systems. Automatic sprinklers should be installed for those hazards identified as requiring fixed suppression.

Fire suppression systems should be provided based on the fire hazards analysis.

Fixed fire suppression capability should be provided for hazards that could jeopardize safe plant shutdown. Automatic sprinklers are preferred. An acceptable alternative is automatic gas (Halon or CO_2) for hazards identified as requiring fixed suppression protection.

Operation of the fire protection systems should not compromise integrity of the containment or the other safety-related systems. Fire protection activities in the containment areas should function in conjunction with total containment requirements such as control of contaminated liquid and gaseous release and ventilation.

An enclosure may be required to confine the agent if a gas system is used. Such enclosures should not adversely affect safe shutdown, or other operating equipment in the containment.

Fire detection systems should alarm and annunciate in the control room. The type of detection used and the location of the detectors should be most suitable to the particular type of fire that could be expected from the identified hazard. A primary containment general area fire detection capability should be provided as backup for the above described hazard detection. To accomplish this, suitable smoke detection (e.g., visual obscuration, light scattering, and particle counting) should be installed in the air recirculation system ahead of any filters.

Automatic fire suppression capability need not be provided in the primary containment atmospheres that are inerted during normal operation. However, special fire protection requirements during

refueling and maintenance operations should be satisfied as provided below.

Response

The primary containment at PBAPS is inerted during normal operation. Three general area smoke detectors which alarm in the control room are provided. Smoke detectors are not provided in the air recirculation system.

Item No. 64 - Refueling and Maintenance (F.1.b)

Refueling and maintenance operations in containment may introduce additional hazards such as contamination control materials, decontamination supplies, wood planking, temporary wiring, welding, and flame cutting (with portable compressed fuel gas supply). Possible fires would not necessarily be in the vicinity of fixed detection and suppression systems.

Management procedures and controls necessary to assure adequate fire protection are discussed in Section 3a.

In addition, manual fire-fighting capability should be permanently installed in containment. Standpipes with hose stations and portable fire extinguishers should be installed at strategic locations throughout containment for any required manual fire-fighting operations.

Equivalent protection from portable systems should be provided if it is impractical to install standpipes with hose stations.

Adequate self-contained breathing apparatus should be provided near the containment entrances for fire-fighting and damage control personnel. These units should be independent of any breathing apparatus or air supply systems provided for general plant activities.

Response

Standpipes, hose stations, and portable fire extinguishers are provided in secondary containment. Permanently installed fire suppression equipment is not provided inside primary containment. Work involving the use of ignition sources within primary containment and elsewhere in the plant is controlled by applicable administrative procedures, which require consideration of fire protection provisions.

Self-contained breathing apparatus is located at certain entrances to secondary containment and is dedicated to fire protection or emergency activities.

Item No. 65 - Control Room (F.2)

The control room is essential to safe reactor operation. It must be protected against disabling fire damage and should be separated from other areas of the plant by floors, walls, and roofs having minimum fire resistance ratings of 3 hours.

Control room cabinets and consoles are subject to damage from two distinct fire hazards:

(a) Fire originating within a cabinet or console

(b) Exposure fire involving combustibles in the general room area

Manual fire-fighting capability should be provided for both hazards. Hose stations and portable water and Halon extinguishers should be located in the control room to eliminate the need for operators to leave the control room. An additional hose piping shutoff valve and pressure reducing device should be installed outside the control room.

Hose stations adjacent to the control room with portable extinguishers in the control room are acceptable.

Nozzles that are compatible with the hazards and equipment in the control room should be provided for the manual hose station. The nozzles chosen should satisfy actual fire-fighting needs, satisfy electrical safety, and minimize physical damage to electrical equipment from hose stream impingement.

Fire detection in the control room cabinets and consoles should be provided by smoke and heat detectors in each fire area. Alarm and annunciation should be provided in the control room. Fire alarms in other parts of the plant should also be alarmed and annunciated in the control room.

Breathing apparatus for control room operators should be readily available. Control room floors, ceiling, supporting structures, and walls, including penetrations and doors, should be designed to a minimum fire rating of 3 hours. All penetration seals should be air tight.

The control room ventilation intake should be provided with smoke detection capability to automatically alarm locally and isolate the control room ventilation system to protect operators by preventing smoke from entering the control room. Manually operated venting of the control room should be available so that operators have the option of venting for visibility.

Manually operated ventilation systems are acceptable.

Cables should not be located in concealed floor and ceiling spaces. All cables that enter the control room should terminate in the control room. That is, no cabling should be simply routed through the control room from one area to another.

If such concealed spaces are used, however, they should have fixed automatic total flooding Halon protection.

Response

Fire suppression capability in the control room is provided by:

1. Portable fire extinguishers within the control room

2. Manual hose stations adjacent to the control room entrances

Four smoke detectors are provided in the control room. The fire alarm system annunciation panel is located in the control room. Self-contained breathing apparatus is provided at the entrances to the control room. The control room ventilation system has a manually initiated purge mode. The ventilation system can be manually shut down. Early warning fire detectors are provided in all enclosed rooms in the control room as well as above the control room. Openings in the walls separating the main control room from the enclosed rooms have been closed and doors provided with self-closing mechanisms. The control room floor penetrations were not sealed to provide 3-hour fire resistance. Penetrations through the floor were sealed to provide a hot gas and smoke barrier. The false ceiling of the enclosed rooms is a 1-hour fire barrier. In the event of a fire in the control room, alternative shutdown panels outside the control room will allow the plant to be safely shutdown.

Item No. 66 - Cable Spreading Room (F.3)

The preferred acceptable methods are:

1. Automatic water system such as closed-head sprinklers, open-head deluge, or open directional spray nozzles. Deluge and open spray systems should have provisions for manual operation at a remote station; however, there should also be provisions to preclude inadvertent operation. Location of sprinkler heads or spray nozzles should consider cable tray sizing and arrangements to assure adequate water coverage. Cables should be designed to allow wetting down with deluge

water without electrical faulting. Open-head deluge and open directional spray systems should be zoned so that a single failure will not deprive the entire area of automatic fire suppression capability. The use of foam is acceptable, provided it is of a type capable of being delivered by a sprinkler or deluge system, such as an aqueous film forming foam (AFFF).

2. Manual hoses and portable extinguishers should be provided as backup.

3. Each cable spreading room of each unit should have divisional cable separation, and be separated from the other and the rest of the plant by a minimum 3-hour rated fire wall (refer to NFPA 251 or ASTM E-119 for fire test resistance rating).

4. At least two remote and separate entrances are provided to the room for access by fire brigade personnel; and

5. Aisle separation provided between tray stacks should be at least 3 feet wide and 8 feet high.

Response

Fire protection in the cable spreading room is provided by:

1. Smoke detectors that alarm locally and in the control room

2. A manually initiated fixed CO_2 system supplied by two 6-ton storage tanks

3. Hose stations located adjacent to the two separate entrances to the room, each equipped with variable gallonage fog nozzles with a ball type shutoff

4. Portable fire extinguishers located within the room

Additional design features incorporated in the cable spreading room are:

1. All cable trays are located at least 6 feet above the floor negating the requirement for aisle separation.

2. The cables are capable of passing the IEEE No. 383 flame test negating the requirement for a fire retardant coating. (Refer to Item Nos. 24 and 31.)

3. The PBAPS separation criterion prohibits a nonsafety-related cable from being run in more than one safeguards channel tray; however it does permit two nonsafety-related cables that have been partially routed in separate safeguards channel tray to be run in the same non-safeguards tray. With this exception, the divisional cable separation in the cable spreading room meets the guidelines of Regulatory Guide 1.75.

Item No. 67 - Alternatives to Divisional Cable Separation (F.3.b)

For cable spreading rooms that do not provide divisional cable separation of a(3), in addition to meeting a(1), (2), (4), and (5) above, the following should also be provided:

1. Divisional cable separation should meet the guidelines of Regulatory Guide 1.75, "Physical Independence of Electrical Systems."

2. All cabling should be covered with a suitable fire retardant coating.

3. As an alternative to a(1) above, automatically initiated gas systems (Halon or CO_2) may be used for primary fire suppression, provided a fixed water system is used as a backup.

4. For plants that cannot meet the guidelines of Regulatory Guide 1.75, in addition to meeting a(1), (2), (4), and (5) above, an auxiliary shutdown system with all cabling independent of the cable spreading room should be provided.

Response

PBAPS does not meet preferred acceptable methods 1 and 3; however, meeting the intent of the guidelines of Regulatory Guide 1.75 along with the use of flame retardant cable construction provides an acceptable alternative to preferred method 3.

The fixed CO_2 suppression system is manually initiated. The two hose stations and portable fire extinguishers are provided as a backup. The CO_2 system along with the detection and manual backup is considered sufficient and has been accepted by the NRC.

Item No. 68 - Plant Computer Room (F.4)

Safety-related computers should be separated from other areas of the plant by barriers having a minimum 3-hour fire resistant rating. Automatic fire detection should be provided to alarm and

annunciate in the control room and alarm locally. Manual hose stations and portable water and Halon fire extinguishers should be provided.

Response

The PBAPS computers are not safety-related. The computers are located in a room inside the cable spreading room. Smoke detectors which alarm locally and in the control room are provided. A manually initiated CO_2 fire suppression system is provided. Manual hose stations are provided external to the cable spreading room. Portable CO_2 fire extinguishers are provided inside the computer room. In the event of a fire in this area, the plant can be safely shut down through use of the alternative shutdown capability. The block wall between the two rooms is 2-hour rated. Since the walls are not required to separate redundant safe shutdown methods, adequate protection is provided. Refer to Chapter 5, fire area 25.

Item No. 69 - Switchgear Rooms (F.5)

Switchgear rooms should be separated from the remainder of the plant by minimum 3-hour rated fire barriers to the extent practicable. Automatic fire detection should alarm and annunciate in the control room and alarm locally. Fire hose stations and portable extinguishers should be readily available.

Acceptable protection for cables that pass through the switchgear room is automatic water or gas agent suppression. Such automatic suppression must consider preventing unacceptable damage to electrical equipment and possible necessary containment of agent following discharge.

Response

Safety-related switchgear is separated from the remainder of the plant by 2-hour and 3-hour fire rated barriers. Refer to Section 3.2.2, Item Nos. 37, 38, and 39 for a discussion of the acceptability of these barriers. An automatic fire detection and suppression system using a double interlock pre-action design which alarms locally and in the control room is provided in each safety-related switchgear room. Hose stations are provided adjacent to the rooms, and portable fire extinguishers are provided within the rooms. Most cable that passes through a switchgear room is installed in conduit; however, there are numerous cable trays in the rooms. Combustible material in the area consists primarily of electrical cable insulation. Given the automatic fire detection and suppression in the switchgear rooms, the exposed cable jacketing does not have a significant impact on the fire protection.

In accordance with 10 CFR 50 Appendix R, Section III.G.2, redundant cables and equipment and associated nonsafety circuits located in the 13.8 kV switchgear rooms having 1 hour fire rating enclosures are protected by fire detectors and automatic fire suppression systems in the fire area.

Item No. 70 - Remote Safety Related Panels (F.6)

The general area housing remote safety-related panels should be provided with automatic fire detectors that alarm locally and alarm and annunciate in the control room. Combustible materials should be controlled and limited to those required for operation. Portable extinguishers and manual hose stations should be provided.

Response

The remote shutdown panels for both units are located on elevation 165 feet in the radwaste building at column line H, fire zones 25-108A (behind rolling steel grills 340 and 341). General area smoke detectors, which alarm locally and in the control room, are provided. Line type heat detectors are provided in all cable trays in this area. An automatic sprinkler system is provided. A hose station and portable fire extinguishers are provided.

Item No. 71 - Station Battery Rooms (F.7)

Battery rooms should be protected against fire explosions. Battery rooms should be separated from each other and other areas of the plant by barriers having a minimum fire rating of 3 hours inclusive of all penetrations and openings. (See NFPA 69, "Standard on Explosion Prevention Systems.") Ventilating systems in the battery rooms should be capable of maintaining the hydrogen concentration well below 2 vol. % hydrogen concentration. Standpipe and hose and portable extinguishers should be provided.

Alternatives:

(a) Provide a total fire rated barrier enclosure of the battery room complex that exceeds the fire load contained in the room.

(b) Reduce the fire load to be within the fire barrier capability of 1-1/2 hours.

OR

(c) Provide a remote manually actuated sprinkler system in each room and provide the 1-1/2 hour fire barrier separation.

Response

Rooms housing safety-related batteries are separated from each other and the remainder of the plant by 2-hour and 3-hour fire rate barriers. Refer to Section 3.2.2, Item Nos. 37, 38, and 39 for a discussion of the acceptability of these barriers. An automatic fire detection and suppression system using a double interlock pre-action design is provided. In addition, hose stations and portable extinguishers are provided. Ventilation is provided to maintain hydrogen concentrations well below 2 percent by volume of hydrogen in air. The barrier ratings are in excess of those needed for the fixed combustible loading in the rooms.

Item No. 72 - Turbine Lubrication and Control Oil Storage and Use Areas (F.8)

A blank fire wall having a minimum resistance rating of 3 hours should separate all areas containing safety-related systems and equipment from the turbine oil system.

When a blank wall is not present, open-head deluge protection should be provided for the turbine oil hazards and automatic open-head water-curtain protection should be provided for wall openings.

Response

The turbine lubricating oil storage tanks and the EHC system reservoir and pumps are located in rooms within the turbine building (nonsafety-related structure). These rooms are separated from the remainder of the building by 2 hour fire rated barriers. Each room is protected by a wet pipe sprinkler system. The construction of the walls surrounding oil areas is heavily reinforced concrete. The boundary doors are A-label (3 hour) doors. The main wall between the lube oil storage area and the moisture separator area is a radiation shield wall with few penetrations. The wet pipe sprinkler system was modified to provide protection for an opening above the door between the Lube Oil Storage Room and the Moisture Separator Area.

Item No. 73 - Diesel Generator Areas (F.9)

Diesel generators should be separated from each other and other areas of the plant by fire barriers having a minimum fire resistance rating of 3 hours.

Automatic fire suppression such as AFFF or sprinklers should be installed to combat any diesel generator or lubricating oil fires. Automatic fire detection should be provided to alarm and annunciate in the control room and alarm locally. Drainage for fire-fighting water and means for local manual venting of smoke should be provided.

Day tanks with total capacity up to 1,100 gallons are permitted in the diesel generator area under the following conditions:

(a) The day tank is located in a separate enclosure, with a minimum fire resistance rating of 3 hours, including doors or penetrations. These enclosures should be capable of containing the entire contents of the day tanks. The enclosure should be ventilated to avoid accumulation of oil fumes.

(b) The enclosure should be protected by automatic fire suppression systems such as AFFF or sprinklers.

When day tanks cannot be separated from the diesel generator, one of the following should be provided for the diesel generator area:

(a) Automatic open-head deluge or open-head spray nozzle system(s)

(b) Automatic closed-head sprinklers

(c) Automatic AFFF that is delivered by a sprinkler deluge or spray system

(d) Automatic gas system (Halon or CO_2) may be used in lieu of foam or sprinklers to combat diesel generator and/or lubricating oil fires.

Response

The individual diesel generators are separated from each other by 3-hour fire rated barriers. The diesel generators are located in a separate building external to the main plant. Exterior walls are not sealed to provide 3-hour fire resistance. There are no potential fire hazards in close proximity to the walls. Fuel oil storage tanks for the diesels are located outside the building, underground. The primary fire suppression systems for the diesel generators are manually initiated fixed CO_2 systems. Nine heat detectors which alarm locally and in the control room are provided in each diesel generator compartment. Drains for water from manual hose application are provided.

The diesel generator day tanks are located in a separate nonrated, concrete enclosure within the associated diesel generator

compartment. A CO_2 discharge nozzle and one heat detector is provided in each day tank enclosure.

Item No. 74 - Diesel Fuel Oil Storage Areas (F.10)

Diesel fuel oil tanks with a capacity greater than 1,100 gallons should not be located inside the buildings containing safety-related equipment. They should be located at least 50 feet from any building containing safety-related equipment, or, if located within 50 feet, they should be housed in a separate building with construction having a minimum fire resistance rating of 3 hours. Buried tanks are considered as meeting the 3-hour fir resistance requirements. See NFPA 30, "Flammable and Combustible Liquids Code," for additional guidance.

When located in a separate building, the tank should be protected by an automatic fire suppression system such as AFFF or sprinklers.

Tanks, unless buried, should not be located directly above or below safety-related systems or equipment regardless of the fire rating of separating floors or ceilings.

In operating plants where tanks are located directly above or below the diesel generators and cannot reasonably be moved, separating floors and main structural members should, as a minimum, have fire resistance rating of 3 hours. Floors should be liquid tight to prevent leaking of possible oil spills from one level to another. Drains should be provided to remove possible oil spills and fire-fighting water to a safe location.

One of the following acceptable methods of fire protection should also be provided:

(a) Automatic open-head deluge or open-head spray nozzle system(s)

(b) Automatic closed-head sprinklers

(c) Automatic AFFF that is delivered by a sprinkler system or spray system.

Response

The diesel generator fuel oil storage tanks are located underground.

Item No. 75 - Safety Related Pumps (F.11)

Pump houses and rooms housing safety-related pumps should be protected by automatic sprinklers unless a fire hazards analysis can demonstrate that a fire will not endanger other safety-related equipment required for safe plant shutdown. Early warning fire detection should be installed with alarm and annunciation locally and in the control room. Local hose stations and portable extinguishers should also be provided.

Equipment pedestals or curbs and drains should be provided to remove and direct water away from safety-related equipment.

Provisions should be made for manual control of the ventilation system to facilitate smoke removal if required for manual fire-fighting operation.

Response

Rooms housing safety-related pumps are not equipped with automatic water fire suppression systems. Fire detectors are provided for all safety-related pumps. A fire in one room would not result in the loss of capability to safely shut down a unit. Separation requirements to assure safe shutdown in accordance with 10CFR50, Appendix R, have been satisfied (refer to Chapter 5).

Fire detectors are provided for the high pressure service water pump and HPCI pump rooms. The HPCI rooms are equipped with fixed CO_2 fire suppression systems. Hose stations and portable fire extinguishers are provided. Safety-related pumps and support equipment are mounted on pedestals. Normal ventilation systems can be used for smoke removal.

Item No. 76 - New Fuel Area (F.12)

Hand portable extinguishers should be located within this area. Also, local hose stations should be located outside but within hose reach of this area. Automatic fire detection should alarm and annunciate in the control room and alarm locally. The storage area should be provided with a drainage system to preclude accumulation of water.

The storage configuration of new fuel should always be so maintained as to preclude criticality for any water density that might occur during fire-fighting water application.

Response

New fuel is stored in high density storage racks on in the spent fuel pool. Portable fire extinguishers are provided. Hose stations are located on the refueling floor. Fire detectors are not provided. Floor drains are provided. A discussion of criticality considerations is contained in Section 10.3 of the FSAR. As indicated in Reference 6 of Appendix C, two smoke detectors were installed on the refueling floor in the vicinity of the only safety-related system, the ventilation stack radiation monitoring station. The ventilation stack monitoring stations were removed from the fuel floor. The associated smoke detectors were also removed since there was no other safety-related equipment in the area.

Item No. 77 - Spent Fuel Pool Area (F.13)

Protection for the spent fuel pool area should be provided by local hose stations and portable extinguishers. Automatic fire detection should be provided to alarm and annunciate in the control room and to alarm locally.

Response

Hose stations and portable extinguishers are provided on the refueling floor. As indicated in reference 6 of Appendix C, two smoke detectors were installed on the refueling floor (which includes the spent fuel pool) in the vicinity of the only safety-related system, the ventilation stack radiation monitoring station. The ventilation stack monitoring stations were removed from the refuel floor. The associated smoke detectors were also removed since there was no other safety related equipment in the area.

Item No. 78 - Radwaste Building (F.14)

The radwaste building should be separated from other areas of the plant by fire barriers having at least 3-hour ratings. Automatic sprinklers should be used in all area where combustible materials are located. Automatic fire detection should be provided to annunciate and alarm in the control room and alarm locally. during a fire, the ventilation systems in these areas should be capable of being isolated. Water should drain to liquid radwaste building sumps.

Acceptable alternative fire protection is automatic fire detection to alarm and annunciate in the control room, in addition to manual hose stations and portable extinguishers consisting of handheld and large wheeled units.

Response

The radwaste building is separated from other areas of the plant by fire barriers of at least 3-hour fire rating where it is required to separate redundant safe shutdown methods. (See Item No. 21.) Automatic sprinklers are provided in the radwaste building fan room (no. 381). Automatic sprinklers are provided in the radwaste building drummed waste/storage area. Drains to the liquid radwaste system are provided. Automatic sprinklers are also provided for the M-G set rooms and the M-G set lube oil pumps Unit 2 only. Smoke detectors are provided throughout the radwaste building only in the vicinity of safety-related equipment and high combustible loadings. The ventilation system fans can be tripped and the fan dampers closed during a fire. Hose stations and portable fire extinguishers are provided.

Item No. 79 - Decontamination Areas (F.15)

The decontamination areas should be protected by automatic sprinklers if flammable liquids are stored. Automatic fire detection should be provided to annunciate and alarm in the control room and alarm locally. The ventilation system should be capable of being isolated. Local hose stations and hand portable extinguishers should be provided as backup to the sprinkler system.

Response

A personnel decontamination room is located in the radwaste building elevation 135 feet at columns J and H.

Equipment decontamination areas are located on the fires floor of the administration building. Flammable liquids are not stored in these areas. Automatic water fire suppression systems are not provided. General area smoke detectors are provided. Hose stations and portable fire extinguishers are provided.

Item No. 80 - Safety-Related Water Tanks (F.16)

Storage tanks that supply water for safe shutdown should be protected from the effects of fire. Local hose stations and portable extinguishers should be provided. Portable extinguishers should be located in nearby hose houses. Combustible materials should not be stored next to outdoor tanks. A minimum 50-foot separation should be provided between outdoor tanks and combustible materials where feasible.

Response

The condensate storage tanks (nonsafety-related) and the emergency cooling tower may supply water to be used for plant shutdown. The condensate storage tanks are located outdoors. The emergency cooling tower is of noncombustible construction and is located approximately 250 feet from the main plant. Hydrants and hose houses are located near the tanks and tower. Portable fire extinguishers are provided inside the emergency cooling tower structure.

Item No. 81 - Cooling Towers (F.17)

Cooling towers should be of noncombustible construction or so located that a fire will not adversely affect any safety-related systems or equipment. Cooling towers should be of noncombustible construction when the basins are used for the ultimate heat sink or for the fire protection water supply.

Response

PBAPS is provided with two cooling tower systems:

(1) circulating water cooling towers and (2) an emergency cooling tower. The circulating water cooling towers (nonsafety-related) are of combustible construction and are located approximately 600 feet from the nearest structure housing safety-related equipment. The emergency cooling tower (safety-related) is of noncombustible construction. Cooling tower basins are not used for fire protection water supply.

Item No. 82 - Miscellaneous Areas (F.18)

Miscellaneous areas such as records storage areas, shops, warehouses, and auxiliary boiler rooms should be so located that a fire or effects of a fire, including smoke, will not adversely affect any safety-related systems or equipment. Fuel oil tanks for auxiliary boilers should be buried or provided with dikes to contain the entire tank contents.

Response

The maintenance shop and plant offices are located in the administration building, and the storeroom is located in the warehouse north of the plant. Both buildings are separate from the main plant. The auxiliary boilers are located in a separate building adjacent to the main plant. The main auxiliary boiler fuel oil storage tank and the auxiliary boiler diesel fuel oil day tank are located within a dike (110 percent of tank capacity).

The auxiliary boiler dirty oil tank is a double wall tank which is capable of containing 110 percent of the tank capacity.

Special Protection Guidelines (G)

Item No. 83 - welding and Cutting, Acetylene-Oxygen Fuel Gas Systems (G.1)

This equipment is used in various areas throughout the plant. Storage locations should be chosen to permit fire protection by automatic sprinkler systems. Local hose stations and portable equipment should be provided as backup. The requirements of NFPA 51 and 51B are applicable to these hazards. A permit system should be required to utilize this equipment.

Response

Bulk storage of gas cylinders is provided outdoors adjacent to the administration building (nonsafety-related). Hydrants and hose stations are provided. The system complies with the requirements of NFPA 51 (Chapters 3 to 8 - not applicable) and NFPA 51B. See Response to Guidelines B.3.a, Item No. 10.c for control of ignition sources.

Item No. 84 - Storage Areas for Dry Ion Exchange Resins (G.2)

Dry ion exchange resins should not be stored near essential safety-related systems. Dry unused resins should be protected by automatic wet pipe sprinkler installations. Detection by smoke and heat detectors should alarm and annunciate in the control room and alarm locally. Local hose stations and portable extinguishers should provide backup for these areas. Storage areas of dry resin should have curbs and drains. (Refer to NFPA 92M, "Waterproofing and Draining of Floors.")

Response

Ion exchange resins used at PBAPS typically contain some moisture. Prior to use, these resins may be temporarily stored inside the plant in approved areas. The temporary storage of resins is specifically controlled by administrative procedures. When not being used, resins are stored in warehouse. Since the resins are not stored near essential safety-related systems or in any one area in the plant, automatic suppression and detection systems are not specifically provided for this purpose.

Item No. 85 - Hazardous Chemicals (G.3)

Hazardous chemicals should be stored and protected in accordance with the recommendations of NFPA 49, "Hazardous Chemicals Data."

Chemical storage areas should be well ventilated and protected against flooding since some chemicals may react with water to ignite.

Response

Sodium hypochlorite is stored outdoors adjacent to the chlorination room. Storage tanks for sodium hydroxide and sulfuric acid are located inside the water treatment building (nonsafety-related). Two supply and two exhaust fans are provided for the water treatment building. The water treatment building floor is at elevation 116 feet. The flood of record (Agnes - June 1972) resulted in a maximum water level of 111 feet.

Item No. 86 - Materials Containing Radioactivity (G.4)

Materials that collect and contain radioactivity, such as spent ion exchange resins, charcoal filters, and HEPA filters, should be stored in closed metal tanks or containers that are located in areas free from ignition sources or combustibles. These materials should be protected from exposure to fires in adjacent areas as well. Consideration should be given to requirements for removal of isotopic decay heat from entrained radioactive materials.

Response

Spent ion exchange resins are handled by the plant radwaste system and shipped as solid radwaste in metal drums. Contaminated material awaiting compaction and drumming may be stored temporarily in the baling area of the radwaste building. Filters may be shipped in containers meeting applicable DOT regulations (may not be metal).

3.2 APPENDIX R OF TITLE 10 CFR, PART 50

The purpose of this section is to compare the fire protection provisions of Peach Bottom Atomic Power Station Units 2 and 3 with the requirements of Appendix R of 10 CFR, Part 50.

To identify areas of potential impact and to facilitate comparison, a matrix addressing each requirement of Section III of Appendix R and relating to the plant systems, equipment, and components is included as Section 3.2.1. The matrix has extracted all requirements from Appendix R and given each an item number, 1 through 45. Each item has condensed a particular requirement and makes reference to the section in Appendix R where that requirement can be found. The general degree of conformance to the requirement is indicated in the "Comparison" column, using codes defined as follows:

C - indicates conformance to the requirement or conformance to its intent. Substantiating statements may be included as part of the matrix or in Section 3.2.2.

AC - indicates conformance to the requirement by alternative means or methods. The manner of conformance is included in the matrix or discussed in Section 3.2.2.

WC - indicates that design changes, means, or methods are planned in order to conform, or conform to the intent of the requirement. The planned design changes, means, or methods and the manner of conformance are discussed in Section 3.2.2.

NC - indicates that the plant is not in conformance and no design changes are planned. The basis for non-conformance to the requirement is included in the matrix or discussed in Section 3.2.2.

NA - indicates that the requirement is not applicable to Peach Bottom Atomic Power Station Units 2 and 3. Substantiating statements are included as part of the matrix in Section 3.2.1.

In the "Remarks" column, additional information is provided to explain or expand on the degree of conformance. Alternatively, reference may be made to Section 3.2.2 for a more detailed discussion. The item numbers in Section 3.2.2 correspond to those in Section 3.2.1.

Section 3.2.1

DETAILED COMPARISON TO APPENDIX R OF TITLE 10 CFR PART 50

Appendix R
Section III

Item No.	Appendix R Requirement	Item No.	Comparison	Remarks
	Water Supplies for Fire Suppression Systems			
1.	Two separate water supplies shall be provided to furnish necessary water volume and pressure to the fire main loop.	A	AC	The fire pumps take suction from independent, isolatable intake wells. The water source is Conowingo Pond.
2.	Each supply shall consist of a storage tank, pump, piping, and appropriate isolation and control valves.	A	AC	In lieu of storage tanks, suction is taken from independent, isolable intake wells.
3.	These supplies shall be separated so that a failure of one supply will not result in a failure of the other supply.	A	C	See Section 3.2.2.
4.	Each supply of the fire water distribution system shall be capable of providing the maximum expected water demands for a period of 2 hours.	A	C	
5.	Requirements for ensuring minimum water volume when storage tanks are used for combined service-water/fire-water uses.	A	NA	The service water and fire water systems are not combined.
6.	Requirements for other water systems used as sources of fire protection water.	A	NA	See Section 3.2.2.
	Sectional Isolation Valves			
7.	Sectional isolation valves such as post indicator valves or key operated valves shall be installed in the fire main loop to permit isolation of portions of the main fire main loop for maintenance or repair without interrupting the entire water supply.	B	C	Sectionalizing valves in the fire system piping provide the capability of maintaining system operability with portions out of service. Sectionalizing capability is provided by post-indicator valves.

Section 3.2.1 (Cont'd)

Appendix R
Section III

Item No.	Appendix R Requirement	Item No.	Comparison	Remarks
	Hydrant Isolation Valves			
8.	Valves shall be installed to permit isolation of outside hydrants from the fire main for maintenance or repair without interrupting the water supply to automatic or manual fire suppression systems.	C	C	
	Manual Fire Suppression			
9.	Standpipe and hose systems shall be installed so that at least one effective hose stream will be able to reach any location that contains or presents an exposure fire hazard to structures, systems, or components important to safety.	D	AC	See Section 3.2.2.
10.	Access to permit effective functioning of the fire brigade shall be provided to all areas that contain or present an exposure fire hazard to structures, systems, or components important to safety.	D	C	
11.	Standpipe and hose stations shall be inside PWR containments and BWR containments that are not inerted.	D	NA	The primary containment is inerted with nitrogen during reactor operation.
12.	For BWR drywells, standpipe and hose stations shall be placed outside the drywell with adequate lengths of hose to reach any location inside the drywell with an effective hose stream.	D	C	
	Hydrostatic Hose Tests			
13.	Fire hose shall be hydrostatically tested at a pressure of 150 psig or 50 psi above maximum fire main operating pressure, whichever is greater. Hose stored in outside hose houses shall be tested annually. Interior standpipe hose shall be tested every 3 years.	E	C	

Section 3.2.1 (Cont'd)

Appendix R
Section III

Item No.	Appendix R Requirement	Item No.	Comparison	Remarks
	Automatic Fire Detection			
14.	Automatic fire detection systems shall be installed in all areas of the plant that contain or present an exposure fire hazard to safe shutdown or safety-related systems or components. These fire detection systems shall be capable of operating with or without offsite power.	F	AC	See Section 3.2.2
	Fire Protection of Safe Shutdown Capability			
15.	Fire damage shall be limited so that one train of systems necessary to achieve and maintain hot shutdown conditions from either the control room or emergency control station is free of fire damage.	G.1.a	C	Refer to Chapter 5 for safe shutdown analysis.
16.	Fire damage shall be limited so that systems necessary to achieve and maintain cold shutdown from either the control room or emergency control station can be repaired within 72 hours.	G.1.b	C	Refer to Chapter 5 for safe shutdown analysis.
17.	Consideration of associated non-safety circuits as requiring protection to ensure freedom from fire damage.	G.2 (part of first paragraph)	C	Refer to Chaper 6 (Special Topics) for associated circuits analysis.
18.	Alternative means of ensuring that one train of systems necessary to achieve and maintain hot shutdown is free of fire damage (where cables or equipment of redundant trains are located in the same fire area).	G.2.a G.2.b G.2.c	C	Refer to Chapter 5 for description of alternative shutdown capability. See Section 3.2.2 for structural steel protection.
19.	Alternative means of providing fire protection inside non-inerted containments.	G.2.d G.2.e G.2.f	NA	Containment at Peach Bottom is inerted.
20.	Provision of alternative or dedicated shutdown capability in certain fire areas.	G.3	C	Refer to Chapter 5 for safe and alternative shutdown analysis.

Section 3.2.1 (Cont'd)

Appendix R
Section III

Item No.	Appendix R Requirement	Item No.	Comparison	Remarks
	Fire Brigade			
21.	Requirements for the onsite fire brigade.	H	C	Refer to Appendix C, reference 1.
	Fire Brigade Training			
22.	Requirements for training of fire brigade members.	I	**AC**	Refer to Appendix C, reference 1. Operators are not trained in the charging of the self-contained breathing air bottles.
	Emergency Lighting			
23.	Emergency lighting units with at least an 8-hour battery power supply shall be provided in all areas needed for operation of safe shutdown equipment and in access and egress routes thereto.	J	AC	See Section 3.2.2.
	Administrative Controls			
24.	Establishment of administrative controls to minimize fire hazards.	K	C	Refer to Appendix C, reference 1.
	Alternative and Dedicated Shutdown Capability			
25.	The shutdown capability provided for a specific fire area shall be able to achieve and maintain subcritical reactivity conditions in the reactor, maintain reactor coolant inventory, achieve and maintain hot shutdown conditions, achieve cold shutdown conditions within 72 hours, and maintain cold shutdown conditions thereafter.	L.1	C	Refer to Chapter 5 for safe shutdown analysis.
26.	During the postfire shutdown, the reactor coolant system process variables shall be maintained within those predicted for a loss of normal ac power, and the fission product boundary integrity shall not be affected.	L.1	C	Refer to Chapter 5 for safe shutdown analysis.

Section 3.2.1 (Cont'd)

Appendix R
Section III

Item No.	Appendix R Requirement	Item No.	Comparison	Remarks
27.	Performance goals for the shutdown functions.	L.2	C	Refer to Chapter 5 for safe shutdown analysis.
28.	The alternative shutdown capability shall be independent of the specific fire areas.	L.3	C	Refer to Chapter 5 for safe shutdown analysis.
29.	The shutdown capability shall accommodate postfire conditions where offsite power is available and where offsite power is not available for 72 hours.	L.3	C	Refer to Chapter 5 for safe shutdown analysis.
30.	If the capability to achieve and maintain cold shutdown will not be available because of fire damage, the equipment and systems comprising the means to achieve and maintain the hot shutdown condition shall be capable of maintaining such conditions until cold shutdown can be achieved.	L.4	C	Refer to Chapter 5 for safe shutdown analysis.
31.	If the equipment and systems comprising the means to achieve and maintain hot shutdown conditions will not be capable of being powered by both onsite and offsite electric powered systems because of fire damage, an independent onsite power system shall be provided.	L.4	C	Refer to Chapter 5 for safe shutdown analysis.
32.	Equipment and systems comprising the means to achieve and maintain cold shutdown conditions shall not be damaged by fire; or the fire damage to such equipment and systems shall be limited so that the systems can be made operable and cold shutdown can be achieved within 72 hours.	L.5	C	Refer to Chapter 5 for safe shutdown analysis.
33.	Materials for such repairs shall be readily available on site and procedures shall be in effect to implement such repairs.	L.5	C	Refer to Chapter 5 for safe shutdown analysis.

Section 3.2.1 (Cont'd)

Appendix R
Section III

Item No.	Appendix R Requirement	Item No.	Comparison	Remarks
34.	If the equipment and systems comprising the means to achieve and maintain cold shutdown conditions (and which are used prior to 72 hours after the fire) will not be capable of being powered by both offsite and onsite power systems because of fire damage, an independent onsite power system shall be provided.	L.5	C	Refer to Chapter 5 for safe shutdown analysis.
35.	Shutdown systems installed to ensure postfire shutdown capability need not be designed to meet seismic Category I criteria, single failure criteria, or other design basis accident criteria, except where required for other reasons.	L.6	C	Refer to Chapter 5 for safe shutdown analysis.
36.	Isolation of safe shutdown equipment and systems from associated non-safety circuits.	L.7	C	Refer to Chapter 5 for safe shutdown analysis.
	Fire Barrier Cable Penetration Seal Qualification			
37.	Requirement for noncombustible seal materials deleted per change in 10CFR50, Appendix R as identified in Federal Register Notice 65FR38182-38191, Dated June 20, 2000.			
38.	Penetration seal designs shall be qualified by tests that are comparable to tests used to rate fire barriers.	M	C/AC	See Section 3.2.2.
39.	The penetration seal shall be tested in accordance with acceptance criteria to verify that the seal is capable of providing the fire resistance required of the barrier.	M.1 M.2 M.3	C/AC	See Section 3.2.2.
	Fire Doors			
40.	Fire doors shall be self-closing or provided with closing mechanisms.	N	C	See Section 3.3.1, Item No. 34.
41.	Fire doors shall be inspected semiannually to verify that automatic hold-open, release, and closing mechanisms and latches are operable.	N	C	

Section 3.2.1 (Cont'd)

Appendix R
Section III

Item No.	Appendix R Requirement	Item No.	Comparison	Remarks
42.	Alternative means for ensuring that fire doors protect the door opening as required in case of fire.	N.1 N.2 N.3 N.4	C	See Section 3.2.2.
43.	The fire brigade leader shall have ready access to keys for any locked fire doors.	N	C	
44.	Areas protected by automatic total flooding gas suppression systems shall have electrically supervised self-closing fire doors or shall be closed and electrically supervised.	N	C	Doors to cable spreading room, HPCI pump rooms, diesel generator bays, and plant computer room are electrically supervised.
	Oil Collection System for Reactor Coolant Pump			
45.	The reactor coolant pump shall be equipped with an oil collection system if the containment is not inerted during normal operation.	O	NA	The primary containment is inerted with nitrogen during normal reactor operation.

3.2.2 Explanatory Notes for Comparison to Appendix R

Item 3 - Appendix R Requirement Section III.A

These supplies shall be separated so that a failure of one supply will not result in a failure of the other supply.

PBAPS Design

The source of water for fire protection is Conowingo Pond. The fire pumps are located in the intake structure in separate seismic Category I rooms with walls which have a fire rating commensurate with the amount of fixed combustibles (see Chapter 5, fire areas 48 and 47 for discussion). Separate supply lines to the yard fire main loop are provided from each pump. The connection points are approximately 24 feet apart with an isolation valve between.

Item 6 - Appendix R Requirement Section III.A

Other water systems used as one of the two fire water supplies shall be permanently connected to the fire main system and shall be capable of automatic alignment to the fire main system. Pumps, controls, and power supplies in these systems shall satisfy the requirements for the main fire pumps. The use of other water systems for fire protection shall not be incompatible with their functions required for safe plant shutdown. Failure of the other system shall not degrade the fire main system.

PBAPS Design

No water systems other than the two intakes from Conowingo Pond are used as fire water supplies; therefore, this guideline does not apply to PBAPS.

Item 9 - Appendix R Requirement Section III.D

Standpipe and hose systems shall be installed so that at least one effective hose stream will be able to reach any location that contains or presents an exposure fire hazard to structures, systems, or components important to safety.

PBAPS Design

Standpipe or hose systems are not installed in the diesel-generator building. The diesel-generator building is protected by manually actuated total flooding CO_2 systems, portable dry chemical and CO_2 extinguishers and can be reached by hose from nearby hydrants (maximum distance is approximately 180 feet less than the length of available hose).

Hose stations are equipped with 100 feet of hose. Hose reel carts on elevations 165 feet and 195 feet of each reactor building are equipped with 200 feet of hose capable of reaching elevations 180 feet and 214 feet. All emergency core cooling system (ECCS) pumps can be reached by a stream of water from a nozzle not more than 30 feet away attached to not more than 100 feet of hose.

Item 14 - Appendix R Requirement Section III.F

Automatic fire detection systems shall be installed in all areas of the plant that contain or present an exposure fire hazard to safe shutdown or safety-related systems or components. These fire detection systems shall be capable of operating with or without offsite power.

PBAPS Design

Inasmuch as 10 CFR 50, Appendix R, paragraph III.F provides no specific criteria for the number, location, and type of fire detectors, criteria used to locate detectors are based on NFPA 72E, modified to address combustible loading, ventilation characteristics, room size, room geometry, and room congestion. These criteria are consistent with those accepted in Supplements 1 and 3 to the Peach Bottom Fire Protection Safety Evaluation Report. Instances of nonconformance with code requirements for detector location are discussed in Philadelphia Electric Co. letter to the NRC dated March 20, 1981. In addition, all areas containing fire detectors have been inspected and evaluated with respect to NFPA 72E for compliance. For areas in which the smoke detectors were not in strict compliance with NFPA 72E-1984 a qualified fire protection engineer evaluated the effectiveness of the detectors with respect to the aforementioned criteria. The location and type/designation of the fire detectors are listed in Table 3.14.7-1 of the PBAPS Technical Requirements Manual. See Section 3.3.1, Item Nos. 1, 2, 3, and 5 for evaluation of specific areas.

An exemption from the requirement of Appendix R, Section III.F was granted by the NRC in the SER dated March 13, 1985. The fire areas/zones affected by these exemption requests are as follows:

MSIV Rooms (17-21 and 20-29)
Chemical Waste Tank Room (21-65B)
Offgas Line Tunnels (50-130 and 50-131)
Diesel Generator Building Ventilation Supply Enclosures
(43-132, 44-133, 45-134, and 46-135)

An exemption from the requirements of Appendix R, Section III.F was granted by the NRC in the SER dated November 14, 1986, for the emergency cooling tower stairwell (fire area 51-136).

In a letter from the licensee to the NRC dated September 16, 1983 (see reference 25 in Appendix C) three additional areas were identified where detection would not be installed in accordance with Appendix R, Section III.F. These areas do not contain safety-related equipment but do contain safety-related cabling in raceway. In lieu of detection, a 3 hour rated barrier was installed to protect the safety related raceway in the areas. The three areas are as follows:

Fire Area/Zone 4-6	Stairwell No. 24
Fire Area/Zone 5-7	Stairwell No. 18
Fire Area/Zone 12-15	Stairwell No. 23

An exemption from the requirements of Appendix R, Section III.F was granted by the NRC in the SER dated August 18, 2000. The fire zone included in this exemption request are as follows: 50-78W U2 Turbine Building rooms 22, 138 and 223; 50-78V U3 Turbine Building rooms 181 and 272; 50-78B U2/U3 Common Turbine Building rooms135, 184, 185, 228, 229, and 274; 50-88 Unit 2 Main Turbine Lube Oil Storage Tank Room, 50-89 Unit 3 Main Turbine Lube Oil Storage Tank Room; 50-78EE Unit 3 Steam Jet Air Ejector Room; 6S-5M Unit 2 Reactor Water Clean-up (RWCU) Backwash Tank Transfer Pump Room; 13N-13M Unit 3 RWCU Backwash Tank Transfer Pump Room; 6S-42 Unit 2 RWCU Non-Regenerative Heat Exchanger Room and 13N-36 Unit 3 RWCU Non-Regenerative Heat Exchanger room.

An exemption from the requirements of Appendix R, Section III.F was granted by the NRC in a Safety Evaluation Report dated December 7, 2001. The fire zones addressed by this exemption request were: 50-78B, Room 429, elevation 165’ Common Area Turbine Building, and 50-99, Room 222, 4th and 5th stage Unit 2 Feedwater Heater Room.

Item 18 - Appendix R Requirement Section III.G.2.a

Separation of cables and equipment and associated non-safety circuits of redundant trains by a fire barrier having a 3-hour rating. Structural steel forming a part of or supporting such fire barriers shall be protected to provide fire resistance equivalent to that required of the barrier.

PBAPS Design

All structural steel forming a part of or supporting fire barriers has been shown analytically to have fire resistance equivalent to that required of the barrier; otherwise, appropriate protection will be provided in the form of structural steel fire proofing or cable tray covers (refer to Appendix C, reference 18). An exemption request for areas which could experience higher than

acceptable temperatures but need not be modified was granted by the NRC in the SER dated December 31, 1986.

Item 22 – Appendix R Requirement Section III.I.3.a

Fire brigade drills shall be performed in the plant so that the fire brigade can practice as a team.

PBAPS Design

One fire brigade drill for each shift team is performed during annual fire school. The fire brigade shift members attend fire school together so they do perform the drill as a team. The burn building at the fire school mimics an industrial facility. The drills involve actual fires, using charged fire fighting equipment in an industrial type environment. This provides for a more realistic drill scenario and still permits the shift crew to practice as a team.

Item 23 - Appendix R Requirement Section III.J

Emergency lighting units with at least an 8-hour battery power supply shall be provided in all areas needed for operation of safe shutdown equipment and in access and egress routes thereto.

PBABS Design

Areas provided with 8-hour battery powered emergency lighting were identified in Appendix C, references 15 and 16. Those areas presently provided with 8-hour battery powered emergency lights are summarized below:

1. Main control room
2. Remote shutdown panel area
3. High pressure service water pump bays
4. Fifth bay of the diesel-generator building
5. Cable spreading room - selected locations
6. HPCI alternative control station
7. 4-kV switchgear rooms
8. Access and egress routes thereto

Emergency lighting is provided in support of operator manual actions required by safe shutdown and alternative shutdown procedures. For the access and egress routes to structures beyond the Power Block, portable lanterns with at least 8-hours' battery supply are stored in an emergency equipment cabinet.

Fixed, self-contained, nominally 8-hour rated, dc emergency battery lighting units are provided in all Plant areas, with the

exception of the Control Room and the alternative control station (ACS) locations, where post-fire safe shutdown manual actions must be performed and in access and egress routes thereto.

Fixed emergency lighting in the Control Room is provided by two subsystems of 8-hour, non-safety related, dedicated stationary batteries along with their associated chargers and dc to ac inverters. The two subsystems of batteries, chargers, inverters and associated cables are electrically isolated and spatially separated from each other to prevent a single fire or electrical malfunction from affecting more than one of the two subsystems.

The Alternative Control Stations are provided with station battery-backed lights. The batteries and their chargers are protected from a fire in the control room, the cable spreading room, the computer room, or the emergency shutdown panel area. The lights are maintained in the "off" position to reduce loading on the safety-related batteries during non-fire events. They are switched to the "on" position as part of the Alternative Shutdown procedure when required.

Items 37, 38, and 39 - Appendix R Requirements III.M

Fire barriers at Peach Bottom are provided to separate redundant safe shutdown trains as required in Section III.G of Appendix R. Locations of all plant fire barriers are shown in Figures B-4 through B-13.

Wall and floor construction for fire barriers is summarized in Chapter 5 and outlined below:

1. Most barriers are reinforced concrete.

2. Structural steel beams supporting floors in all areas of the plant containing safe shutdown equipment were evaluated to determine capability of the beams to withstand a fire. Beams requiring fire proofing have been protected in accordance with the SER dated December 31, 1986.

3. Concrete block walls serving as a 2-hour fire barrier were constructed and installed in accordance with UL Standard 618 for Safety-Concrete Masonry Units. Refer to Chapter 5 for effect of walls on safe shutdown.

4. A 1/4-inch steel plate wall separates the Unit 2 and 3 high pressure service water pump bays in the circulating water pump structure. The plate, although not tested to demonstrate its ability to withstand a three-hour fire, provides a level of fire protection in

excess of the hazard in each area. Refer to Chapter 5, area 48 for impact on safe shutdown.

5. A 4-inch-high by 1/4-inch thick steel angle traverses the top of the wall between fire area 25 and 2 on elevation 165 feet. The angle, although not tested to demonstrate its ability to withstand a 3-hour fire, provides a level of fire protection in excess of the hazard in each area as described in the associated fire hazards analysis (Reference 10). Refer to Chapter 5, area 25 for impact on safe shutdown.

Fire dampers are provided in HVAC penetrations through fire barriers as needed to maintain the fire resistance of the barrier. Dampers are guillotine, curtain or trap door type, with fusible links rated at 165° F. The damper installations consist of a single 3-hour rated damper, 2, 1-1/2 hour rated dampers in series or a single 1-1/2 hour rated damper. A fire hazards analysis was performed which concluded that several HVAC penetrations do not require fire dampers to achieve the fire resistance needed by the barrier. Chapter 5 references the appropriate NRC Safety Evaluation Report for those HVAC openings penetrating a fire barrier which do contain a 3-hour rated fire damper. An analysis was also performed to evaluate the ability of fire dampers to close against airflow. Procedures have been implemented to deenergize HVAC systems associated with fire dampers which would not close against airflow immediately upon verification of a fire which could cause the dampers to close.

Penetration seals in fire barriers provide fire resistance equal to that required by the barrier to withstand a fire equivalent to the combustible loading in the surrounding rooms. Seals were qualified to ASTM Standard E-814, "Standard Test Method for Fire Tests of Through Penetration Fire Stops," or American Nuclear Insurer's NEL-PIA/MAERP, "Standard Method of Fire Tests of Through-Penetration Fire Stops". The test standards exposed the seals to the standard time temperature curve found in ASTM E-119. Penetration seals which, because of field conditions, could not be installed in strict accordance with tested configurations and procedures, were controlled by procedure to ensure that the integrity of the barriers was not compromised. The penetration seal program documents the deviation types. As outlined in Generic Letter 86-10, Section 3.2.2, the deviations satisfy the following criteria:

1. The continuity of the fire barrier material is maintained.

2. The thickness of the barrier is maintained.

3. The nature of the support assembly is unchanged from the tested configuration.

4. The application or "end use" of the fire barrier is unchanged from the tested configuration. For example, the use of a cable tray barrier to protect a cable tray which differs in configuration from those that were tested would be acceptable. However, the use of structural steel fire proofing to protect a cable tray assembly may not be acceptable.

5. The configuration has been reviewed by a qualified fire protection engineer and found to provide an equivalent level of protection.

In accordance with Generic Letter 86-10, a fire hazard analysis was performed for deviations and the respective justifications that fail to satisfy one of these criteria. The analysis confirmed that the seal designs provide a fire resistance equivalent to that required by the barrier (Reference 10). These deviations include:

1. Internal bus duct seals (described in Section 5.3)

2. Internal conduit sealing criteria (described in this section)

Polyurethane foam, a combustible material, has been utilized in certain applications as described in the SER dated November 14, 1986, to provide 3-hour fire resistant penetration seals. Testing, in accordance with ASTM E-119, satisfactorily demonstrated the seal configurations ability to withstand a fire.

The majority of the penetration seal types consist of the following configurations:

1. Cement-type grout.

2. Foamed silicone polymer. This is a self-vulcanizing material that results from the mixture of two liquid components.

3. Solid silicone polymer. The polymer is impregnated with a powdered high-density filler.

4. Flexible boot with ceramic fiber. The boot material is silicone rubber with woven glass fiber reinforcing. Ceramic fiber is installed inside the boot, in the space between the penetrating object and the edge of the penetration opening. Stainless steel compression

straps and silicone adhesives are used in attaching the boot.

5. Fire rated link-seals. Modular, mechanical type seals consist of interlocking synthetic rubber links shaped to continuously fill the annular space between a pipe and the wall opening.

6. Ceramic fiber seals. Mineral wool is used in either empty sleeves with a metal cap or in annular gaps between pipes and sleeves with welded steelplate anchors.

Openings inside conduit were evaluated to determine their effect on the integrity of fire barriers. For conduits that have an access point (i.e., conduit cover, junction box, etc.) at the barrier, a 3-hour-rated fire seal is provided. For conduits with an access point within 5'-0" of a barrier, a 3-hour fire seal is provided on the side that contains the nearest access point. Conduits with an access point greater than 5'-0" from a barrier on both sides are not sealed if the access point is outside the room adjacent to the barrier or if the access point is normally not open (i.e., closed junction box, condulets with conduit covers). Conduits that enter a barrier but do not completely penetrate is are not considered a penetration and are, therefore, not sealed. Conduits with and access point greater than 5'0" from a barrier on both sides and containing an open access point are sealed to prevent the passage of smoke and hot gases. A Fire hazards Analysis, Reference 10, provides a detailed description and justification for internal conduit sealing.

Item 42 - Appendix R Requirement Section III.N

All fire doors in safe shutdown fire barriers are electrically supervised or otherwise maintained closed in order to provide fire resistance in accordance with the requirements of Appendix R to 10CFR50. These doors are inspected in accordance with the provisions of the Technical Requirements Manual and Appendix R. (Refer to FPP Section 3.3.2, Item No. 34, and Appendix C, reference 5).

3.3 SAFETY EVALUATION REPORT

The purpose of this section is to compare the fire protection provisions of Peach Bottom Atomic Power Station Units 2 and 3 with the commitments made in the Fire Protection Safety Evaluation Report (SER) and its supplements (see references 17, 18, 19, 20, 21, and 29 in Appendix C).

To identify areas of potential design impact and to facilitate a comparison of SER commitments and installed plant conditions, a matrix, which addresses each modification, each incomplete item, and each fire protection feature listed in the SER and which relates to the plant systems, equipment, components, and operation, was prepared and is included in Section 3.3.1 of this report. The matrix has extracted all modifications, incomplete items, and fire protection features from the SER and given each item a number, 1 through 112. Each item has condensed a particular modification or incomplete issue and makes reference to the applicable sections of the SER where the details of the modification or incomplete item can be found. The general degree of conformance to the guideline is indicated in the "Comparison" column, using the codes defined as follows:

- C - indicates conformance to the guideline or conformance to its intent. Substantiating statements may be included as part of the matrix or in Section 3.3.2.

- AC - indicates conformance to the guidelines by alternate means or methods. The manner of conformance is included in the matrix or discussed in Section 3.3.2.

- WC - indicates that design changes, means, or methods are planned in order to conform, or conform to the intent of the guideline. The planned design changes, means, or methods and the manner of conformance are discussed in Section 3.3.2.

- NC - indicates that the plant is not in conformance and no design changes are planned. The basis for non-conformance to the guideline is included in the matrix or discussed in Section 3.3.2.

- NA - indicates that the guideline is not applicable to Peach Bottom Atomic Power Station Units 2 and 3. Substantiating statements are included as part of the matrix in Section 3.3.1.

In the "Remarks" column, additional information is provided to explain or expand on the degree of conformance. Alternatively, reference may be made to Section 3.3.2 for a more detailed discussion. The item numbers in Section 3.3.2 correspond to those in Section 3.3.1.

Section 3.3.1

DETAILED COMPARISON TO SAFETY EVALUATION REPORT

Item No.	SER Section Requirement	SER Section Nos.	Comparison	Remarks
	Fire Detection Systems			
1.	Install additional smoke detectors in the following areas:	3.1.1, 4.2, 5.2, 5.3, 5.5, 5.6, 5.10, 5.12, 5.15, 5.16	C	See Section 3.3.2.
	(1) Residual heat removal pump rooms			
	(2) Reactor core isolation cooling pump rooms			
	(3) Core spray pump rooms			
	(4) Deleted			
	(5) Enclosed rooms within the control room complex			
	(6) Cable spreading room			
	(7) Diesel generator Rooms		AC	Heat detectors were installed in lieu of smoke detectors to preclude false alarms due to diesel exhaust fumes and will provide adequate coverage because a fire will have a high heat release rate.
	(8) Diesel generator auxiliary room			
	(9) High pressure service water pump rooms to replace the existing heat detectors			
	(10) Battery rooms			

Section 3.3.1 (Cont'd)

Item No.	SER Section Requirement	SER Section Nos.	Comparison	Remarks
2.	The need will be evaluated for additional early fire detectors in:	3.2.3, 5.2, 5.6, 5.7, 5.8, 5.9	C	See Section 3.3.2
	(1) Fire zones 6-5H, 7-5J, 8-5K, 13-13H, 14-13J, 15-13K, 6-19, 13-27, 6-20, 13-30, 17-21, 20-29, 6-23, and 13-31			
	(2) Ceiling above the control room			
	(3) Enclosed panels in the control room which contain redundant channels		NA	See Section 3.3.2.
	(4) Torus compartment and instrumentation rack rooms			
	(5) Drywell			Drywell contains 3 general area smoke detectors and normally inerted with nitrogen during plant operation. Configuration was accepted in SER Supplement No. 3.
3.	A qualified fire protection engineer will review the fire detector installation design to ensure that the placement and sensitivity of the detectors will adequately provide early warning	3.2.3, 4.2	AC	See Section 3.3.2
4.	The feasibility of installing remote alarm lamps for new or existing detectors which are obstructed from sight in large rooms with multiple detectors will be studies.	3.2.3, 4.2	C	See Section 3.3.2.
5.	The necessity for installing additional detectors in all of those areas that contain safety-related equipment and those areas that pose a hazard to safety-related areas will be evaluated.	3.2.3, 4.2, 5.1, 5.2, 5.13	AC	Refer to Appendix C, reference 6. See Section 3.2.2, Item No. 14 and Section 3.3.2.
6.	Heat detectors which alarm in the control room are provided in the filter ductwork of both the standby gas treatment system and the recombiner building ventilation system.	4.4.2	C	

Section 3.3.1 (Cont'd)

Item No.	SER Section Requirement	SER Section Nos.	Comparison	Remarks
	Water Suppression Systems			
7.	Fire suppression systems will be installed:	3.1.2.A, 4.3, 4.8, 5.1, 5.4, 5.13, 5.14	AC	See Section 3.3.2.
	(1) On elevation 116 feet of the turbine building for protection of anti-contamination clothing stored in this area. An acceptable alternative is to permanently relocate the anticontamination clothing to an area separated from safe shutdown equipment by a 3-hour fire barrier.			
	(2) Recirculation pump motor generator set lube oil pump rooms.			(2) See Section 3.3.2, Item 7
	(3) Drummed waste/storage area of the radwaste building.			
8.	Heat reflecting shields will be provided for sprinklers under the grating in the main turbine lube oil reservoir rooms.	3.1.2.B, 4.3, 5.1	C	
9.	The adequacy of protection will be evaluated in:	3.2.4, 4.14, 5.14, 5.17	C	See Section 3.3.2.
	(1) Recombiner building			
	(2) Fire zones 4-4C, 2-12C			
	(3) Recombiner building for the ventilation system filters.			
10.	The design and installation of the wet pipe automatic sprinkler systems, manually initiated preaction systems, and both manual and thermal detector-actuated deluge systems conform to the provisions of NFPA 13 and 15.	4.3.1(5)	AC	See Section 3.3.2, Item Nos. 7 and 18.
11.	Automatic deluge water spray systems are provided at the outside main auxiliary trans-formers and at the startup transformer at the southwest corner of the turbine building.	4.3.1(5), 5.18.3	C	

Section 3.3.1 (Cont'd)

Item No.	SER Section Requirement	SER Section Nos.	Comparison	Remarks
12.	Water suppression systems are also provided inside the plant to protect the charcoal filters in the standby gas treatment system and the recombiner building ventilation systems.	4.3.1(5), 5.12	C	
13.	Each of the two seal oil reservoirs and pumping units at the 116-foot elevation in fire zone 78B are protected by an automatically activated sprinkler system	4.3.1(5), 5.1.4	C	
14.	Wet pipe sprinkler systems are provided for the drummed oil storage area.	4.3.1(5), 5.1.4	C	
15.	Wet pipe sprinkler systems are provided for the reactor feed pump turbine lube oil reservoir rooms.	4.3.1(5), 5.1.4	C	
16.	Wet pipe sprinkler systems shall be installed for the main turbine lube oil storage tank rooms	4.3.1(5), 5.1.4	C	
17.	Wet pipe sprinkler systems are installed for the main turbine lube oil reservoir rooms.	4.3.1(5), 5.1.4	C	
18.	Fixed water suppression systems are provided in the turbine generator equipment areas on the 116-, 135-, and 150-foot elevations.	4.1.3(5), 5.1.4		See Section 3.3.2.
19.	The diesel engine driven fire pump room is protected by a wet pipe automatic sprinkler system.	4.3.1(5), 5.16	C	
	Hose Stations			
20.	All hose stations will be fitted with sufficient hose length to permit effective application of a hose stream to all safety-related equipment serviced by the particular station.	3.1.3(1), 4.3, 5.9, 5.11	AC	See Section 3.3.2 and 3.2.1 Item 9.
21.	All hose stations will have the hose connected to the station valve.	3.1.3(2), 4.3	C	

Section 3.3.1 (Cont'd)

Item No.	SER Section Requirement	SER Section Nos.	Comparison	Remarks
22.	All hose stations will be equipped with a ball shutoff valve.	3.1.3(3), 4.3	C	
23.	Additional hose will be provided to serve the 180- and 214-foot elevations of the reactor buildings.	3.1.3(4), 4.3	C	
24.	The need for additional hose stations and access ladders in the torus compartments will be evaluated.	3.2.7, 4.3, 5.6	AC	See Section 3.3.2. Additional hose is not required as long as hose stations outside of torus compartments provide coverage.
25.	The feasibility of installing variable gallonage nozzles at stations servicing the control room complex, cable spreading room, and emergency switchgear rooms will be evaluated.	3.2.7, 4.3, 5.2, 5.3, 5.4	AC	See Section 3.3.2.
26.	There are 97 hose stations throughout the plant each with at least 100 feet of 1-1/2-inch hose and adjustable spray nozzles. The following areas identified in the SER are served:			
	Turbine building	5.1.4	C	
	Turbine building near the entrance to the main entrance to the control room	5.2.4	C	
	Turbine building near the cable spreading room	5.3.4	C	
	Vicinity of all emergency switchgear rooms	5.4.4	C	
	Turbine building within reach of all battery rooms	5.5.4	C	
	Radwaste building and turbine building on elevation 91 feet, 6 inches to provide coverage of reactor building, elevation 91 feet, 6 inches.	5.6.4, 5.12.4	C	

Section 3.3.1 (Cont'd)

Item No.	SER Section Requirement	SER Section Nos.	Comparison	Remarks
	Reactor building elevation 135 feet. A nozzle attached to hose will be able to reach the 119-foot elevation of drywell below recirculation pumps where oil would accumulate	5.7.4, 5.11.6	C	
	Reactor building elevation 165 feet	5.8.4	C	
	Reactor building elevation 195 feet	5.9.4	C	
	Reactor building elevation 234 feet	5.10.4	C	
	Radwaste building, fire zone 72A	5.13.4	C	
	Radwaste building, fire zones 4B, 4C, 12B and 12C	5.14.4	C	
	Circulating water pumphouse	5.16.4	C	
	Recombiner building elevations 136 feet and 157 feet	5.17.4	C	
	Portable Extinguishers			
27.	Two 2-1/2-gallon pressurized water extinguishers will be installed in one or more of the enclosed rooms within the control room complex.	3.1.4(1), 5.2	AC	See Section 3.1.2, Item No. 35 and Section 3.3.2.
28.	All welding carts will be equipped with portable extinguishers or administrative controls will be implemented to ensure that fire extinguishers are located in the immediate area where welding is being performed.	3.1.4(2), 4.3	C	
29.	Two carbon dioxide extinguishers will be installed in both the corridor on the west side of the switchgear rooms and in the turbine building on the east side of this area.	3.1.4(3), 5.4	AC	Extinguishers are located in the stairwell, behind unlocked doors to the corridor which will not impede access to them rather than in the narrow corridor itself. Refer to Appendix C, reference 7.

Section 3.3.1 (Cont'd)

Item No.	SER Section Requirement	SER Section Nos.	Comparison	Remarks
30.	The main turbine bearings are provided with fittings to which a 350-pound, wheeled, dry chemical container may be connected.	5.1	AC	The dry chemical system has been removed and is replaced with a wet pipe automatic suppression system, Mod 1832
31.	Portable dry chemical and/or carbon dioxide extinguishers are provided throughout the:			
	Turbine building	5.1.4	C	
	Control room complex	5.2.4	C	
	Cable spreading room area	5.3.4	C	
	Emergency switchgear rooms and nearby	5.4.4	C	
	Near the station battery rooms	5.5.4	C	
	Reactor building instrument rack rooms and pump rooms on lowest level of torus compartment	5.6.4	C	
	Reactor building elevation 135 feet	5.7.4	C	
	Reactor building elevation 165 feet	5.8.4	C	
	Reactor building elevations 195 and 214 feet	5.9.4	C	
	Reactor building elevation 234 feet	5.10.4	C	
	Radwaste building elevation 91 feet 6 inches	5.12.4	C	
	Radwaste building, fire zone 72A	5.13.4	C	
	Radwaste building, fire zone 4B, 4C, 12B,	5.14.4	C	
	Each diesel generator room and auxiliary tray	5.15.4	C	
	Circulating water pumphouse	5.16.4	C	
	Recombiner building elevations 136 feet, 146 feet and 157 feet	5.17.4	C	

Section 3.3.1 (Cont'd)

Item No.	SER Section Requirement	SER Section Nos.	Comparison	Remarks
	Fire Doors			
32.	The watertight doors in the center section of the circulating water pump structure will be electrically supervised.	3.1.5(1), 5.16	C	
33.	Doors to the condensate pump room will be upgraded.	3.1.5(2), 5.13	C	See Section 3.3.2
34.	The need for modifications to ensure that fire doors are electrically supervised or otherwise maintained closed will be evaluated	3.2.6, 4.9, 5.2, 5.13	AC	See Section 3.3.2
	(1) All doors to enclosed rooms surrounding the control room should be automatically closed in the event of fire or maintained closed at times by administrative procedures.	5.2	C	
	(2) Fire doors in zone 72A of the radwaste building should be electrically supervised or otherwise maintained in the closed position.	5.13	C	
35.	Doors to the reactor feed pump turbine lube oil reservoir will be evaluated to determine the need to upgrade them to provide a 3-hour fire rating.	3.2.6, 5.1	C	Doors 208, 270, 283 and 285 to the turbine lube oil rooms are a label doors. Doors are not required to separate redundant safe shutdown methods. See Item 34.
	Ventilation Equipment			
36.	Three portable air handling units will be provided for smoke removal.	3.1.6(1), 4.4, 5.6	C	One portable fan is located on elevation 165 feet in turbine building just outside the south door of the control room. The other two fans are located in the turbine building on elevation 116 near rollup door 111.

Section 3.3.1 (Cont'd)

Item No.	SER Section Requirement	SER Section Nos.	Comparison	Remarks
37.	The license will verify that smoke can be exhausted from a torus compartment fire to a suitable location as described in procedures.	3.1.6(2), 4.4	C	Fire brigade smoke removal capacity for the torus compartments is adequate.
38.	Battery room ventilation air flow system will be upgraded to include exhaust air flow detector.	3.1.6(3), 5.5	C	
39.	The necessity for modifying the ventilation in the control room complex by installing, as necessary, manual or automatic closing devices for dampers will be evaluated.	3.2.9, 5.2	C	See Section 3.3.2 and Section 3.1.2, Item No. 65.
	Fire Barrier Penetration Seals			
40.	Mechanical seals will be evaluated and upgraded as necessary.	3.1.7, 4.9, 5.6, 5.7, 5.8, 5.9, 5.12, 5.15	AC	Refer to Section 3.2.2 Item Nos. 38 and 39. The computer room walls are 2-hour rated and sealed (refer to Sections 3.1.2, Item 21 and 3.2.2, Items 37, 38, and 39). The diesel fire pump room walls are 2-hour rated to provide fire resistance between the pump room and fire area 48-144.
41.	Barriers separating fire areas have fire resistance ratings of two or three hours, adequate to contain the postulated fire within the fire area.	4.11	AC	Penetrations through fire barriers provide the required fire resistance in accordance with the requirements of Appendix R to 10CFR50. See Section 3.2.2, Items 38 and 39 and Section 3.1.2, Item 21 for details.
42.	The practicality of sealing the open pipe penetrations separating zones 4B from 4C and 12B from 12C will be investigated.	3.2.8, 5.14	NC	See Section 3.3.2.

Section 3.3.1 (Cont'd)

Item No.	SER Section Requirement	SER Section Nos.	Comparison	Remarks
	Air Breathing Equipment			
43.	A total of 38 self-contained breathing units (Chemox masks) are provided throughout the plant. Each Chemox mask is provided with two cartridges; each cartridge has a service life of 1 hour.	4.4.3	AC	Scott 4.5 self contained breathing Apparatus (SCBA) packs are provided. Spare cylinders are maintained such that at least two cylinders are provided for each SCBA pack.
44.	A supply of 72 extra canisters for the Chemox masks will be provided at a central location for an extra 6 hours breathing capacity for 12 people.	3.1.8, 4.4	AC	Replaced by Scott 4.5 packs which are equivalent to Chemox masks.
45.	Self-contained breathing units are located in the turbine building just outside each of the entrances to the main control room.	5.2.4	C	Scott 4.5 packs at locations 165-38 and 165-50.
46.	Two Chemox breathing masks are located at the northeast corner of the diesel generator building.	5.15.4	AC	Two Scott 4.5 packs at location Y-8, the northeast corner of the diesel generator building.
	Emergency Lighting			
47.	The need to provide fixed emergency lighting consisting of fixed sealed beam units with individual battery power supplies for access to and egress from the control room, the cable spreading room, the emergency switchgear and battery rooms, and the ground floor below via stairway No. 9 will be evaluated.	3.2.14, 4.6	C	See Section 3.3.2 and Section 5.2.
48.	Twenty-two portable battery-powered handheld lights will be provided.	3.1.9, 4.6	C	A minimum of 22 handheld lights are stored in an emergency equipment cabinet just outside the entrance to the main control room at the head of stairway 9.

Section 3.3.1 (Cont'd)

Item No.	SER Section Requirement	SER Section Nos.	Comparison	Remarks
	Fire Detection and Signaling Systems			
49	A fire detection and signaling system is provided in various portions of the plant which transmits alarm and supervisory signals to the control room where they are annunciated at the fire panel. In addition to handling fire detector signals, the system transmits indications of water flow from the sprinkler and deluge extinguishing systems, as well as the status of pump mode and system pressure. The system also indicated operation of the carbon dioxide extinguishing systems and in all cases indicates the zone from which the alarm or supervisory signal initiated. Supervisory alarm signals are displayed at the fire alarm panel in the control room and show the location of the affected area in the event of loss of power, under voltage, short or open circuits, or ground faults. Powers is supplied from the emergency AC power system.	4.2	C	See Section 2.12 and Section 3.3.2.
50.	Each area monitored by detectors is provided with a local control panel incorporating a "power on", pilot light and a key operated "reset" switch. During the site visit, it was noted that some of the pilot lights were not illuminated or were very dim. The licensee will restore these lamps to their original intensity.	4.2	AC	Accurate for smoke detectors only. Heat detectors are not monitored by control panels but by automatic code transmitters which do not have a "power on" light or a key operated "reset" switch, but are supervised. In addition, the 13 kV Switchgear Preaction Sprinkler System release control panel does not utilize a key operated “reset” switch.(exception: The H_2 Water Chemistry System backup leak detection heat detectors are not tied to an automatic code transmitter and are not supervised).
	Control of combustibles			
51.	A curb or doorsill will be installed to prevent the flow of combustible liquids under the doors between the individual diesel generator rooms at the 127-foot elevation.	3.1.11(1), 4.5, 5.15	C	See Section 3.3.2.
52.	The curb around the hydrogen seal oil unit will be upgraded.	3.1.11(2), 4.5, 5.1	C	See Section 3.3.2, Item No. 59.

Section 3.3.1 (Cont'd)

Item No.	SER Section Requirement	SER Section Nos.	Comparison	Remarks
53.	The motor-generator set oil pump room drains will be plugged, separated, or provided with backwater valves to prevent an oil pathway via the motor-generator set room drainage system.	3.1.11(3), 4.5	C	See Section 3.3.2, Item No. 59.
54.	The health physics cleaning and repair operations for breathing equipment will be permanently relocated from the 116-foot elevation corridor of the radwaste building.	3.1.11(4), 5.13	C	
55.	A curb will be added at the door of the diesel fire pump room. A fusible link shutoff valve or high temperature shutoff switch to the fuel transfer pump will be provided to limit the flow of diesel fuel into the diesel fire pump room during a fire.	3.1.11(5), 4.5, 5.16	C	See Section 3.3.2, Item No. 59.
56.	Curbs for the reactor feed pump turbine lube oil reservoir at the 135-foot elevation will be raised to contain the full contents of the reservoir and a 20-minute sprinkler flow.	3.1.11(6), 4.5, 5.1	C	
57.	Metal cabinets will be provided for storage of protective clothing or the clothing will be relocated from elevation 116 feet of the turbine building.	3.1.11(7), 5.1	C	
58.	Flammable liquid cabinets will be provided in laboratories.	3.1.11(8), 5.1	C	
59.	The need for modification will be evaluated to control the spread of combustibles in : (1) Reactor feed pump turbine lube oil Reservoir rooms (2) Diesel fire pump room (3) Main turbine lube oil storage tank room (4) Recirculation pump motor-generator set room and motor-generator set oil equipment rooms	3.2.10, 4.5, 5.1, 5.14	C	See Section 3.3.2.

Section 3.3.1 (Cont'd)

Item No.	SER Section Requirement	SER Section Nos.	Comparison	Remarks
60.	The curb for the drummed oil storage room is adequate.	5.1	C	
61.	The dikes in the main turbine lube oil storage tank rooms should be upgraded to contain the full contents of all tanks in the room plus the quantity of fire suppression water needed to suppress a postulated fire. Verification should be provided that an oil fire in this room will not spread to other areas via the floor drains outside the existing curb.	5.1	C	
62.	The turbine lube oil equipment areas at elevation 135 feet and the hydrogen seal oil units at elevation 116 feet of the turbine building are drained by individual drain lines with no branch connections.	4.5	C	
63.	The drains from the individual diesel generator rooms are located two feet above the common header and each drain line is provided with a backwater valve to prevent the spread of combustible liquids between rooms in the diesel generator building.	4.5	C	
64.	The reactor feed pump turbine lube oil reservoir rooms floor drainage system should be modified, if necessary, to prevent the spread of oil outside the room via the drains.	4.5	AC	See Section 3.3.2.
65.	The diesel fire pump room floor drains should be modified, if necessary, to prevent the spread of fuel oil outside the room via the drains.	4.5	WC	The need to isolate floor drains in the diesel fire pump room is being investigated.
	Yard Hydrants			

Section 3.3.1 (Cont'd)

Item No.	SER Section Requirement	SER Section Nos.	Comparison	Remarks
66.	The hydrant in the middle of the west side will be rotated to allow both hose connections to be used (4.3).	3.1.12(1), 4.3	C	
67.	The environmental station pipe will be relocated or the licensee will take other corrective measures to provide adequate clearance for use of the hydrant wrench.	3.1.12(2), 4.3	C	There are no interferences that prevent the hydrant wrenches from being rotated.
68.	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 hydrant will be evaluated. These fittings should be stored in a central location.	3.2.15, 4.3.1	C	Adapters are stored on turbine deck elevation 165 feet, Unit 2.
69.	Exterior fire hydrants are installed around the plant at approximately 250-foot intervals with the maximum spacing between hydrants of 290 feet.	4.3.1(3)	AC	Hydrants with curb valves are installed, in general, at design intervals of approximately 250 Feet with a 290-foot maximum. See Section 3.3.2.
70.	The hydrant hose threads are compatible with the local fire department.	4.3.1(3)	C	
71.	The hydrant located at the southeast corner of the turbine building that was found to be leaking will be repaired.	4.3.1(3)	C	
	Water Systems			
72.	Water for fire protection is obtained directly from Conowingo Pond, a body of water formed by dams across the Susquehanna River. The water is drawn in through a screen structure and then to the intake structure through isolable ponds.	4.3.1(1)	C	
73.	A secondary source of water can be obtained by taking suction from the inlet pond by a fire department pumper and discharging through hose lines connected to a hydrant.	4.3.1(1)	C	

Section 3.3.1 (Cont'd)

Item No.	SER Section Requirement	SER Section Nos.	Comparison	Remarks
74.	Two vertical shaft, centrifugal fire pumps, each with a design capacity of 2,500 gallons per minute (gpm), at a pressure of 125 pounds per square inch gauge (psig), are provided. One of the fire pumps is diesel engine driven with a base-mounted 120-gallon day tank adequate for approximately 4.3 hours of running time.	4.3.1(2)	C	The two fire pumps are vertical, open line shaft, turbine, wet pit type fire pumps, each rated for a maximum of 2,500 gpm at 125 psig total head.
75.	Both fire pumps can be started from the control room or at the intake structure by means of the Underwriters Laboratory listed fire pump controllers.	4.3.1(2)	C	
	Yard Piping			
76.	Separate 12-inch supply lines to the 12-inch underground yard main encircling the plant are provided from each of the fire pumps. The connection points of these supply lines with the yard main system are approximately 10 feet apart with a post indicator valve between.	4.3.1(3)	C	The connection points of the fire pump's supply lines with the yard main system are approximately 24 feet apart.
77.	Post indicator type sectionalizing valves are strategically located along the yard main in order to minimize the effects of a pipe break.	4.3.1(3)	C	
	Hose Cart Houses			
78.	An additional hose cart will be installed in the yard west of the reactor building. This cart and the existing hose carts will contain as a minimum: (1) 150 feet of 2-1/2-inch hose (2) Two 75-foot lengths of 1-1/2-inch hose (3) One gated wye having a female 2-1/2-inch inlet and two 1-1/2-inch male outlets (4) Two 1-1/2-inch and one 2-1/2-inch adjustable spray nozzles	3.1.13, 4.3, 5.18, 3.2.13	C	See Section 3.3.2.

Section 3.3.1 (Cont'd)

Item No.	SER Section Requirement	SER Section Nos.	Comparison	Remarks
	(5) Hydrant and hose coupling spanner wrenches			
	(6) One 1-1/2-inch hydrant gate valve			
79.	The need for a forcible entry tool to be provided in each hose cart will be evaluated.	3.2.11, 4.3	AC	See Section 3.3.2.
80.	The need to provide two hose houses at the east side of the plant at the hydrants nearest the northeast and southeast corners of the turbine building will be evaluated.	3.2.13, 4.3	AC	See Section 3.3.2.
	Hydrostatic Testing of Hoses			
81.	The need to hydrostatically test all hose stored in outside hose cart houses annually at a pressure 50 psi above maximum service pressure will be evaluated.	3.2.12, 4.3	AC	See Section 3.3.2.
	Administrative Controls/Procedures			
	Implement appropriate procedures to ensure that:			
82.	Hose houses will be maintained free of ice and snow that might hinder access;	3.1.14(1), 4.3	C	A-30, "Plant Housekeeping Controls," requires that the plant assistant maintenance engineer ensure the hose houses remain free of ice.
83.	Each hydrant will have the caps removed, threads lubricated, and barrel checked in the fall of each year;	3.1.14(2), 4.3	C	
84.	Procedures are developed for the use of portable smoke removal equipment;	3.1.14(3), 4.4	C	
85.	Pilot and alarm lights for detectors are properly illuminated at control panels;	3.1.14(4), 4.2	C	

Section 3.3.1 (Cont'd)

Item No.	SER Section Requirement	SER Section Nos.	Comparison	Remarks
86.	Fire doors are inspected semiannually to verify self-closing mechanisms and latches are in proper working order;	3.1.14(5), 4.9, 5.15	C	see Item No. 34.
87.	A stepladder will be provided in the control room to provide access to the space above the suspended ceiling;	3.1.14(6), 5.2	C	
88.	Unnecessary combustibles are not stored in the control room complex;	3.1.14(7), 5.2	C	
89.	Prefire strategy plans include manual trip of the auxiliary boiler fuel oil transfer pump	3.1.14(8), 5.15	C	Plant fire procedure provides for manually tripping the auxiliary boiler fuel oil transfer pumps.
90.	Clarification will be provided to demonstrate compliance of the licensee's administrative controls with staff guidelines or justification for deviations will be provided.	3.1.14(9), 6.0	C	Refer to Appendix C, reference 6.
	Fire Water System Valve Supervision			
91.	Chains and locks will be provided on all nonoperating valves controlling the flow of fire water, and administrative controls will be instituted to provide assurance that the fire protection valves are maintained in the appropriate position. Operating valves such as gate valves for deluge control and main discharge valves will be electrically supervised.	3.1.15, 4.3, 5.18	C	Administrative controls have been implemented. TRM 3.14.1.5.
	Diesel Fuel Tank Fill Connection			
92.	The area around the diesel fire pump fuel oil storage tank fill connection will be regraded to prevent a fire involving spilled fuel from affecting the circulating water pumphouse.	3.1.16, 5.18	C	

Section 3.3.1 (Cont'd)

Item No.	SER Section Requirement	SER Section Nos.	Comparison	Remarks
	Safe Shutdown Analysis			
93.	A safe shutdown analysis was performed by assuming a design basis fire in each fire zone and that all equipment within that zone as well as all equipment whose cabling passed through that zone was disabled. The analysis did not address the capability to achieve and maintain both hot and cold shutdown and did not consider the effects of loss of offsite power on shutdown capability. A reevaluation of this analysis will be performed which includes these staff-identified assumptions.	3.2.1, 4.1	C	Refer to Chapter 5 for safe shutdown analysis.
	Cable Separation Criteria			
94.	The adequacy of redundant division cable separation will be evaluated for protection against fire.	3.2.2, 4.10	NA	The cable separation criteria described in this section are no longer a concern. Appendix R requirements are more severe. See Item No. 93 which takes precedence.
95.	The need for modifications will be evaluated to insure that no single panel in the control room contains redundant equipment without a solid fire barrier.	3.2.2, 5.2	NA	Refer to Appendix C, reference 6.
	Gas Suppression System			
96.	The practicality and need for automatic actuation of the carbon dioxide system in the cable spreading room will be evaluated.	3.2.5, 4.3, 5.3	C	See Section 3.3.2.
	(1) The computer room is protected by a manually actuated carbon dioxide system	4.3.2, 5.3	AC	

Section 3.3.1 (Cont'd)

Item No.	SER Section Requirement	SER Section Nos	Comparison	Remarks
	(2) The cable spreading room is protected with a manually actuated carbon dioxide system which can be manually actuated.	4.3.2, 5.3	AC	Cable Spreading Room is a manually actuated system, see Item 96.
97.	The concentrations of carbon dioxide meet the requirements of NFPA 12.	4.3.2	C	
98.	A fixed manually actuated total flooding carbon dioxide system is provided in each diesel generator room.	4.3.2, 5.1.5	C	
99.	The HPCI pump rooms, fire zones 59 and 62, are provided with carbon dioxide extinguishing systems automatically activated by heat detectors.	4.3.2, 5.12	AC	Both HPCI Pump Room CO_2 Systems are manually actuated, see Item 99.
100.	Two carbon dioxide hose reels are mounted in north and south ends of the main control room. These hose reels contain sufficient hose (100 feet each) to reach all areas of the control room that contain electrical equipment.	4.3.2, 5.2	AC	Portable fire extinguishers are provided in the control room. See Section 3.1.2, Items 35 and 65.
101.	Two carbon dioxide hose reels are located in the turbine building at the high pressure turbine bearing lube oil pumps.		C	
	Fixed Foam Systems			
102.	The auxiliary boiler's fuel oil tank is protected by a fixed foam system. The auxiliary boiler building houses the foam system controls and is provided with a hose reel connected to the foam system supply.	4.3.1(6) & 5.18	C	
	Effects of Suppression Systems on Safety Systems			
103.	Water flows from automatic suppression are annunciated on the fire panel in the control room.	4.3.1(7)	AC	See Section 3.3.2.

Section 3.3.1 (Cont'd)

Item No.	SER Section Requirement	SER Section Nos	Comparison	Remarks
104.	Inadvertent fire protection system actuation that may result in damage to safety-related equipment.	4.3.1(7)	C	Refer to Chapter 5 for discussion of inadvertent actuation.
105.	Valves have been provided to isolate sections of fire protection system piping inside buildings to preclude the buildup of water and thus prevent equipment from being incapacitated due to flooding.	4.3.1(7)	C	
106.	Flows from manual hose stations are not annunciated, but they will cause the fire pump to start, thereby transmitting a "fire pump running" signal to the control room.	4.3.1(7)	C	
	Instrument Nitrogen			
107.	In addition to the redundancy and separation of the service air and instrument nitrogen systems, modifications to the fire protection system will provide further assurance that either instrument air or nitrogen will be available if required for shutdown.	4.1.15	NA	The fire protection modifications described in this section are no longer applicable. Appendix R requirements are more severe. Instrument nitrogen supplies required for safe shutdown are analyzed per FPP Section 5.1. See UFSAR Section 10.17 for additional details.
108.	Following the implementation of the modifications of fire protection systems resulting from this review, the Technical Specifications will be similarly modified to incorporate the limiting conditions for operation and surveillance requirements for these modifications.	7.0	C	Changes to the technical specifications to incorporate modifications as a result of the SER were approved 6/16/82.
	Communications			
109.	Six portable two-way radio units will be procured for use of the fire brigade.	3.1.10, 4.7	C	
	Electric Cables			
110.	The power and control cables used at Peach Bottom are capable of passing IEEE-383-1974.	4.8	AC	See Section 3.1.2, Item No. 24.

Section 3.3.1 (Cont'd)

Item No.	SER Section Requirement	SER Section Nos	Comparison	Remarks
111.	Less than 0.3 percent (by volume) of the cables in all the safeguard trays are PVC-jacketed.	4.8	C	
	Control Room Modification			
112.	Carpeting may be installed in the control room. Carpeting will have a critical radiant flux equal to 1.01 watts per square centimeter (ASTM E-648) and therefore will be considered a Class I interior finish and will have a smoke development rating of less than 250 (ASTM E-662).	SER of 10/10/85	AC	Installed floor finishes in the Main Control Room meet the requirements of a "Class I" interior floor finish as defined by NFPA 101-1985 (see reference 3 of Appendix C).

3.3.2 Explanatory Notes for Comparison to Safety Evaluation Report Commitments

Item No. 1

Ionization type fire detectors were installed to provide detection in the areas listed below which were not previously protected (original plant design). The general criteria used in designing the detection systems and the specific factors considered for each included: combustible loading, ventilation characteristics, and room size, geometry, and congestion. All areas listed below were evaluated for conformance with NFPA 72E.

1. Residual heat removal pump rooms
2. Reactor core isolation cooling pump rooms
3. Core spray pump rooms
4. Deleted
5. Enclosed rooms within the control room complex (room nos. 422, 424, 425, 427, and 428)
6. Cable spreading room
7. Diesel generator rooms
8. Diesel generator auxiliary room
9. High pressure service water pump room to replace the existing heat detectors
10. Battery rooms

For the cable spreading room, the 25 ionization type fire detectors were provided in addition to the two existing ones. The cabling used for control and power circuits at Peach Bottom consists of cross-linked polyethylene insulation with a flame retardant neoprene jacket equal to cable construction capable of passing IEEE-383-1974. Because of the inherent fire resistance of the cabling, it is expected that an electrically initiated fire in the cabling will not propagate and involve large quantities of adjacent cabling although an exposure fire involving transient combustible materials could.

The fire detection system in each diesel generator room is provided with nine rate compensation heat detectors. The fire detectors provide adequate protection in accordance with NFPA 72E which is the industry-accepted standard for fire detection. A

fire involving diesel fuel would produce a fast developing, high heat output fire that would be detected quickly by the heat detectors.

The neutron monitoring equipment rooms, fire zones 6S-20 and 13S-30, do not contain safe shutdown components and therefore do not require fire detection per Section III.F of Appendix R. Refer to Appendix C, reference 6.

See Item No. 3 below for discussion of differences between NFPA 72E and installed detectors.

Item No. 2

The area above the control room suspended ceiling contains 26 cables trays. None of these 26 cable trays are safety related. Of the 26 cable trays, 23 contain only cable that is of flame retardant construction. The remaining three cable trays contain only instrumentation cable consisting of polyethylene and PVC insulation and jacketing. Based on this, the three cable trays containing cabling that is not fire retardant have been covered with a fire retardant coating. Therefore, no need exists for the installation of early warning fire detectors in the space above the suspended ceiling of the control room. However, line-type heat detectors were installed in all trays above the control room ceiling.

The control room panels are internally divided into sub-compartments in such a manner to provide segregation of the two primary shutdown systems. Therefore, a panel fire cannot result in the loss of shutdown capability. The panel partitions are sufficient to withstand the heat flux that could be generated by the combustible loading within the panel. In addition, continuous manning of the control room assures prompt detection and suppression of control room fires. For these reasons, fire detection within the control room panel does not appear to be required by the provisions of Appendix R, Section III.F. Refer to Appendix C, reference 6.

As indicated in reference 6 of Appendix C, only two smoke detectors were installed on the refueling floor (which includes the spent fuel pool) in the vicinity of the only safety-related system, the ventilation stack radiation monitoring station. The ventilation stack monitoring stations were removed from the refuel floor. The associated smoke detectors were also removed since there was no other safety related equipment in the area.

Item No. 3

An operational and calibration test has been performed on each detector following installation to ensure its design sensitivity. All fire detector installations were reviewed in 1985 by a qualified fire protection engineer. See also Item Nos. 1, 2, and 5 of this section.

In the diesel fire pump room a heat detector is located at the bottom of a beam greater than 18 inches from the ceiling. Beams are also greater than 8 feet on centers. The heat detector is located closer to the recognized fire hazard and in confined areas such that pockets will not prevent the heat detector from sensing a fire. A fire would also be fast developing. An automatic, wet pipe sprinkler system is provided to extinguish a fire.

The heat detector in the diesel fire pump room is located sufficiently remote from a diesel exhaust pipe. No problems caused by heat from the exhaust pipe actuating the detector have been experienced to date.

Detectors in the plant computer room are not located in every bay formed by ceiling beams that are greater than 18 inches deep and greater than 8 feet on centers. Although some smoke from a localized fire could collect in the beam pockets initially, the small size of the room and the proximity of the detectors to all combustibles will ensure there is not a significant delay in detection because of beam pockets. In addition, the ventilation system will tend to mix the air and smoke in the room.

In the turbine building laydown area on elevation 165 feet, the detector has been placed over the recognized fire hazard (the turbine bearing lube oil lift pumps), approximately 8 feet above the floor rather than near the ceiling due to the height of the ceiling.

Item No. 4

A remote indicator panel has been installed outside the cable spreading room. Each smoke detector in the cable spreading room has a lamp on the panel to indicate detector actuation.

Item No. 5

On the refueling floor, total area protection was not provided due to the minimal combustible loading and the presence of only one safety-related radiation monitoring panel. The safety-related panel was provided with a cabinet detector. The radiation monitoring panel and the smoke detection associated with it has been removed from the refuel floor.

Item No. 7

A water suppression, pre-action sprinkler system having a design density of 0.3 gpm/sq ft was installed over the diked area of the recirculation pump motor generator set lube oil pump rooms. The system is actuated by either of two smoke detectors located over each diked area. The detectors activate the pre-action water spray system flow control valve and the automatic code transmitter via the local smoke detector control panel. A pressure switch is installed to indicate water flow. Heat is required to activate the fusible sprinkler heads. Manual arming of the pre-action system from outside the recirculation pump motor generator set lube oil pump rooms is possible.

ECR 13-00338 removes the pre-action sprinkler system installed over the Unit 3 MG Set Lube Oil Pumps. The Unit 3 MG Set lube oil pumps have been abandoned in place with oil removed. Existing smoke detection which alarms the Main Control Room remains in the room. Water flow and low nitrogen pressure alarms are disabled with removal of the sprinkler system.

A wet-pipe automatic sprinkler system with a design density of approximately 0.20 gpm/sq. ft. was installed to cover the radwaste drummed waste/storage area. Operation of the system will annunciate an alarm via the station fire alarm system.

In the Unit 2 reactor building component cooling water room, a pump motor and electrical junction box may be hit by spray from the sprinkler heads. Considering all available sprinklers, the pattern of the spray covers the hazard, and the electric motors are enclosed and insulated, and the junction boxes are of watertight construction so that electrical arcing and water intrusion should not occur. In the Unit 2 reactor building component cooling water rooms sprinkler heads are more than 16 inches below the ceiling. The maximum head drop specified in NFPA-13 is based on area-wide combustion and does not consider the effects of localized combustion. Where this condition occurs, the sprinkler heads have been lowered to provide more direct spray on a local concentration of combustibles, and fusible links will be melted by rising heat from the fire and not the stratification of hot air near the ceiling. The sprinkler heads are also spaced more than 6 feet from the wall, but this is acceptable since the oil is confined by a dike and the sprinklers are within 6 feet of the dike. Sprinkler heads have been provided around the trash compactor and baling area and satisfy the spacing requirements of NFPA-13 to cover the specific fire hazard. Where ducts and other obstructions could interfere with the spray distribution, the interference has been minimized and care was taken to place supplementary sprinkler heads below the ducts. Sprinkler heads with threaded connections are located at low points in this area and can be removed to provide system drainage if required.

Item No. 9

The likelihood of an explosion in the recombiner building has been addressed in the response to IE Bulletin 78-03 and in reference 8 of Appendix C, in response to staff position PF-42. In addition, NUREG-0442 indicates that an explosion in the off-gas system would not result in an unacceptable release of radiation. The probability of an external fire affecting the recombiner building charcoal filters and exhaust ventilation fans is remote. The equipment is enclosed in a masonry and concrete room with no combustibles present. Ducts passing through the walls are provided with fire dampers, and the charcoal filters are protected by automatic deluge water spray systems. Hose stations and portable extinguishers are also provided in the area. Excessive radiation conditions will initiate an alarm in the control room which will be immediately investigated. Based on this, no additional fire protection provisions in the recombiner building are necessary.

The Unit 2 M-G set room has a full area pre-action sprinkler system. The Unit 3 M-G set room has a pre-action sprinkler system located over the M-G itself. The pre-action sprinkler systems are actuated by the existing ionization type smoke detection located above the M-G sets. Action of both the smoke detection and the pre-action sprinkler system transmits an alarm signal in the control room.

Both the Unit 2 and the Unit 3 MG Set(s) have been abandoned in place per ECR(s) 13-00338 and 15-00378. All oil has been drained from the machines and fluid drives. Pre-action sprinkler system(s) remain in each MG Set Room.

Item No. 18

In the turbine generator equipment areas, sprinkler heads have been located over control/alarm panels, motor control centers, equipment motors, and other electrical equipment that could be hit by spray from the sprinkler heads. The pattern of the spray considering all available sprinklers covers the fire hazard, and the electrical equipment is either enclosed in appropriate NEMA enclosure or insulated so electrical arcing due to water intrusion should not occur. Adequate room coverage has been provided in rooms 228 and 229, even though some sprinkler heads are further from the walls than is recommended by Section 4-5.4 of NFPA 13, since the major source of combustibles is not concentrated near the walls and is covered by other sprinkler heads. Some sprinkler heads in room 274 are located less than 4 inches from the wall; however, the existing clearance is adequate for removal and maintenance of the sprinkler heads. In rooms 124, 135, and 228,

sprinkler heads with threaded connections are located at low points and can be removed to provide system drainage if required. Even though sprinkler heads in room 228 are more than 16 inches below the ceiling, they are immediately below the beams and not more than 20 inches below a noncombustible ceiling, except for one sprinkler head which is located 36 inches below the ceiling in order to provide adequate coverage below enclosed electrical junction boxes.

Item No. 20

Hose stations are equipped with 100 feet of hose. Hose reel carts are provided on elevations 165 feet and 195 feet of each reactor building which are equipped with 200 feet of hose capable of reaching elevations 180 feet and 214 feet. From adjacent hose stations, a 100-foot length of hose will be able to reach all areas of rooms 100, 101, 158, and 159 and will be able to direct a stream of water down through the steel grating floor on all areas of rooms 2, 3, 40, and 41. The stream will cool the rooms, thereby controlling the fire. Portable extinguishers may be needed for final extinguishment. Additional hose is provided to ensure that all areas of the drywell can be reached from the personnel access hatches on elevation 135 feet.

Item No. 24

Portable fire extinguishers are mounted in the pump rooms adjacent to the torus compartment. Considering the low combustible levels, accessibility of the cables, and fire retardant characteristic of the cable insulation, more than sufficient fire protection capabilities presently exist. There is sufficient hose length (300 feet) outside the torus compartment from hose stations HS-116-12 and HS-116-56 such that water coverage of this area will be ensured. In addition hose can be attached to hose stations HS-116-19, HS-116-21, HS-116-47, HS-116-49, HS-135-19, and HS-135-57.

Item No. 25

All of the Peach Bottom hose stations are equipped with Alfco nozzles. All hose nozzles are Alfco spray nozzles except for the nozzles at the following hose stations in the turbine buildings:

HS-165-14	Alfco all fog nozzles
HS-165-72	Alfco all fog nozzles
HS-150-2	Alfco all fog nozzles
HS-150-19	Alfco all fog nozzles
HS-135-5	Alfco super fog nozzles

The Alfco fog nozzle represents the best industrial type nozzle available for use and is safer than a variable gallonage nozzle.

Many years of experience with the Alfco fog nozzle have proven it to be very effective in fighting many types of fires. A ball type shutoff valve has been added to each hose nozzle.

Item No. 27

Nine clean agent portable extinguishers were installed in the control room proper, not in the peripheral rooms. The clean agent extinguishers have a class A rating, the same as water extinguishers and, therefore, provide the same protection as the required water extinguishers. In addition, the clean agent extinguishers greatly reduce the safety hazard present with water extinguishers when the water impinges on energized electrical equipment which may not be directly involved in the fire. This information was transmitted for staff review in reference 7 of Appendix C.

Item No. 33

The condensate pump room doors were upgraded by removing the existing louvers, filling the gap with kaowool insulation, and mounting steel plates on both sides of the door over the openings for support. This was accepted by the NRC in Supplement No. 2 of the SER.

Item No. 34

The existing doors designated as fire doors are certified by Underwriters Laboratories as having a 3-hour fire rating. All fire doors at the plant had been electrically supervised except for 29 doors. The following actions were taken for upgrading the status of the 29 unsupervised doors:

1. Installing self-closing mechanism on the four conventional fire doors lacking this equipment.

2. Providing administration controls to maintain doors in the closed position with the exception of door 230, between the west common stairwell (no. 34) and the contaminated fresh storage area, and door 233, between the turbine building and the radwaste building, which were provided with self-closing mechanisms or are electrically supervised.

3. Posting all 29 fire doors listed with signs stating: "Fire Door - Keep Closed."

4. Providing instructions to maintain fire doors in the closed position except when required to accommodate the movement of personnel and equipment. Instructions will be provided

in the General Employee Training Program and administrative procedures.

5. Inspecting fire doors semiannually to verify that self-closing mechanism and latches are in good working order.

By reference 5 of Appendix C, this commitment in the SER was superseded as follows: "Fire doors will be provided in fire barriers which protect redundant divisions of safety-related systems required to ensure safe shutdown capability in the event of a fire. Fire door surveillance will be performed in accordance with the provisions of 10CFR50, Appendix R, Section III.N."

Two doors, door no. 305 in the entrance to the Unit 2 M-G set vent supply fan room (fire area 27) and door no. 356 in the entrance to the Unit 3 M-G set vent supply fan room (fire area 26) were not purchased to UL requirements; however, each door and frame construction is equal to that of labeled doors and provides adequate fire resistance for the equivalent severity of the combustible loading on either side of the door, zero minutes on the M-G set vent supply fan room side and 41 minutes on the remote shutdown panel area side of the door. This information was previously provided in reference 11, Appendix C.

Fire door assemblies located in safe shutdown fire barriers provide fire resistance required by the barrier in accordance with the requirements by the barrier in accordance with the requirements of Appendix R to 10CFR50. The door assemblies were evaluated against the recommendations presented in UL Inspection Report NC972, 85NK28895. Modifications were performed where required to ensure that the assemblies provide the required fire resistance.

Two door assemblies in the entrance to the cable spreading room, door Nos. 284 and 286 include fire dampers directly above the doors to provide ventilation and vent to C02 during actuation of the C02 suppression system. A fire hazards analysis has concluded that these assemblies provide the required fire resistance.

Item No. 39

In the event of a fire in the control room complex, the control HVAC can be changed over to 100 percent exhaust to the outside and clear the control room of smoke. The control room complex ventilation system can be manually isolated to prevent smoke from entering the area as a result of fires in other areas of the plant. Early warning fire detectors have been provided in the peripheral rooms. Openings in walls separating the main control room and peripheral rooms have been closed. All doors to enclosed

rooms within the control room complex have been provided with self-closing mechanisms.

In the event a fire in the control room complex forced an evacuation of the main control room, the plant can be safely shut down. Refer to Chapter 5 for the safe shutdown analysis.

Item No. 42

The floor between fire zones 2-4B and 4-4C is sealed to provide 3-hour fire resistance for separation required by Appendix R but is not required to be a flood barrier and was therefore not sealed for watertightness as stated in Supplement No. 2 of the SER. Since the floor between fire zones 2-12B and 2-12C is not required to separate redundant safe shutdown methods, penetration seals were not upgraded. Safe shutdown is assured. Refer to Chapter 5 for a description of safe shutdown.

Item No. 47

The control room, cable spreading room, switchgear rooms, battery rooms, and stairway no. 9 are provided with emergency ac lighting, emergency dc lighting, or both, in addition to the normal lighting system.

Item No. 49

A fire detection signal for the detection of Hydrogen Water Chemistry hydrogen fire in any of the hydrogen shrouds located in Fire Area 50-Fire Zone 78A signals the HWC PLC and the PLC provides an output signal to the Fire Protection Annunciation Board 00C201 via the Fire Protection Equipment Panel 00C001. The intent of the hydrogen heat fire detectors is to provide a back-up source for hydrogen leak detection in the shrouds. These hydrogen heat detectors are not area detectors and do not activate any sprinkler or deluge extinguishing systems. These heat detectors are an integral part of the HWC control scheme which prevents hydrogen flow in the case of a leak.

Item No. 51

The curb to prevent the flow of combustible liquids under the doors between the diesel generator rooms is fabricated of 1.5-inch steel angle with appropriate caulking for oil retention.

Item No. 59

Curbing was provided at the door of the diesel fire pump room. The curbing is of sufficient height to contain the volume of the diesel fuel day tank and a suitable sprinkler flow. The installed

curbing will confine an oil spill to this room and prevent a potential fire from affecting safe shutdown. A high temperature shutoff switch has been installed to stop the flow of diesel fuel oil in the event of a fire in the compartment.

The main turbine lube oil storage tank rooms area is protected by a sprinkler system. The existing dikes meet the recommendations of NFPA 30. Therefore, the volumetric capacity of the diked area is not less than the greatest amount of liquid that can be released from the largest tank within the diked area, assuming a full tank.

Dikes were originally provided around the motor-generator set fluid drives to contain any hydraulic fluid associated with a pipe rupture or leak. However, both units MG Sets have since been abandoned in place with all oil removed. Due to the lack of any combustible fluid the diking has been removed (Reference EC 619361). Pre-Action sprinkler systems remain in both units MG-Set rooms. Based on the only remaining hazard (cable insulation), operation of multiple sprinklers in the event of a fire is not expected. The water flow expected from sprinkler operation will not create unacceptable consequences.

Item No. 64

The floor drains from each reactor feed pump turbine lube oil reservoir room each flow into separate 55-gallon drums. The discharge lines each contain a normally closed gate valve before discharging into the 55-gallon drums. Therefore, any oil leakage will be confined to reservoir rooms.

Item No. 69

Fire hydrant H-8 was originally installed in the northwest corner of the plant but was removed in 1971 to accommodate installation of a condensate storage tank and was never reinstalled. The distance between the two hydrants on either side of where hydrant H-8 used to be is 430 feet. An analysis performed in 1982 indicated that 300-foot sections of hose from the two adjacent hydrants could provide coverage for the area that would have been protected by hose connected to hydrant H-8 except for the area northeast of the access road in the back of the plant. This area contains no equipment or structures and is not used for storage. Since no combustibles or ignition sources are present, the likelihood of a fire occurring is negligible. A safety evaluation was written in 1982 addressing this concern.

Item Nos. 78 and 80

There are hose carts located at the north, south, and southeast areas adjacent to the turbine building. An additional hose cart was provided in the yard west of the reactor building. Each cart house contains all the additional equipment recommended.

Item No. 78

Cart house and hose cart were installed but 2-1/2-inch adjustable spray nozzles were replaced with Alfco nozzles with ball valve shutoff. The following items were included in addition to those required by SER Section 3.3.1.

1. An additional 150 feet of 2-1/2-inch hose
2. 400 feet of 1-1/2-inch hose on a reel
3. One 2-1/2-inch hydrant gate valve
4. One 2-1/2-inch fog nozzle
5. One 1-1/2-inch fog nozzle

Item No. 79

Forcible entry tools are stored on each of the fire hose carts. To minimize any potential security concerns, administrative procedures direct that security personnel should report directly to the location of the fire alarm.

Item No. 81

Per Technical Requirements Manual, hoses will be tested annually at a pressure of 50 psi above the maximum operating pressure but not less than 150 psig.

Item No. 96

The CO_2 system in the cable spreading room was changed to manual actuation, and the applicable provisions of NFPA 12 were followed. See ECR 06-00435.

Item No. 99

The CO_2 system in the HPCI Pump Rooms was changed to manual actuation per ECR 04-00077 and 04-00078.

Item No. 103

Water flows from hose stations are not annunciated. Use of a hose station will cause the pressure in the yard main to drop below 140

psig at which point the transmitted signal will automatically cause the electric fire pump to start. Pump running lights in the control room will alert the control room operators. Also when gas is released from the dry pipe systems, the decrease in pressure will cause annunciation in the control room. The fire brigade will then determine if the sprinkler system should be manually actuated to extinguish the fire.

CHAPTER 4

EVALUATION OF POTENTIAL FIRE HAZARDS

4.1 SCOPE OF EVALUATION

This chapter provides an evaluation of the potential for occurrence of fires within the plant and a summary of the capabilities of the existing fire protection program. This evaluation was performed for all structures that contain safety-related equipment or could affect safety-related structures by virtue of the fire hazards present.

A review of the plant was made to identify the combustible materials present, quantify the fire hazard in terms of combustible loading, and relate the potential hazard to the capabilities of the existing fire barriers and fire suppression systems. This information is presented in Table A-1 which lists the type of combustible materials present in each fire zone, the corresponding combustible loading, and the availability of detection and suppression equipment. Figures B-4 through B-13 show the locations of the fire zones, fire barriers, and fire suppression coverage.

4.2 PROCEDURE

The evaluation of fire hazards was performed using a procedure that is summarized by the following steps:

a. For identification purposes, the various structures of the plant were divided into specific fire areas. A fire area is defined as that portion of a structure that is separated from other areas by boundaries (walls, floors, and ceilings) which are of a type of construction which is sufficient to prevent the spread of fire across the boundary, considering the combustible loading in the area. Many fire areas were further subdivided into fire zones to permit more precise identification of the locations of combustible materials, fire detection and suppression systems, and components associated with safety-related systems. The breakdown into fire zones was based on the location of interior walls and slabs with each fire area. Fire areas are identified by a unique number, and fire zones within the same fire area are identified by a subnumber-letter. The fire area and fire zone designations are listed in Table A-1 under "Area/Zone."

b. Each fire zone was surveyed to determine the type, quantity, and distribution of combustible materials present.

c. The combustible loading for each fire zone was determined based on the quantity of combustible materials present and the heat of combustion of each type of combustible material. The heat of combustion values used in this analysis are listed in Table A-2. The quantity of each type of combustible material (unit) was multiplied by the appropriate heat of combustion (in BTU unit) to determine the heat release (in BTU) of each type of combustible material. The total heat release of all combustibles in the fire zone was then calculated by adding the heat release of each combustible material. To obtain the combustible loading (in BTU/ft^2) for each fire zone, the total heat release (in BTU) was divided by the floor area of the fire zone. An additional 400 BTU/ft^2 was added to each fire area to encompass incidental combustibles.

d. The methodology for calculating fire severity (hours) is based on information presented in the 17th edition of the NFPA Handbook. The methodology uses the relationship between the calculated fire load in an area and an exposure to a fire severity which is equivalent to the standard time - temperature curve which is used as the exposure fire in fire resistance rating tests (ASTM E-119). The steps involved in calculating fire severity are as follows:

   1. Calculate the fire load (BTU/ft^2) for an area as stated within the methodology.

   2. Divide the calculated fire load by 80,000 BTU/ft^2 hr to obtain fire severity:

$$\text{Fire Severity} = \frac{\text{Fire Load BTU/ft}^2}{80{,}000 \text{ BTU/ft}^2\text{hr}}$$

e. The classification of the fire loading in a zone is based on the results of fire loading studies performed by the British (contained in the 17th edition of the Fire Protection Handbook). The results of the study show that the loading in an occupancy can be classified as low, moderate, or high, defined by the fire loading (BTU/ft^2) of the occupancy. The classifications are defined as follows:

Low - The fire load of a zone is classified as low if it does not exceed an average of 60,000 BTU/ft^2 of floor area. This loading corresponds to a fire severity of 45 minutes using the standard time temperature curve (ASTM E-119). Classification of fire load in a fire zone or area as low identifies the zone as having a fire severity below that which could be expected to be contained within a 1-hr fire rated enclosure.

Moderate - The fire load of a zone is classified as moderate if it exceeds an average of 60,000 BTU/ft^2 but does not exceed an average of 140,000 BTU/ft^2 of floor area. This loading corresponds to a fire severity of 1 hour, 45 minutes using the standard time temperature curve. Classification of fire load in a fire zone or area as moderate identifies the zone as having a fire severity below that which could be expected to be contained within a 2-hr fire rated enclosure.

High - The fire load of a zone is classified as high if it exceeds an average of 140,000 BTU/ft^2 of floor area. This loading corresponds to a fire severity in excess of 1 hour, 45 minutes using the standard time temperature curve.