SSES-FPRR

UNITS 1 AND 2

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1.0 INTRODUCTION

1.1 OBJECTIVE

This Fire Protection Review Report (FPRR) submitted by PPL Susquehanna, LLC (PPL) describes the fire protection features which ensure the capability to achieve and maintain the cold (safe) shutdown of Susquehanna SES Units 1 and 2 and demonstrates compliance to the requirements of Appendix A to Branch Technical Position Auxiliary Power Conversion Systems Branch 9.5-1 (BTP APCSB 9.5-1); 10CFR50 Appendix R Sections III.G, III.J, III.L and III.O; 10CFR50.48; and General Design Criterion 3 of Appendix A to 10CFR50.

1.2 BACKGROUND

In September of 1976, PPL was informed by the NRC that the guidelines in Appendix A to BTP APCSB 9.5-1 would be used by the NRC to evaluate the fire protection program at Susquehanna SES. Additionally, PPL was requested to provide a fire hazards analysis that divided the plant into distinct fire areas and to show that redundant safety systems required to achieve and maintain cold shutdown are adequately protected against fire damage. By early 1980, most of the aspects of Appendix A had been implemented at Susquehanna. In November, 1980, the NRC issued Appendix R to 10CFR50.

Appendix R was originally intended as a mechanism to close out a limited number of open issues for a limited set of plants. PPL agreed to comply with Sections III.G, III.J and III.O which was applied to all plants. As a result of our analysis compliance to Section III.L is also shown.

1.3 PHILOSOPHY

It is PPL's corporate philosophy that fire protection be provided for all company facilities in order to protect its employees and facilities as well as the general public from the effects of a fire. Subsequently, proper fire protection was an original design objective for Susquehanna SES. In addition to fire protection design features which would insure a safe and reliable facility, further design and programmatic requirements were necessary to prevent damage to those systems and components essential to the safe operation and safe shutdown of the station as well as the control of any radiological release from the station.

It is PPL's philosophy that in the event of a fire, Susquehanna SES Units 1 and 2 will be operated in accordance with symptom based Emergency Operating Procedures and Off Normal Procedures.

This Fire Protection Review Report primarily addresses PPL's compliance to the licensing and regulatory requirements which must be met in order to demonstrate the safe shutdown capability of both reactor units in the event of a design basis fire and to control the release of any radioactive elements from the station.

While Appendix A addresses the fire protection program as a whole, Appendix R requirements more specifically address the capability of both reactors to achieve and maintain a safe shutdown condition. Therefore, where the requirements of Appendix A and Appendix R overlapped, the Appendix R requirements govern since they most directly affect safe shutdown.

1.4 FIRE PROTECTION PROGRAM

1.4.1 Initial Implementation

Bechtel Power Corporation was the architect/engineer for Susquehanna SES and provided the fire protection engineers and consultants to develop the design concept, preparation of specifications, and selection of experienced fire protection contractors during plant construction. Bechtel has designed fire protection systems for several operating nuclear plants and employed a specialized staff that monitored the latest in fire protection methods.

As the plant progressed from a construction to an operational mode, PPL took full responsibility of the fire protection program. Responsibility for the fire protection program is vested in PPL managerial personnel in the same manner as other operating and design responsibilities.

1.4.2 Compliance

The fire protection program is implemented through approved specification, drawings, and procedures which are generated and controlled under the PPL Operational Quality Assurance Program.

PPL's long term compliance program for fire protection is an integral part of the design control process and assures that present plant fire protection features and hazard configurations will not be degraded by the implementation of a design change. Plant procedures control the use and storage of combustible materials. Design specifications and plant procedures provide for the periodic surveillance of required fire protection features. The combustible loading analysis is modified through the design control process.

Through this controlled, programmatic approach, the fire protection features at Susquehanna SES are assured to maintain their integrity as plant operation continues.

1.4.3 Personnel/Training

1.4.3.1 Fire Protection Staff

PPL employs qualified personnel to ensure an adequate fire protection program is provided and maintained. The Site Fire Protection Engineer shall be a qualified fire protection engineer with suitable background experience to meet the job requirements. This will be supplemented with appropriate training from vendor training schools and state fire fighting schools as necessary to carry out the job responsibilities. Other personnel who are assigned fire protection duties will receive the necessary training to perform their assigned functions. Training for the fire protection staff shall include the following as necessary:

a) design and maintenance of fire detection, suppression, and extinguishing systems.

b) fire prevention techniques and procedures.

c) training and manual fire fighting techniques and procedures for plant personnel and fire brigade.

1.4.3.2 Other Station Employees

Instruction shall be provided for all employees with an unescorted security clearance. The instruction shall include, as appropriate, the fire protection program, recognizing the station emergency alarm sirens, and response to a fire related incident, including reporting a fire and evacuating the area.

Instruction shall be provided for security personnel that addresses entry control procedures for outside fire departments and other emergency response agencies, crowd control for personnel exiting the station, and procedures for reporting potential fire hazards observed when touring the facility.

Instruction shall be provided to all non fire brigade shift personnel to familiarize them with fire brigade activities and responsibilities.

Instruction shall be provided, as appropriate, to those personnel responsible for performing the inspection and maintenance of fire protection equipment.

Employees (when present at the time of a drill) shall participate in a fire exit drill to familiarize them with the evacuation routes and procedures for the individual office/administrative buildings on site. Fire exit drills should be held annually.

1.4.3.3 Fire Brigade

1) Instruction

  a) Instruction in the topics listed in (d) below shall be administered to individuals as required to supplement previous experience and training prior to assignment as a fire brigade member.

  b) Refresher instruction shall be provided to all fire brigade members on a regularly scheduled basis of not less than four (4) sessions per calendar year. One (1) quarter of grace shall be allowed for make-up of a missed session. The sessions will be repeated at a frequency of not more than 2 years.

  c) The instruction shall be provided by qualified individuals, knowledgeable and experienced in fighting the types of fires that could occur in the plant, and in using the types of equipment provided in the plant. Members of the Fire Protection staff may also conduct this training.

  d) The scope of this instruction should include the following items:

    i) An identification of the fire hazards and associated types of fires that could occur in the plant, and an identification of the location of the hazards, including areas where breathing apparatus is required, regardless of the size of the fire.

ii) Identification of the location of installed and portable firefighting equipment in each area, and familiarization with layout of the plant including access and egress routes to each area.

iii) The proper use of available fire fighting equipment, and the correct method of fighting each type of fire. The types of fires covered shall include electrical fires, fires in cables and cable trays, hydrogen fires, flammable liquids, waste/debris fires, and record file fires.

iv) Indoctrination in the plant fire fighting plan, with coverage of each individual's responsibilities, including changes thereto.

v) The proper use of breathing equipment, communication, lighting, and portable ventilation equipment.

vi) A detailed review of the fire fighting procedures and procedure changes, with particular emphasis on what equipment must be used in particular areas.

vii) A review of latest modifications, additions, or changes to the facility or procedures which affect the fire fighting equipment or the fire fighting plan.

viii) The proper method of fighting fires inside building and tunnels.

ix) Special instruction shall be provided for fire brigade leaders in directing and coordinating fire fighting activities.

2) Hands-On Training/Practice

Hands-on training/practice sessions shall be held for fire brigade members on the proper method of fighting various types of fires. These sessions shall provide brigade members with practice in extinguishing actual fires, except in the case of energized cables. Practice sessions shall be conducted at facilities remote from the nuclear power plant so as not to endanger safety-related equipment. These practice sessions shall be provided annually.

Practice sessions shall also be conducted that require fire brigade members to don protective equipment, including emergency breathing apparatus. These practice sessions shall not necessarily include fire fighting. These practice sessions shall be provided annually.

3) Drills

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

a) The simulated use of equipment for the various situations and types of fires which could reasonably occur in each safety-related area.

b) Conformance, where possible, to the established plant fire fighting plans (pre-fire plans).

c) Operating fire fighting equipment where practical. This will include self-contained breathing apparatus, communication equipment and portable and/or installed ventilation equipment.

d) Drills shall be performed quarterly for each Operations shift. The minimum number of Fire Brigade drills conducted within a calendar quarter shall be equal to the number of Operations shifts at the station. At least one drill per calendar year for each Operations shift shall be unannounced. Each individual assigned to the Fire Brigade shall participate in at least 2 drills per calendar year. New Fire Brigade members or members who are reassigned to the Fire Brigade after June 30 of a calendar year shall only be required to participate in one (1) drill in that calendar year.

e) Periodically (at least annually), the off-site fire department personnel shall be requested to participate in these drills. These drills shall conform with the facility plan for coordination with off-site fire departments.

f) The drills shall be preplanned to establish the training objectives of the drills. The drills will be critiqued to determine how well the training objectives have been met. At a minimum, the critique shall assess:

   i) The effectiveness of the Fire alarms,

   ii) Time required to notify and assemble the Fire Brigade,

   iii) Selection, placement and use of equipment,

   iv) Use of the Pre-Fire Plan,

   v) Each Fire Brigade member's knowledge of their role and ability to perform their assignments,

   vi) The Fire Brigade Leader's direction of the firefighting effort.

4) Organization

The Operations Shift Manager - shall not be a member of the fire brigade.

1.4.3.4 Off-Site Fire Departments

Off-site fire departments shall be offered training annually to include basic radiation principles and practices, typical radiation hazards that may be encountered when fighting fires, and related procedures. This training should also include site access and egress practices and procedures for emergency responders.

1.5 CONTENT AND FORMAT

This FPRR is intended to address those fire protection aspects of the plant which are required to satisfy the requirements delineated in Section 1.1. This report focuses primarily on the demonstration of the capability to bring and maintain both units at Susquehanna SES in a safe shutdown condition in the event of a design basis fire.

Section 2.0 of this report provides a listing of terms and definitions to provide clarity and understanding while reviewing this report. Some of the terms are uniquely applicable to the Susquehanna Fire Protection Program while others are defined to provide a uniform base of understanding to the reader.

Section 3.0 of this report explains the methodology used to perform the safe shutdown analysis and to demonstrate that both reactor units can be safely shutdown in the event of a fire.

Section 4.0 of this report describes the active and passive fire protection features used at Susquehanna SES. This includes the fire detection and suppression systems, water supply systems, raceway wrappings, cable insulation, etc.

Section 5.0 of this report contains an item-by-item comparison of Susquehanna SES design with the applicable positions of Appendix A to BTP APSCB 9.5-1 and 10CFR50 Appendix R.

Section 6.0 of this report discusses the fire hazards and plant shutdown methods on a fire area basis. In this section, each fire area of the plant is addressed designating the method to be utilized for achieving and maintaining safe shutdown in the event of a fire.

Section 7.0 of this report contains the Appendix R deviation requests required to support the safe shutdown analysis. Each deviation request addresses plant conditions where a specific Appendix R requirement is not met. The deviation request serves as a means to justify the acceptability of the non-conforming condition based on engineering and fire hazard analysis.

Section 8.0 of this report contains the upper tier fire protection features drawings necessary to understand the technical content of this report and to demonstrate the fire protection features of the plant.

2.0 DEFINITIONS

The following definitions are derived using the general industry recognized definition of the term around the time of inception of Appendix R. The terms defined in this section are used throughout this report or in the post-fire safe shutdown analysis.

2.1 ADJACENT FIRE ZONE

An adjacent fire zone is a fire zone having a physical point of contact with a primary fire zone.

2.2 ASSOCIATED CIRCUITS

Those cables (safety related, non-safety related, Class 1E, and non-Class 1E) that have a physical separation less than that required by Appendix R Section III.G.2 and; have one of the following:

Common Power Source

A common power source with the shutdown equipment (redundant or alternative) and the power source is not electrically protected from the circuit of concern by coordinated breakers, fuses, or similar devices, or

Spurious Operation

A connection to circuits of equipment whose spurious operation would adversely effect the shutdown capability (e.g., RHR/RCS isolation valves, ADS valves, instrumentation, steam bypass, etc.), or

Common Enclosure

A common enclosure (e.g., raceway, panel, junction, etc.) with the shutdown cables (redundant or alternative) and, are not electrically protected by circuit breakers, fuses or similar devices, or will allow the propagation of the fire into the common enclosure.

2.3 BUFFER ZONE

A buffer zone is a fire zone which acts as a spatial barrier between two adjacent fire areas. Using the fire spread limitation, and by assuring multiple paths within two or more adjacent fire zones (referred to as buffer zones), adequate separation between fire areas with different safe shutdown paths is provided without fire barriers (See Deviation Request No. 7).

2.4 CABLE

A conductor with insulation, or a stranded conductor with or without insulation and other coverings (single-conductor cable) or a combination of conductors insulated from one another (multiple-conductor cable).

2.5 CABLE HIT

A safe shutdown cable, required to support a safe shutdown component for a particular safe shutdown path, that is located in a fire zone which credits that particular safe shutdown path as the required safe shutdown path in the event of a fire in that fire zone (i.e. potential Appendix R non-compliance). The cable could also be a cable associated with a component whose spurious operation could affect the required safe shutdown path.

2.6 CATEGORY I COMPONENT

A safe shutdown component which may be required to perform a safe shutdown function in the event of potential fire damage in the fire zone where the component is located.

2.7 CIRCUIT

A conductor or system of conductors through which an electric current is intended to flow.

2.8 CIRCUIT FAILURE MODES

The following are the circuit failure modes that are postulated in the Post-Fire Safe Shutdown Analysis as a result of a fire:

Hot Short

A fire induced insulation breakdown between conductors of the same cable, a different cable or from some other external source resulting in a compatible but undesired impressed voltage on a specific conductor.

Open Circuit

A fire induced break in a conductor resulting in a loss of circuit continuity.

Short-to-Ground

A fire induced breakdown of a cable's insulation system resulting in the potential on the conductor being applied to ground potential.

2.9 COLD SHUTDOWN

Cold shutdown occurs when the reactor mode switch is in the shutdown position and the average reactor coolant temperature is less than 212° F at saturated conditions. Both the Technical Specification and the FSAR have exercised conservatism by using the value of less than or equal to 200° F for the Cold Shutdown Condition Definition.

2.10 COLD SHUTDOWN REPAIR

Repairs made to fire damaged equipment required to support achieving or maintaining cold shutdown for the required safe shutdown path.

2.11 CONDUCTOR

A single 'wire' within a cable; conductors could also be considered a circuit or a cable.

2.12 DESIGN BASIS FIRE

A postulated event used in the post-fire safe shutdown analysis. See Exposure Fire.

2.13 ENCLOSURE

An identifiable housing such as a cubicle, compartment, terminal box, panel, or enclosed raceway used for electrical equipment or cables.

2.14 EXPOSURE FIRE

An exposure fire is a fire in a given area that involves either in situ or transient combustibles and is external to any structures, systems, or components located in or adjacent to that same area. The effects of such fire (e.g., smoke, heat, or ignition) can adversely affect those structures, systems, or components important to safety. Thus, a fire involving one train of safe shutdown equipment may constitute an exposure fire for the redundant train located in the same area, and a fire involving combustibles other than either redundant train may constitute an exposure fire to both redundant trains located in the same area.

2.15 FIRE AREA

The term "fire area" as used in Appendix R means an area sufficiently bounded to withstand the hazards associated with the fire area and, as necessary, to protect important equipment within the fire area from a fire outside the area. A fire area may consist of one or more fire zones.

Fire area boundaries need not be completely sealed with floor-to-ceiling and/or wall-to-wall boundaries. Where such boundaries are not floor-to-ceiling or floor-to-floor boundaries with all penetrations sealed to the fire rating of the boundary, an evaluation is performed to assess the adequacy of the fire area boundary to withstand the hazard associated with the area and to protect safe shutdown equipment within the area from a fire outside of the area. Fire area boundary components have been justified to be acceptable in deviation requests and/or fire hazard analysis.

The primary containment wall are considered to be acceptable fire area boundaries because of their unique construction and since the primary containment is inerted.

2.16 FIRE BARRIER

Those components of construction (walls, floors, and their supports), including beams, joists, columns, penetration seals or closures, fire doors, fire dampers and electrical raceway fire wrapping that are rated by approving laboratories in hours of resistance to fire and are used to prevent the spread of fire.

2.17 FIRE LOADING

The amount of combustible material present in a given room, zone or area, usually expressed in the total heat released (BTU) per square foot of floor area of each fire zone and converted to equivalent minutes of fire duration.

2.18 FIRE PROTECTION PROGRAM

The fire protection policy for the protection of structures, systems, and components important to safety at each plant and the procedures, equipment, and personnel required to implement the program at the plant site. The fire protection program shall extend the concept of defense-in-depth to fire protection in fire areas important to safety, with the following objectives:

a) To prevent fires from starting;
b) To detect rapidly, control, and extinguish promptly those fires that do occur;
c) To provide protection for structures, systems, and components important to safety so that a fire that is not promptly extinguished by the fire suppression activities will not prevent the safe shutdown of the plant.

2.19 FIRE RATING

The time in minutes or hours that materials or assemblies have withstood a standard fire exposure as established by testing requirements such as ASTM E-119 (NFPA 251).

2.20 FIRE SUPPRESSION

Refers to the capability to control and extinguish a fire (fire fighting). Manual fire suppression activities refer to the use of hoses or portable extinguishers. Fixed suppression refers to permanently installed, non-portable suppression systems that are automatically actuated by fire or smoke sensing devices (e.g., detectors and/or fusible links) or manually actuated by plant personnel.

2.21 FIRE UNIT

A plant fire could cause impacts to both of the units at SSES. The unit primarily affected by the fire. For example, Unit 1 is the "fire unit" for a fire in the Unit 1 Reactor Building. For common plant areas where either unit could be the "fire unit", the post-fire safe shutdown analysis has designated which unit is to be considered to be the fire unit. The unit which is not the "fire unit" is designated as the "non-fire unit".

Refer to the definition of "non-fire unit" for additional information.

2.22 FIRE ZONE

The subdivision of fire area(s) for analysis purposes that is not necessarily bounded by fire rated barriers.

2.23 FLOW DIVERSION COMPONENT

A flow diversion component for Appendix R safe shutdown analysis purposes is a component that can divert fluid flow from any safe shutdown system or the reactor pressure vessel.

2.24 FREE OF FIRE DAMAGE

The structure, system or component under consideration is capable of performing its intended function during and after the postulated fire, as needed. It may perform this function automatically, by remote control, or by manual operations.

2.25 HIGH IMPEDANCE FAULT

An electrical fault below the trip point for a breaker on an individual circuit.
See 'Multiple high impedance fault'.

2.26 HIGH/LOW PRESSURE INTERFACE

A valve whose spurious opening could result in a loss of Reactor Pressure Vessel inventory and, due to the lower pressure rating on the down stream piping, an interfacing LOCA.

2.27 HOT SHORT

See 'Circuit failure modes'.

2.28 HOT SHUTDOWN

Hot shutdown occurs when the reactor mode switch is in the shutdown position and the average reactor coolant temperature is greater than 212° F at saturated conditions. Both the Technical Specification and the FSAR have exercised conservatism by using the value of greater than 200° F for the Hot Shutdown Condition Definition.

2.29 IN-SITU COMBUSTIBLE

In-situ combustibles are combustible materials which are permanently installed in the plant during initial construction and through the modification process.

2.30 INTERVENING COMBUSTIBLES

An intervening combustible is a material which can propagate fire from one location to another. This does not include cables in conduit, cables in wrapped cable tray or transient combustibles.

2.31 ISOLATION DEVICE

A device in a circuit which prevents malfunctions in one section of a circuit from causing unacceptable influences in other sections of the circuit or other circuits.

2.32 LOCAL CONTROL

Operation of safe shutdown equipment on the required safe shutdown path using remote controls (e.g., control switches) specifically designed for this purpose from a location other than the main control room.

2.33 MANUAL OPERATION

Operation of safe shutdown equipment on the required safe shutdown path by an operator when automatic, local or manual controls are no longer available
(e.g. opening of a motor operated valve using the hand wheel).

2.34 MANUAL CONTROL

Operation of safe shutdown equipment on the required safe shutdown path using the control room control devices (e.g., switches) in the event that automatic control of the equipment is either inhibited based on plant procedures or unable to function as a result of fire induced damage.

2.35 MECHANICAL COMPONENT

A component supporting safe shutdown which does not have an electrical interface (e.g. tank, accumulator, turbine-driven pump, heat exchanger).

2.36 MULTIPLE HIGH IMPEDANCE FAULT(S)

A condition where multiple circuits fed from a single power distribution source each have a high impedance fault. See 'High Impedance Fault'.

2.37 NON-FIRE UNIT

The unit not experiencing the fire. Depending on the fire conditions, this unit may also need to be safely shutdown. This definition applies to fires outside of the Control Room only. For a fire in the Control Room, both units are considered to be the "fire unit".

2.38 OPEN CIRCUIT

See 'Circuit failure modes'.

2.39 PRIMARY FIRE ZONE

The primary fire zone is the fire zone where the fire is assumed to be initiated.

2.40 RACEWAY

Any channel that is designed and used expressly for supporting wires, cable, or bus bars. Raceways consist primarily of, but are not restricted to, cable trays, wireways, conduits, and interlocked armor enclosing cable.

2.41 REMOTE CONTROL

Plant design features that allow the operation of equipment through a combination of electrically powered control switches and relays. Remote control can typically be performed from the main control room or from local control stations, including the remote shutdown panel and other locations with control capability outside of the main control room.

2.42 REMOTE SHUTDOWN LOCATION

A plant location outside of the main control room with remote control capability.

2.43 REMOTE SHUTDOWN PANEL

The plant location included within the plant design for the purpose of satisfying the requirements of 10 CFR 50 Appendix A General Design Criteria 19. If electrical isolation and redundant fusing is provided at this location, it may also be suitable for use in achieving and maintaining safe shutdown for an event such as a main control room fire.

2.44 REPAIRS

A repair constitutes an action which alters the plant equipment in order to restore the function of equipment that has been damaged by the fire. For Appendix R compliance, such repairs are only permitted to restore the capability to achieve cold shutdown and the repair activity must be controlled by procedures and all material required for the repair activity must be readily available on site. Repairs for III.G shutdown must be completed within 72 hours after the start of the fire. Repairs for III.L must be completed in a time frame such that cold shutdown can be achieved within 72 hours.

2.45 REQUIRED SAFE SHUTDOWN PATH

The safe shutdown path selected for achieving and maintaining safe shutdown in a particular fire area. This safe shutdown path must be capable of performing all of the required safe shutdown functions.

2.46 REQUIRED SAFE SHUTDOWN SYSTEM

A system that performs one of the required safe shutdown functions and is, therefore, a part of the required safe shutdown path for a particular fire area.

2.47 REQUIRED SAFE SHUTDOWN EQUIPMENT/COMPONENT

Equipment that is required to either function or not malfunction in order that the required safe shutdown path will be capable of achieving and maintaining safe shutdown in a particular fire area.

2.48 REQUIRED SAFE SHUTDOWN CABLE/CIRCUIT

Cable/circuit required to support the operation or prevent the maloperation of required safe shutdown equipment in a particular fire area.

2.49 SAFE SHUTDOWN

For Appendix R Section III.G, Safe Shutdown is defined as the ability, with the plant starting from 100% power operation, to achieve and maintain hot shutdown with those systems required for cold shutdown able to be repaired within 72 hours.

For Appendix R Section III.L, Safe Shutdown is defined as the ability, with the plant starting from 100% power operation, to achieve cold shutdown conditions within 72 hours and to maintain cold shutdown conditions thereafter.

2.50 SAFE SHUTDOWN CAPABILITY

Redundant

Any combination of equipment and systems with the capability to perform the shutdown functions of reactivity control, inventory control, decay heat removal, process monitoring and associated support functions when used within the capabilities of its design.

Alternative

Where none of the hot shutdown trains of the redundant safe shutdown capability is "free of fire damage" and dedicated equipment is not provided, the shutdown systems used are classified as alternative.

Dedicated

A system or set of equipment specifically installed to provide one or more of the post-fire safe shutdown functions of inventory control, reactivity control, decay heat removal, process monitoring, and support as a separate train or path.

2.51 SAFE SHUTDOWN EQUIPMENT/COMPONENT

Equipment included in the analysis of post-fire safe shutdown capability to demonstrate compliance with Appendix R.

2.52 SHORT-TO-GROUND

See 'Circuit failure modes'.

2.53 SAFE SHUTDOWN PATHS

A specific combination of analyzed systems and equipment capable of achieving and maintaining a safe shutdown condition during and following an exposure fire.

2.54 SPURIOUS OPERATION

The inadvertent operation or repositioning of a piece of equipment.

2.55 TRANSIENT COMBUSTIBLES

Transient combustibles are combustible materials that are not permanently installed in the plant through the plant modification process. Transient combustibles are administratively controlled.

2.56 WRAPAROUND AREA

On Elevations 683'-0, 719'-1 and 749'-1 of both reactor buildings, an area 66 feet wide has been designated as the Wraparound Area. The Wraparound Area has no physical boundaries but is used to provide spatial separation between the north and south sides of the reactor buildings, each of which generally contains opposite paths of safe shutdown equipment. Within the Wraparound Area, both paths of safe shutdown equipment are protected, unless specifically identified in a deviation request or fire hazards analysis. The concept of the Wraparound Area is presented in Deviation Request No. 4.

3.0 SAFE SHUTDOWN ANALYSIS

3.1 INTRODUCTION

The purpose of this section is to identify the methodology used by PPL Susquehanna, LLC (PPL) to demonstrate that both units at the Susquehanna Steam Electric Station (SSES) can be brought to and maintained in a safe shutdown condition assuming a single fire in any fire area. PPL has committed to perform the post-fire safe shutdown analysis in accordance with 10CFR50 Appendix R Sections III.G, III.J, III.L (as required by III.G.3) and III.O.

The post-fire safe shutdown analysis for SSES is a systems based approach. Specific safe shutdown paths are developed and the availability of one of these paths is assured in each fire area. Credit is not assumed for any system that has not been rigorously determined to be free of fire damage in a particular fire area. Equipment with the potential to spuriously operate and to affect the ability of the required safe shutdown path to achieve and maintain safe shutdown is identified. Equipment with this spurious operation potential is included on any safe shutdown path that it could affect. Fire induced impacts to this equipment is addressed in the same manner as fire induced impacts to equipment on the required safe shutdown path for a particular fire area.

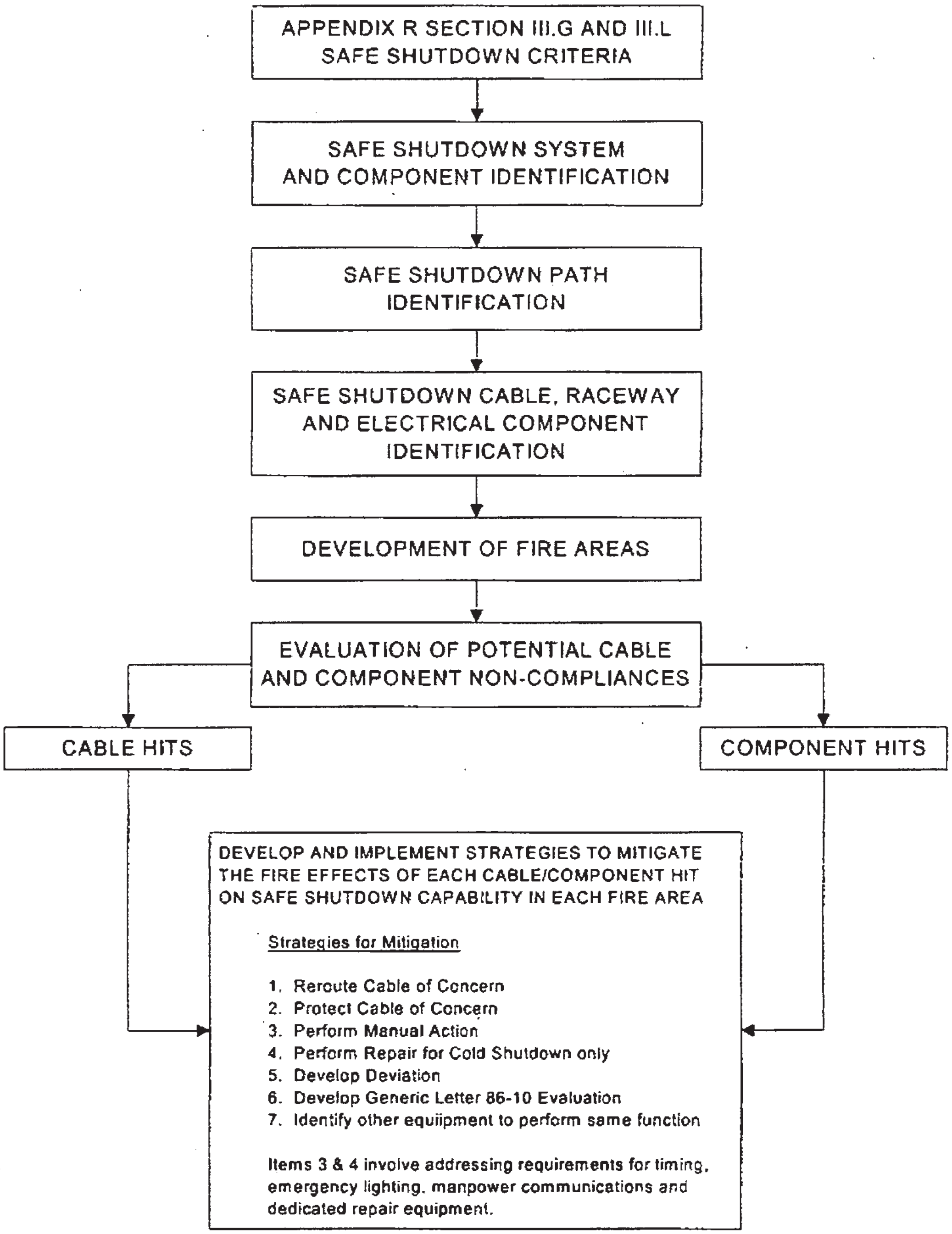
Depending on the fire conditions, a single fire in one unit could require that both units be brought to the safe shutdown condition. As such, the methodology covered in this report addresses safely shutting down both units from the 100% power operating condition to the cold shutdown condition. For each plant area, a "fire unit" and a "non-fire unit" shutdown path are designated. The "fire unit" is the unit that is primarily affected by the fire. For example, for a fire in the Unit 1 Reactor Building, Unit 1 would be designated as the "fire unit". The "non-fire unit" is the unit not designated as the "fire unit". In the previous example, Unit 2 would be the "non-fire unit".

For post-fire safe shutdown meeting the requirements of Appendix R Sections III.G.1 and 2, offsite power may be used to achieve and maintain safe shutdown provided it has been demonstrated that the fire will not cause a loss of offsite power. Offsite power has been demonstrated to be unaffected by the fire in certain fire areas. In most fire areas, however, the onsite power provided by the Emergency Diesel Generators is used to achieve and maintain post-fire safe shutdown.

For alternative post-fire safe shutdown meeting the requirements of Appendix R Sections III.G.3 and III.L, the ability to achieve and maintain safe shutdown must be demonstrated for the conditions of offsite power available and offsite power not available. This requirement is satisfied for SSES by assuming that offsite power is lost for the alternative shutdown path. The Control Room Fire Area is the only fire area where alternative shutdown is used at SSES.

Table 3.1-1 is a flow chart that provides an overview of the method used to bring SSES into compliance with Appendix R Sections III.G and III.L.

TABLE 3.1-1
APPENDIX R COMPLIANCE FLOW CHART



DEVELOP AND IMPLEMENT STRATEGIES TO MITIGATE THE FIRE EFFECTS OF EACH CABLE/COMPONENT HIT ON SAFE SHUTDOWN CAPABILITY IN EACH FIRE AREA

Strategies for Mitigation

1. Reroute Cable of Concern
2. Protect Cable of Concern
3. Perform Manual Action
4. Perform Repair for Cold Shutdown only
5. Develop Deviation
6. Develop Generic Letter 86-10 Evaluation
7. Identify other equiipment to perform same function

Items 3 & 4 involve addressing requirements for timing, emergency lighting, manpower communications and dedicated repair equipment.

3.2 CRITERIA

3.2.1 10CFR50 Appendix R Section III.G.1 and 2

The criteria used to demonstrate safe shutdown capability in accordance with Appendix R Sections III.G.1 and 2 is depicted in Table 3.2-1 and described as follows:

Fire protection features shall be provided for structures, systems and components important to safe shutdown. These features shall be capable of limiting fire damage so that::

a. One train of systems necessary to achieve and maintain hot shutdown conditions from either the control room or the emergency control station(s) are free of fire damage; and

b. Systems necessary to achieve and maintain cold shutdown from either the control room or emergency control station(s) can be repaired within 72 hours.

Free of fire damage is achieved when the structure, system or component under consideration is capable of performing its intended function during and after the postulated fire, as needed. It may perform this function automatically, by remote control or by manual operations.

During the post-fire shutdown, the reactor coolant system process variables shall be maintained within those predicted for a loss of normal a.c. power, and the fission product boundary integrity shall not be affected; i.e. there shall be no fuel clad damage, rupture of any primary coolant boundary, or rupture of the containment boundary. Deviation Request No. 33 describes that the process variables when using ADS and Core Spray as a redundant post-fire safe shutdown path may be worse than predicted for a loss of normal a.c., but that there will be no affect on the integrity of fission product boundary. When using ADS and Core Spray as a redundant post-fire safe shutdown path there will be no fuel clad damage, no rupture of the primary coolant boundary and no rupture of the primary containment. Additionally, Deviation Request No. 33 concludes that the reactor coolant makeup function can maintain the reactor coolant level above the top of active fuel when using this redundant post-fire safe shutdown path.

Shutdown systems installed to ensure post-fire safe 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, e.g., because of interface with or impact on existing safety systems, or because of adverse valve actions due to fire damage. No design basis event or non-fire damage induced equipment failure is considered in conjunction with a fire for this section.

The safe shutdown equipment and systems for each fire area shall be known to be isolated from associated non-safety circuits in the fire area so that hot shorts, open circuits or shorts to ground in the associated circuits will not prevent operation of the safe shutdown equipment. Except as provided for in Section 3.2.2, where cables or equipment, including associated non-safety circuits that could prevent operation or cause maloperation due to hot shorts, open circuits, or shorts to ground, of redundant trains of systems necessary to achieve and maintain hot shutdown conditions are located within the same fire area outside of primary containment, one of the following means of ensuring that one of the redundant trains is free of fire damage shall be provided:

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;

b. Separation of cables and equipment and associated non-safety circuits of redundant trains by a horizontal distance of more than 20 feet with no intervening combustible or fire hazards. In addition, fire detectors and automatic fire suppression system shall be installed in the fire area; or

c. Enclosure of cable and equipment and associated non-safety circuits of one redundant train in a fire barrier having a 1-hour rating. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area.

Each of these separation approaches may be supplemented with or replaced by deviation requests or fire hazards analysis that demonstrate an equivalent level of protection to that required above. Deviation requests are used when it is intended that the alternative compliance approach is to be submitted to the NRC for their concurrence. Fire hazards analysis are an equivalent alternative to deviation requests and are to be prepared using the guidance in NRC Generic Letter 86-10. There is, however, no regulatory requirement to submit either deviation requests or fire hazards analysis to the NRC for acceptance. Maintaining these on file and available for NRC review is an acceptable approach.

For those fire areas where the separation requirements described above cannot be met, the requirements of Appendix R Section III.G.3 apply.

3.2.2 10CFR50 Appendix R Section III.L (As Required by Section III.G.3)

Appendix R Section III.L criteria has been used to demonstrate alternative or dedicated shutdown capability. Compliance with Appendix R Section III.L follows directly from Section III.G.3 for areas where the separation features of Section III.G.2 cannot be met. In accordance with Appendix R Section III.G.3, the following requirements apply to the Alternative Shutdown Capability.

Alternative shutdown capability and its associated circuits independent of cables, systems or components in the areas, room or zone under consideration, shall be provided:

a. Where the protection of systems whose function is required for hot shutdown does not satisfy the requirement of paragraph G.2 of this section; or

b. Where redundant trains of systems required for hot shutdown located in the same fire area may be subject to damage from fire suppression activities or from the rupture or inadvertent operation of fire suppression systems.

In addition, fire detection and a fixed fire suppression system shall be installed in the area, room, or zone under consideration.

Fire Area CS-9, Control Room, is the only fire area where alternative shutdown is provided. Fire Area CS-9 does not have a fixed suppression system throughout the fire area. Deviation Request No. 23 describes the fire protection features in Fire Area CS-9, Control Room Fire Area. This deviation request justifies the lack of a fixed suppression system for Fire Area CS-9.

The systems and equipment needed for alternative post-fire safe shutdown are those systems necessary to perform the following shutdown functions: reactivity control, reactor coolant makeup, reactor depressurization and heat removal, process monitoring and associated support functions. The criteria as stated in Appendix R Section III.L for systems performing these shutdown functions are as follows:

1. Alternative or dedicated shutdown capability provided for a specific fire area shall be able to (a) achieve and maintain sub-critical reactivity conditions in the reactor; (b) maintain reactor coolant inventory; (c) achieve and maintain hot shutdown; (d) achieve cold shutdown conditions within 72 hours; and (e) maintain cold shutdown conditions thereafter. During the post-fire shutdown, the reactor coolant system process variables shall be maintained within those predicted for a loss of normal a.c. power, and the fission product boundary integrity shall not be affected; i.e. there shall be no fuel clad damage, rupture of any primary coolant boundary, or rupture of the containment boundary.

2. The performance goals for the shutdown functions shall be:

   a. The reactivity control function shall be capable of achieving and maintaining cold shutdown reactivity conditions.

   b. The reactor coolant makeup function shall be capable of maintaining the reactor coolant level above the top of the core for BWRs.

   c. The reactor heat removal function shall be capable of achieving and maintaining decay heat removal.

   d. The process monitoring function shall be capable of providing direct readings of the process variables necessary to perform and control the above functions.

   e. The supporting functions shall be capable of providing the process cooling, lubrication, etc., necessary to permit the operation of the equipment used for safe shutdown functions.

3. The shutdown capability for specific fire areas may be unique for each such area, or it may be one unique combination of systems for all such areas. In either case, the alternative shutdown capability shall be independent of the specific fire area(s) and shall accommodate post-fire conditions where off-site power is available and where off-site power is not available for 72 hours. Procedures shall be in effect to implement this capability.

4. 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. If such equipment and systems will not be capable of being powered by both onsite and off-site electric power systems because of fire damage, an independent onsite power system shall be provided. The number of operating shift personnel, exclusive of fire brigade members, required to operate such equipment and systems shall be on site at all times.

5. 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. Materials for such repairs shall be readily available on site and procedures

shall be in effect to implement such repairs. If such equipment and systems used prior to 72 hours after the fire will not be capable of being powered by both onsite and off-site electric power systems because of fire damage, an independent onsite power system shall be provided. Equipment and systems used after 72 hours may be powered by off-site power only.

6. Shutdown systems installed to ensure post-fire 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, e.g., because of interface with or impact on existing safety systems, or because of adverse valve actions due to fire damage.

7. The safe shutdown equipment and systems for each fire area shall be known to be isolated from associated non-safety circuits in the fire area so that hot shorts, open circuits or shorts to ground in the associated circuits will not prevent operation of the safe shutdown equipment. The separation and barriers between trays and conduits containing associated circuits of one safe shutdown division and trays and conduits containing circuits or safe shutdown cables from the redundant division, or the isolation of these associated circuits from the safe shutdown equipment, shall be such that a postulated fire involving associated circuits will not prevent safe shutdown.

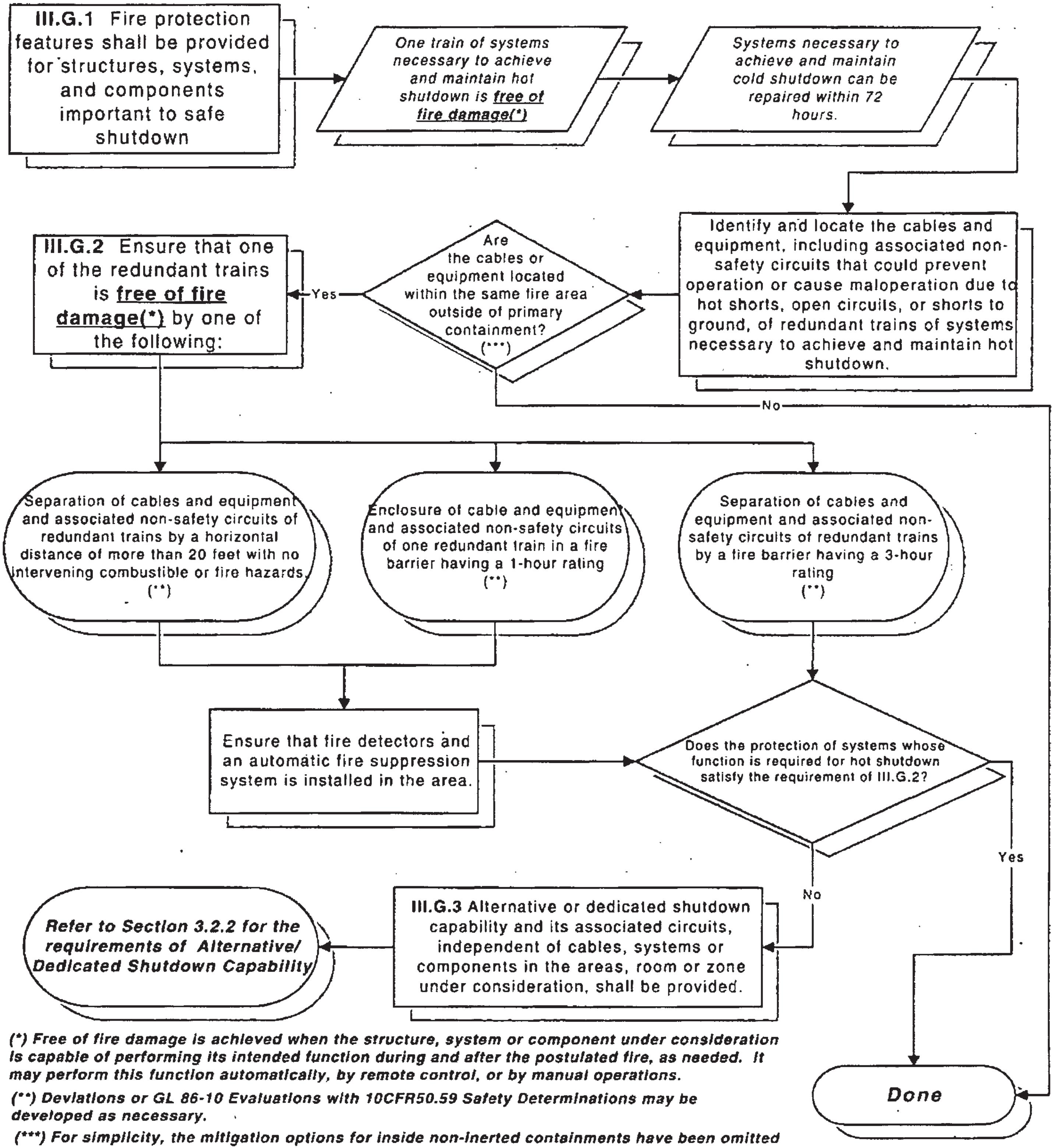
3.2.3 10CFR50 Appendix R Section III.J

Appendix R Section III.J requires that emergency lighting with at least an 8 hour battery power supply be provided in all areas needed for operation of safe shutdown equipment and in access and egress routes thereto. Emergency lighting as outlined in this section is not required for operation of safe shutdown equipment when the operation of such equipment is not required within the first 8 hours of the fire event.

3.2.4 10CFR50 Appendix R Section III.O

Appendix R Section III.O requires that the reactor coolant pump be equipped with an oil collection system if the containment is not inerted during normal operation. The containment for Susquehanna Steam Electric Station Units 1 and 2 is inerted and, therefore, Appendix R Section III.O does not apply.

Table 3.2-1



(*) Free of fire damage is achieved when the structure, system or component under consideration is capable of performing its intended function during and after the postulated fire, as needed. It may perform this function automatically, by remote control, or by manual operations.

(**) Deviations or GL 86-10 Evaluations with 10CFR50.59 Safety Determinations may be developed as necessary.

(***) For simplicity, the mitigation options for inside non-inerted containments have been omitted from this diagram.

3.3 METHODOLOGY

PPL's post-fire safe shutdown analysis for the Susquehanna Steam Electric Station Units 1 and 2 is performed in accordance with the requirements and guidance of Appendix R Section III.G.1, III.G.2 and III.G.3 (which invokes III.L) as outlined in the methodology described below. This post-fire safe shutdown analysis demonstrates and assures the availability to achieve and maintain safe shutdown for the condition of a single fire in any plant fire area. It accomplishes this by assuring that systems, components, and raceway for one safe shutdown path for each fire area

(a) capable of performing all of the required hot shutdown functions is free of fire damage, and,

(b) if required to achieve and maintain cold shutdown, is capable of being repaired within the required time period. [Note: For Section III.G.1 and 2, the required time period is 72 hours. For Section III.G.3 (III.L), repairs must be completed and cold shutdown achieved within 72 hours.]

3.3.1 Appendix R Sections III.G and III.L

Three (3) basic safe shutdown paths are used at the Susquehanna Steam Electric Station to demonstrate the ability to achieve and maintain post-fire safe shutdown in accordance with the requirements of Appendix R Sections III. G.1, III.G.2 and III.G.3 (which invokes III.L).

Safe Shutdown Paths 1 and 3 are used for achieving and maintaining post-fire safe shutdown in the event of a single fire in any fire areas outside of the Control Room Fire Area, CS-9. These safe shutdown paths are classified as redundant safe shutdown paths and the methodology applied to these safe shutdown paths is governed by the requirements of Appendix R Section III.G.1 and III.G.2.

Safe Shutdown Path 2 is used for achieving and maintaining post-fire safe shutdown in the event of a fire in the Control Room Fire Area, CS-9. This safe shutdown path is classified as an Alternative Safe Shutdown Path and the methodology applied to this safe shutdown path is governed by the requirements of Appendix R Section III.G.3 (which invokes III.L).

There are many similarities between the requirements for Redundant post-fire safe shutdown contained in Appendix R Sections III.G.1 and III.G.2 and for Alternative post-fire safe shutdown contained in Appendix R Section III.G.3 (which invokes III.L).

The goal of post-fire safe shutdown is to assure that a single fire in any single plant fire area will not result in any fuel cladding damage, rupture of the primary coolant boundary or rupture of the primary containment. This goal is accomplished by determining those functions important to safely shutting down the reactor and assuring that systems with the capability to perform these functions are not adversely impacted by a single fire in any plant fire area. The required safe shutdown functions are: (1) Reactivity Control; (2) Pressure Control; (3) Inventory Control; and (4) Decay Heat Removal. To accomplish the required safe shutdown functions, certain support system functions (e.g. power, ventilation) and process monitoring capability (e.g. reactor level and pressure indication) are also required.

In addition, it must be assured that fire induced spurious operations do not occur that can prevent equipment in the required safe shutdown path from performing its intended safe shutdown function. The spurious operations that present a potential concern for the safe shutdown functions described above are: (1) those that can cause a loss of inventory in excess of make up capability from the reactor; (2) those that can cause a flow diversion or a flow blockage in the safe shutdown systems being used to accomplish the inventory control function; (3) those that can cause a flow diversion or a flow blockage in the safe shutdown systems being used to accomplish the decay heat removal function; and (4) those that can cause an inadvertent overfill of the reactor.

The acceptability of the current design features of the BWR to mitigate the effects of an inadvertent reactor vessel overfill condition as a result of either a fire or equipment failure has been addressed by the BWROG in GE Report No. EDE 07-0390 DRF# A00-03773 dated March 30, 1990 in response to NRC Generic Letter 89-19. The NRC subsequently accepted the BWROG Position in a Safety Evaluation dated June 9, 1994. Based on commitments made to the NRC in PLA-4505 dated December 6, 1996, however, preventing an inadvertent overfill of the reactor vessel has been included as a consideration in the SSES post-fire safe shutdown analysis.

In the sections that follow, any specific differences between the governing requirements for these safe shutdown paths are highlighted where necessary.

3.3.1.1 Safe Shutdown System and Component Identification

As discussed above, the following safe shutdown functions were considered in choosing the systems and components required for safe shutdown: reactivity control, reactor coolant makeup, reactor depressurization and heat removal, process monitoring, and associated support functions.

The first step in performing the safe shutdown analysis was to identify the systems that could be used to perform the safe shutdown functions. Various safe shutdown paths were originally evaluated to shutdown the dual unit plant for the conditions described above.

Two primary redundant safe shutdown paths were selected. These paths are the Division I and Division II trains of ADS/Core Spray, Alternate Shutdown Cooling using the Core Spray system and Suppression Pool Cooling. These paths have been identified as Paths 1 and 3, respectively. In certain fire areas, as discussed in Section 6.2 of this document, offsite power sources are credited for Safe Shutdown Path 3 because it has been demonstrated that the fire cannot cause a loss of offsite power and, as such, offsite power will be available for fires in these fire areas. In addition, HPCI would also be available to provide a source of high pressure make up to the reactor in the event of a fire in this fire area. This additional source of high pressure make up is in addition to the low pressure make up capability provided by core spray on Path 3. These paths are incorporated into our symptom based emergency operating procedures and off normal procedures and are discussed in FSAR Subsections 15.2.9, 15.6.4.2.1.1 and 15A.6.5.3. These two paths offer good electrical separation between the different divisions comprising the paths so as to limit the number of potential non-compliant cables and to reduce the number of associated circuit concerns.

The capability to simultaneously achieve safe shutdown of both units has been assured by protecting safe shutdown Path 1 and/or 3 for both units in each fire area. In addition, HPCI and its required associated support systems and/or RCIC and its required associated support systems are protected for the unit not experiencing the fire. To assure the availability of an adequate steam supply for operating either HPCI or RCIC, the fire induced spurious operation of the SRVs is prevented on the non-fire unit. SRV depressurization capability is also provided for the unit not experiencing the fire. On Path 1, SRV depressurization capability is available from the Control Room. On Path 3, which uses primarily Division II equipment, SRV depressurization capability is provided from the Lower Relay Room by use of the keylock switches. This operator action is required on Path 3 because all 16 SRVs are powered from Division I power. Additionally, breakers for the Feedwater Stop Valves, HV-B21-1/2F011A/B are opened as a part of the plant start up procedure to assure that a fire induced spurious closure of these valves in the HPCI/RCIC flow path inside of primary containment cannot cause a flow blockage for these systems. In the event of a fire that results in the need to safely shutdown both units, this allows the non-fire unit to be maintained in a stable hot shutdown condition while the fire unit is safely shutdown. Subsequent to safely shutting down the fire unit, the non-fire unit is brought to a safe shutdown condition.

With the exceptions and clarifications described below, one of these primary redundant safe shutdown paths is credited for achieving and maintaining post-fire safe for all fire areas outside of the Control Room.

(1) Fire Areas R-1D, Unit 1 Valve Access Area, and R-2D, Unit 2 Valve Access Area contain both divisions of the Core Spray injection valves for their respective unit, HV E21 1/2F004A/B and HV E21 1/2F005A/B. Because of this plant design feature, a different safe shutdown path is used to assure the ability to achieve and maintain safe shutdown in these two fire areas. In these fire areas, RCIC, Division I RHR Suppression Pool Cooling and Division I RHR Shutdown Cooling are assured to be available for safely shutting down the fire unit. For the non-fire unit, Path 3 is assured to be available.

(2) Onsite power provided by the emergency diesel generators is used for achieving post-fire safe shutdown in all fire areas, except Fire Area D-1, Diesel Generator A, and D-3, Diesel Generator C. In these fire areas, offsite power is used to support post-fire safe shutdown.

(3) In Fire Area D-5, Diesel Generator E, the protected safe shutdown path is the same as the protected safe shutdown path for the diesel generator for which Diesel Generator E is substituted. When Diesel Generator E is not substituted for one of the four (4) diesel generators, it has been evaluated to have no impact on the ability to achieve and maintain post-fire safe shutdown should a fire occur in Diesel Generator E.

(4) Fire Area R-1C, Unit 1 Primary Containment, and R-2C, Unit 2 Primary Containment, are inerted with nitrogen during normal plant operation. As such, the environment will not sustain a fire and no safe shutdown path is analyzed for these fire areas.

Path 2, or the Alternative Shutdown Path, is based on evacuation from the Main Control Room, and shutting down the plant from each unit's respective Remote Shutdown Panel (RSP). In the event that an MOV required for operation at the RSP is damaged by a hot short from a Control Room fire that bypasses the protective devices, i.e. torque and limit switches, on the valve, safe shutdown is achieved from the RSP by depressurizing the reactor to below the shut-off head for the RHR System and entering RHR in the alternate shutdown cooling mode of operation. In this mode of operation, the reactor vessel inventory make-up and the decay heat removal safe shutdown functions are accomplished using the same equipment in the RHR System. The use of this shutdown methodology has been accepted by the NRC in a Safety Evaluation Report dated October 21, 1997.

All of the safe shutdown systems discussed below are manually operated. No automatic functions are protected from the effects of fires. Spurious system operation as a result of fire induced failures which affect the automatic initiation logic have been evaluated to assure that these will not have an adverse impact on the ability to achieve and maintain safe shutdown.

Reactivity control on all paths is performed by portions of the Reactor Protection System and the Control Rod Drive System (SCRAM function). The Appendix R Safe Shutdown Analysis assures either a manual scram from the Control Room or, where necessary, a scram by venting the instrument air header locally. The Alternative Shutdown Path utilizes a manual SCRAM from the Main Control Room prior to evacuation of the Control Room.

Reactor coolant makeup is provided by different divisions of the Core Spray System for Paths 1 and 3 and by RCIC and RHR injection on the Alternative Shutdown Path (Path 2). In certain fire areas, as discussed in Section 6.2 of this document, HPCI would also be available to provide a source of high pressure make up to the reactor in the event of a fire in this fire area. This additional source of high pressure make up is in addition to the low pressure make up capability provided by core spray on path 3.

MSIV closure is relied upon for all shutdown paths. This simplifies the analysis by making shutdown paths the same whether or not off-site power is available. If the MSIV’s do not isolate automatically, they are isolated manually. For the Alternative Shutdown Path, Path 2, credit is taken for manually closing the MSIV’s prior to evacuating the Control Room. The use of this additional operator action prior to Control Room evacuation has been accepted by the NRC in a Safety Evaluation Report dated October 21, 1997.

Reactor depressurization is provided by ADS SRVs on Paths 1 and 3, as described in Deviation Request No. 33. On Path 2, reactor depressurization can be performed by opening one of three specific SRVs from the remote shutdown panel or up to six (6) ADS SRVs locally in the Upper Relay Room.

For Paths 1 and 3, the reactor heat removal process utilizes alternate shutdown cooling with suppression pool cooling, except for Fire Areas R-1D and R-2D as described above. Normal shutdown cooling and suppression pool cooling is used on the Alternative Shutdown Path, except in the event of fire induced MOV damage as described above. It should be recognized that one loop of Suppression Pool Cooling is required for all paths.

Alternate shutdown cooling utilizes the Core Spray System and ADS SRVs. It is used if reactor pressure vessel (RPV) cooldown is required but cannot be accomplished using normal shutdown cooling. To enter alternate shutdown cooling, the reactor head vents, the MSIVs and the main steam line drain lines must all be closed. Then, the SRVs are opened and one core spray pump taking suction from the suppression pool slowly increases reactor water level. The suppression pool cooling mode of RHR is initiated. Reactor water level is slowly raised to flood the main steam lines and establish a flow path through the open SRVs and back to the suppression pool. In Fire Areas R-1D and R-2D, the capability to use RHR in the alternate shutdown cooling mode also exists.

Process monitoring is provided for all paths. The selection of instrumentation to monitor process variables is based on NRC Information Notice 84-09 dated March 7, 1984, Attachment 1, Section IX and addresses the following considerations: 1) The operators must be able to monitor RPV level and pressure because these are the two parameters that alert the operators to manually SCRAM the reactor and/or actuate a safe shutdown system, 2) Flow rate indication is required for makeup systems and 3) Flow indication for systems with throttleable flow and temperature indication are required for heat transfer systems. In this analysis, since the suppression pool rather than the condenser is being used as the heat sink, both suppression pool temperature and level are monitored. In the event of a fire in the vicinity of Instrument Racks 1C004 and 1C005 on Elevation 749'-1 in Unit 1 and 2C004 and 2C005 on Elevation 749'-1 on Unit 2, Deviation Request No. 27 and 28, respectively, have justified the ability to achieve and maintain safe shutdown in the event of a loss of RPV level and pressure indication.

The support functions either remove heat or supply power to the process system functions of reactivity control, reactor coolant makeup, reactor depressurization, and heat removal.

Another support function provides a passive, backup source of keepfill water to the ECCS and RCIC pump discharge lines. A tank with at least 2000 gallons of water is the source of water to the pump discharge lines. This tank is part of a backup system and it is not dynamically qualified. This tank gravity feeds water to these discharge lines through the keepfill piping. This source of water is isolated from all other loads by a check valve so that the full capacity of this tank is available for the ECCS & RCIC pump discharge lines. This tank is designed to assure that there is an adequate supply of water to keep the ECCS & RCIC pump discharge lines full of water for greater than eight (8) hours after the loss of condensate transfer, the normal source of ECCS & RCIC Keepfill. This passive backup system is provided because condensate transfer may not be available in the event of an Appendix R fire. By keeping the ECCS & RCIC pump discharge lines full of water, these systems are protected from the damaging effects of waterhammers throughout the period of time when these systems perform their functions in support of post-fire safe shutdown.

The support system for reactor heat removal is RHR Service Water which removes heat from the suppression pool in the suppression pool cooling mode and from the reactor loop through the heat exchanger in shutdown cooling. Cooling for equipment is provided by the emergency service water system through the RHR room coolers and HPCI and RCIC room coolers for the non-fire unit. No other RB HVAC components are necessary to achieve safe shutdown.

Control Structure HVAC is not necessary to achieve and maintain cold shutdown if the following Operator actions are taken:

- Selected electrical heat loads located in the Control Structure must be de-energized within 24 hours following a complete loss of Control Structure HVAC.

- Selected electrical cabinet doors located in the Control Structure must be opened to reduce the internal cabinet temperature within 24 hours following a complete loss of Control Structure HVAC.

- The 125 and 250 VDC Battery Chargers must be verified to be in float mode and the doors to the 250 VDC Battery Rooms must be opened within 6 hours following a loss Battery Room Ventilation System.

Power is supplied by the diesel generators, except for Fire Areas D-1 and D-3 as described above, and the batteries to the various components with the AC and DC distribution system modifying voltages as appropriate and distributing the power.

The Nuclear Boiler Instrumentation has been evaluated to assure that a spurious actuation of a safety system will not adversely affect the ability to achieve and maintain safe shutdown. Automatic initiation of safety systems is not credited in the Appendix R Safe Shutdown Analysis. Although automatic safety system actuations may occur, the Appendix R Safe Shutdown Analysis assures the availability of manual system initiation only. For the Core Spray System a low pressure permissive bypass switch, HS-1/25249A/B has been installed into the control circuitry for the inboard Core Spray injection valves on each unit, HV E21 1/2F005A/B. This bypass switch allows operation of the Core Spray System in the event that fire induced damage to the Core Spray automatic initiation logic prevents this low pressure permissive signal from closing the contact in the control circuitry. Additionally, in the event that fire damage to the ADS automatic initiation logic prevents manual ADS from the Control Room, operator actions to depressurize the reactor using the keylock switches in the Upper or Lower Relay Rooms are included in the procedures.

The effects of fire induced spurious signals were reviewed to assure that these will not result in an overfilling or an inventory loss from the reactor pressure vessel or a flow diversion or flow blockage in the safe shutdown systems being used for inventory make up or decay heat removal. It was determined that there were no adverse effects introduced by this scenario and that safe shutdown can be achieved using protected safe shutdown components.

Flow diversion has the potential to prevent safe shutdown by diverting flow from a safe shutdown system or causing a loss of coolant from the RPV. The RPV and all safe shutdown systems were reviewed for potential flow diversion paths. High/Low pressure interfaces were analyzed and spurious openings of the SRVs were considered.

Flow diversion paths were determined by reviewing all penetrations of the reactor pressure vessel and all safe shutdown system flow paths and identifying all lines too small to allow a significant flow diversion. All lines that would permit a significant flow diversion were then traced to a point where a determination of flow diversion could be made. This point was always a check valve, a normally closed manual valve, or an actuated valve. It was assumed that check valves function properly and prevent flow diversion and that normally closed manual valves would be in the correct position to prevent flow diversion. Actuated valves were evaluated and dispositioned by one of the methods discussed in Subsections 3.3.1.3 and 3.3.1.5.

For use of each unit's remote shutdown panel (Alternative Shutdown Path) the following assumptions were made:

1. The reactor is scrammed, the MSIVs are closed, the Reactor Feed Pump Turbines are tripped and the Reactor Feed Pump Discharge Valves are closed in the control room prior to control room evacuation. The first action is consistent with the guidance in NRC Generic Letter 86-10 paragraph 3.8.4. Acceptance of the use of the latter three (3)

actions was requested in PLA-4505 dated December 6, 1996 and accepted by the NRC in an SER dated October 21, 1997. Subsequent spurious opening of the Reactor Feed Pump Discharge Valves has been evaluated and determined to have no impact on post-fire safe shutdown. With the Reactor Feed Pump Turbine tripped, reactor vessel injection through the Reactor Feed Pump Discharge Valves would not occur until reactor pressure was reduced to below the shutoff head for the Condensate System. Inadvertent and uncontrolled injection by the Condensate System has been evaluated to be bounded by the design basis loads on the SRV Discharge Piping.

2. Offsite power is lost as well as automatic starting of the onsite diesel generators and the automatic function of valves and pumps whose control circuits could be affected by a control room fire.

The analysis demonstrates that capability exists to manually achieve safe shutdown conditions from outside the control room by restoring a.c. power to designated pumps, assuring that valve lineups are correct, and assuring that any spurious valve operations which could permit the loss of reactor coolant can be corrected before unrestorable conditions occur. A communication system has been provided where necessary to facilitate these manual actions. This communication system is described in Section 4.13.

Spurious signals/operations, as required by NRC Generic Letter 86-10, must be addressed. The focus of the evaluation is to be on identifying and mitigating the effects of each individual potential spurious operation. Spurious signals/operations are evaluated as follows:

1. Each spurious signal/operation is evaluated on a one-at-a-time basis. By addressing spurious operations on a one-at-a-time basis, the need to consider the aggregate effects of the potential spurious operations and the need to include time domain analysis, such as transient analysis is eliminated. In addition, consideration of combinations of sequentially selected circuit failures is not required.

2. If more than one hot short on the electrical circuitry for a component is required to cause a spurious operation, then the spurious operation is not considered to be credible. In addition, for Hi/Lo Pressure interface valves, 3-phase hot shorts on AC circuits and two hot shorts of the proper polarity without grounding on ungrounded DC circuits are considered to be credible.

3. The effects of each potential spurious operation is mitigated on a one-at-a-time basis using by one of the following:

    a. Providing a fire barrier or fire wrap.

    b. Routing the circuit of concern in a dedicated raceway that does not contain any other normally energized circuits that could cause a hot short.

    c. Rerouting or relocating the circuit/component.

    d. Providing a procedural action. For a Control Room fire actuation of an isolation transfer switch is considered to be an acceptable action to mitigate the effects of any spurious operation on the population of equipment that can be isolated from the effects of a Control Room fire.

e. Identifying other equipment that can prevent the spuriously operated equipment from affecting safe shutdown.

When using this last option, the alternate equipment selected cannot itself have the potential to spuriously operate during the same fire. The spurious operation criteria described above was submitted to the NRC in PLA-4505 dated December 6, 1996 and accepted by the NRC in an SER dated October 21, 1997.

3.3.1.2 Safe Shutdown Path Identification

After identifying the systems required to support the safe shutdown function, the systems were grouped into various shutdown paths. Three safe shutdown paths were developed. They are as follows:

Path 1 - The safe shutdown path comprised primarily of Division 1 equipment and cables. This path is used to achieve and maintain safe shutdown in those fire areas where the majority of the installed equipment and cables are Division II. This path is classified as a Redundant Safe Shutdown Path.

Path 2 - The alternative shutdown path or remote shutdown panel is used for achieving and maintaining safe shutdown in Fire Area CS-9, Main Control Room Fire Area.

Path 3 - The safe shutdown path composed primarily of Division II equipment and cables. This path is used to achieve and maintain safe shutdown in those fire areas where the majority of the installed equipment and cables are Division I. This path is classified as a Redundant Safe Shutdown Path.

See Table 3.3-1 for a listing of the safe shutdown systems in each safe shutdown path.

3.3.1.3 Safe Shutdown Cable, Raceway and Electrical Components Identification

The previous step identified all the systems and process components required to achieve safe shutdown, as well as, any components that could potentially impact the ability to safely shutdown the reactor through spurious operations. To determine the cables required to operate the safe shutdown components or that could cause the maloperation of the potential spurious operation components, the schematics or elementary wiring diagram for each component was reviewed. For each component, all circuit cables that ensure operability of the component were initially identified as required for safe shutdown. The circuits identified included those for power, control and instrumentation. Additionally, all interlocks in the safe shutdown components circuit were traced back to the initiating devices and all corresponding cables were identified as potentially impacting the safe shutdown component of concern. In this way, all system interactions were identified. The safe shutdown component and cable information was entered into a computer database that contained cable/raceway by plant location. In order to identify preferred safe shutdown paths by plant location, the plant was divided into fire areas.

3.3.1.4 Development of Fire Areas

Our safe shutdown analysis is based on a fire area concept. Each fire area at the plant uses a minimum of one of the three safe shutdown paths described in Subsection 3.3.1.2 to achieve and maintain safe shutdown. The safe shutdown path used for each fire area is presented in Table 6.1-1.

To perform the safe shutdown analysis, the plant was initially analyzed on a fire zone basis. A fire zone is a room or compartment usually separated from adjacent fire zones by a physical barrier. These barriers typically consist of reinforced concrete walls, ceilings and floors or gypsum board walls. These barriers may or may not be fire rated. Penetrations and openings in these non-rated barriers are usually treated in a similar manner as those for fire rated barriers. Therefore, fire zone boundaries should generally resist the spread of fire by a radiant heat transfer mechanism. Deviation Request No. 7 further outlines the fire spread limitation criteria. Each fire zone utilizes one of the three safe shutdown paths identified in Section 3.3.2 for achieving and maintaining safe shutdown.

For Appendix R compliance, it was necessary to group these fire zones into fire areas. A fire area is comprised of one or more fire zones and is bounded on all sides by fire rated construction or spatial separation. The fire rated boundaries of these fire areas are designed to ensure that a fire initiated anywhere within the fire area does not propagate into or adversely impact any other fire area in the plant.

Since the wraparound fire zones and the buffer fire zones would eventually comply with the requirements of both adjoining fire areas, they were considered to be in both fire areas. The wraparound and buffer fire zones and a few additional fire zones where protection of both safe shutdown paths 1 and 3 is required have been analyzed as a part of a pseudo-fire area in the safe shutdown analysis. The specific fire zones analyzed in this manner are identified in section 6.2. The plant specific fire hazards analysis in Section 6.0 discusses fire area separation in more detail.

The physical boundaries of all the fire areas were evaluated and upgraded as necessary to ensure that they are fire rated barriers. All penetrations and openings in these barriers are equipped with fire rated assemblies or are justified by deviation requests. The integrity of the fire barriers are assured by ongoing plant surveillance activities.

The plant specific fire hazards analysis in Section 6.0 is presented on a fire area basis, however, within the discussion of each fire area, safe shutdown components are described on a fire zone basis to more specifically identify the location for this equipment.

3.3.1.5 Evaluation of Potential Cable and Component Noncompliances

The Appendix R data was sorted by fire zone to develop a list of all potential Appendix R noncompliances which were termed cable hits. Each cable hit was evaluated either individually or on a generic basis, to determine the impact of fire induced faults on all affected components. The term "cable hit" is used to describe

1. an individual cable that is either required for the proper functioning of a component that is part of the required safe shutdown path for the fire area where the cable is located,

2. or an individual cable that could potentially result in a spurious operation that could impact the required safe shutdown path in a particular fire area.

For example, if a fire zone contains predominantly Division I (Path 1) components, Division II (Path 3) components would be used to achieve safe shutdown in the event of a fire in that fire zone. The reason for this is that the Division I components located in the zone of fire origin would be assumed to be damaged by the fire. The Division II components would be located in a different fire area, and would consequently remain free of fire damage. Therefore, Division II (Path 3) would be used to achieve safe shutdown. However, if a cable to one of the Division II safe shutdown components was routed through the Division I zone, that cable could potentially be destroyed by the fire in that zone. This cable would be called a "cable hit". It should be noted that not all cable hits are noncompliances as discussed in Section 3.3.1.6.

The evaluation process consisted of examining each fire zone to determine the number of cable hits generated by first assuming that Division I (Path 1) was required for safe shutdown in that fire zone and then assuming that Division II (Path 3) was required for safe shutdown in that fire zone. The path with the least number of cable hits was then designated as the required safe shutdown path for that fire zone.

Safe shutdown components were evaluated in a similar manner as cable hits. Components in noncompliance with Appendix R (i.e., component hits) were called Category I Components.

The evaluation process also considered a number of electrical components. Each component was evaluated to determine its affect on safe shutdown. The types of components evaluated and a brief description of their analysis follows:

Pseudo-Components

The concept of pseudo-components was developed to account for certain safe shutdown cables which constitute a control circuit scheme common to various components within a system. A psuedo-component is merely a designation given to a group of cables/devices whose sole purpose is to actuate various safe shutdown components based on certain plant parameters. The purpose for the pseudo-components is to distinguish the cabling and other electrical components for the common circuit scheme from the primary control circuit of each component. In addition, by associating the cables of a common scheme with a pseudo-component, it avoids the duplication of the common scheme cables and components under each of the affected safe shutdown components.

Interlocks

In order to assure that all system interactions were accounted for, the control circuits for each safe shutdown component were reviewed to identify all interlocks whose failure could adversely affect the required component function. Each interlock component and its respective cables were then evaluated to assess the effect of fire induced failures on the Safe Shutdown component. Interlocks and their connected cables which could adversely affect Safe Shutdown components were identified as being required for safe shutdown. Therefore, interlock components were analyzed in the same manner as Safe Shutdown components.

Electrical Distribution Components

These are power supplies or other electrical equipment that supports components required for safe shutdown. The required safe shutdown paths for these components was assigned based on the required paths for each safe shutdown load fed by a particular power supply. Included on this list are switchgear, load centers, motor control centers, load center transformers, distribution panels, DC control centers, DC battery chargers, DC batteries, fuse boxes, and battery banks.

Postulated Cable Faults

Each cable hit was subjected to an evaluation which postulated a hot short, short-to-ground or an open circuit on the cable. Within the context of this report the following definitions are utilized to describe cable faults.

- Hot Short - A fire induced insulation breakdown between conductors of the same cable, a different cable or from some other external source resulting in a compatible but undesired impressed voltage on a specific conductor.
- Open Circuit - A fire induced break in a conductor resulting in a loss of circuit continuity.
- Short to Ground - A fire induced breakdown of a cable's insulation system resulting in the potential on the conductor being applied to ground potential.

The methodology used to postulate cable faults and their duration was based on the guidance provided in NRC Generic Letter 86-10 Section 5.3.

High/Low Pressure Interfaces

For the purposes of postulating credible fire-induced cable faults for high/low pressure interfaces, the criteria outlined in Section 5.3.1 of NRC Generic Letter 86-10 was used

Spurious actuation of the safety relief valves was investigated. Based on the definition for a Hi/Lo Pressure Interface presented to the NRC in PLA-4505 dated December 6, 1996 and accepted by the NRC in an SER dated October 21, 1997, the SRVs are not considered to be Hi/Lo Pressure Interfaces. As such, it was determined that postulation of spurious operation of multiple SRV's was not required. The mitigating strategy for any spurious SRV operation is to further depressurize the reactor, as required, using the available SRVs and to inject with the available inventory make-up system, typically Core Spray.

Associated Circuits

Several studies were completed to identify and demonstrate compliance with NRC Generic Letter 81-12 which provides a definition of associated circuits for Appendix R consideration and provides guidelines for protecting the safe shutdown capability from the fire-induced failures of associated circuits.

The electrical buses required for safe shutdown were identified and all circuits from those buses were analyzed for their safe shutdown function. All of the associated circuits were identified and potential associated circuits of concern were identified by comparison of the bus safe shutdown paths with the fire zone safe shutdown paths for those areas through which associated circuit cables were routed. An associated circuit became an associated circuit of concern when the associated circuit cable entered a fire zone where the required safe shutdown path was the same as the safe shutdown path assigned to the bus.

It was verified by calculation or analysis that the potential associated circuit of concern would not impair the safe shutdown function of any other circuit powered from the same bus.

Some cables which were connected to safe shutdown components were analyzed and were classified as safe shutdown circuits even though they were not required to be functional but their loss could result in the misoperation of the identified safe shutdown component.

Multiple High Impedance Faults (MHIF)

The possibility of multiple faults exist when circuits on the same bus are routed in the same raceway. The nature of multiple high impedance faults is that the fault current of the individual branch circuits could be below the trip setting of the branch breakers. If enough branch circuits on the same bus failed in this manner, the additive currents could trip the upstream main breaker for the bus. This could then disable safe shutdown circuits on this bus.

MHIFs were addressed by analyzing all of the safe shutdown power buses at the following voltages: 4160, 480, 120 AC and 250, 125 DC. All associated circuits of concern on a common bus were identified within a common "hit" fire zone. Unprotected safe shutdown circuits of the common bus in the hit fire zone were also identified and the fault currents were added to the associated circuit fault current.

The total MHIF current was calculated using Generic Letter 86-10 criteria and was added to the total running current of the bus. For all safe shutdown buses, if this current exceeded the long time trip setting of the bus main breaker then either a procedural action to strip and reload the bus was established or the circuit of concern was wrapped in a protective fire barrier.

Spurious Actuation

The guidance provided in NRC Generic Letter 86-10 was supplemented with the information contained in PLA-4505 dated December 6, 1996 and this criteria was used in the evaluation of each cable hit which could cause spurious actuation of a component. For those spurious actuations which were the result of a hot short, no limitation was placed on the hot short duration. The hot short condition was postulated to exist until action was taken to isolate the fault and negate the spurious operation.

In addition to these electrical components, other equipment which could affect the safe shutdown analysis was also evaluated. This equipment included:

Instrument Tubing

The evaluation on instrument tubing was performed in a manner similar to that used to determine and evaluate Category I cables. Each instrument on the required component list was reviewed to determine those with associated tubing. The process tap, tubing, and instrument location (fire zones) were identified for each instrument with tubing. The tubing was identified as Category I if any of the tubing was routed through a fire zone on the same shutdown path as the instrument under evaluation. Each Category I hit was evaluated to assess the potential impact on instrument operation and subsequent system/component function.

3.3.1.6 Resolution of Cable and Component Non-compliances

All non-compliant cables and components were reviewed to determine their proper disposition. Many of the cable hits were grouped by unique function and addressed under specific analyses. Individual raceways with numerous cable hits were identified for fire protective wrapping to preclude a specific analysis for each cable hit contained within the raceway. Some cable hits were located in raceway which was already wrapped or planned to be wrapped for other cable hit dispositions. All remaining cable hits were grouped by system and component and an evaluation was performed to determine the impact of a fire-induced cable failure on the component and on the safe shutdown analysis.

Based on the above evaluations, each cable hit was ultimately resolved by performing a plant modification (i.e., fire wrapping, circuit modification, cable relocation), a procedural/manual action, further analysis which verified that fire-induced faults would not adversely impact safe shutdown or by a deviation request.

Category I components were grouped by function and evaluated in a specific analysis. These analyses took into consideration component location within the fire zone, combustible loading, arrangement and location of fire detection and suppression within the zone. Also considered was separation between components of the redundant shutdown division. Category I components were resolved by a plant modification, a procedural action, a deviation request or an analysis which verified that fire damage to the component would not adversely affect safe shutdown.

3.3.2 Appendix R Section III.J

Emergency lighting with an 8 hour battery power supply is provided in the main control room and along the access and egress routes from the main control room to each unit's respective remote shutdown panel, to local areas required for operation required for manual control of safe shutdown equipment.

For the operator manual action to close the MSIVs on Unit 1 or 2 using the MSIV keylock switches in the Upper and Lower Relay Rooms, the use of Emergency Diesel Generator backed Essential Lighting is credited. This action is only performed in response to a Control Room Evacuation and is only required to be performed if a loss of offsite power does not occur. If a loss of offsite power does occur, the desired MSIV isolation will occur automatically and is assured without performing the action to actuate the MSIV keylock switches in the Upper and Lower Relay Rooms. If a loss of offsite power does not occur, then either Normal or Essential Lighting will be available. If Normal Lighting circuits are damaged by the effects of the Control Room fire, Essential Lighting will be available. Essential lighting circuits for the Lighting in the Upper or Lower Relay Rooms do not run through the Control Room Fire Area, CS-9.

3.3.3 Appendix R Section III.O

Susquehanna SES Unit 1 and Unit 2 primary containments are inerted during normal operations; compliance with Section III.0 is achieved.

TABLE 3.3-1

SAFE SHUTDOWN PATHS

PATH 1[1] DIVISION I	PATH 2 REMOTE SHUTDOWN PANEL	PATH 3[1] DIVISION II
Reactivity Control[2] CRD (Scram Function) Manual Scram from the Control Room or by venting the instrument air header locally on elevation 719 of the Reactor Building	Reactivity Control CRD (Scram Function) Manual Scram	Reactivity Control[2] CRD (Scram Function) Manual Scram from the Control Room or by venting the instrument air header locally on elevation 719 of the Reactor Building
Reactor Pressure Control Manual ADS from the Control Room or the Upper Relay Room Manual SRVs from Control Room (Non-Fire Unit) Inboard MSIVs	Reactor Pressure Control A, B, C, SRVs Manual ADS/SRVs from the Upper Relay Room Inboard MSIVs	Reactor Pressure Control Manual ADS from the Control Room or the Upper Relay Room Manual SRVs from LRR (Non-Fire Unit) Outboard MSIVs
Reactor Coolant Makeup Core Spray RCIC (Non-Fire Unit)	Reactor Coolant Makeup RCIC RHR LPCI	Reactor Coolant Makeup Core Spray HPCI (Non-Fire Unit)
Reactor Heat Removal Process RHR Suppression Pool Cooling Mode RHRSW	Reactor Heat Removal Process RHR Suppression Pool Cooling and Shutdown Cooling Mode RHRSW	Reactor Heat Removal Process RHR Suppression Pool Cooling Mode RHRSW
Monitoring Suppression Pool Monitoring Nuclear Boiler Instrumentation Control Room Indication	Monitoring Suppression Pool Monitoring Nuclear Boiler Instrumentation Remote Shutdown Panel Indication	Monitoring Suppression Pool Monitoring Nuclear Boiler Instrumentation Control Room Indication

TABLE 3.3-1

SAFE SHUTDOWN PATHS

PATH 1[1] DIVISION I	PATH 2 REMOTE SHUTDOWN PANEL	PATH 3[1] DIVISION II
Associated Support Functions RHR Room Coolers RCIC Room Coolers (Non-Fire Unit) Passive Keepfill System • Tank 1T274 For Unit 1 • Tank 2T274 For Unit 2	Associated Support Functions RHR Room Coolers RCIC Room Coolers Passive Keepfill System • Tank 1T274 For Unit 1 • Tank 2T274 For Unit 2	Associated Support Functions RHR Room Coolers HPCI Room Coolers (Non-Fire Unit) Passive Keepfill System • Tank 1T274 For Unit 1 • Tank 2T274 For Unit 2 •
Common Required Components ESW ESSW Pumphouse HVAC D.G. HVAC & Aux. Systems	Common Required Components ESW ESSW Pumphouse HVAC D.G. HVAC & Aux. Systems	Common Required Components ESW ESSW Pumphouse HVAC D.G. HVAC & Aux. Systems
Electrical[3] EDGs A&C or Offsite Power (T-10) Respective Distribution Equipment	Electrical[3] EDGs A, B, C, & D Respective Distribution Equipment	Electrical[3] EDGs B&D or Offsite Power (T-20) Respective Distribution Equipment
App. R Comm. System (Unit 1) Communication Loop No. 1 Communication Loop No. 5 Communication Loop No. 6	App. R Comm. System (Unit 1) Communication Loop No. 2	App. R Comm. System (Unit 1) Communication Loop No. 3 Communication Loop No. 4 Communication Loop No. 5 Communication Loop No. 7
App. R Comm. System (Unit 2) Communication Loop No. 1 Communication Loop No. 4 Communication Loop No. 5 Communication Loop No. 6	App. R Comm. System (Unit 2) Communication Loop No. 2	App. R Comm. System (Unit 2) Communication Loop No. 3 Communication Loop No. 5 Communication Loop No. 7

Notes:

1. These Paths are not completely divisionalized.

2. For those plant areas where the scram is accomplished by manually venting the air header in the Reactor Building, it must be assured that the ability to trip the Reactor Recirculation Pumps from the Control Room is available. The tripping of the Reactor Recirculation Pumps from the Control Room can occur either automatically or by the Operator performing the action manually using the Control Room trip switch.

3. Diesel Generator “E” may be substituted for Diesel A, B, C or D.

TABLE 3.3-2

SHUTDOWN PATHS AND METHODOLOGY BY FIRE LOCATION
FIRE OUTSIDE CONTROL ROOM (EXCEPT FIRE ZONES 1-5B AND 2-5B)

Unit 1 (Fire Unit)	Unit 2 (Non-Fire Unit)
Path 1	RCIC & Manual SRVs (Note 2) No Spurious SRV or ADS Path 1
Path 3	HPCI & Manual SRVs (Note 2) No Spurious SRV or ADS Path 3

Unit 1 (Non-Fire Unit)	Unit 2 (Fire Unit)
RCIC & Manual SRVs (Note 2) No Spurious SRV or ADS Path 1	Path 1
HPCI & Manual SRVs (Note 2) No Spurious SRV or ADS Path 3	Path 3

NOTES:

1. Table 6.1-1 lists the required safe shutdown path (Path 1 or 3) and which unit is the fire unit for all fire areas.

2. HPCI or RCIC has been protected for the non-fire unit. With the changes made to add additional RHR pumping capability as a part of the Extended Power Uprate Project, the availability of HPCI or RCIC for the non-fire unit is no longer required. Since these systems, however, have already been protected, the decision was made to maintain their availability to add a measure of conservatism to the post-fire safe shutdown analysis. Additionally, on the non-fire unit, the availability to operate the SRVs is preserved so that reactor pressure can be gradually reduced to allow injection with the low pressure core spray system.

TABLE 3.3-3

SHUTDOWN PATHS AND METHODOLOGY BY FIRE LOCATION FIRE ZONES 1-5B AND 2-5B

FIRE ZONE 1-5B	FIRE ZONE 2-5B
UNIT 1	UNIT 2
Path 1 With Following Changes:	Path 1 With Following Changes:
A. CS Not Available For Vessel Makeup	A. CS Not Available For Vessel Makeup
B. Spurious SRV or ADS Must Be Prevented	B. Spurious SRV or ADS Must Be Prevented
C. RCIC And Division I or II RHR SPC Used Until Division I or II RHR SDC Can Be Entered (Reactor Pressure <98 Psig) To Achieve Cold Shutdown (Notes 1 and 2)	C. RCIC And Division I or II RHR SPC Used Until Division I or II RHR SDC Can Be Entered (Reactor Pressure <98 Psig) To Achieve Cold Shutdown (Notes 1, 2 and 4)
UNIT 2	UNIT 1
Path 3 (Note 3)	Path 3 and Division 1 RHR (Notes 3 and 4)

NOTES:

1. As an alternative to the use of RCIC, RHR (LPCI) may be used in the alternative shutdown cooling mode. ADS/SRV's must be available for depressurization and vessel flow to the suppression pool. The main steam line drain valves must be capable of being closed.

2. For LPCI and SDC, the F015A valve needs to be opened. Core Spray automatic initiation logic and RHR automatic initiation logic provide the permissive for this valve to open automatically or manually from the Control Room. Manual override from the Control Room exists for valves required for SPC that may have closed due to RHR automatic initiation logic.

3. The use of Path 3 is required to allow simultaneous operation of the Unit 1 and 2 RHR pumps to prevent interruption of core cooling when RHR SDC is used to achieve cold shutdown.

4. Due to postulated cable faults in the Unit 2 RHR automatic initiation logic that could result in the inability to open the 2F015A valve or spuriously trip RHR pump 1P202B, Unit 2 Division 11 RHR and Unit 1 Division I RHR are also protected in Fire Zone 2-5B. This allows for the operation of Unit 2 Division II LPCI or SDC while allowing for simultaneous operation of Unit 1 Division I suppression pool cooling.

TABLE 3.3-4

SHUTDOWN PATHS AND METHODOLOGY BY FIRE LOCATION
CONTROL ROOM FIRE

UNIT 1	UNIT 2
PATH 2 RCIC and SRV's A,B & C with Division II RHR SPC/SDC, RHRSW, and ESW	PATH 2 RCIC and SRV's A,B & C with Division I RHR SPC/SDC, RHRSW, and ESW

NOTES:

1. Potential spurious SRV or ADS actuations resulting from a Control Room fire could deplete the steam supply required for operation of RCIC from the Remote Shutdown Panel. In the event that this were to occur, safe shutdown would be achieved through the operation of alternate shutdown cooling using LPCI from the Remote Shutdown Panel.
2. Similarly, valve damage due to MOV "Hot Shorts", as described in NRC IN 92-18, could require the use of alternate SDC using LPCI.

3.4 APPENDIX R COMPLIANCE

PPL has committed to perform the post-fire safe shutdown analysis in accordance with 10CFR50 Appendix R Sections III.G, III.J, III.L (as required by III.G.3) and III.O. Compliance with Appendix R is essential to the safe operation of Susquehanna SES. Our Appendix R compliance program is implemented through a series of design standards, specifications, drawings and administrative procedures. Plant modifications are reviewed in the design process for their impact on the safe shutdown analysis, deviation requests, combustible loading analysis and other fire hazard configurations. Existing fire protection features are inspected through ongoing surveillances required by the Technical Requirements Manual.

The Susquehanna SES Unit 1 and 2 Operating License Condition NPF-14, Paragraph 2.C.(6) and NPF-22, Paragraph 2.C.(3) indicate that changes may be made to the approved fire protection program without prior NRC approval only if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire. NRC Generic Letter 86-10 provides guidance on making changes to the approved fire protection program.

4.0 FIRE PROTECTION SYSTEM DESCRIPTION

This section provides an integrated description of the fire suppression and detection systems which can be used in conjunction with specific discussions in Section 6.0.

Components for the fire suppression and detection systems contained within safety related areas, which would cause damage to the safety related equipment should they fail, are supported so that structural integrity will be maintained through a safe shutdown earthquake.

National Fire Protection Association (NFPA) codes and standards were used as guidance for the Susquehanna Fire Protection Program. It is not PPL's nor NFPA's intent that code changes be retroactively applied to existing conditions. The NFPA code or standard used for design documents and procedures was the current NFPA code or standard active on the date when the original design document or procedure was approved (unless otherwise noted).

The codes and standards considered and used for the original design of the fire protection system were:

a) Basic Fire Protection for Nuclear Power Plants, ANI/MAERP
b) Property Loss Prevention Standards for Nuclear Generating Stations, NML
c) National Fire Protection Association Standards and Recommended Practices (See Table 4.0-1 for the code of record at the original design, unless otherwise noted.)
d) Building Regulations for Protection from Fire and Panic, Commonwealth of Pennsylvania, Department of Labor and Industry
e) OSHA Fire Protection Regulations, Vol. 2, 3, 4 and 5

Table Rev. 0

Table 4.0-1

National Fire Protection Association Standards and Recommended Practices

(Code of Record at Original Design)

No.	Title
10-1974	Installation of Portable Fire Extinguishers
10A-1973	Maintenance and Use of Portable Fire Extinguishers
12-1973	Carbon Dioxide Extinguishing Systems
12A-1973	HALON 1301 Fire Extinguishing Systems
13-1974	Installation of Sprinkler System
13A-1971	Maintenance of Sprinkler Systems
13E-1973	Fire Department Operations in Properties Protected by Sprinkler and Standpipe Systems
14-1974	Standpipe and Hose Systems
15-1973	Water Spray Fixed Systems
20-1974	Centrifugal Fire Pumps
24-1973	Outside Protection
27-1967	Private Fire Brigades
30-1973	Flammable and Combustible Liquids Code
37-1970	Combustion Engines and Gas Turbines
50A-1973	Gaseous Hydrogen Systems
72A-1974	Local Protective Signaling Systems
72D-1974	Proprietary Signaling Systems
72E-1974	Automatic Fire Detectors
75-1972	Electronic Computer Data Processing Equipment
78-1968	Lightning Protection Code
80-1974	Fire Doors and Windows
90A-1977	Air Conditioning and Ventilation System
91-1973	Blower and Exhaust Systems
92M-1972	Waterproofing and Draining Floors
101-1973	Life Safety Code
204-1968	Smoke and Heat Venting Guide
241-1973	Building Construction and Demolition Operation
321-1973	Classification of Flammable Liquids

4.1 FIRE PROTECTION WATER SUPPLY SYSTEMS

The fire protection water supply systems are shown schematically on Drawing E-106227. The plant's two automatic fire pumps have three suction sources: the two cooling tower basins each containing six million gallons of water and the 500,000 gallon clarified water storage tank from which a minimum of 300,000 gallons of water are available. The clarified water storage tank is provided with an internal standpipe that terminates at the 300,000 gallon level thereby limiting use of the tank's contents for other than fire protection purposes to 200,000 gallons.

The 300,000 gallons of water in the clarified water storage tank and the contents of one of the cooling tower basins are available for fire protection use. The other cooling tower basin is provided with a normally closed valve on the fire pump suction supply.

The fire protection water supply system has two horizontal centrifugal type fire pumps, each rated for 2500 gpm at 140 psig (net head). Both pumps are located in the circulating water pump house. One pump is motor driven and one is diesel engine driven with a day tank containing enough diesel fuel oil for 8 hours of operation in accordance with NFPA 20. There is also one backup diesel engine driven fire pump rated at 2500 gpm at 155 psig (net head) located at the Well Water Pumphouse with a day tank containing enough diesel fuel oil for 8 hours of operation per NFPA 20.

A jockey pump maintains a system pressure of 105 to 125 psig to prevent frequent operation of the main fire pumps. Should the fire main pressure fall the motor driven pump and diesel driven pump start sequentially to maintain system pressure at greater than or equal to 85 psig. Both pumps continue running until shut off manually.

The largest single demand can be satisfied by one fire pump. With a loss of both offsite power supplies, the electric fire pump cannot operate. The diesel fire pump can be started either from the diesel pump controller or in the control room using the diesel fire pump batteries as a power source; no a.c. power is required for the diesel pump starting.

The sectional and control valves of both fire pumps and the manual valve in the fuel supply line for the diesel fire pump are locked open and administratively controlled.

Either one or both pumps can be started manually from the fire protection control panel in the main control room or locally at the circulating water pump house, in which both pumps are located.

The electric power for the electric motor driven fire pump is taken from a load center that is supplied by two power sources.

If the primary power source fails, the power will automatically be transferred to the secondary power source.

Alarms including "pump running," "power failure," and "failure to start" are provided and arranged to annunciate in the control room and at the local fire pump panels for monitoring the pumps. For test purposes, a flowmeter has been installed on a test manifold in the pump discharge piping, which indicates flow locally.

A 12-in. diameter cement-lined, ductile-iron yard loop encircling the plant is buried in the ground below the frost level, and is made of piping which conforms to the requirements of NFPA 24. A secondary loop surrounds the site support buildings. For the yard main arrangement refer to Drawing E-105176. Post indicator valves have been provided for sectional control. Fire fighting equipment is provided for fire hydrants using the guidelines of NFPA 24.

The diesel driven fire pump is enclosed within a 3 hour fire rated enclosure which prevents both fire pumps from being damaged by a single fire.

In addition to the above, the Susquehanna SES site has a backup fire protection system which consists of a 2500 gpm diesel driven fire pump a jockey pump and a dedicated water supply. The 2500 gpm pump is not part of the Technical Specification requirements and is isolated from the main yard loop. The backup fire protection system and the main plant fire protection system can be cross-tied. Separation by distance ensures a fire in the circulating water pump house will not damage this pump.

4.2 AUTOMATIC WET PIPE SPRINKLER SYSTEMS

Wet pipe sprinkler systems are selected to provide primary suppression capability for various areas.

Wet pipe sprinkler systems are designed in accordance with NFPA 13. Each sprinkler system in the area of safety related equipment consists of an alarm valve assembly, an alarm device, piping, and fusible element sprinkler heads.

Wet pipe sprinkler systems operate when ambient temperature rises to the melting point of fusible links on sealed sprinkler heads, thus permitting the heads to open. Flow of water through alarm check valves actuates a pressure switch and registers an alarm condition on an audible-visual annunciator on the fire protection control panel in the control room. Once initiated, wet pipe sprinkler operation is terminated manually by shutting the outside screw and yoke (OS&Y) gate valves. The systems are restored to a "ready" condition by replacing the sprinkler heads that operated and reopening the OS&Y valves.

4.3 DRY PIPE SPRINKLER SYSTEMS

Dry pipe sprinkler systems are selected to provide primary suppression capability for various areas. Dry pipe sprinkler systems are designed in accordance with NFPA 13. The dry pipe sprinkler systems are selected for areas where low temperatures may occur, thus avoiding freezing of sprinkler piping.

Dry pipe sprinkler systems use automatic sprinkler heads attached to a piping system that contains air under pressure. The system operation is initiated by the melting of fusible links, which allows a sprinkler head to open and release the air. Loss of air pressure permits the water pressure to open the dry pipe valve. Activation of the system operates a pressure switch and registers an alarm condition on an audible-visual annunciator on the fire protection control panel in the control room. After operation, the dry pipe sprinkler system is reset by manually closing the OS&Y gate valve, draining the system, replacing all sprinkler heads that operated, resetting dry pipe valve, and repressurizing the pipe with air, before reopening the OS&Y valve.

4.4 AUTOMATIC PREACTION SPRINKLER SYSTEMS

Automatic preaction sprinkler systems are selected to provide primary fire suppression capability for various plant areas.

When automatic sprinkler protection is provided in areas containing safety-related equipment, preaction sprinkler systems are provided to reduce the risk of possibly flooding the area in the event of a pipe failure.

Preaction sprinkler system operation is initiated by sensors which detect a rapid temperature rise, a fixed high temperature, and/or presence of products of combustion (Ionization or Photoelectric detectors). The initiation sensors and local circuits may be shared with the fire detection system described in Section 4.12. The sensor releases a tripping device to open the deluge valve, permitting water to flow into the sprinkler piping system. When the fusible links holding the sprinkler heads closed melts, water will discharge from the sprinkler head. A pressure switch will sense water flow and register an alarm condition on an audible-visual annunciator on the fire protection control panel in the control room. After operation, the preaction sprinkler system is reset by closing the OS&Y gate valve, draining the system, replacing all sprinkler heads that operated, resetting the preaction valve, and repressurizing the pipe with air, before reopening the OS&Y valve.

4.5 DELUGE SYSTEMS

Deluge systems provide fire suppression capability for various areas.

Automatic Deluge systems are open-head water spray systems activated by heat detectors which provide a signal to open the deluge valve. The individual systems may be manually activated from a local pushbutton switch or a manual control station. Some of the deluge systems can also be manually activated from the Control Room.

The heat detectors, which activate the deluge valves, will operate when temperatures in the protected area rise at an abnormally high rate or reach a fixed temperature. Heat detector actuation is indicated on a local panel and annunciated on the Control Room panel. Deluge systems are reset by closing the outside screw and yoke (OS&Y) gate valve, draining the system, resetting the deluge valve and reopening the OS&Y valve.

Manual deluge systems are open-head water spray systems that will discharge upon opening of the manual control valve(s) for the system. These systems are reset by closing the manual control valve(s) and draining the system. Manual deluge systems provide no alarm annunciation.

For manual systems, heat detector activation will provide an annunciated high-high temperature “FIRE” alarm on Control Room panels and/or a high temperature “TROUBLE” alarm indication on local and Control Room panels. On receipt of an alarm, an operator will be dispatched to the affected area and manually open the control valves if a fire condition is confirmed.

4.6 WET STANDPIPES AND HOSE STATIONS

Wet standpipes for safety-related buildings were designed and installed for Class II service. Wet standpipes for non-safety related buildings were designed and installed using either Class I, II, or III service. All wet standpipes designed used the guidance of NFPA 14.

Hose stations are strategically located throughout the plant using the guidance of NFPA 14. The minimum residual pressure at the highest hose station in the plant is at least 65 psig with 100 gpm flowing. Each hose station in the power block contains 100 ft. of 1-1/2 inch fire hose with an appropriate nozzle. Hose stations located in areas of the plant where there is electrical equipment are provided with electrically safe fog nozzles, with the exception of the fire hose nozzles in the Fire Zone 0-8A, where straight stream nozzles are provided.

The site Fire Brigade is trained in fighting fires using hose stations and actions to be taken should additional fire hose be required. Areas exist in the plant where the installed 100’ fire hose at the hose station may not be sufficient to fully reach all extents of the area. For those areas, high rise fire hose packs are available for Fire Brigade use.

4.7 PORTABLE FIRE EXTINGUISHERS

Portable fire extinguishers are selected to provide either primary or backup fire suppression capability depending on the particular area. They are located throughout the plant.

The exact number, type, and location of each extinguisher has been determined using the guidelines of NFPA 10.

Portable fire extinguishers are provided at the containment during refueling and major maintenance operations.

4.8 CARBON DIOXIDE SYSTEMS

Low pressure carbon dioxide (CO_2) systems provide primary fire suppression capability in the electrical equipment rooms as shown on the drawings in Section 8.0.

The low pressure carbon dioxide systems are designed using the guidelines of NFPA 12, "Carbon Dioxide Extinguishing Systems". The design quantity of the agent is based on 50 percent concentration in the hazard area. At its minimum allowed level, the carbon dioxide storage tank holds sufficient carbon dioxide to supply a single discharge of carbon dioxide to the largest hazard. When the CO_2 storage tank is used to supply carbon dioxide for generator purging, administrative controls are used to assure that the minimum allowed level is maintained.

The two types of CO_2 systems in use are automatic total flooding and manual spurt.

The automatic total flooding system is actuated by heat detectors. A predischarge alarm sounds locally in normally occupied areas and in the control room. HVAC system penetrations into the area are sealed off by CO_2 operated fire dampers. Spearmint odorizer cartridges are provided in all automatic flooding and manual spurt systems for indicating the discharge or presence of CO_2.

Manual spurt systems are provided to protect cables in concealed spaces on the control room level.

Ionization detectors in the hazard areas actuate the audible and visual alarm on the main fire protection control panel.

Since it is desirable for the operators to remain in the control room, the manual spurt system allows the operators to control the release of CO_2 in the vicinity of the control room. Once the operator activates the manual spurt system, a discharge alarm is sounded in the control room. In addition to the audible alarm, odorizer cartridges provide indication of actuation (CO_2 Flow).

4.9 HALON EXTINGUISHING SYSTEMS

Power Generation Control Complex (PGCC) modules are provided with self-contained Halon 1301 fire extinguishing systems. Each system includes pressurized cylinders containing liquefied Halon 1301 at ambient temperature, product-of-combustion detectors (ionization), thermal detectors, spray nozzles, control panel, battery backup, and manual pull station. Each PGCC module cable way is sealed at point of connection. Thermal detectors activate automatic discharge of Halon to the panel and floor sections. The PGCC floor sections are provided with a 20% concentration by volume for a 20 minute duration. Each system alarms locally and in the control room upon activation. The Halon 1301 system is designed using the guidelines of NFPA 12A.

Reference: NEDO-10466, G. C. Minor, H. R. Clay, "Power Generation Control Complex Design Criteria and Safety Evaluation," Licensing Topical Report, Class 1, Revision 2, March, 1978.

4.10 INSULATION AND JACKETING OF CABLE

Scheduled Class 1E cables at Susquehanna SES as a minimum meet the flame propagation requirements of IEEE-383, see Table 5.0-1, Section D.3(f). Type tests for each type of scheduled Class 1E cable used at Susquehanna SES were performed to the requirements of IEEE-383. Each cable type passed the IEEE-383 vertical flame test. This test used a gas burner flame at 70,000 Btu/hr. These cables self-extinguished or burnt out when the flame source was removed which is the IEEE-383 acceptance criteria for the flame test. Also in accordance with IEEE-383, individually insulated or insulated and jacketed conductors removed from each multiconductor cable, which was type tested, passed a flame resistance test specified in IPCEA S-19-81 Section 6.19.6.

Scheduled Non Class 1E cables used at Susquehanna SES as a minimum meet the flame propagation requirements of IEEE-383 with the possible exception of cables containing PVC. Scheduled Non Class 1E cables may not have been tested to the procedures outlined in IEEE-383, however these cables meet the IEEE-383 acceptance criteria for the flame test. The cables containing PVC, listed in Table 5.0-1, may not have been qualified to the flame propagation requirements of IEEE-383.

In accordance with the criteria outlined in Table 5.0-1, Section D.2(c), cable insulation and jacketing is evaluated to assure the use of plastic, elastomeric, combustible material is minimized.

Any exemptions to this criteria are included in Table 5.0-1, Section D.2(c).

4.11 RACEWAY WRAPPING

The wrapping material used at Susquehanna SES to protect cable trays or conduits meets the requirement of 10CFR50, Appendix R, Section III.G.2 which requires that the wrapping material used as a fire barrier be either 1 hour or 3 hour rated.

Raceway fire barriers are qualified on the basis of a combination of fire testing and engineering evaluations. Deviations from tested configurations are evaluated to assure that they provide a level of protection in excess of the specific fire hazard in the vicinity of the deviation.

Raceway required to be wrapped in support of the post-fire safe shutdown analysis are shown along with their diagrammatic routing on the Fire Protection Features Drawings. On these drawings, each raceway is referenced to an isometric drawing that depicts the detailed physical routing of the raceway. On the isometric drawings, the raceway is divided into node points. Each node point is identified with a reference to a typical detail drawing that represents the qualified configuration that applies to that portion of the wrapped raceway. Each typical detail drawing provides a reference to the calculations providing the qualification basis for the typical detail. The qualification calculation provides a reference to any testing that supports the qualification of the typical detail. These calculations also contain engineering evaluations justifying deviations to the qualified configurations.

The fire barrier ampacity derating factors used when evaluating power cables in raceway wrapped with Thermo-Lag are indicated in Table 4.11-1. The ampacity derating factors in Table 4.11-1 are based on the following:

Conduit, Pull Boxes, Junction Boxes, Air Drops

1 Hour Installations (Upgraded with Thermo-Lag 330-1)

> The ampacity derating values for 1 Hour rated conduits, pull boxes, junction boxes and air drop enclosures are based on the ampacity derating tests performed by Florida Power Corporation under Project No. 95NK1730 report letter dated May 7, 1996. The ampacity derating values in Table 4.11-1 bound the values determined in the testing and the values accepted by the NRC (L. Raghavan, Project Manager, Project Directorate II-3, NRC to Roy Anderson, Senior Vice President Nuclear Operations, Florida Power Corporation, November 14, 1997). Walkdowns and destructive examinations verified that the installed fire barrier configurations at Susquehanna SES bound those fire barrier configurations in the Florida Power Corporation test.

3 Hour Installations (Upgraded with Thermo-Lag 770-1)

The ampacity derating values for 3 Hour rated conduits, pull boxes, junction boxes and air drop enclosures are based on the ampacity derating tests performed by Tennessee Valley Authority under Project Nos. 11960-97337 and 11960-97338 dated August 21, 1995. The ampacity derating values in Table 4.11-1 bound the values determined in the testing and the values accepted by the NRC (NUREG-0847, Supplement No. 18, October, 1995). Test configurations consisted of a baseline 3 Hour installation (1-1/8" ± 1/8" with post-buttered joints) of Thermo-Lag 330-1 upgraded with two layers of Thermo-Lag 770-1 material. The tested configurations are consistent with the construction of the baseline and upgrade configurations installed at Susquehanna SES. Walkdowns and destructive examinations verified that the baseline configurations at Susquehanna SES are bounded by the configurations in the Tennessee Valley Authority test.

3 Hour Installations (Abandoned-in-place; No upgrade material)

The ampacity derating values for 3 Hour rated conduits, pull boxes, junction boxes and air drop enclosures are based on the ampacity derating tests performed by Florida Power Corporation under Project No. 95NK17030 report letter dated May 7, 1996. The ampacity derating values in Table 4.11-1 bound the values determined in the testing and the values accepted by the NRC (L. Raghavan, Project Manager, Project Directorate II-3, NRC to Roy Anderson, Senior Vice President Nuclear Operations, Florida Power Corporation, November 14, 1997). Walkdowns and destructive examinations verified that the baseline configurations at Susquehanna SES are bounded by the configurations in the Florida Power Corporation test.

Non-Standard Conduit

1 Hour Installations

The ampacity derating values for 1 Hour rated non-standard conduit enclosures are based on the ampacity derating tests performed by Tennessee Valley Authority under Project No. 11960-97335. The ampacity derating values in Table 4.11-1 bound the values determined in the testing and the values accepted by the NRC (NUREG-0847, Supplement No. 18, October, 1995). Walkdowns examinations verified that the non-standard configurations at Susquehanna SES are bounded by the configurations in the Tennessee Valley Authority test.

3 Hour Installations

Walkdowns and destructive examinations verified that there are no non-standard 3-Hour installations at Susquehanna SES.

Cable Tray and Wireway

The ampacity derating values for cable tray without covers is based on the ampacity derating tests performed by Texas Utilities Electric Company under Ampacity Derating Test Report No. TUE 12340-95169. The ampacity derating values for cable tray with covers and wireway is based on the ampacity derating tests performed by Florida Power Corporation under Project No. 95NK17030 report dated May 8, 1996. The ampacity derating values in Table 4.11-1 bound the values determined in the testing and the values accepted by the NRC (TUE 12340-95169 - Timothy J. Polich, Project Manager, Project Directorate IV-1, NRC to C. Lance Terry, Group Vice President, Nuclear, TU Electric, June 14, 1995 and NUREG-0847, Supplement No. 18, October, 1995) (FPC Project No. 95NK17030 - L. Raghavan, Project Manager, Project Directorate II-3, NRC to Roy Anderson, Senior Vice President Nuclear Operations, Florida Power Corporation, November 14, 1997). Wireways are considered to be similar to cable tray with covers. Walkdowns and destructive examinations verified that there are no non-standard cable tray or wireway configurations at Susquehanna SES. The ampacity derating values in Table 4.11-1 are applicable to 1 Hour and 3 Hour installations based on the Florida Power Corporation test where the same derating values were derived for both 1 Hour and 3 Hour installations. Walkdowns and destructive examinations verified that the installed fire barrier configurations at Susquehanna SES bound those fire barrier configurations in the Florida Power Corporation and Texas Utilities Electric Company reports.

TABLE 4.11-1

AMPACITY DERATING VALUES FOR RACEWAYS PROTECTED WITH THERMO-LAG

Raceway Type	Fire Barrier Derating Factor
Conduit, Air Drop – 1 Hour	10.7%
Conduit (non standard) – 1 Hour	15.7%
Conduit, Air Drop – 3 Hour	13.0%
Pull Boxes, Junction Boxes – 1 Hour	10.7%
Pull Boxes, Junction Boxes – 3 Hour	13.0%
Cable Tray (without tray covers)	31.5%
Cable Tray (with tray covers)	41.0%
Wireway	41.0%

4.12 FIRE DETECTION AND ALARM SYSTEM

The fire and smoke detection system is in compliance with NFPA 72E. An uninterruptable power supply has been provided for the fire and smoke detection system.

The system complies with the requirements of NFPA 72D. The system is located on the fire protection control panels in the control room. The system records the date and time of a fire alarm. The recording identifies the general location of the alarm by unit (Unit 1, Unit 2 or common).

Fire and smoke monitoring, detection, and alarm are accomplished by installed ionization, photoelectric, flame, or thermal detectors. In certain areas of the plant, heat detectors activate fire suppression systems and fire and smoke detection systems provide early warning alarm function only. In other areas of the plant, the fire and smoke detection system provides early warning alarm and activates the preaction system valve.

The fire and smoke detection system is electrically supervised to detect circuit breaks, ground faults, and power failure. All fire or trouble alarms register on the audible-visual annunciator on the fire protection control panel in the control room.

The Fire and Smoke detection system and hardware installed in panels 1C650 and 2C650 meet NFPA 72 2004. Local Fire and Smoke detection panels report to control room panels 1C650 and 2C650. The individual local panels for CO_2, Sprinkler, Deluge, Pre-action and Halon systems also report to 1C650 or 2C650. Panels 1C650 and 2C650 each have an Operator interface on the front of each panel for all the fire and smoke detection systems. A TruSite Workstation (TSW) located in the Technical Support Center (TSC) serves as a backup to the Control Room. The local fire and smoke detection panels, the TSW, and panels 1C650 and 2C650 are all connected in a style 7 loop. Power to panels 1C650 and 2C650 is provided from a Vital AC source, which is an uninterruptable power supply, with battery backup. The fire and smoke detection system is electronically supervised to detect circuit breaks, ground faults and power failure.

The control room 1C650 and 2C650 panel provides fire and trouble indication for the CO_2, smoke detection, sprinkler, deluge, preaction and Halon systems. Individual local panels are provided for each of these systems. In addition to displaying fire and trouble alarms, the local panels provide supervision of detector and release mechanism wiring, and where applicable, provide system activation. Power to panels, except the Halon panels, is provided by separate connections to the uninterruptable power supply, which is described in Subsection 8.3.1.8 of the FSAR. The Halon panels in the power generation control complex are powered by normal a.c. power and are provided with battery packs for backup power.

The control room 0C650 panel contains fire pump start switches and annunciators to alarm fire pumps operating, AC Power Failure, Motor Overcurrent, Engine Running, Control Switch Not in Auto Position and "trouble" alarms. The control structure smoke removal system graphic display is located on panel 0C650 and contains controls for the fans and dampers of this system.

4.13 APPENDIX R VOICE POWERED COMMUNICATION SYSTEM

The Appendix R Voice Powered Communication System provides un-interruptable communication from the Control Room and Remote Shutdown Panel (RSP) to numerous locations throughout the plant where manual actions may be required in the event of postulated fires in various fire zones.

This voice powered communication system consists of headsets with acoustic boom and/or noise-shielded microphone that plug into jack plates. The jackplates are located as shown on Table 4.13-1. The system provides communication for use during Appendix R fire scenarios. No power is required to operate the system.

TABLE 4.13-1

JACKPLATE LOCATIONS

UNIT	AREA	FIRE ZONE(S)
1	Control Room	0-26H
1	Turbine Building 13.8K Switchgear	0-TB
1	Reactor Building - 4.16KV Emerg Switchgear Rooms - Remote Shutdown Panel - Reactor Protection System Dist. Panel - 120V AC Distribution Panels	 1-4C, 1-4D, 1-5F, 1-5G 1-2D 1-5A-S 1-4A-N, 1-4A-W
1	Lower Relay Room	0-24D
1	Upper Relay Room	0-27E
2	Control Room	0-26H
2	Turbine Building 13.8KV Switchgear	0-TB
2	Reactor Building - 4.16KV Emerg Switchgear Rooms - Remote Shutdown Panel - Reactor Protection System Dist. Panel	 2-4C, 2-4D, 2-5F, 2-5G 2-2A 2-5A-N
2	Lower Relay Room	0-24G
2	Upper Relay Room	0-27A
Common	Diesel Generator Bays A, B, C, D, E	0-41A, 0-41B, 0-41C, 0-41D, 0-41E
Common	Control Structure H&V Equipment Room	0-29B

5.0 COMPARISON OF SUSQUEHANNA SES DESIGN AND FIRE PROTECTION FEATURES TO REGULATORY REQUIREMENTS

The purpose of this section is to compare the fire protection provisions of Susquehanna Steam Electric Station (SSES) Units 1 and 2 with the guidelines in Appendix A of Branch Technical Position APCSB 9.5-1 Rev. 0 and Appendix R to 10CFR50.

To identify areas of impact and to facilitate comparison, matrices for items in Appendix A and Appendix R were developed. Table 5.0-1 contains the matrix which compares Susquehanna SES with Appendix A. Table 5.0-2 contains the matrix which compares Susquehanna SES with Appendix R.

General Design Criteria 3, Fire Protection, of Appendix A to 10 CFR Part 50, General Design Criteria for Nuclear Power Plants, requires that structures, systems and components important to safety shall be designed and located to minimize, consistent with safety requirements, the probability and effects of fires and explosions. Noncombustible and heat resistant materials should be used wherever practical throughout the unit, particularly in locations such as Containment and Control Room. Fire detection and fire fighting systems of appropriate capacity and capability shall be provided and designed to minimize the effects of fires on structures, systems and components important to safety. Fire fighting systems shall be designed to assure that their failure, rupture or inadvertent operation does not significantly impair the safety capability of these structures, systems and components.

The purpose of Appendix A of Branch Technical Position APCSB 9.5-1 Rev. 0 is to describe guidelines acceptable for implementing this criterion for Nuclear Power Plants outlined in General Design Criteria 3. The purpose of the Fire Protection Program for Nuclear Power Plants is to maintain the ability to perform and maintain safe reactor plant shutdown functions and to minimize radioactive releases to the environment in the event of a fire.

Appendix A of Branch Technical Position APCSB 9.5-1 Rev. 0 addresses only fire protection for safety related systems and equipment in nuclear power plants, including equipment with the potential to result in radioactive releases to the environment. As such, the requirements in Table 5.0-1 apply only to systems and components in the following structures, and to the fire protection features, e.g. water supply systems, suppression systems, detection systems and fire barriers, for the following structures:

- Reactor Building Unit 1 and 2
- Control Structure
- ‘A’ through ‘E’ Diesel Generator Buildings
- Engineered Safeguards Service Water Pumphouse
- Turbine Building Unit 1 and 2
- Radwaste Building
- Circulating Water Pumphouse
- Low Level Radwaste Storage Facility

The plant areas where the requirements of 10CFR50 Appendix R Sections III.G, III.J, III.L and III.O, as outlined in Table 5.0-2, apply are described in the balance of the Fire Protection Review Report.

TABLE 5.0-1
SUSQUEHANNA SES AS COMPARED WITH BRANCH TECHNICAL POSITION 9.5-1, APPENDIX A, REV. 0

BRANCH TECHNICAL POSITION GUIDELINE	SUSQUEHANNA SES COMPLIANCE
A. Overall Requirements of Nuclear Plant Fire Protection Program 1. Personnel 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 for the fire protection engineer or consultant who will assist in the design and selection of equipment, inspect and test the completed physical aspects of the system, develop the Fire Protection Program, and assist in the fire-fighting training for the operating plant should be stated. 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 be responsible for: (a) Coordination of building layout and systems design with fire area requirements, including consideration of potential hazards associated with postulated design basis fires, (b) Design and maintenance of fire detection, suppression, and extinguishing systems, (c) Fire prevention activities, (d) Training and manual fire-fighting activities of plant personnel and the fire brigade.	The Fire Protection Program is the responsibility of the Senior Vice President-Chief Nuclear Officer. Responsibilities for design are delegated to the Vice President-Nuclear Engineering/Support. The responsibilities for the operational phase of the Fire Protection Program are delegated to the Vice President-Nuclear Site Operations. Within the organization, reporting to the Vice President-Nuclear Engineering/Support is a qualified fire protection engineer who is responsible for formulation and evaluation of the Fire Protection Program. The Susquehanna SES procedures describe the qualification requirements, training requirements, and tasks for personnel assigned fire protection responsibilities.

TABLE 5.0-1

BRANCH TECHNICAL POSITION GUIDELINE	SUSQUEHANNA SES COMPLIANCE
2. <u>Design Bases</u> 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.	The Susquehanna SES fire hazards analysis provided in Section 6.0 of this report demonstrates that the plant will maintain the ability to perform safe shutdown functions and minimize radioactive releases to the environment in the event of a fire.
3. <u>Backup</u> Total reliance should not be placed on a single automatic fire suppression system. Appropriate backup fire suppression capability should be provided.	All fixed fire suppression systems have manual backup systems of either standpipe and hose reels, portable extinguishers, or fire hydrants.
4. <u>Single Failure Criterion</u> A single failure in the fire suppression system should not impair both the primary and backup fire suppression capability. For example, redundant fire 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 effects of lightning strikes should be included in the overall plant Fire Protection Program.	Neither the failure of a fire pump, its power supply or controls, nor a crack in a moderate-energy line in the fire suppression system will result in loss of function of both sprinkler and hose standpipe systems in an area protected by such primary and backup systems. Two 100% capacity pumps (one electric and one diesel driven) are provided, each capable of supplying the design flow rate at design pressure. By use of sectional control valves and cross-connecting, damaged fire yard mains can be isolated. Separate supplies are provided for sprinkler and standpipe/hose reel stations. Protection from lightning strikes is a part of the Susquehanna SES design.
5. <u>Fire Suppression Systems</u> 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 APCSB Branch Technical Position 3-1, “Protection Against Postulated Piping Failures in Fluid Systems Outside Containment.”	This item is addressed as part of Susquehanna SES compliance with 10CFR50, Appendix R, as discussed in Section 6.1 of this report. (See response to Item E.3.a of Section 5.0-1)

TABLE 5.0-1

BRANCH TECHNICAL POSITION GUIDELINE	SUSQUEHANNA SES COMPLIANCE
6. <u>Fuel Storage Areas</u> The Fire Protection Program (plans, personnel, and equipment) for buildings storing new reactor fuel and for adjacent fire zones which could affect the fuel storage zone should be fully operational before fuel is received at the site.	The Fire Protection Program at Susquehanna SES was in operation prior to fuel being received on site.
7. <u>Fuel Loading</u> The Fire Protection Program for an entire reactor unit should be fully operational prior to initial fuel loading in that reactor unit.	The Fire Protection Program at Susquehanna SES was in operation prior to fuel loading.
8. <u>Multiple-Reactor Sites</u> On multiple-reactor sites where there are operating reactors and construction of remaining units is being completed, the Fire Protection Program should provide continuing evaluation and include additional fire barriers, fire protection capability, and administrative controls necessary to protect the operating units from construction fire hazards. The superintendent of the operating plant should have the lead responsibility for site fire protection.	Prior to operation of both units at Susquehanna SES, the Fire Protection Program under the responsibility of the Superintendent of the Plant was operational and included fire barriers, fire protection capability, and administrative controls to protect the operating unit from construction fire hazards. Both units at Susquehanna SES are currently operating units.
9. <u>Simultaneous Fires</u> 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.	This item is addressed as part of Susquehanna SES compliance with 10CFR50, Appendix R, as discussed in Section 3.0 of this report.

TABLE 5.0-1

BRANCH TECHNICAL POSITION GUIDELINE	SUSQUEHANNA SES COMPLIANCE
B. Administrative Procedures, Controls, and Fire Brigade 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: NFPA 4 - Organization for Fire Services NFPA 4A - Organization for Fire Department NFPA 6 - Industrial Fire Loss Prevention NFPA 7 - Management of Fire Emergencies NFPA 8 - Management Responsibility for Effects of Fire on Operations NFPA 27 - Private Fire Brigades	The Susquehanna SES Plant Procedures include the necessary administrative and technical procedures required to implement the Fire Protection Program. National Fire Protection Association (NFPA) codes and standards were used as guidance for the Susquehanna Fire Protection Program. The date of the NFPA code or standard used corresponds with the date in effect when the original design document or procedure was approved. It is not PPL's nor NFPA's intent that code changes be retroactively applied to existing conditions.
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.	Administrative procedures control the storage of combustible materials including prohibiting bulk storage of combustible materials in areas where they might endanger safety-related equipment.

TABLE 5.0-1

BRANCH TECHNICAL POSITION GUIDELINE	SUSQUEHANNA SES COMPLIANCE
3. Normal and abnormal conditions or other anticipated operations such as modifications (e.g., breaking fire stops, 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.	Administrative controls used at Susquehanna SES maintain the performance of the fire protection system and personnel. These controls establish procedures that: a. Prohibit bulk storage of combustible materials inside or adjacent to safety-related buildings or systems during operation or maintenance periods. b. Govern the handling and limitation of the use of ordinary combustible materials, combustible and flammable gases, liquids, or other combustible supplies in safety-related areas. c. Govern the handling of and limit transient fire loads. d. Designate the onsite staff member responsible for the in-plant fire protection review of proposed work activities to identify potential transient fire hazards and specify required additional fire protection in the work activity procedure. e. Govern the use of ignition sources by use of a Hot Work permit system to control welding, flame cutting, brazing, or other open flame operations. f. Control the removal of all waste material in a timely manner. g. Prohibit the use of open flames or combustion-generated smoke for leak testing. h. Maintain the periodic housekeeping inspections. i. Control the use of specific combustibles in safety-related areas. j. Disarm fire detection or fire suppression systems.

TABLE 5.0-1

BRANCH TECHNICAL POSITION GUIDELINE	SUSQUEHANNA SES COMPLIANCE
(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 non-combustible substitutes are not available. If wood must be used, only fire retardant treated wood (scaffolding, lay down 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.	k. Test plant fire protection and detection systems. l. Provide guidance on actions to be taken by an individual discovering a fire. m. Provide guidance on actions to be taken by the fire brigade.
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 with respect to fire-fighting activities and rely on the public response only for supplemental or backup capability.	Susquehanna SES has been designed to be self-sufficient with respect to fire protection and relies on the public fire departments for supplemental and backup capability.
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 utilize 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.	See Item B.3 above.

TABLE 5.0-1

BRANCH TECHNICAL POSITION GUIDELINE	SUSQUEHANNA SES COMPLIANCE
(b) Basic training is a necessary element in an 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.	Plant procedures detail the organization and actions necessary to accomplish the self-sufficient fire-fighting response. The training intervals and persons to be trained are set forth in FPRR Section 1.4. Local fire departments are invited and encouraged to attend training provided by PPL. The fire-fighting program utilizes the appropriate National Fire Protection Association codes and standards as guidance.
6. 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 the operational precautions when 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.	See Item B.5. above.

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TABLE 5.0-1

BRANCH TECHNICAL POSITION GUIDELINE	**SUSQUEHANNA SES COMPLIANCE**
7. NFPA 27, "Private Fire Brigade" 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 utilized: NFPA 194 - "Standard for Screw Threads and Gaskets for Fire Hose Couplings," 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 utilized.	The Fire Protection Program utilizes the appropriate NFPA codes and standards as guidance.
C. <u>Quality Assurance Program</u> Quality Assurance (QA) programs of applicants and contractors should be developed and implemented to assure 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:	<u>Construction Phase</u> A program was provided for the design and construction phases of the fire protection installation. The program was not under the control of the QA organization. The following is a description of that program.
1. <u>Design Control and Procurement Document Control</u> 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 therefrom are controlled.	Procedures were followed by both PP&L and Bechtel, whereby appropriate existing NRC safety guides and other regulatory documents including new revision were included in design documents in accordance with Bechtel Division Engineering Standards. Plant procurement specifications were reviewed and controlled in accordance with the current procedures, design criteria, regulatory documents, and codes and standards referenced in the specific design criteria.

TABLE 5.0-1

BRANCH TECHNICAL POSITION GUIDELINE	SUSQUEHANNA SES COMPLIANCE
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.	Appropriate procurement and drawing procedures existed in Bechtel for the control of inspections, tests, and instructions for the fire protection equipment and systems during the procurement and construction phases. Specific care was taken to formulate adequate tests, equipment procurement, and fire drill procedures to ensure maximum fire protection capability following plant construction.
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.	Materials, services, and equipment purchased were supplied and subcontracted by individuals who have demonstrated their ability to the industry to provide quality material, equipment, and services. Bid evaluations were performed in accordance with Bechtel procedures. Surveillance inspections were performed on suppliers work (other than that performed by recognized national laboratories) in accordance with the inspection requirements of the particular equipment or material specification. Receiving inspections were performed in accordance with the Quality Control Instructions and normal warehouse procedures.
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.	Bechtel field personnel witnessed the fire protection installation and verified conformance with design drawings.
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.	Not applicable to the design and construction phase.

TABLE 5.0-1

BRANCH TECHNICAL POSITION GUIDELINE	SUSQUEHANNA SES COMPLIANCE
6. Inspection, Test, and Operating Status Measures should be established to provide for the identification of items that have satisfactorily passed required tests and inspections.	Not applicable to the design and construction phase.
7. Non-Conforming Items Measures should be established to control items that do not conform to specified requirements to prevent inadvertent use of installation.	Materials received by either Bechtel personnel or PP&L personnel, which did not comply with the purchase specification and equipment found not operating satisfactorily during testing, were segregated or identified as nonconforming items in accordance with Bechtel Quality Control Instructions, PP&L Warehouse procedures, or PP&L Testing Program Procedures.
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-conformances are promptly identified, reported, and corrected.	Conditions or equipment which would be adverse to fire protection were identified and a corrective course of action recommended to PP&L by Bechtel.
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.	Records in the form of design drawings, letters, comment, etc., were prepared and stored to furnish evidence that fire protection criteria have been met.
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.	None. Operational Phase Following the turnover of the fire protection systems to PP&L, the PP&L OQA program took effect. The Operation Quality Assurance Program concerning fire protection is discussed in FSAR Section 17.2.2.

TABLE 5.0-1

BRANCH TECHNICAL POSITION GUIDELINE	SUSQUEHANNA SES COMPLIANCE
D. <u>General Guidelines for Plant Protection</u>	
1. <u>Building Design</u>	
(a) Plant layouts should be arranged to: (1) Isolate safety-related systems from unacceptable fire hazards, and (2) Separate redundant safety-related systems from each other so that both are not subject to damage from a single fire hazard.	Safe shutdown systems are addressed as part of Susquehanna SES compliance with 10CFR50, Appendix R, as discussed in Section 3.0 and 6.0 of this report.
(b) In order to accomplish 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. Additionally, the fire hazards analysis should be done after any plant modification.	A fire hazards analysis has been completed as part of Susquehanna SES compliance with 10CFR50, Appendix R. This fire hazards analysis will be revised after any plant modifications as necessary.
(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 three hours. Cabling for redundant safety divisions should be separated by walls having three-hour fire barriers.	The redundant division Cable Spreading Rooms on each Unit are separated from each other by a 3-hour barrier. Each unit's cable spreading rooms are also separated from the other unit by a 3-hour barrier. Each unit's cable spreading rooms are also separated from their respective unit's Reactor and Turbine Buildings by a 3-hour barrier. Within each unit's Control Structure, the Upper Cable Spreading Rooms in each unit are separated from their respective unit's Upper Relay Rooms by a3-hour barrier. Each cable spreading room in each unit is separated from adjacent duct and cable chases, the elevator and the stairwell by a 2-hour barrier. Beams supporting the upper cable spreading room floor slabs are not fire proofed; however, they are addressed and justified in Deviation Request No. 6. The upper and lower cable spreading rooms primarily contain different divisions of safety-related cable. The separation of redundant safe shutdown cabling complies with the requirements of 10CFR50, Appendix R.

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(d) Interior wall and structural components, thermal insulation materials and radiation shielding materials, and sound-proofing should be non-combustible. Interior finishes should be non-combustible 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").	The interior walls and structural sound proofing and radiation shielding materials are non-combustible. The interior finishes are either non-combustible or listed by a testing laboratory for flame spread, smoke, and fuel contribution of 25 or less in its use configuration. Interior finishes are considered to be non-combustible if (1) they have a structural base of non-combustible material, (2) they are not over 1/8” thick and (3) they have a flame spread rating of less than 50 when measured in accordance with ASTM E-84, “Surface Burning Characteristics of Building Materials.”
(e) Metal deck roof construction should be non-combustible (see the building materials directory of the Underwriters' Laboratory, Inc.) or listed as Class I by Factory Mutual System Approval Guide.	Non-combustible roof construction is used at Susquehanna SES.
(f) Suspended ceilings and their supports should be of non-combustible construction. Concealed spaces should be devoid of combustibles. Adequate fire detection and suppression systems should be provided where full implementation is not practicable.	"Suspended ceiling panels are constructed from non-combustible material as evidenced by the panels being UL listed for flame spread, smoke and fuel contribution of 25 or less. Suspended ceiling supports are non-combustible." Concealed spaces and suspended ceilings are devoid of combustibles with the exception of cables. Where cables are present in these areas, fixed fire suppression and detection are provided.
(g) High voltage - High amperage transformers installed inside buildings containing safety-related systems should be of the dry type or insulated and cooled with non-combustible 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 or transformers that are insulated and cooled with non-combustible liquid; or (ii) Enclosing the transformer with a three-hour fire barrier and installing automatic water spray protection.	It is PP&L's practice to install dry type transformers in buildings. All transformers have been taken into account as part of the combustible loading analysis in compliance with Appendix R.

TABLE 5.0-1

BRANCH TECHNICAL POSITION GUIDELINE	SUSQUEHANNA SES COMPLIANCE
(h) Buildings containing safety-related systems, 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 of the opening to have fire resistance equal to three hours, (ii) Constructing a three-hour fire barrier between the transformers and the wall openings; or (iii) Closing the opening and providing the capability to maintain a water curtain in case of a fire.	Several buildings at the Susquehanna Steam Electric Station containing safety-related systems have openings in the exterior walls that are located closer than 50 feet to an oil filled transformer. The oil filled transformers are located on grade, which for the reactor building is at Elevation 670'-0" and for the E-Diesel Generator building is at Elevation 675'-0". In each of these cases, the building is a reinforced concrete structure with a wall thickness in excess of that which would be required to achieve a three-hour fire resistance rating. The Reactor Buildings have openings in their exterior walls closer than 50 feet to the four (4) flammable, oil-filled engineered safeguard transformers: 0X-201; 0X-203; 0X-211; and 0X-213. - Blowout panels located below grade in the exterior wall of the Reactor Buildings are protected by steam vents constructed of reinforced concrete which extend approximately 20 feet above grade. The walls of these steam vents are 12" thick which would be equivalent to a fire rating of more than three-hours. Most of the penetrations in these steam vent walls are sealed as three-hour fire rated penetrations. The non-fire rated penetrations are open and provide no fire resistance rating. There are no more than three non-rated penetrations in each steam vent enclosure with the largest sized penetration being 6" in diameter. These penetrations must remain open because they perform a vacuum breaker function in the event of a high-energy steam break inside of the Reactor Building. These open penetrations do not provide a direct pathway between the steam vent enclosure and the reactor building blowout panels. The open penetrations are at Elevation 672'-0" and the top of the reactor building blowout panels are at Elevation 677'-9". The largest size penetration is 6" diameter and there are fewer than 3 open (non-fire rated) penetrations in any one steam vent. The steam vent covers are mild carbon steel plate reinforced with structural steel angles. These covers are approximately 20 feet above grade at Elevation 690'-0". These covers are approximately 20 feet from the oil-filled transformers. The vent covers protect the steam vents from weather and

TABLE 5.0-1

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	foreign substances and only open in the event of a high energy line break that releases steam through the blowout panels. In the event of a transformer fire, the steam vent covers, although not fire rated, are considered to be adequate to prevent the fire from entering the steam vent area. - The remaining exposed penetrations in the reactor building wall within a 50 foot radius of the oil filled transformers are three-hour fire rated or have been evaluated by a qualified FPE to provide acceptable fire protection per GL 86-10.
	- The door to the Unit 2 Truck Bay Airlock is not an approved three-hour fire barrier. The door is approximately 45 feet from the transformers. The door opens to the Unit 2 Reactor Building Truck Bay which contains some safety-related conduits, but no safety-related equipment. The nearest floor penetration is a floor drain that is over 12' away from the Unit 2 Truck Bay Airlock door. The floor of the Unit 2 Truck Bay is reinforced concrete and it slopes away from the floor hatch.
	The E Diesel Generator building has openings within 50 feet of test facility oil-filled transformer 0X-207.
	- Exhaust vent openings above elevation 726'-0" in the south wall are at least 40'-0" from the transformer. The vents open to non-safety related areas of the E-Diesel Generator building. The vents have 3/4" drains, which would divert any liquid (e.g. transformer oil) prior to accumulating.
	- The portion of the south wall of the E-Diesel Generator building enclosed by the blast door access protection does not require additional fire rating.
	- The remaining elevation of the south wall and the penetrations, up to elevation 726'-0" have a fire rating sufficient to preclude any impacts to safety related equipment from an oil filled transformer fire.

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BRANCH TECHNICAL POSITION GUIDELINE	SUSQUEHANNA SES COMPLIANCE
(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. (See NFPA 92M, "Waterproofing and Draining of Floors.") 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.	The floor drains at Susquehanna SES are required and are sized to accommodate the expected fire-fighting water flow from the fixed suppression systems or hose stations. Curbs are used where necessary to divert water to floor drains. Floor drains in potentially radioactive areas are routed to liquid radwaste. The water from these floor drains is monitored prior to release to the environment.
(j) Floors, walls, and ceilings enclosing separate fire areas should have 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.	Fire barriers required to separate redundant safe shutdown equipment are addressed as part of Susquehanna SES compliance with 10CFR50, Appendix R, as described in Section 6.0 of this report. Additional fire barriers as required by Appendix A have a rating exceeding the combustible loading in the adjacent areas. Openings in these barriers are protected to ensure the fire rating integrity of the barrier. One of the following measures is employed to ensure that fire doors which separate fire areas protect openings as required in case of fire: 1) Fire doors are kept closed and electrically supervised at a continuously manned location; or 2) Fire doors are locked closed; or 3) Fire doors are provided with automatic hold-open and release mechanisms and inspected weekly to verify that doorways are free of obstructions; or 4) Fire doors are kept closed and inspected weekly to verify that they are in the closed position.

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BRANCH TECHNICAL POSITION GUIDELINE	SUSQUEHANNA SES COMPLIANCE
2. Control of Combustibles	
(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.	This item is addressed as part of Susquehanna SES compliance with 10CFR50, Appendix R, as discussed in this report.
(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.")	Bulk gas storage at Susquehanna SES is not permitted inside buildings housing safety-related systems. The bulk storage of hydrogen is located outdoors away from any buildings housing safety-related equipment. The orientation of the bulk hydrogen storage containers is with the long axes parallel to the Circulating Water Pumphouse west wall. The bulk storage of nitrogen is located in a vertical tank oriented with its long axis parallel to the north wall of the Radwaste Building. Bulk chlorine is not currently stored at Susquehanna SES. The Hydrogen Water Chemistry System storage facility is located southwest of the South Gatehouse, outside of the plant security Protected Area. This facility consists of cryogenic liquid storage tanks (one each for hydrogen, oxygen and nitrogen), ambient air vaporizers, automatic valves to isolate the tanks, liquid hydrogen pumps, hydrogen gas receivers and excess flow control devices to protect against a large system leak. This facility is designed and installed in accordance with NRC approved report EPRI NP-5283-SR-A, “Guidelines for Permanent BWR Hydrogen Water Chemistry Installation-1987 Revision”. The high pressure gas receivers are located so their long axis is not pointed at any safety related buildings. This will minimize the possibility of wall penetration in the event of a container failure that might generate a missile.

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BRANCH TECHNICAL POSITION GUIDELINE	SUSQUEHANNA SES COMPLIANCE
	The use of compressed gas inside plant buildings is controlled by administrative procedures.
(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 non-combustible 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.	The use of plastics, particularly halogenated plastics (PVC neoprene), will be minimized and these types of materials will be used only when non-combustible substitutes are not available in plant areas where the use of plastic materials could impact the ability to achieve or maintain post–fire safe shutdown. The concern with plastics is that they burn like hydrocarbons producing heavy quantities of smoke. Halogenated plastics are emphasized as an additional concern because they also produce toxic gases and corrosive substances when burning. This requirement is implemented by minimizing the use of plastics in situations where their use could result in large quantities of plastics accumulating in plant areas where, if ignited, they could pose a threat, for the reasons stated above, to the ability to achieve or maintain post-fire safe shutdown. Typical items of concern are bulk cables runs, particularly in open cable trays, where high chlorine content cables could produce large quantities of toxic gases if ignited, or large pieces of equipment where alternative non-combustible materials of construction to plastics are readily available. Based on this, the use of plastics will be minimized for the following types of equipment in plant areas where their use could impact the ability to achieve or maintain post-fire safe shutdown:

TABLE 5.0-1

BRANCH TECHNICAL POSITION GUIDELINE	SUSQUEHANNA SES COMPLIANCE
	1. Architectural finishes, coatings, tiles, flooring, paneling etc. 2. Bulk cables, scheduled and unscheduled, permanent and temporary cable 3. Furnishings, chairs, tables, cabinets 4. Tanks, storage containers 5. Equipment such as the refueling bridge Conversely, the use of plastics, as described below, is exempt from this requirement due to the limited amount of material involved and due to the fact that in these cases, alternative non-combustibles substitute materials are not available. Plastics, including PVC, used in wiring supplied on vendor components or sub-components is generically exempt from this criteria. For these types of items, any fire affecting these items would typically be limited to the cabinet or skid on which the component was mounted. Additionally, such a fire would produce limited amounts of smoke and have little affect on personnel or equipment in the surrounding area. In the event of a cabinet fire, extensive cleaning of items such as relay contacts would be required regardless of the presence of these types of materials. Therefore, for the reasons cited above, minimizing the use of plastics, including PVC, **does not** apply to the following types of equipment: (a) Component housings for relays and other panel mounted components, computers, telephones, communications and testing equipment. (b) Wiring used in vendor supplied panels, computers or equipment. Additional exceptions to this policy on minimizing the use of plastics will be documented and justified in either the FPRR or DBD019. The following are additional exceptions to this criteria: 1. Exemptions applicable to the category of architectural finishes, coatings, tiles, flooring, paneling, etc. - Plastic architectural materials are used only where no suitable substitute material is available, such as: (a) Plastic laminate flooring on some access floor areas, plastic laminated countertops.

TABLE 5.0-1

BRANCH TECHNICAL POSITION GUIDELINE	SUSQUEHANNA SES COMPLIANCE
	(b) Vinyl asbestos tile and seamless vinyl flooring, vinyl all base, vinyl edge trim on access floor panels, and vinyl coated acoustic ceiling panels. These vinyl materials are acceptable for use without evidence of test or listing by a nationally recognized laboratory based on the guidance provided in NUREG-0800. (c) Floor panels installed in the PGCC rooms are used due to their unique magnetic shielding capabilities and strength to weight ratio. These panels pass the requirements for flame spread per ASTM E84 as documented in FPRR Table 5.0-1, Section D.1.(d). (d) Acrylic lenses are used in fluorescent lighting fixtures. (e) Carpeting installed in areas containing safety-related equipment has been tested for fire safety under both the Pill Test (FF1-70) and Critical Radiant Panel Test (NFPA 253). The results ensure the carpet will not spread flame in the initial growth stage of a fire and the carpet will not contribute to flame spread in the event of a fire due to other combustibles. (e).1 Pill Test (FF1-70) Results show the carpeting passes federal standards. (e).2 Critical Radiant Panel Test (NFPA 253-1978) Results show the CRF of the carpeting is acceptable at a value of 0.45 W/cm^2 (or higher). 2. Exemptions applicable to the category of <u>bulk cables, scheduled and unscheduled, permanent and temporary cable:</u> - Cabling as described in Table 5.0-1, Sections D.3(f) and (g). - PVC insulated wiring is not in compliance in the following areas:

TABLE 5.0-1

BRANCH TECHNICAL POSITION GUIDELINE	SUSQUEHANNA SES COMPLIANCE
	(a) Time Response Testing cables (b) Fiber optic cables designated as Cable Code FB8 and installed prior to Feb. 1998 contain PVC material (those installed after Feb. 1998 should not contain PVC). - Elevator traveling cables are not in compliance in the following areas: (a) Unit 1 and Unit 2 Reactor Building elevators traveling cables are specially constructed. Non-PVC cables are unavailable to the industry. (b) The Control Structure passenger elevator traveling cable is specially constructed. Non-PVC cables are unavailable to the industry. - Cables installed in the Turbine Building under DCP 93-3063 and labeled as THHN. - PVC Cables installed in the Radwaste Building Elevation 676" for Crane OH301 upgrade under EC 1090866.
(d) Storage of flammable liquids should, as a minimum, comply with the requirements of NFPA 30, "Flammable and Combustible Liquids Code."	The storage of flammable liquids at Susquehanna SES uses the guidance within the applicable sections of NFPA 30.
3. <u>Electric Cable Construction, Cable Trays, and Cable Penetrations</u>	
(a) Only non-combustible materials should be used for cable tray construction.	Susquehanna SES cable trays are constructed of non-combustible material.
(b) See Section F.3 for fire protection guidelines for cable spreading rooms.	See Section F.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 sprinkler water discharge, should be protected from sprinkler system operation of malfunction.	Protection of redundant safe shutdown cabling is addressed as part of Susquehanna SES compliance with 10CFR50, Appendix R, as discussed in Section 6.0 of this report. The tray configuration outside the cable spreading rooms complies with the separation criteria of Regulatory Guide 1.75. Manual hose stations and portable hand extinguishers are provided for fire protection.

TABLE 5.0-1

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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.	Cables procured for use at Susquehanna SES have been designed for installation in a wet or dry location.
(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.	Vertical and horizontal cable and cable tray penetrations are sealed. The design of penetration seals for horizontal and vertical cable and cable trays have been qualified by standard fire testing methods in accordance with either ASTM E119 "Fire Test of Building Construction and Materials", IEEE 634 "Standard Cable Penetration Fire Stop Qualification Test", or ASTM E814 "Fire Tests of Through-Penetration Fire Stops". All fire testing for these penetration seals considered the exposure fire time-temperature curve as defined in ASTM E119. Thermal responses at representative locations (i.e. sealant surface, through penetrant, or interface of sealant/through penetrant) on the unexposed sides of the tested assemblies were recorded for comparison to the appropriate acceptance criteria identified in the above referenced standard fire tests. Hose stream testing has been performed on all fire-tested configurations. The majority of the hose stream testing meets the ASTM E119 requirements. However, several configurations were qualified by alternative hose stream testing applications deemed acceptable by Generic Letter 86-10 Supplement 1, Information Notice 88-04, Appendix A, and NUREG-0800, Section 9.5.1.
(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.)	Although fire breaks have been installed at Susquehanna SES, they are not deemed necessary as a result of the fire hazards analysis. Therefore, it is not intended that new breaks will be installed nor will existing breaks be maintained unless the fire break is specifically described in Section 6.0, a deviation request, or is part of a fire barrier.

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(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.	All scheduled cable types used at Susquehanna SES have been qualified in accordance with the Flame Test Requirements of IEEE 383-1974 except for small quantities of PVC insulated and jacketed cables identified in our response to Item D.2.c. above.
(g) To the extent practical, cable construction that does not give off corrosive gases while burning should be used in new cable installations.	Cable types which give off highly corrosive gases while burning such as PVC cabling are not used for new cable installations at Susquehanna SES except for small quantities of PVC insulated and jacketed cables identified in our response to Item D.2.c above. Fiber optic cables designated as Cable Code FB8 and installed prior to Feb. 1998 contain PVC material. Fiber optic cables installed after Feb. 1998 should not contain PVC material.
(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. Previously installed equipment in cable tunnels or culverts need not be removed if they present no hazard to the cable runs as determined by the fire hazards analysis.	At Susquehanna SES, the raceways (cable trays and conduits) are used only for cables. Piping for flammable or combustible liquids or gases is not routed near safe shutdown systems.
(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.	The Control Structure, including the cable spreading rooms, is provided with a manual smoke removal system to facilitate manual fire-fighting capability.
(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 cabling installed in concealed floor and ceiling spaces should be protected with an automatic total flooding halon system.	Cables installed in the control room (Fire Zone 0-26H) have been kept to the minimum necessary for operation of the control room. Design practice is not to route cables into the control room without terminating them there. Cabling installed in concealed floor and ceiling spaces are protected with total flooding CO_2 systems.

TABLE 5.0-1

BRANCH TECHNICAL POSITION GUIDELINE	**SUSQUEHANNA SES COMPLIANCE**
4. Ventilation	
(a) The products of combustion that need to be 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. The products of combustion which need to be removed from a specific fire area should be evaluated to determine how they will be controlled.	The SSES ventilation exhaust system is described below. Not all rooms and areas have fixed exhaust systems to remove combustion products. The rooms and areas that do have exhaust systems capable of removing smoke do not automatically discharge directly outside as specified in the guideline. This specified discharge is contrary to effective fire-fighting guidelines, which refer to automatic room isolation in the event of fire, and guidelines and regulations that govern the release of radioactivity. In all cases the operator will have the option of controlling the various systems manually.
	The exhaust systems contain fire dampers and doors where penetrations are made in fire-rated walls, floors, or ceilings.
	Products of combustion emanating from areas that could contain radioactive materials are continuously monitored prior to discharge. These monitors do not monitor a given single-fire area.
	The following described the method used in controlling smoke from various areas:
	Control Structure: In case of fire in any room in the control structure between elevations 698'-0" through 771'-0", the fire dampers of the supply and return air ducts will close automatically and isolate the room. After the fire has been extinguished, the smoke removal fan can be started manually and the required dampers necessary for smoke removal from the affected room will be opened by remote manual operation. The exhausted smoke is monitored for radiation in the exhaust stack.

TABLE 5.0-1

BRANCH TECHNICAL POSITION GUIDELINE	SUSQUEHANNA SES COMPLIANCE
	Turbine Building: The turbine lube oil reservoir room, hydraulic control power room, lube oil conditioner room, and upper and lower switchgear rooms in the turbine building are provided with fire dampers in their supply and return air ducts. The above listed rooms will be isolated in case of fire. There is no dedicated smoke removal system in the turbine building. Smoke and heat vents on a ratio of 1 sq. ft. of effective vent area to each 100 sq. ft. of floor area and heat vents are operated either by fusible link or manually. Reactor Building: The heating and ventilating system of the reactor building is a 100 percent outside air operation. The reactor building has no dedicated smoke removal system. Only the emergency load center and emergency switchgear rooms are provided with fire dampers at the ventilation system penetrations for isolation in case of fire. Portable smoke ejectors are provided if required. Once control of the fire is established, the ventilation system serving the affected area can be activated. Radwaste Building: The heating and ventilating system of the radwaste building is a 100 percent outside air operation. In case of fire, the supply and exhaust fans can be stopped manually by the operator. Smoke could be removed after a fire by using a portable smoke ejector. There is no dedicated smoke removal system in the radwaste building. Diesel Generator, ESSW Pumphouse, and Circulating Water Pumphouse: None of these buildings are provided with a dedicated smoke removal system. Upon receiving an alarm in the control room, the operator can remotely stop the ventilation systems in either the diesel generator building or the ESSW pumphouse. The circulating water pumphouse requires local tripping of each fan system in order to isolate the building. All systems for the subject buildings are capable of exhausting and supplying fresh air by manually activating the ventilation systems.

TABLE 5.0-1

BRANCH TECHNICAL POSITION GUIDELINE	SUSQUEHANNA SES COMPLIANCE
(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.	Other than the smoke vents in the turbine building roof and the smoke exhaust system for the control structure, there are no portions of the ventilation system specifically dedicated to smoke removal. The basic design of the overall plant ventilation system considers the effects of inadvertent operation and single failure. The effects of inadvertent operation of the control room ventilation system (pressurization) are minimized by administrative controls. The fire dampers provided within the ventilation system affect only those portions isolated by the dampers with no adverse effects on the balance of the systems.
(c) The power supply and controls for mechanical ventilation systems should be run outside the fire area served by the system.	The controls for all fans are in the same fire area they serve except for hand switches located in the control room.
(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."	The suppression systems for charcoal filters are designed in accordance with the recommendation of Regulatory Guide 1.52.
(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.	No basis for determining the acceptability of intake and exhaust separation is given in the guideline. Because the requirements of the Uniform Building Code and standard practice are met, existing plant design is considered in compliance with the guideline. The minimum distance between an exhaust system and fresh air intake is approximately 90 feet.
(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 a minimum fire rating of three 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 three-hour fire-rated barrier with equivalent fire doors, escape and access routes should be established by pre-fire plan and practiced in drills by operating and fire brigade personnel.	Although the stairwells are not ventilated by the HVAC system, they are provided with fire doors which are normally closed which minimize smoke infiltration. The stairways are clearly marked and are enclosed in two-hour shafts which is the industry standard construction. This provides a three-hour floor-to-floor separation.

TABLE 5.0-1

BRANCH TECHNICAL POSITION GUIDELINE	SUSQUEHANNA SES COMPLIANCE
(g) 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 I sq. foot of venting area per 200 sq. feet of floor area should be provided. If forced-convection ventilation is used, 300 CFM should be provided for every 200 sq. feet of floor area. See NFPA No. 204 for additional guidance on smoke control.	Smoke and heat vents are provided in the turbine building at a ratio of 1 sq. ft. ft venting area to each 100 sq. ft. of floor area. The upper and lower switch gear room fire doors would need to be opened manually and exhausted with a portable smoke ejector. The cable spreading rooms are provided with a separate smoke removal system as described in Item D.4.a. of this table.
(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 half except for the self-contained units. At least two extra air bottles should be located onsite 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.	The self-contained breathing apparatus available on site are full face positive pressure masks. This apparatus is provided to the fire brigade, damage control, and control room personnel. Each self-contained breathing apparatus has a minimum of one half hour service time. Each has an adequate supply of bottles and an air recharging system is on site which satisfies the six-hour supply of reserve air requirement.
(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.")	Initiation of a total flooding gas extinguishing system automatically closes the inlet and exhaust dampers in ventilation ducts serving the areas protected by the system. The Halon 1301 systems are totally enclosed within the PGCC units and do not require dampers to isolate.

TABLE 5.0-1

BRANCH TECHNICAL POSITION GUIDELINE	SUSQUEHANNA SES COMPLIANCE
5. Lighting and Communication 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.	Sealed beam units with individual eight-hour minimum battery power supplies are addressed as part of Susquehanna SES compliance with 10CFR50, Appendix R, as discussed in this report. Additional lighting which meets Pennsylvania State requirements for emergency egress is provided throughout the facility.
(b) Suitable sealed beam battery powered portable hand lights should be provided for emergency use.	Sealed beam battery-powered portable hand lights are provided for emergency use.
(c) Fixed emergency communication should use voice powered head sets at preselected stations.	The communication system consists of four separate and independent networks: 1. Radio system - 5 channel UHF Security (1 primary, 1 backup) Operations (1 for Unit 1, 1 for Unit 2) Other Talk Groups (1 Channel) 2. Public address - 6 channels, 1 page and 5 talk 3. Private auto branch exchange telephone system 4. Voice Powered Communication System
(d) Fixed repeaters installed to permit use of portable radio communication units should be protected from exposure fire damage.	Repeaters for the radio system are not protected since they are located in an area of the turbine building which contains low combustibles and no safety-related equipment.

TABLE 5.0-1

BRANCH TECHNICAL POSITION GUIDELINE	SUSQUEHANNA SES COMPLIANCE
E. <u>Fire Detection and Suppression</u>	
1. <u>Fire Detection</u>	

(a) Fire detection systems should as a minimum comply with NFPA 72D, "Standard for the Installation, Maintenance and Use of Proprietary Protective Signaling Systems."
(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.
	The system complies with the requirements of NFPA 72D, Proprietary Protective Signaling Systems, except as follows:
	- Operation and supervision of the system is not the primary function of the operators.
	- Only a low-level alarm is provided for the clarified water storage tank to indicate level is at 300,000 gallons.
	- Water storage containers are not provided with alarm annunciation when water temperature is below 40°F.
	- The Fire Alarm and Supervisory Alarm contacts, by having a normally closed contact or lacking the proper end of line resistor, do not meet the requirements of NFPA 72D, except for those identified below:
	  - Deluge Sprinkler Systems (E-327, sh 22)
	  - Halon Systems (E-327, sh 26)
	  - PI Valves (E-327, sh 29 and 31)
	  - Wet and Dry Pipe Sprinkler Systems (E-327, sh 29 and 31)
	- Local alarms are as follows:
	1) Deluge and preaction systems - no local audible alarm
	2) CO_2 - I common local audible alarm
	3) Ionization, combustion, and fire detectors - no local audible alarm
	The AC power supplied to the fire detection and actuation systems is fed from the vital AC system.

TABLE 5.0-1

BRANCH TECHNICAL POSITION GUIDELINE	SUSQUEHANNA SES COMPLIANCE
2. <u>Fire Protection Water Supply Systems</u>	
(a) An underground yard fire main loop should be installed to furnish anticipated fire water requirements. NFPA 24, "Standard for Outside Protection," 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 Works 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. The fire main system piping should be separate from service or sanitary water system piping.	The underground yard fire main loop complies with NFPA 24. It is made of mortar-lined ductile iron pipe to reduce tuberculation. Water used for fire service meets requirements of NFPA 22 and does not require treatment. Flushing of the fire main is possible by sectionalized control of the main fire loop. Post indicator valves provide sectionalized control and isolation to portions of the fire main loop. The fire main system piping is separate from the service and domestic water system piping.
(b) A common yard fire main loop may serve multi-unit 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.	Susquehanna SES is a two-unit plant site. A common underground fire loop serves both units of the plant. Since both units are in a single plant structure, it is not possible to run an individual loop around each unit. The fire main includes post indicator valves for sectionalizing control of the fire protection water distribution system. A common water supply is used and sized for the maximum expected flow of a single plant fire since fires in both units simultaneously are not a design consideration.

TABLE 5.0-1

BRANCH TECHNICAL POSITION GUIDELINE	SUSQUEHANNA SES COMPLIANCE
(c) If pumps are required to meet system pressure or flow requirements, a sufficient number of pumps should be provided so that 100% capacity will be available with one pump inactive (e.g., three 50% pumps or two 100% 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 non-electrical means, preferably diesel engine. Pumps and drivers should be located in rooms separated from the remaining pumps and equipment by a minimum three-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."	Two 100% redundant 2500 gpm, 140 psi fire pumps are provided. One pump is diesel driven and the other pump is electric. One additional 100% backup 2500 gpm, 165 psi diesel driven fire pump is provided. SSES is provided with three separate sources of water to be used for fire protection. The three sources (clarified water storage tank, Unit 1 and Unit 2 cooling tower basis) are interconnected, allowing the pumps to draw water from any or all sources. Individual fire pump connections to the yard fire main loop are separated with sectionalizing valves between connections. The diesel engine driven fire pump is located in a room enclosed by three-hour fire rated walls, doors, and duct penetrations. The motor driven fire pump is located in the main pump room with the service water pumps and circulating water pumps. This area has a low combustible loading and is protected by hose reels and portable fire extinguishers. The diesel engine driven fire pump is protected by a wet pipe sprinkler system. Alarms indicating pump running, driver availability, or failure to start have been provided in the control room. The fire pump installation conforms to NFPA 20 with the exception that the electric fire pump feeder circuit conductors, which are physically routed inside of the turbine building and circulating Water pump house, are not protected with two inches of concrete or a 2 hour fire rated barrier. The two primary fire pumps are installed in the Circulating Water Pump House and are separated by a 3 hour rated fire wall. A single fire is not capable of removing both fire pumps from service due to the fire wall. The fire wall meets the intent of a 2 hour fire rated barrier protecting the feeder circuit conductors for installations with a single primary pump.
(d) Two separate reliable water supplies should be provided. If tanks are used, two 100% (minimum of 300,000 gallons each) system capacity tanks should be installed. They should be so interconnected 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 water supply capacity should be capable of refilling either	At Susquehanna SES, there are three separate sources of water to be used for fire protection. The three sources for the Motor Driven and Diesel Driven Fire Pumps are available to be interconnected. The Backup Diesel Driven Fire Pump source is not interconnected to the three primary sources.

TABLE 5.0-1

BRANCH TECHNICAL POSITION GUIDELINE	SUSQUEHANNA SES COMPLIANCE
tank in a minimum of eight hours.	
Common tanks are permitted for fire and sanitary or service water storage. When this is done, however, minimum fire water storage requirements should be dedicated by means of a vertical standpipe for other water services.	The domestic water tank does not use a vertical standpipe for minimum fire water storage requirements, however, administrative controls are in place to ensure 300,000 gallons of water are dedicated for fire water.
(e) The fire 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 1,000 gpm for manual hose streams plus the greater of: (1) All sprinkler heads opened and flowing in the large designed fire area, or (2) The largest open head deluge system(s) operating.	The capacity of the clarified water storage tank used for fire protection is 300,000 gallons. Each of the cooling tower basins contains approximately 6,000,000 gallons. The fire water supply (total capacity for each source) is calculated based on the largest expected flow rate for a period of two hours, but not less than 300,000 gallons. The largest expected flow rate is based on all Technical Requirements Manual (TRM) systems assuming a 500 gpm manual hose stream allowance plus the greater of: (1) All sprinkler heads within the system with the largest design area and with the highest design density opened and flowing, or (2) The largest open head deluge system operating. The value of 500 gpm is based on the NRC Safety Evaluation Report, NUREG 0776, provided for Susquehanna Units 1 & 2. This value is also consistent with the current requirement for manual hose stream allowance in the NRC Standard Review Plan, NUREG 0800.
(f) Lakes or fresh water 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. (3)	Not applicable to Susquehanna SES.

TABLE 5.0-1

BRANCH TECHNICAL POSITION GUIDELINE	SUSQUEHANNA SES COMPLIANCE
(g) Outside manual hose installation 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 every 1,000 feet. Threads compatible with those used by local fire departments should be provided on all hydrants, hose couplings, and standpipe risers.	Outside manual hose installations have been installed to protect safety related and non-safety related buildings. For the yard main loop surrounding the power block (i.e. Turbine, Reactor and Radwaste Buildings), this is accomplished by installing hydrants at intervals of approximately 250 feet on average along the yard loop surrounding the power block. For other safety related buildings, hydrants have been installed within 250 feet of the building. Fire fighting equipment, such as fire hose, nozzles, adaptors, etc., is provided for each hydrant using NFPA 24 as guidance. The yard main laterals to the hydrants are controlled by a post indicator valve. PP&L has standardized on American National Fire Hose connection screw thread (NST) as set forth in the National Fire Protection Association Standard 1963. Equipment and material is provided to support the plant's need to be self-reliant; adapters from American National Fire Hose connection screw threads (NST) to the thread type of the local fire department are provided for fire department use.
3. <u>Water Sprinklers and Hose Standpipe Systems</u> (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 shut-off 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.	Sprinkler systems and manual hose station standpipes are connected to the plant underground water main separately so that no single active failure or crack in a moderate-energy line can impair both the primary and backup fire suppression systems. Hose, standpipe, and automatic water suppression systems serving a single fire area have independent connections to the yard main system. Headers fed from each end are not used at Susquehanna SES. The effect of fire protection on safe shutdown equipment is addressed as part of the Susquehanna SES compliance with 10CFR50, Appendix R, as discussed in this report. All sprinkler systems in safety-related buildings are equipped with an approved shutoff valve and a water flow alarm. All standpipes in safety-related buildings are equipped with approved shutoff valves.

TABLE 5.0-1

BRANCH TECHNICAL POSITION GUIDELINE	SUSQUEHANNA SES COMPLIANCE
(b) All valves in the fire 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.	All major fire-protection control valves are provided with electrical supervision or locked in the open position with the exception of normally closed valves.
(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."	The appropriate requirements of NFPA 13 and NFPA 15 were used as guidance for the design and installation of automatic sprinkler systems.
(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 1-1/2 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 of at least 4-inch diameter for multiple hose connections and 2-1/2 inch diameter for single hose connections. These systems should follow the requirements of NFPA No. 14 for sizing, spacing, and pipe support requirements.	A general system description for standpipes and hose stations at Susquehanna is included in FPRR section 4.6. The standpipes and hose stations were installed prior to the issue date of BTP 9.5-1. There are no standpipes or hose stations inside of primary containment, although a fire hose station is located just outside the Equipment and Personnel Airlock to the containment. Hose stations are strategically located throughout the plant using the guidance of NFPA 14. Each hose station in the power block contains 100 feet of 1-1/2 inch fire hose with an appropriate nozzle. Hose stations were originally designed to assure that each room or plant area would be within the effective range of a 100' fire hose with suitable nozzle. This resulted in most of the hose stations being spaced at greater than 100' intervals. However, areas have been identified in the plant where an effective hose stream from the installed 100' fire hose at the hose station may not be sufficient to fully reach all extents of each area. The site Fire Brigade is trained in fighting fires using hose stations and actions to be taken should additional fire hose be required. For those areas where the installed fire hose is not long enough, high rise fire hose packs are available for Fire Brigade use.

TABLE 5.0-1

BRANCH TECHNICAL POSITION GUIDELINE	SUSQUEHANNA SES COMPLIANCE
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 shut off valves and pressure reducing devices (if applicable) outside the area.	There are no standpipes or hose stations inside of the ESSW pumphouse or the A, B, C, and D diesel generator buildings. Both the ESSW pumphouse and the diesel generator building are in close proximity to outside yard fire hydrants. These fire hydrants are provided with hose houses which are outfitted with 2-1/2 inch and 1-1/2 inch hoses and nozzles. All normally occupied areas have hose stations provided inside with the exception of the Control Room, where they are located adjacent to the Control Room. Standpipes serving hose stations in areas housing safety-related equipment have post indicator valves located outside the building.
(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.	The hose nozzles are selected based on the fire hazards analysis. Electrically safe nozzles are provided where electrical equipment or cabling is located.
(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 and mechanical low expansion foams, high expansion foam, and the relatively new aqueous film forming form (AFFF) for the portion of hose standpipe system affected by this functional requirement should at least satisfy ANSI Standard B31.1, "Power Piping." The water supply for this condition may be obtained by manual operator actuation of valve(s) in a connection to the hose standpipe header from a normal Seismic Category I water system such as Essential Service Water System. The cross-connection should be (a) capable of providing flow to at least two hose stations (approximately 75 gpm/hose station), and (b) designed to the same standards as the seismic Category I water system; it should not degrade the performance of the Seismic Category I water system.	Automatic foam fire suppression systems are not installed at PPL Susquehanna, LLC. Foam is available .for use at PPL Susquehanna LLC. Administrative controls restrict the use of foam on Elevation 818 and on the Reactor Building roof during those times when new fuel is being stored in the new fuel storage vault.

TABLE 5.0-1

BRANCH TECHNICAL POSITION GUIDELINE	SUSQUEHANNA SES COMPLIANCE
4. Halon Suppression Systems 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 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.	The appropriate requirements of NFPA 12A and 12B were used for the design and installation of Halon systems. Preventive maintenance and testing are performed in accordance with the plant technical specifications.
5. Carbon Dioxide Suppression Systems The use of carbon dioxide extinguishing systems should as a minimum comply with the requirements of NFPA 12, "Carbon Dioxide Extinguishing Systems." Particular 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 overpressurization versus sealing to prevent loss of agent.	The appropriate requirements of NFPA 12 were used for the design and installation of the CO_2 systems.

TABLE 5.0-1

BRANCH TECHNICAL POSITION GUIDELINE	**SUSQUEHANNA SES COMPLIANCE**
6. Portable Extinguishers Fire extinguishers should be provided in accordance with guidelines of NFPA 10 and 10A, "Portable Fire Extinguishers, 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.	The appropriate requirements of NFPA 10 were used for the selection and location of plant portable fire extinguishers. The effectiveness, nature, and clean-up associated with each fire extinguishing agent is considered in placement of fire extinguishers.
F. Guidelines for Specific Plant Areas 1. Primary and Secondary Containment (a) Normal Operation 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 alternate is automatic gas (Halon or CO_2) for hazards identified as requiring fixed suppression protection.	This item is addressed as part of the Susquehanna SES compliance with 10CFR50, Appendix R, as discussed in Section 6.0 of this report. Safety related HVAC charcoal filters for SGTS and CREOAS are protected with manually operated deluge systems.

TABLE 5.0-1

BRANCH TECHNICAL POSITION GUIDELINE	SUSQUEHANNA SES COMPLIANCE
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 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.	See the response to Item E.3.a of Table 5.0-1.
(b) Refueling and Maintenance 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	The Susquehanna SES plant procedures govern transient combustibles and ignition sources in the primary and secondary containments. The atmosphere inside the primary containment area is inerted with nitrogen during operation. There are no standpipes with hose stations installed within the primary containment. During maintenance and refueling, a hose from the standpipe/hose reel located inside the shielding wall of the equipment and personnel access door can be brought into the containment. Portable fire extinguishers are also provided at the containment during refueling and major maintenance outages.

TABLE 5.0-1

BRANCH TECHNICAL POSITION GUIDELINE	**SUSQUEHANNA SES COMPLIANCE**
containment for any required manual fire-fighting operations.	Adequate self-contained breathing apparatus are provided at several locations within the plant in designated fire brigade sheds.
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.	
2. Control Room 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 three hours.	The control room fire area is bounded on all sides by three-hour fire-rated barriers except for the structural steel beams supporting the floor slab over the control room which are not fire proofed and the fire barriers that interfere with the stairwells, the elevators, the duct chases and the cable chases which are 2-hour rated The structural steel supporting the floor slab over the control room is addressed and justified in Deviation Request No. 6. The interfacing fire barriers with the stairwells, the elevators and the duct chases have a rating sufficient to withstand the level of combustibles in each area. The cable chases are addressed and justified in Deviation Request No. 37.
Control room cabinets and consoles are subject to damage from two distinct fire hazards: (a) Fire originating within a cabinet or console; and (b) Exposure fire involving combustibles in the general room area.	A standpipe with a hose reel is located at the control room elevation in each of the two control structure stairwells. Electrically safe nozzles have been provided. Portable fire extinguishers are located both inside and outside adjacent to the control room. Fire detection is provided under the false floor, above the false ceiling, in cable chases, and in the normally occupied areas.
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.	Breathing apparatus for control room operators is readily available. Cables located in concealed floor and ceiling spaces are provided with fixed automatic total flooding or manual spurt CO_2 protection. A duct ionization smoke detector is installed in the outside air intake plenum, which alarms in the control room if smoke is about to enter the control room. The operator can manually isolate the control room ventilation system.

TABLE 5.0-1

BRANCH TECHNICAL POSITION GUIDELINE	**SUSQUEHANNA SES COMPLIANCE**
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.	Automatically isolating the control room ventilation system by the detection system would be degrading to the safety-related ventilation system since the fire detection system is non-safety related. Cables in the PGCC floor sections are protected by an automatic Halon system. See Section D.3.(j) for a discussion of cable terminations.
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 three hours. All penetration seals should be airtight. 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.	
3. Cable spreading room (a) 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	Automatic pre-action water system using closed head directional spray nozzles is provided to protect the cable spreading rooms.

TABLE 5.0-1

BRANCH TECHNICAL POSITION GUIDELINE	SUSQUEHANNA SES COMPLIANCE
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.	Manual fire hose stations and portable fire extinguishers are 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 three-hour rated fire wall. (Refer to NFPA 251 or ASTM E-119 for fire test resistance rating.)	Each unit has two cable spreading rooms which generally contain separate electrical divisions. The redundant division cable spreading rooms on each Unit are separated from each other by a 3-hour barrier. Each unit's cable spreading rooms are also separated from the other unit by a 3-hour barrier. Each unit's cable spreading rooms are also separated from their respective unit's Reactor and Turbine Buildings by a 3-hour barrier. Within each unit's Control Structure, the Upper Cable Spreading Rooms in each unit are separated from their respective unit's Upper Relay Rooms by a 3-hour barrier. Each cable spreading room in each unit is separated from adjacent duct and cable chases, the elevator and the stairwell by a 2-hour barrier. The ability to safely shut down the plant is addressed as part of the Susquehanna SES compliance with 10CFR50, Appendix R, as discussed in this report.
(4) At least two remote and separate entrances are provided to the room for access by fire brigade personnel.	Two remote and separate entrances are provided to each of the cable spreading rooms.
(5) Aisle separation provided between tray stacks should be at least three feet wide and eight feet high.	The aisle separation between tray stacks in the upper cable spreading room, for the most part, satisfy with the width and height recommendations of Appendix A. However, due to space limitations in some areas, the aisle height clearance is between 7 feet and 3 feet 6 inches.
(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:	N/A

TABLE 5.0-1

BRANCH TECHNICAL POSITION GUIDELINE	SUSQUEHANNA SES COMPLIANCE
(1) Divisional cable separation should meet the guidelines of Regulatory Guide 1.75, "Physical Independence of Electric Systems". (2) All cabling should be covered with a suitable fire retardant coating. (3) As an alternate 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) 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.	
4. Plant Computer Room Safety-related computers should be separated from other areas of the plant by barriers having a minimum three-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.	The computers at Susquehanna SES are not safety related, but a three-hour barrier separates the computer room from the relay rooms. The computer room is protected by a CO_2 system. The computer room fire detection system is automatic and is alarmed in the control room. No local annunciation is provided. Portable extinguishers are provided.
5. Switchgear Rooms Switchgear rooms should be separated from the remainder of the plant by minimum three-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.	Switchgear rooms are enclosed by concrete or concrete block walls of sufficient thickness and density to qualify as three-hour rated barriers. Floor slabs and overhead slabs are of sufficient thickness to qualify as three-hour rated barriers. Exposed floor steel framing is not fireproofed. However, it is justified in Deviation Request No. 6. The fire detection system in the switchgear rooms alarm on the fire protection control panel in the control room. No automatic water or gas agent suppression is provided for cables passing through the switchgear rooms. Fire hose stations and portable extinguishers are readily available.

TABLE 5.0-1

BRANCH TECHNICAL POSITION GUIDELINE	**SUSQUEHANNA SES COMPLIANCE**
6. Remote Safety-Related Panels 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.	The fire detection system in the area of remote safety-related panels will alarm on the fire protection control panel in the control room. Fire hose stations and portable extinguishers are provided. Combustible material is controlled through the plant procedures.
7. Station Battery Rooms 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 three hours inclusive of all penetrations and openings. (See NFPA 69, "Standard on Explosion Prevention Systems.") Ventilation systems in the battery rooms should be capable of maintaining the hydrogen concentration well below 2 volume % 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 manual actuated sprinkler system in each room and provide the 1-1/2 hour fire barrier separation.	The appropriate requirements, including protection against fire and explosions, of NFPA 69 were used as guidance for the design of the battery rooms. Battery rooms containing combustible batteries are separated from each other and other plant areas by three-hour fire-rated barriers. The ventilation system is capable of maintaining the hydrogen concentration below 2% by volume. Portable extinguishers and hose stations are provided.

TABLE 5.0-1

BRANCH TECHNICAL POSITION GUIDELINE	SUSQUEHANNA SES COMPLIANCE
8. Turbine Lubrication and Control Oil Storage and Use Areas	
A blank fire wall having a minimum resistance rating of three 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.	This item is addressed as part of the Susquehanna SES compliance with 10CFR50, Appendix R, as discussed in Section 6.0 of this report.
9. Diesel Generator Areas	
Diesel generators should be separated from each other and other areas of the plant by fire barriers having a minimum fire resistance rating of three hours.	The diesel generator buildings A, B, C, and D are separated from each other and other plant areas by minimum three-hour fire barriers. The E Diesel Generator Building is physically detached from all other plant buildings.
Automatic fire suppression such as AFFF foam 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.	An automatic pre-action fire suppression system and a fire detection system are provided for each diesel generator building. The systems alarm on the fire protection control panel in the control room. Drainage is provided for fire-fighting water. The ventilation systems for the diesel generator areas are discussed in Item E.4 (a) above.
Day tanks with total capacity up to 1100 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 three 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.	A 550-gallon capacity day tank is mounted on the skid of each diesel engine. The whole area is protected by a preaction sprinkler system. This is in accordance with the guidance provided in NFPA 37.

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TABLE 5.0-1

BRANCH TECHNICAL POSITION GUIDELINE	**SUSQUEHANNA SES COMPLIANCE**
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 systems. (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.	
10. Diesel Fuel Oil Storage Areas Diesel fuel oil tanks with a capacity greater than 1100 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 three hours. Buried tanks are considered as meeting the three-hour fire 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 three 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.	The diesel fuel storage tanks are buried outside and adjacent to the diesel generator buildings.

TABLE 5.0-1

BRANCH TECHNICAL POSITION GUIDELINE	**SUSQUEHANNA SES COMPLIANCE**
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, or (c) Automatic AFFF that is delivered by a sprinkler system or spray system.	
11. <u>Safety-Related Pumps</u> Pump houses and rooms housing safety-related pumps should be protected by automatic sprinkler protection 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.	The pumps needed to achieve safe shutdown have been addressed as part of Susquehanna SES compliance with 10CFR50, Appendix R. Local hose stations and portable extinguishers are available at these areas.
12. <u>New Fuel Area</u> 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. Combustibles should be limited to a minimum in the new fuel area. 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 water application.	The new fuel area is a vault with top access covered with a watertight cover plate over a removable aluminum grating. Portable fire extinguishers have been provided adjacent to the top access of the new fuel area. The new fuel area is within the range of hose reel 1HR-201 or 2HR-201. There are no automatic fire detectors within the vault, but there are smoke detectors on the ceiling above the vault. The new fuel is stored in a configuration such that criticality is precluded by administrative controls. Straight stream nozzles are provided in the area of the new fuel storage area. The plant procedures provide control of combustible material in the area. The use of fog spray nozzles on Elevation 818 for fire fighting and for the B.5.b Strategies to spray the spent fuel pool and the reactor/containment is addressed in plant procedures.
13. <u>Spent Fuel Pool Area</u> 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.	Hose stations and portable extinguishers are provided in the area of the spent fuel pool. The automatic fire detection system above the spent fuel pool area alarms on the fire protection control panel in the control room.

TABLE 5.0-1

BRANCH TECHNICAL POSITION GUIDELINE	SUSQUEHANNA SES COMPLIANCE
14. Radwaste Building The radwaste building should be separated from other areas of the plant by fire barriers having at least three-hour ratings. Automatic sprinklers should be used in all areas 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 hand-held and large wheeled units.	The radwaste building is separated from the other plant areas by a three-hour fire-rated barrier except for the internal conduit seals as described in Deviation Request No. 20. The controlled zone shops and the access control and laundry area are provided with automatic wet pipe sprinklers. The charcoal portion of the tank vent filter unit is provided with a manual deluge system. All areas in the radwaste building are within reach of at least one water stream from a hose reel. The cable trays in the corridors and pipeway are not provided with automatic sprinklers or fire detectors since they are not controlling or supplying power to safety-related equipment, and a fire in the cable trays will not endanger safety-related equipment. Portable fire extinguishers are located in all areas containing combustible materials except for high radiation areas. Smoke detectors are located in the elevator foyers, the radwaste control center, and the electrical equipment room. Fire detection alarms on the fire protection control panel in the control room and not locally. Ventilation for the radwaste building is discussed in Section D4. (a) above. Floor drains which drain to liquid radwaste sumps are provided.
15. Decontamination Areas 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.	Flammable liquids are not stored in decontamination areas.
16. Safety-Related Water Tanks 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	Safety-related water tanks are not used at Susquehanna SES.

TABLE 5.0-1

BRANCH TECHNICAL POSITION GUIDELINE	SUSQUEHANNA SES COMPLIANCE
hose houses. Combustible materials should not be stored next to outdoor tanks. A minimum of 50 feet of separation should be provided between outdoor tanks and combustible materials where feasible.	
17. <u>Cooling Towers</u> Cooling towers should be of non-combustible construction or so located that a fire will not adversely affect any safety-related systems or equipment. Cooling towers should be of non-combustible construction when the basins are used for the ultimate heat sink or for the fire protection water supply. Cooling towers of combustible construction so located that a fire in them could adversely affect safety-related systems or equipment should be protected with an open head deluge system installation with hydrants and hose houses strategically located.	The cooling towers at Susquehanna SES are used as a source of water for the fire protection system. The Unit 1 cooling tower is constructed of non-combustible structural components. The Unit 1 fill material is non-combustible, cement fiber boards. The Unit 2 cooling tower is constructed of non-combustible structural components. The Unit 2 fill material is primarily non-combustible, cement fiber boards. Approximately 1.5% of the fill has been replaced with PVC film fill material having a flame spread rating of less than or equal to 25. A fire in the cooling towers would not adversely affect any safety-related structures, systems, or components. Therefore, no additional suppression systems or other fire protection features are required. Due to the limited amounts of combustible PVC film fill installed, the low flame spread rating on this material, and the lack of proximity or potential impact to safety-related structures, systems, and components, this change is considered to maintain an equivalency to the requirements of this section.

TABLE 5.0-1

BRANCH TECHNICAL POSITION GUIDELINE	SUSQUEHANNA SES COMPLIANCE
18. Miscellaneous Areas 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.	The affect of a fire in miscellaneous areas on safe shutdown equipment is addressed as part of Susquehanna SES compliance with 10CFR50, Appendix R, as discussed in Section 6.0 of this report. The auxiliary boilers at Susquehanna SES are electric and, therefore, do not have any fuel oil tanks.
G. Special Protection Guidelines 1. Welding and Cutting, Acetylene - Oxygen Fuel Gas Systems 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. (Also refer to 2f herein.)	Use and storage of all compressed gas cylinders, including Acetylene and Oxygen, within the plant are controlled by plant procedures. Bulk storage of compressed gas cylinders is located outside of and remote from safety-related buildings. The applicable requirements of NFPA 51 and 51B were used as guidance in the preparation of plant procedures.
2. Storage Area for Dry Ion Exchange Resins 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.")	Bulk storage of dry ion exchange resins are not located near essential safety-related systems or safe shutdown systems. Small amounts (less than 40 c.f.) of dry ion exchange resin are stored in safety related buildings in the plant, all of which are not stored near essential safety-related or safe shutdown equipment. Automatic fire suppression, smoke detection, manual hose stations, and fire extinguishers are provided in these areas except as noted below: 1) Units 1 and 2 Reactor Building elev. 779' (no suppression), 2) Units 1 and 2 Turbine Building elev. 699' (no detection or suppression), 3) Radwaste Building elevation 676' (no detection or suppression).

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TABLE 5.0-1

BRANCH TECHNICAL POSITION GUIDELINE	SUSQUEHANNA SES COMPLIANCE
3. Hazardous Chemicals Hazardous chemicals should be stored and protected in accordance with the recommendations of NFPA 49, "Hazardous Chemicals Data." Chemicals storage areas should be well ventilated and protected against flooding conditions since some chemicals may react with water to produce ignition.	The applicable requirements of NFPA 49 were used as guidance for the storage and protection of hazardous chemicals. Where necessary, chemical storage areas are ventilated and protected against flooding conditions.
4. Materials Containing Radioactivity 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.	Closed metal tanks or containers are used to store contaminated materials. Administrative procedures for handling, storage, and protection of radioactive materials are used at Susquehanna SES. The containers for waste, requiring special considerations for removal of isotopic decay heat, are designed for sufficient heat removal, heat generation, and radiation protection.

TABLE 5.0-2

COMPARISON WITH 10 CFR 50 APPENDIX R

REQUIREMENTS	SUSQUEHANNA SES POSITION
III.G. Fire Protection of Safety Shutdown Capability 1. Fire Protection features shall be provided for structures, systems, and components important to safe shutdown. These features shall be capable of limiting fire damage so that: a. One train of systems necessary to achieve and maintain hot shutdown conditions from either the control room or emergency control station(s) is free of fire damage; and b. Systems necessary to achieve and maintain cold shutdown from either the control room or emergency control station(s) can be repaired within 72 hours.	The design of the fire protection features at Susquehanna SES is such that both units can achieve and maintain a safe shutdown condition assuming a fire anywhere on site by the use of at least one safe shutdown path. The philosophy used to determine the safe shutdown paths is given in Section 3.0 of this report. Cold shutdown systems can be repaired within 72 hours.
2. Except as provided for in paragraph G.3 of this section, where cables or equipment, including associated non-safety circuits that could prevent operation or cause maloperation due to hot shorts, open circuits, or shorts to ground, of redundant trains of systems necessary to achieve and maintain hot shutdown conditions are located within the same fire area outside of primary containment, one of the following means of ensuring that one of the redundant trains is free of fire damage shall be provided:	As discussed in Section 3.0 of this report, the safe shutdown paths system components and cabling including support systems and associated circuits were identified. At least one shutdown path is available in each fire area. (See Section 6.0 of this report for a description of each fire area.) Where separation and protection did not meet the requirements of this Section of 10CFR50 Appendix R, either deviations were requested or changes were made using the Fire Protection Program License Condition coupled with a Fire Hazards Analysis and/or a Fire Protection Program screen. These deviation requests are contained in Section 7.0 of this report. Also, the guidance in NRC Generic Letter 86-10, Section 3.1.2 states that rated fire boundaries which have been evaluated and accepted in a published SER, need not be reviewed as part of the reanalysis for compliance with Section III.G of Appendix R. A number of fire barriers at Susquehanna SES have been evaluated and accepted in NUREG 0776 and its supplements and are therefore considered fire rated.

TABLE 5.0-2

COMPARISON WITH 10 CFR 50 APPENDIX R

REQUIREMENTS	SUSQUEHANNA SES POSITION
a. Separation of cables and equipment and associated non-safety circuits of redundant trains by a fire barrier having a three-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; b. Separation of cables and equipment and associated non-safety circuits of redundant trains by a horizontal distance of more than 20 feet with no intervening combustible or fire hazards. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area; or c. Enclosure of cable and equipment and associated non-safety circuits of one redundant train in a fire barrier having a one-hour rating. In addition fire detectors and an automatic fire suppression system shall be installed in the fire area.	
Inside noninerted containments one of the fire protection means specified above or one of the following fire protection means shall be provided: d. Separation of cables and equipment and associated non-safety circuits of redundant trains by a horizontal distance of more than 20 feet with no intervening combustibles or fire hazards; e. Installation of fire detectors and an automatic fire suppression system in the fire area; or f. Separation of cables and equipment and associated non-safety circuits of redundant trains by a noncombustible radiant energy shield.	Since the primary containments at Susquehanna SES are inerted during normal operation, these requirements do not apply.

TABLE 5.0-2

COMPARISON WITH 10 CFR 50 APPENDIX R

REQUIREMENTS	SUSQUEHANNA SES POSITION
3. Alternative or dedicated shutdown capability and its associated circuits, independent of cables, systems or components in the area, room or zone under consideration, shall be provided: a. Where the protection of systems whose function is required for hot shutdown does not satisfy the requirement of paragraph G2 of this section; or b. Where redundant trains of systems required for hot shutdown located in the same fire area may be subject to damage from fire suppression activities or from the rupture or inadvertent operation of fire suppression systems. In addition, fire detection and a fixed fire suppression system shall be installed in the area, room or zone under consideration.	The design of the alternative shutdown path meets the criteria as set forth in 10CFR50, Appendix R, Section III.L as required by Generic Letter 86-10. The description of this path is discussed in Section 3.0 of this report. Where separation and protection did not meet the requirements of 10CFR50 Appendix R, deviations were requested. These deviation requests are contained in Section 7.0 of this report.
III.J <u>Emergency Lighting</u> Emergency lighting units with at least an 8-hour battery power supply shall be provided in all areas needed for manual control of safe shutdown equipment and in access and egress routes thereto.	Eight-hour battery powered emergency lighting is provided in all areas needed for operation of safe shutdown equipment and in access and egress routes thereto except as noted in the deviation requests.

TABLE 5.0-2

COMPARISON WITH 10 CFR 50 APPENDIX R

REQUIREMENTS	SUSQUEHANNA SES POSITION
III.L. Alternative and Dedicated Shutdown Capability 1. Alternative or dedicated shutdown capability provided for a specific fire area shall be able to (a) achieve and maintain subcritical reactivity conditions in the reactor; (b) maintain reactor coolant inventory; (c) achieve and maintain hot standby conditions for a PWR (hot shutdown for a BWR); (d) achieve cold shutdown conditions within 72 hours; and (e) maintain cold shutdown conditions thereafter. During the postfire shutdown, the reactor coolant system process variables shall be maintained within those predicted for a loss of normal A.C. power, and the fission product boundary integrity shall not be affected; i.e., there shall be no fuel clad damage, rupture of any primary coolant boundary, or rupture of the containment boundary.	The design of the alternative shutdown path meets the criteria as set forth in this section. The description of the alternative shutdown path is discussed in Section 3.0 of this report.
2. The performance goals for the shutdown functions shall be: a. The reactivity control function shall be capable of achieving and maintaining cold shutdown reactivity conditions. b. The reactor coolant makeup function shall be capable of maintaining the reactor coolant level above the top of the core for BWRs and be within the level indication in the pressurizer for PWRs. c. The reactor heat removal function shall be capable of achieving and maintaining decay heat removal. d. The process monitoring function shall be capable of providing direct readings of the process variables necessary to perform and control the above functions.	

TABLE 5.0-2

COMPARISON WITH 10 CFR 50 APPENDIX R

REQUIREMENTS	SUSQUEHANNA SES POSITION
e. The supporting functions shall be capable of providing the process cooling, lubrication, etc., necessary to permit the operation of the equipment used for safe shutdown functions.	
3. The shutdown capability for specific fire areas may be unique for each such area, or it may be one unique combination of systems for all such areas. In either case, the alternative shutdown capability shall be independent of the specific fire area(s) and shall accommodate postfire conditions where off-site power is available and where off-site power is not available for 72 hours. Procedures shall be in effect to Implement this capability.	
4. 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 standby or hot shutdown condition shall be capable of maintaining such conditions until cold shutdown can be achieved. If such equipment and systems will not be capable of being powered by both on-site and off-site electric power systems because of fire damage, an independent on-site power system shall be provided. The number of operating shift personnel exclusive of fire brigade members, required to operate such equipment and systems shall be on site at all times.	

TABLE 5.0-2

COMPARISON WITH 10 CFR 50 APPENDIX R

REQUIREMENTS	SUSQUEHANNA SES POSITION
5. 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. Materials for such repairs shall be readily available on site and procedures shall be in effect to implement such repairs. If such equipment used prior to 72 hours after the fire will not be capable of being powered by both on-site and off-site electric power systems because of fire damage, an independent on-site power system shall be provided. Equipment and systems used after 72 hours may be powered by off-site power only.	
6. 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, e.g., because of interface with or impact on existing safety systems, or because of adverse valve actions due to fire damage.	
7. The safe shutdown equipment and systems for each fire area shall be known to be isolated from associated non-safety circuits in the fire area so that hot shorts, open circuits or shorts to ground in the associated circuits will not prevent operation of the safe shutdown equipment. The separation and barriers between trays and conduits of one safe shutdown division and trays and conduits containing associated circuits or safe shutdown cables from the redundant division, or the isolation of these associated circuits from the safe shutdown equipment, shall be such that a postulated fire involving associated circuits will not prevent safe shutdown.	

TABLE 5.0-2 Page 7 of 7

COMPARISON WITH 10 CFR 50 APPENDIX R

REQUIREMENTS	SUSQUEHANNA SES POSITION
III.O Oil Collection System for Reactor Coolant Pump The reactor coolant pump shall be equipped with an oil collection system if the containment is not inerted during normal operation. The oil collection system shall be so designed, engineered, and installed that failure will not lead to fire during normal or design basis accident conditions and that there is reasonable assurance that the systems will withstand the Safe Shutdown Earthquake. Such collection systems shall be capable of collecting lube oil from all potential pressurzied and unpressurized leakage sites in the reactor coolant pump lube oil systems. Leakage shall be collected and drained to a vented closed container that can hold the entire lube oil system inventory. A flame arrester is required in the vent and the flash point characteristics of the oil present the hazard of fire flashback. Leakage points to be protected shall include lift pump and piping, overflow lines, lube oil cooler, oil fill and drain lines and plugs, flanged connections on oil lines, and lube oil reservoirs where such features exist on the reactor coolant pumps. The drain line shall be large enough to accommodate the largest potential oil leak.	Since Susquehanna SES Unit 1 and 2 primary containments are inerted during normal operation, compliance with Section III.O is achieved.

6.0 FIRE HAZARDS ANALYSIS

6.1 INTRODUCTION

6.1.1 Purpose

The purpose of this section is to demonstrate that a single fire postulated to occur anywhere at the plant will not affect the ability of both units to be brought and to be maintained in cold shutdown condition. Section 6.1 describes the general fire protection features used in the fire hazards analysis of each fire area. This discussion serves as an overview to the detailed fire area analysis in Section 6.2. Section 6.2 describes each fire area within the plant and addresses the capability to safely shutdown based on the fire area configuration, combustible loading, specific fire hazards, safe shutdown equipment in each fire zone within the fire area and the deviation requests which directly impact that fire area.

Table 6.1-1 lists each fire area in the plant and provides a description of each area, the required safe shutdown path for each area, the FPRR section where its fire hazards analysis is presented and a list of all the fire zones in each fire area.

6.1.2 Fire Protection Features

Our safe shutdown criteria is based on the premise that a fire initiated within any given fire area will be contained within that fire area and not damage safe shutdown equipment in any other fire area. Furthermore, as presented in Deviation Request No. 7, for certain fire zones a fire initiated in that fire zone is postulated to spread to each adjacent fire zone which is not separated from the fire zone of origin by fire rated construction. In this manner, safe shutdown components and cables in unaffected fire areas and fire zones will be used to safely shutdown both reactors.

As discussed in Section 3.3.1.4, the plant was divided into specific fire areas with each fire area consisting of one or more fire zones. Fire areas were selected to optimally separate the safe shutdown components and cables in each redundant path. This selection process was used to separate, to the greatest extent possible, those systems and components in each redundant path required for safe shutdown as identified in Table 3.1-1.

6.1.2.1 Establishing Fire Areas Boundaries

In accordance with NRC guidelines, the term "fire area" as used in Appendix R is an area sufficiently bounded to withstand the hazards associated with the area and, as necessary, to protect important equipment within the area from a fire outside the area. At Susquehanna SES, a fire area is separated from all other fire areas in the plant by fire-rated construction or spatial separation. The fire rating of the fire-rated construction is designed to withstand the fire load of the fire area or any specific combustible configuration within the fire area. Where relied upon, spatial separation between two fire areas precludes the propagation of the postulated fire from one fire area to another.

In order to determine the adequacy of the fire rating of the fire area boundaries, the physical fire area boundaries (i.e., walls and floors/ceilings) were evaluated. The majority of these barriers consist of 12" minimum thick reinforced concrete. Fire-rated gypsum board has also been used for wall construction in some areas. Structural steel and openings in these barriers have been provided with fire rated components or have been justified by deviation requests. Spatial separation has been used as a fire area boundary where sufficient physical distance, lack of intervening combustibles and/or fire protection features exist to adequately separate the redundant safe shutdown equipment of two different areas. At Susquehanna SES two distinct methods of spatial separation were used; the wraparound zone and the buffer zone. A brief description of both concepts is provided here.

The wraparound zone exists at three elevations in each Reactor Building. These are areas of the plant which are corridors that connect Fire Areas R-1A with R-1B (Unit 1) and R-2A with R-2B (Unit 2). The construction of a fire-rated wall is impractical due to the plant configuration in these areas. The wraparound zone was initially a spatial separation of 50 ft. between the two communicating fire areas. Due to field conduit routing tolerances of ± 8 ft., the wraparound zone was expanded 8 ft. on each side to account for cabling designed to be in the 50 foot area. Hence, the wraparound zone became a 66 foot wide area. Within the wraparound zone, both redundant divisions of required safe shutdown cables are either protected by fire protective wrapping, by spatial separation of 50 feet (minimum), or justified by a fire hazards analysis. Safe shutdown components within the wraparound zone have been analyzed and are addressed in deviation requests. The fire hazards and combustible configuration of each wraparound area was examined to determine the acceptability of the zone as a spatial separation barrier. A fire initiated in either of the two fire areas connected by the wraparound zone will not propagate through the wraparound zone and into the adjacent fire-free area. Additionally, a fire initiated within the wraparound zone will not propagate to both adjacent fire areas. Our Appendix R compliance program prohibits the location of any safe shutdown components within the wraparound zone unless a specific evaluation is conducted. The wraparound zone concept is presented in more detail in Deviation Request No. 4.

The buffer zone concept is used in the upper elevations of both Reactor Buildings where little or no safe shutdown equipment exists. Using the buffer zone concept, fire areas are separated by two intervening fire zones (buffer zones). Within these buffer zones, both redundant divisions of safe shutdown components and cables are required to be protected or justified by analysis. The combustible loading of the buffer zones is low and there is no specific combustible configurations which would act to propagate a fire between fire areas. Deviation Request No. 7 discusses the buffer zone concept in more detail.

6.1.2.2 Combustible Loading

A fire zone specific combustible loading analysis has been performed. This analysis identifies all in-situ combustible items within each fire zone and assigns each one a conservative heat load value. All of this heat load is summarized and divided by the area of the fire zone to yield an equivalent fire duration in minutes. This theoretical value is the time it would take for all the combustibles to be consumed by a fire in that fire zone assuming that the combustibles are evenly dispersed throughout the zone.

In our combustible loading analysis, types of combustibles were grouped into five major categories: 1) mechanical items (i.e., lube oil in pumps or valves, charcoal, etc.), 2) cables in unwrapped or unqualified wrap cable tray, 3) Thermo-Lag raceway fire barriers, either qualified or unqualified wrap, 4) electrical panels and cabinets and 5) miscellaneous items.

Under the mechanical items category, the equipment name and number is listed and the quantity of combustibles is given for each piece of equipment in either gallons of lube oil, diesel fuel oil or pounds of charcoal. Gallons of lube, oil or diesel fuel oil is multiplied by 148,875 BTUs/gallon and charcoal quantity is multiplied by 14,730 BTUs/pound to establish the combustible content for each mechanical item. The combustible contents for all mechanical items are then added for the subtotal for each fire zone.

For cable trays, the combustible loading for the cable insulation in each fire zone was compiled. Initially, the heat released value per sq. ft. was determined for each tray depth and all trays were considered to have maximum fill of 30% cable. The long term program evaluates the combustible loading on a per cable basis. This assures that the aggregate effect of all cables in each cable tray is evaluated against the fire area minimum boundary rating or other limitations which may exist. In accordance with NRC guidelines cables in metal conduits do not constitute combustibles and therefore, are not included in this analysis.

NRC Information Notice 95-27 identified that Thermo-Lag was a combustible material. To address this concern, the combustible contribution from Thermo-Lag raceway fire barriers has been included in the combustible loading analysis. The heat of combustion value used for the Thermo-Lag material was derived from industry testing.

Electrical panels and cabinets were listed by name and number. All cabinets were grouped according to size or type. The combustibles in each cabinet were conservatively estimated assuming that each cabinet was full of the maximum amount of combustible materials which that type of cabinet could contain. This part of the analysis was considered very conservative since most cabinets actually contain less combustibles than the worst case cabinet types. The combustible content for all electrical cabinets was subtotaled for each fire zone.

In the miscellaneous item category, the combustible content for each combustible was established utilizing information from the National Fire Protection Association - Fire Protection Handbook, 16th Edition. Typical examples of these miscellaneous items are poly-propylene battery cases (19,970 BTUs/pound), protective clothing (7,950 BTUs/pound) and hydrogen (61,064 BTU's/pound or 325 BTU's/ft3). All miscellaneous items were subtotaled for each fire zone.

Our analysis adds the subtotals of the four categories of combustibles for each fire zone giving the total combustibles in BTUs. This value is divided by the fire zone floor area to yield the fire zone fire load in BTUs/sq. ft. The equivalent fire duration in minutes is then calculated based on a value of 80,000 BTUs/sq ft for a fire of 60 minutes duration.

Although this classical approach is relied upon for a quantitative assessment of the fire severity in a given zone, it can be somewhat misleading due to the size of the zone and the location and configuration of the combustibles within the zone. In lieu of solely relying upon this method of fire loading severity, the specific combustible configurations within a zone or area and the heat release rate of those combustibles provide a more realistic determination of the fire hazards in the zone.

The purpose of the combustible loading analysis is to assure that the fire area boundaries are adequate to contain a fire within that fire area. Our combustible loading program at Susquehanna assures the integrity of our fire barriers and the compliance to deviation requests which rely on this information.

Therefore, rather than expressing specific combustible numbers for each fire area discussed in Section 6.2, each fire area discussion outlines any severe combustible configurations in the area and shows that fire barriers of the area are able to contain the fire hazards associated with the area.

6.1.2.3 Fire Detection and Suppression

Fire detection and suppression (manual and automatic) systems are an integral part of the plant design. The descriptions of the types of detection and suppression systems employed at Susquehanna SES are described in detail in Section 4.0. Each fire area discussion within this section includes information as to the extent and location of detection and suppression systems in that fire area.

The impact of the inadvertent operation or rupture of any fire suppression system in the plant has been evaluated and it has been determined that this condition would not affect the capability to achieve and maintain safe shutdown.

6.1.2.4 Consequences Of A Fire In Each Fire Area

Each fire area of the plant requires the availability of one of the safe shutdown paths as noted in Table 6.1-1. Our safe shutdown analysis and the specific supporting engineering studies evaluate and assure the availability of the required safe shutdown path systems, components and raceway for each fire area. Electrical cabling located in each fire area associated with the safe shutdown systems and components being used to achieve and maintain safe shutdown in the fire area has been specifically evaluated to assure that potential fire induced failures would not impact the ability of both reactors to reach a safe shutdown condition. This is accomplished by one of the following:

a) evaluating the particular cable and determining that the worst case fire induced effects will not adversely impact the ability of the equipment to perform its required safe shutdown function,

b) by providing a manual operator action that can be used to accomplish the required safe shutdown function in the event that cabling for the equipment is damaged as a result of the fire,

c) by protecting the circuit concern with a fire rated barrier,

d) by physically separating the cable of concern from its redundant counterpart in accordance with the separation criteria provided in Appendix R Section III.G.2.b, or

e) by documenting the acceptability of the existing condition in a deviation request or a fire hazards analysis.

In each fire area evaluated, the safe shutdown components which are located in the fire zone and which would be relied upon for use in the event of a fire in that fire zone are listed. These safe shutdown components are referred to as the Category I components. As previously described, these are components which are required for safe shutdown in the event of a fire in the fire zone where the component is located. All Category I components have been addressed by a deviation request, an engineering analysis or plant modification. Each Category I component is listed by component name and number with a reference to the Deviation Request in which it is addressed or a brief description of the engineering analysis which justified its acceptability.

Cables required to perform a safe shutdown function have been evaluated per the methodology described in Section 3.0. Cables designated as cable hits as described in Subsection 3.3.1.5 have been resolved by performing a plant modification (i.e., installing fire protective wrapping, cable relocation, circuit modification), a procedural action, an analysis which verified that fire-induced faults would not impact safe shutdown or by a deviation request or a fire hazards analysis. Each fire area description denotes which path of safe shutdown system cables has been protected in that fire area. The entire unprotected safe shutdown path is assumed to be damaged by the fire unless specific justification to the contrary is provided.

6.1.2.5 Special Features

In certain fire areas manual actions may be necessary to assure safe shutdown compliance to the Appendix R criteria. Each fire area description in Section 6.2 lists any specific manual actions required as the result of the Appendix R safe shutdown analysis. This section of the report also provides a description of any other features which may be unique to that fire area.

6.1.2.6 Deviation Requests

Due to specific configurations within the plant, certain conditions do not strictly conform to the regulations set forth in Appendix R. NRC Generic Letter 86-10 states that a licensee with a Standard License Condition consistent with that described in NRC Generic Letter 86-10 can decide whether or not to submit Deviations to the NRC for their review and acceptance.

In the late 1980’s prior to the issuance of the SSES Standard License Condition allowing changes to the approved fire protection program, all deviations were submitted to NRC for their review and acceptance. In the 1990’s, subsequent to the issuance of the Standard License Condition for SSES Units 1 and 2, the NRC informed PPL that deviations and fire hazards analysis should be handled using the Standard License Condition.

The purpose of a deviation request is to identify non-conforming conditions and to provide justification to demonstrate that the methods implemented at Susquehanna SES satisfy the intent of a specific Appendix R requirement. Section 7.0 provides a complete listing of Deviation Requests that affect the fire zones in each Fire Area.

TABLE 6.1-1
SUSQUEHANNA SES FIRE AREAS

FIRE AREA	FIRE AREA DESCRIPTION	FIRE AREA PATH	*	FIRE ZONE	FIRE ZONE DESCRIPTION	PROTECTED SSD PATH	NOTES
A-1	Outside/Yard Areas	1, 3		0-00	Outside/Yard Areas	1 and 3	RCIC and HPCI protected on Unit 2.
CS-1	Freight Elevator & Stairwell No. 221	1, 3		0-21B	Freight Elevator & Stairwell No. 221	1 and 3	RCIC and HPCI protected on both units.
				0-29A	Stairwell Vestibule	1 and 3	RCIC and HPCI protected on both units.
CS-2	Passenger Elevator & Stairwell No. 120	1, 3		0-22B	Passenger Elevator & Stairwell No. 120	1 and 3	RCIC and HPCI protected on both units.
				0-29C	Stairwell Vestibule	1 and 3	RCIC and HPCI protected on both units.
CS-3	General Access Area	1		0-21A	Common Equipment Area	1	RCIC protected on Unit 1.
				0-22A	Central Access Area	1	RCIC protected on Unit 1.
				0-22C	Entrance Corridor & Lobby	1	RCIC protected on Unit 1.
				0-23	Control Structure. Egress Corridor	1	RCIC protected on Unit 1.
				0-24A	UPS Panel Room (U2)	1	RCIC protected on Unit 1.
				0-24B	Corridor (C-200, C-204)	1	RCIC protected on Unit 1.
				0-24C	UPS Panel Room (U1)	1	RCIC protected on Unit 1.
				0-24E	Computer Room	1	RCIC protected on Unit 1.

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TABLE 6.1-1
SUSQUEHANNA SES FIRE AREAS

FIRE AREA	FIRE AREA DESCRIPTION	FIRE AREA PATH	*	FIRE ZONE	FIRE ZONE DESCRIPTION	PROTECTED SSD PATH	NOTES
CS-3	General Access Area	1		0-24F	Computer Maintenance Room & Office	1	RCIC protected on Unit 1.
CS-4	HVAC Plenum, Fan Room and Duct Chases	1, 3		0-24I	HVAC Duct Chase	1 and 3	RCIC and HPCI protected on Unit 1.
				0-24K	HVAC Duct Chase	1 and 3	RCIC and HPCI protected on Unit 1.
				0-28S	HVAC Duct Chase	1 and 3	RCIC and HPCI protected on Unit 1.
				0-29B	Fan Room & Associated HVAC Equipment	1 and 3	RCIC and HPCI protected on Unit 1.
				0-29D	Pipe & Duct Chase	1 and 3	RCIC and HPCI protected on Unit 1.
				0-30A	C.S. HVAC & SBGTS	1 and 3	RCIC and HPCI protected on Unit 1.
				0-30B	Stairwell No. 125	1 and 3	RCIC and HPCI protected on Unit 1.
CS-5	U2 Div II Lower Relay Room	1		0-24G	U2 Div II Lower Relay Room	1	RCIC protected on Unit 1.
CS-6	South Cable Chase	3		0-24J	South Electrical Cable Chase	3	HPCI protected on both units.
				0-25B	South Electrical Cable Chase	3	HPCI protected on both units.
				0-26B	South Electrical Cable Chase	3	HPCI protected on both units.
				0-26S	South Electrical Cable Chase	3	HPCI protected on both units.

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TABLE 6.1-1
SUSQUEHANNA SES FIRE AREAS

FIRE AREA	FIRE AREA DESCRIPTION	FIRE AREA PATH	*	FIRE ZONE	FIRE ZONE DESCRIPTION	PROTECTED SSD PATH	NOTES
CS-6	South Cable Chase	3		0-27F	South Electrical Cable Chase	3	HPCI protected on both units.
				0-28P	South Electrical Cable Chase	3	HPCI protected on both units.
CS-7	North and Center Cable Chases	3		0-24L	Center Electrical Cable Chase	3	HPCI protected on Unit 2.
				0-24M	North Electrical Cable Chase	3	HPCI protected on Unit 2.
				0-25C	Center Electrical Cable Chase	3	HPCI protected on Unit 2.
				0-25D	North Electrical Cable Chase	3	HPCI protected on Unit 2.
				0-26C	Center Electrical Cable Chase	3	HPCI protected on Unit 2.
				0-26D	North Electrical Cable Chase	3	HPCI protected on Unit 2.
				0-26T	Center Electrical Cable Chase	3	HPCI protected on Unit 2.
				0-26V	North Electrical Cable Chase	3	HPCI protected on Unit 2.
				0-27G	Center Electrical Cable Chase	3	HPCI protected on Unit 2.
				0-27H	North Electrical Cable Chase	3	HPCI protected on Unit 2.
				0-28Q	Center Electrical Cable Chase	3	HPCI protected on Unit 2.

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TABLE 6.1-1
SUSQUEHANNA SES FIRE AREAS

FIRE AREA	FIRE AREA DESCRIPTION	FIRE AREA PATH	*	FIRE ZONE	FIRE ZONE DESCRIPTION	PROTECTED SSD PATH	NOTES
CS-7	North and Center Cable Chases	3		0-28R	North Electrical Cable Chase	3	HPCI protected on Unit 2.
CS-9	Main Control Room	2		0-26A	Copy Room	2	
				0-26E	Locker Room	2	
				0-26F	Vestibule (U1)	2	
				0-26G	Shift Outage/STA Office	2	
				0-26H	Control Room	2	
				0-26I	Shift Supervisor’s Office	2	
				0-26J	Vestibule (U2)	2	
				0-26K	Technical Support Center	2	
				0-26L	TSC Conference Room/Library	2	
				0-26M	TSC North Soffit	2	
				0-26N	Control Room U1 Soffit	2	
				0-26P	Control Room U2 Soffit	2	

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TABLE 6.1-1
SUSQUEHANNA SES FIRE AREAS

FIRE AREA	FIRE AREA DESCRIPTION	FIRE AREA PATH	*	FIRE ZONE	FIRE ZONE DESCRIPTION	PROTECTED SSD PATH	NOTES
CS-9	Main Control Room	2		0-26R	TSC South Office Soffit	2	
CS-10	U1 Div I Upper Cable Spreading Room	3		0-27C	U1 Div I Upper Cable Spreading Room	3	HPCI protected on Unit 2.
				0-27D	Electricians Office	3	HPCI protected on Unit 2.
CS-11	U2 Div II Equipment Room	1		0-28A-I	U2 Div II Equipment Room	1	RCIC protected on Unit 1.
CS-12	U2 Div I 125V Battery Room	3		0-28C	U2 Div I 125V Battery Room	3	HPCI protected on Unit 1.
CS-13	U2 Div II 125V Battery Room	1		0-28E	U2 Div II 125V Battery Room	1	RCIC protected on both units.
CS-14	U2 Div II 250V Battery Room	1		0-28G	U2 Div II 250V Battery Room	1	RCIC protected on Unit 1.
CS-15	Cold Instrument Repair Shop	1		0-28H	Cold Instrument Repair Shop	1	RCIC protected on Unit 2.
CS-16	U1 Div II 250V Battery Room	1		0-28J	U1 Div II 250V Battery Room	1	RCIC protected on Unit 2.
CS-17	U1 Div II Equipment Room	1		0-28B-I	U1 Div II Equipment Room	1	RCIC protected on Unit 2.
CS-18	U1 Div II 125V Battery Room	1		0-28M	U1 Div II 125V Battery Room	1	RCIC protected on both units.
CS-19	U1 Div II 125V Battery Room	1		0-28N	U1 Div II 125V Battery Room	1	RCIC protected on both units.
CS-20	U2 Div I Equipment Room	3		0-28A-II	U2 Div I Equipment Room	3	HPCI protected on Unit 1.

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TABLE 6.1-1
SUSQUEHANNA SES FIRE AREAS

FIRE AREA	FIRE AREA DESCRIPTION	FIRE AREA PATH	*	FIRE ZONE	FIRE ZONE DESCRIPTION	PROTECTED SSD PATH	NOTES
CS-21	U2 Div I 125V Battery Room	3		0-28T	U2 Div I 125V Battery Room	3	HPCI protected on both units.
CS-22	U2 Div II 125V Battery Room	1		0-28D	U2 Div II 125V Battery Room	1	RCIC protected on both units.
CS-23	U2 Div I 250V Battery Room	3		0-28F	U2 Div I 250V Battery Room	3	HPCI protected on Unit 1.
CS-24	U1 Div I Equipment Room	3		0-28B-II	U1 Div I Equipment Room	3	HPCI protected on Unit 2.
CS-25	U1 Div I 250V Battery Room	3		0-28I	U1 Div I 250V Battery Room	3	HPCI protected on Unit 2.
CS-26	U1 Div I 125V Battery Room	3		0-28K	U1 Div I 125V Battery Room	3	HPCI protected on both units.
CS-27	U1 Div I 125V Battery Room	3		0-28L	U1 Div I 125V Battery Room	3	HPCI protected on both units.
CS-28	U1 Div II Lower Relay Room	1		0-24D	U1 Div II Lower Relay Room	1	RCIC protected on Unit 2.
CS-29	U2 Div II Lower Cable Spreading Room	1		0-25A	U2 Div II Lower Cable Spreading Room	1	RCIC protected on Unit 1.
CS-30	U1 Div II Lower Cable Spreading Room	1		0-25E	U1 Div II Lower Cable Spreading Room	1	RCIC protected on Unit 2.
CS-31	U2 Div I Upper Relay Room	3		0-27A	U2 Div I Upper Relay Room	3	HPCI protected on Unit 1.
CS-32	U2 Div I Upper Cable Spreading Room	3		0-27B	U2 Div I Upper Cable Spreading Room	3	HPCI protected on Unit 1.
CS-33	U1 Div I Upper Relay Room	3		0-27E	U1 Div I Upper Relay Room	3	HPCI protected on Unit 2.

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TABLE 6.1-1
SUSQUEHANNA SES FIRE AREAS

FIRE AREA	FIRE AREA DESCRIPTION	FIRE AREA PATH	*	FIRE ZONE	FIRE ZONE DESCRIPTION	PROTECTED SSD PATH	NOTES
D-1	Diesel Generator Bay A	3		0-41A	Diesel Generator Bay A	3	HPCI protected on both units.
D-2	Diesel Generator Bay B	1		0-41B	Diesel Generator Bay B	1	RCIC protected on Unit 2.
D-3	Diesel Generator Bay C	3		0-41C	Diesel Generator Bay C	3	HPCI protected on both units.
D-4	Diesel Generator Bay D	1		0-41D	Diesel Generator Bay D	1	RCIC protected on both units.
D-5	Diesel Generator "E" Bldg	1, 3		0-41E	Diesel Generator "E" Bldg	1 and 3	RCIC and HPCI protected on both units.
E-1	East Side Of ESSW Pumphouse	3		0-51	East Side Of ESSW Pumphouse	3	HPCI protected on both units.
E-2	West Side Of ESSW Pumphouse	1		0-52	West Side Of ESSW Pumphouse	1	RCIC protected on both units.
R-1A	South Side of Unit 1 Reactor Building	3	*	0-6G	Surge Tank Vault	1 and 3	RCIC and HPCI protected on Unit 2.
			*	0-6H	Cask Storage Pit	1 and 3	RCIC and HPCI protected on Unit 2.
			*	0-8A	Refueling Floor	1 and 3	RCIC and HPCI protected on Unit 2.
				1-1A	Core Spray "A" Pump Room	3	HPCI protected on Unit 2.
				1-1F	RHR "A" Pump Room	3	HPCI protected on Unit 2.
				1-1G	Sump Room	3	HPCI protected on Unit 2.

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TABLE 6.1-1
SUSQUEHANNA SES FIRE AREAS

FIRE AREA	FIRE AREA DESCRIPTION	FIRE AREA PATH	*	FIRE ZONE	FIRE ZONE DESCRIPTION	PROTECTED SSD PATH	NOTES
R-1A	South Side of Unit 1 Reactor Building	3		1-2A	Core Spray "A" Pump Room Access	3	HPCI protected on Unit 2.
				1-2C	Railroad Airlock/Access Shaft	3	HPCI protected on Unit 2.
				1-3A	Heat Exchanger. & Pump Room	3	HPCI protected on Unit 2.
				1-3B-S	Equipment Removal Area	3	HPCI protected on Unit 2.
			*	1-3B-W	Equipment Removal Area	1 and 3	RCIC and HPCI protected on Unit 2.
				1-3C-S	Equipment Access Area	3	HPCI protected on Unit 2.
			*	1-3C-W	Equipment Access Area	1 and 3	RCIC and HPCI protected on Unit 2.
				1-4A-S	Containment Access Area	3	HPCI protected on Unit 2.
			*	1-4A-W	Containment Access Area	1 and 3	RCIC and HPCI protected on Unit 2.
				1-4E	CRD Rebuild Room	3	HPCI protected on Unit 2.
				1-5A-S	Standby Liquid Control Area	3	HPCI protected on Unit 2.
			*	1-5A-W	Access Corridor	1 and 3	RCIC and HPCI protected on Unit 2.
				1-5E	Penetration Room	3	HPCI protected on Unit 2.

- FIRE ZONES WITH AN "*" IN THIS COLUMN ARE ANALYZED AS PART OF A PSEUDO FIRE AREA. THE REQUIRED SAFE SHUTDOWN PATH FOR THESE FIRE ZONES INCLUDES SHUTDOWN CAPABILITY IN ADDITION TO THE REQUIRED SAFE SHUTDOWN PATH FOR THE FIRE AREA.

TABLE 6.1-1
SUSQUEHANNA SES FIRE AREAS

FIRE AREA	FIRE AREA DESCRIPTION	FIRE AREA PATH	*	FIRE ZONE	FIRE ZONE DESCRIPTION	PROTECTED SSD PATH	NOTES
R-1A	South Side of Unit 1 Reactor Building	3		1-5H	I&C Instrument Repair Shop	3	HPCI protected on Unit 2.
			*	1-6B	Load Center Room	1 and 3	RCIC and HPCI protected on Unit 2.
			*	1-6C	Electrical Equipment Room	1 and 3	RCIC and HPCI protected on Unit 2.
			*	1-6D	HVAC Equipment Room	1 and 3	RCIC and HPCI protected on Unit 2.
				1-6E	HVAC Plenum Area	3	HPCI protected on Unit 2.
			*	1-6F	Spent Fuel Pool	1 and 3	RCIC and HPCI protected on Unit 2.
			*	1-7A	HVAC Equipment Area	1 and 3	RCIC and HPCI protected on Unit 2.
			*	1-7B	Recirculation Fan Room	1 and 3	RCIC and HPCI protected on Unit 2.
R-1B	North Side of Unit 1 Reactor Building	1	*	0-6G	Surge Tank Vault	1 and 3	RCIC and HPCI protected on Unit 2.
			*	0-6H	Cask Storage Pit	1 and 3	RCIC and HPCI protected on Unit 2.
			*	0-8A	Refueling Floor	1 and 3	RCIC and HPCI protected on Unit 2.
				1-1B	Core Spray "B" Pump Room	1	RCIC protected on Unit 2.
				1-1C	HPCI Pump Room	1	RCIC protected on Unit 2.

- FIRE ZONES WITH AN "*" IN THIS COLUMN ARE ANALYZED AS PART OF A PSEUDO FIRE AREA. THE REQUIRED SAFE SHUTDOWN PATH FOR THESE FIRE ZONES INCLUDES SHUTDOWN CAPABILITY IN ADDITION TO THE REQUIRED SAFE SHUTDOWN PATH FOR THE FIRE AREA.

TABLE 6.1-1
SUSQUEHANNA SES FIRE AREAS

FIRE AREA	FIRE AREA DESCRIPTION	FIRE AREA PATH	*	FIRE ZONE	FIRE ZONE DESCRIPTION	PROTECTED SSD PATH	NOTES
R-1B	North Side of Unit 1 Reactor Building	1		1-1D	RCIC Pump Room	1	RCIC protected on Unit 2.
				1-1E	RHR "B" Pump Room	1	RCIC protected on Unit 2.
				1-1I	Elevator Shaft & Stairwell No. 102	1	RCIC protected on Unit 2.
			*	1-1J	Stairwell No. 101	1 and 3	RCIC and HPCI protected on Unit 2.
				1-2B	Access Corridor	1	RCIC protected on Unit 2.
				1-2D	Remote Shutdown Panel Room	1	RCIC protected on Unit 2.
				1-3B-N	Equipment Removal Area	1	RCIC protected on Unit 2.
			*	1-3B-W	Equipment Removal Area	1 and 3	RCIC and HPCI protected on Unit 2.
				1-3C-N	Equipment Access Area	1	RCIC protected on Unit 2.
			*	1-3C-W	Equipment Access Area	1 and 3	RCIC and HPCI protected on Unit 2.
				1-4A-N	Containment Access Area	1	RCIC protected on Unit 2.
			*	1-4A-W	Containment Access Area	1 and 3	RCIC and HPCI protected on Unit 2.
				1-4B	Pipe Penetration Room	1	RCIC protected on Unit 2.

- FIRE ZONES WITH AN “*” IN THIS COLUMN ARE ANALYZED AS PART OF A PSEUDO FIRE AREA. THE REQUIRED SAFE SHUTDOWN PATH FOR THESE FIRE ZONES INCLUDES SHUTDOWN CAPABILITY IN ADDITION TO THE REQUIRED SAFE SHUTDOWN PATH FOR THE FIRE AREA.

TABLE 6.1-1
SUSQUEHANNA SES FIRE AREAS

FIRE AREA	FIRE AREA DESCRIPTION	FIRE AREA PATH	*	FIRE ZONE	FIRE ZONE DESCRIPTION	PROTECTED SSD PATH	NOTES
R-1B	North Side of Unit 1 Reactor Building	1		1-4G	Main Steam Pipeway	1	RCIC protected on Unit 2.
				1-5A-N	General Access Area	1	RCIC protected on Unit 2.
			*	1-5A-W	Access Corridor	1 and 3	RCIC and HPCI protected on Unit 2.
				1-5C	Reactor Backwash Receiving Tank Room	1	RCIC protected on Unit 2.
			*	1-5D	RWCU Pump Room & Heat Exchanger Cells	1 and 3	RCIC and HPCI protected on Unit 2.
				1-6A	General Access Area & Pump Room	1	RCIC protected on Unit 2.
			*	1-6B	Load Center Room	1 and 3	RCIC and HPCI protected on Unit 2.
			*	1-6C	Electrical Equipment Room	1 and 3	RCIC and HPCI protected on Unit 2.
			*	1-6D	HVAC Equipment Room	1 and 3	RCIC and HPCI protected on Unit 2.
			*	1-6F	Spent Fuel Pool	1 and 3	RCIC and HPCI protected on Unit 2.
				1-6I	Fuel Pool Holding Pump Room	1	RCIC protected on Unit 2.
			*	1-7A	HVAC Equipment Area	1 and 3	RCIC and HPCI protected on Unit 2.
R-1C	Unit 1 Primary Containment	N/A		1-1H	Suppression Chamber	N/A	

- FIRE ZONES WITH AN "*" IN THIS COLUMN ARE ANALYZED AS PART OF A PSEUDO FIRE AREA. THE REQUIRED SAFE SHUTDOWN PATH FOR THESE FIRE ZONES INCLUDES SHUTDOWN CAPABILITY IN ADDITION TO THE REQUIRED SAFE SHUTDOWN PATH FOR THE FIRE AREA.

TABLE 6.1-1
SUSQUEHANNA SES FIRE AREAS

FIRE AREA	FIRE AREA DESCRIPTION	FIRE AREA PATH	*	FIRE ZONE	FIRE ZONE DESCRIPTION	PROTECTED SSD PATH	NOTES
R-1C	Unit 1 Primary Containment	N/A		1-4F	Drywell	N/A	
R-1D	Valve Access Area	1		1-5B	Valve Access Area	1 and 3	S/D Unit 1 with Path 1; RCIC for inventory control & RHR SDC for decay heat removal. S/D Unit 2 with Path 3.
R-1E	4.16KV Switchgear Room Div II	1		1-4C	4.16KV Switchgear Room Div II	1	RCIC protected on Unit 2.
R-1F	4.16KV Switchgear Room Div I	3		1-4D	4.16KV Switchgear Room Div I	3	HPCI protected on Unit 2.
R-1G	4.16KV Switchgear Room Div II	1		1-5F	4.16KV Switchgear Room Div II	1	RCIC protected on Unit 2.
R-1H	4.16KV Switchgear Room Div I	3		1-5G	4.16KV Switchgear Room Div I	3	HPCI protected on Unit 2.
R-2A	South Side of Unit 2 Reactor Building	3	*	0-8A	Refueling Floor	1 and 3	RCIC and HPCI protected on Unit 2.
R-2A	South Side of Unit 2 Reactor Building	3		2-1B	Core Spray "A" Pump Room	3	HPCI protected on Unit 1.
				2-1F	RHR "A" Pump Room	3	HPCI protected on Unit 1.
				2-1G	Sump Room	3	HPCI protected on Unit 1.
			*	2-1I	Elevator Shaft & Stairwell No. 202	1 and 3	RCIC and HPCI protected on Unit 1.
				2-2A	Remote Shutdown Panel Room	3	HPCI protected on Unit 1.

- FIRE ZONES WITH AN "*" IN THIS COLUMN ARE ANALYZED AS PART OF A PSEUDO FIRE AREA. THE REQUIRED SAFE SHUTDOWN PATH FOR THESE FIRE ZONES INCLUDES SHUTDOWN CAPABILITY IN ADDITION TO THE REQUIRED SAFE SHUTDOWN PATH FOR THE FIRE AREA.

TABLE 6.1-1
SUSQUEHANNA SES FIRE AREAS

FIRE AREA	FIRE AREA DESCRIPTION	FIRE AREA PATH	*	FIRE ZONE	FIRE ZONE DESCRIPTION	PROTECTED SSD PATH	NOTES
R-2A	South Side of Unit 2 Reactor Building	3		2-2C	Vehicle Airlock	3	HPCI protected on Unit 1.
				2-3A	Heat Exchanger Pump Room	3	HPCI protected on Unit 1.
				2-3B-S	Equipment Removal Area	3	HPCI protected on Unit 1.
			*	2-3B-W	Equipment Removal Area	1 and 3	RCIC and HPCI protected on Unit 1.
				2-3C-S	Equipment Access Area	3	HPCI protected on Unit 1.
			*	2-3C-W	Equipment Access Area	1 and 3	RCIC and HPCI protected on Unit 1.
				2-4A-S	Containment Access Area	3	HPCI protected on Unit 1.
			*	2-4A-W	Containment Access Area	1 and 3	RCIC and HPCI protected on Unit 1.
				2-4E	CRD Rebuild Room	3	HPCI protected on Unit 1.
				2-4G	Main Steam Pipeway	3	HPCI protected on Unit 1.
				2-5A-S	General Access Area	3	HPCI protected on Unit 1.
			*	2-5A-W	Access Corridor	1 and 3	RCIC and HPCI protected on Unit 1.
				2-5C	Reactor Backwash Receiving Tank Room	3	HPCI protected on Unit 1.

- FIRE ZONES WITH AN "*" IN THIS COLUMN ARE ANALYZED AS PART OF A PSEUDO FIRE AREA. THE REQUIRED SAFE SHUTDOWN PATH FOR THESE FIRE ZONES INCLUDES SHUTDOWN CAPABILITY IN ADDITION TO THE REQUIRED SAFE SHUTDOWN PATH FOR THE FIRE AREA.

TABLE 6.1-1
SUSQUEHANNA SES FIRE AREAS

FIRE AREA	FIRE AREA DESCRIPTION	FIRE AREA PATH	*	FIRE ZONE	FIRE ZONE DESCRIPTION	PROTECTED SSD PATH	NOTES
R-2A	South Side of Unit 2 Reactor Building	3	*	2-5D	RWCU Pump Room & Heat Exchanger Cells	1 and 3	RCIC and HPCI protected on Unit 1.
				2-5E	Pipe Penetration Room	3	HPCI protected on Unit 1.
			*	2-5H	I&C Instrument Repair Shop	1 and 3	RCIC and HPCI protected on Unit 1.
			*	2-6B	Load Center Room	1 and 3	RCIC and HPCI protected on Unit 1.
			*	2-6D	HVAC Equipment Room	1 and 3	RCIC and HPCI protected on Unit 1.
			*	2-6E	HVAC Plenum Area	1 and 3	RCIC and HPCI protected on Unit 1.
			*	2-6F	Spent Fuel Pool	1 and 3	RCIC and HPCI protected on Unit 1.
			*	2-7A	HVAC Equipment Area	1 and 3	RCIC and HPCI protected on Unit 1.
R-2B	North Side of Unit 2 Reactor Building	1	*	0-8A	Refueling Floor	1 and 3	RCIC and HPCI protected on Unit 2.
				2-1A	Core Spray "B" Pump Room	1	RCIC protected on Unit 1.
				2-1C	HPCI Pump Room	1	RCIC protected on Unit 1.
				2-1D	RCIC Pump Room	1	RCIC protected on Unit 1.
				2-1E	RHR "B" Pump Room	1	RCIC protected on Unit 1.

- FIRE ZONES WITH AN “*” IN THIS COLUMN ARE ANALYZED AS PART OF A PSEUDO FIRE AREA. THE REQUIRED SAFE SHUTDOWN PATH FOR THESE FIRE ZONES INCLUDES SHUTDOWN CAPABILITY IN ADDITION TO THE REQUIRED SAFE SHUTDOWN PATH FOR THE FIRE AREA.

TABLE 6.1-1
SUSQUEHANNA SES FIRE AREAS

FIRE AREA	FIRE AREA DESCRIPTION	FIRE AREA PATH	*	FIRE ZONE	FIRE ZONE DESCRIPTION	PROTECTED SSD PATH	NOTES
			*	2-1J	Stairwell No. 201	1 and 3	RCIC and HPCI protected on Unit 1.
				2-2B	Personnel Access Corridor	1	RCIC protected on Unit 1.
				2-3B-N	Equipment Removal Area	1	RCIC protected on Unit 1.
			*	2-3B-W	Equipment Removal Area	1 and 3	RCIC and HPCI protected on Unit 1.
				2-3C-N	Equipment Access Area	1	RCIC protected on Unit 1.
			*	2-3C-W	Equipment Access Area	1 and 3	RCIC and HPCI protected on Unit 1.
				2-4A-N	Containment Access Area	1	RCIC protected on Unit 1.
			*	2-4A-W	Containment Access Area	1 and 3	RCIC and HPCI protected on Unit 1.
				2-4B	Pipe Penetration Room	1	RCIC protected on Unit 1.
				2-5A-N	Standby Liquid Control Area	1	RCIC protected on Unit 1.
			*	2-5A-W	Access Corridor	1 and 3	RCIC and HPCI protected on Unit 1.
				2-6A	General Access Area & Pump Room	1	RCIC protected on Unit 1.
			*	2-6B	Load Center Room	1 and 3	RCIC and HPCI protected on Unit 1.

- FIRE ZONES WITH AN "*" IN THIS COLUMN ARE ANALYZED AS PART OF A PSEUDO FIRE AREA. THE REQUIRED SAFE SHUTDOWN PATH FOR THESE FIRE ZONES INCLUDES SHUTDOWN CAPABILITY IN ADDITION TO THE REQUIRED SAFE SHUTDOWN PATH FOR THE FIRE AREA.

TABLE 6.1-1
SUSQUEHANNA SES FIRE AREAS

FIRE AREA	FIRE AREA DESCRIPTION	FIRE AREA PATH	*	FIRE ZONE	FIRE ZONE DESCRIPTION	PROTECTED SSD PATH	NOTES
R-2B	North Side of Unit 2 Reactor Building	1		2-6C	Electrical Equipment Room	1	RCIC protected on Unit 1.
			*	2-6D	HVAC Equipment Room	1 and 3	RCIC and HPCI protected on Unit 1.
			*	2-6E	HVAC Plenum Area	1 and 3	RCIC and HPCI protected on Unit 1.
			*	2-6F	Spent Fuel Pool	1 and 3	RCIC and HPCI protected on Unit 1.
			*	2-7A	HVAC Equipment Area	1 and 3	RCIC and HPCI protected on Unit 1.
R-2C	Unit 2 Primary Containment	N/A		2-1H	Suppression Chamber	N/A	
				2-4F	Drywell	N/A	
R-2D	Valve Access Area	1		2-5B	Valve Access Area	1 and 3	S/D Unit 2 with Path 1; RCIC for inventory control & RHR SDC for decay heat removal. S/D Unit 1 with Path 3.
R-2E	4.16KV Switchgear Room Div II	1		2-4C	4.16KV Switchgear Room Div II	1	RCIC protected on Unit 1.
R-2F	4.16KV Switchgear Room Div I	3		2-4D	4.16KV Switchgear Room Div I	3	HPCI protected on Unit 1.
R-2G	4.16KV Switchgear Room Div II	1		2-5F	4.16KV Switchgear Room Div II	1	RCIC protected on Unit 1.
R-2H	4.16KV Switchgear Room Div I	3		2-5G	4.16KV Switchgear Room Div I	3	HPCI protected on Unit 1.

- FIRE ZONES WITH AN “*” IN THIS COLUMN ARE ANALYZED AS PART OF A PSEUDO FIRE AREA. THE REQUIRED SAFE SHUTDOWN PATH FOR THESE FIRE ZONES INCLUDES SHUTDOWN CAPABILITY IN ADDITION TO THE REQUIRED SAFE SHUTDOWN PATH FOR THE FIRE AREA.

TABLE 6.1-1
SUSQUEHANNA SES FIRE AREAS

FIRE AREA	FIRE AREA DESCRIPTION	FIRE AREA PATH	*	FIRE ZONE	FIRE ZONE DESCRIPTION	PROTECTED SSD PATH	NOTES
T-1	Unit 1 and 2 Turbine Building	1, 2 ,3		ALL	Unit 1 and 2 Turbine Building	1, 2 and 3	RCIC and HPCI protected on Unit 1. Path 2 is available for both Units.
W-1	Radwaste Building	1, 3		ALL	Radwaste Building	1 and 3	RCIC and HPCI protected on both units.

- FIRE ZONES WITH AN "*" IN THIS COLUMN ARE ANALYZED AS PART OF A PSEUDO FIRE AREA. THE REQUIRED SAFE SHUTDOWN PATH FOR THESE FIRE ZONES INCLUDES SHUTDOWN CAPABILITY IN ADDITION TO THE REQUIRED SAFE SHUTDOWN PATH FOR THE FIRE AREA.

6.2 FIRE AREA DESCRIPTION

6.2.1 FIRE AREA R-1A

6.2.1.1 General Description

Fire Area R-1A is located in the Unit 1 Reactor Building and is comprised of fire zones which generally occupy the southern half of the building. This fire area is shown on Drawings E-205949 thru E-205956 in Section 8.0. Fire Area R-1A predominately contains Division I equipment, components and cabling. Safe Shutdown Path 3, which is comprised primarily of Division II equipment, components and cabling, can be used to achieve safe shutdown in the event of a fire in this fire area. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.1.2 Fire Zones

The following fire zones are located in Fire Area R-1A:

Fire Zone	**Description**
1-1A	Core Spray "A" Pump Room
1-1F	RHR "A" Pump Room
1-1G	Sump Room
1-2A	Core Spray "A" Pump Room Access
1-2C	Railroad Airlock/Access Shaft
1-3A	Heat Exch. & Pump Room
1-3B-S	Equipment Removal Area
1-3B-W * #	Equipment Removal Area
1-3C-S	Equipment Access Area
1-3C-W * #	Equipment Access Area
1-4A-S	Containment Access Area
1-4A-W * #	Containment Access Area
1-4-E	CRD Rebuild Room
1-5A-S	Standby Liquid Control Area
1-5A-W * #	Access Corridor
1-5E	Penetration Room
1-5H	I&C Instrument Repair Shop
1-6B ** #	Load Center Room
1-6C ** #	Electrical Equipment Room
1-6D ** #	HVAC Equipment Room
1-6E	HVAC Plenum Area
1-6F ** #	Spent Fuel Pool
1-7A ** #	HVAC Equipment Area
1-7B #	Recirculation Fan Room
0-6G ** #	Surge Tank Vault
0-6H ** #	Cask Storage Pit
0-8A ** #	Refueling Floor

Fire Zone	Description
*	This fire zone is a wraparound area (see Deviation Request No. 4)
**	This fire zone is a buffer zone (see Deviation Request No. 7)
#	This fire zone is analyzed as part of a pseudo fire area since protection of both Paths 1 and 3 is required in this zone. Fire Zones 1-1J and 1-5D that are also analyzed as a part of this pseudo-fire area are included in Fire Area R-1B.

6.2.1.3 Combustible Loading

The combustible loading for each fire zone within this fire area has been compiled and has been used for specific fire hazards analysis within this fire area. Specific combustible configurations in the fire area may also have been reviewed for their fire hazard severity and for their impact on fire barrier integrity. The fire rating of the fire area is established based on the lowest fire rating for any fire barrier in any fire zone forming a part of the boundary of the fire area. The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of fire zones in Fire Area R-1A are addressed in Deviation Requests 3, 4, 6, 7, 11, 12, 14, 25, 27, 29 and 42 as well as by several fire hazards analysis for specific configurations. Any fire zones for which specific fire hazards analyses have been prepared are identified on the Drawings contained in Section 8.0 of this document. Any restrictions applicable to a particular fire zone are described in the deviation requests or fire hazards analyses referenced for that fire zone.

6.2.1.4 Fire Detection/Suppression in the Fire Area

Automatic fire detection is provided throughout Fire Area R-1A except in the following fire zones:

Fire Zone	Description
1-2C	Railroad Airlock/Access Shaft
1-4E	CRD Rebuild Room
1-6F	Spent Fuel Pool
1-7B	Recirculation Fan Room
0-6H	Cask Storage Pit

The justification for lack of automatic detection in these fire zones is given in Deviation Request No. 14.

Automatic fire suppression systems have been installed in local areas based upon fire hazards analysis. These systems are designed to control and suppress any fire which could develop in the fire zones which they protect. The fire zones listed below are equipped with full coverage of an automatic suppression system.

Fire Zone	Description
1-2C	Railroad Airlock/Access Shaft
1-3A	Heat Exchanger & Pump Room
1-3B-S	Equipment Removal Area
1-3B-W	Equipment Removal Area
1-4A-S	Containment Access Area
1-4A-W	Containment Access Area
1-5A-W	Access Corridor
1-5A-S	Standby Liquid Control Area

6.2.1.5 Consequences of a Fire in Fire Area R-1A

In the event of a fire in Fire Area R-1A, Safe Shutdown Path 3 systems and components will be available for safe shutdown. Electrical cabling located in Fire Area R-1A associated with Path 3 safe shutdown systems and components has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. This is accomplished by one of the methods described in Section 6.1.2.4.

A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.1.5.1 Fire Zone 1-1A - Core Spray "A" Pump Room

The following Category I components are located in Fire Zone 1-1A:

- Suppression Pool Filter Pump Suction Valve (HV-15766) - Fire induced spurious opening of this normally closed valve in conjunction with a fire induced spurious opening of normally closed valve HV-15768 could result in a flow diversion from the Suppression Pool. The fire induced spurious opening of HV-15768 is prevented for a fire in Fire Area R-1A.

- Suppression Pool Filter Pump Suction Valve (HV-15768) - Fire induced spurious opening of this normally closed valve in conjunction with a fire induced spurious opening of normally closed valve HV-15766 could result in a flow diversion from the Suppression Pool. The fire induced hot short on the circuits for HV-15768 in Fire Zone 1-1A cannot cause a spurious opening of this valve. Any circuits with the potential to cause a spurious opening of HV-15768 in Fire Area R-1A are protected with fire rated barrier.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 1-1A is addressed in Deviation Request 3.

6.2.1.5.2 Fire Zone 1-1F - RHR "A" Pump Room

There are no Category I components located in Fire Zone 1-1F.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 1-1F is addressed in Deviation Requests 3 and 6.

6.2.1.5.3 Fire Zone 1-1G – Sump Room

There are no Category I components located in Fire Zone 1-1G.

6.2.1.5.4 Fire Zone 1-2A - Core Spray "A" Pump Room Access

There are no Category I components located in Fire Zone 1-2A.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 1-2A is addressed in Deviation Request 3.

6.2.1.5.5 Fire Zone 1-2C - Railroad Airlock/Access Shaft

There are no Category I components located in Fire Zone 1-2C.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 1-2C is affected by Deviation Request 14.

6.2.1.5.6 Fire Zone 1-3A - Heat Exchanger & Pump Room

The following Category I components are located in Fire Zone 1-3A:

- Core Spray Loop B Flow Transmitter (FT-E21-1N003B), Core Spray Loop B Minimum Flow Switch (FIS-E21-1N006B) - Addressed in Deviation Request No. 25.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 1-3A is addressed in Deviation Requests 3, 6, 11 and 25. In addition, the fire hazards analysis identified on Drawing E-205951 in Section 8.0 of this document affects the allowable combustible configuration for this fire zone.

Deviation Request 25 justifies limiting the protection of certain equipment and/or cabling for the required safe shutdown path in this fire zone.

6.2.1.5.7 Fire Zone 1-3B-S - Equipment Removal Area

There are no Category I components located in Fire Zone 1-3B-S.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 1-3B-S is addressed in Deviation Request 4.

6.2.1.5.8 Fire Zone 1-3B-W- Equipment Removal Area

There are no Category I components located in Fire Zone 1-3B-W.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 1-3B-W is addressed in Deviation Requests 4, 6 and 42. In addition, the fire hazards analysis identified on Drawing E-205951 in Section 8.0 of this document affects the allowable combustible configuration for this fire zone.

Deviation Request 42 justifies limiting the protection of certain equipment and/or cabling for the required safe shutdown path in this fire zone.

6.2.1.5.9 Fire Zone 1-3C-S - Equipment Access Area

There are no Category I components located in Fire Zone 1-3C-S.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 1-3C-S is addressed in Deviation Request 4.

6.2.1.5.10 Fire Zone 1-3C-W - Equipment Access Area

The following Category I components are located in Fire Zone 1-3C-W:

- RHR Shutdown Cooling Outboard Isolation Valve (HV-E11-1F008) - Addressed in Deviation Request No. 29.

- RHR Injection Inboard Isolation Valves (HV-E11-1F015A and HV-E11-1F015B) - Addressed in Deviation Request No. 29.

- RHR Heat Exchanger Bypass Valves (HV-E11-1F048A and HV-E11-1F048B) - Addressed in Deviation Request No. 29.

- RHR Heat Exchanger Outlet Temperature Elements (TE-E11-1N027A and TE-E11-1N027B) - Addressed in Deviation Request No. 29.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 1-3C-W is addressed in Deviation Requests 4 and 29.

Deviation Request 29 justifies limiting the protection of certain equipment and/or cabling for the required safe shutdown path in this fire zone.

6.2.1.5.11 Fire Zone 1-4A-S - Containment Access Area

The following Category I components are located in Fire Zone 1-4A-S:

- CRD Hydraulic Control Units (1C0219, 1C0223, 1C0227, 1C0231, 1C0235, 1C0239, 1C0243, 1C0615, 1C0619, 1C0623, 1C0627, 1C0631, 1C0635, 1C0639, 1C0643, 1C0647, 1C1011, 1C1015, 1C1019, 1C1023, 1C1027, 1C1031, 1C1035, 1C1039, 1C1043, 1C1047, 1C1051, 1C1407, 1C1411, 1C1415, 1C1419, 1C1423, 1C1427, 1C1431, 1C1435, 1C1439, 1C1443, 1C1447, 1C1451, 1C1455, 1C1803, 1C1807, 1C1811, 1C1815, 1C1819, 1C1823, 1C1827, 1C1831, 1C1835, 1C1839, 1C1843, 1C1847, 1C1851, 1C1855, 1C1859, 1C2203, 1C2207, 1C2211, 1C2215, 1C2219, 1C2223, 1C2227, 1C2231, 1C2235, 1C2239, 1C2243, 1C2247, 1C2251, 1C2255, 1C2259, 1C2603, 1C2607, 1C2611, 1C2615, 1C2619, 1C2623, 1C2627, 1C2631, 1C2635, 1C2639, 1C2643, 1C2647, 1C2651, 1C2655, 1C2659, 1C3007, 1C3015, 1C3023, 1C3031, 1C3039, 1C3047, 1C3055)

- Fire damage to these components could affect the scram capability and the ability to isolate the scram discharge volume. An analysis has determined that damage to the HCU will not prevent scram. If required, the plant operator will isolate the scram discharge volume by manually venting the instrument air header.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 1-4A-S is addressed in Deviation Requests 3, 4, 6 and 11.

6.2.1.5.12 Fire Zone 1-4A-W - Containment Access Area

The following Category I components are located in Fire Zone 1-4A-W:

- SCRAM Discharge Volume Vent and Drain Pilot Solenoid Valves (SV-C12-1F009 and SV-C12-1F182) - Fire induced damage to this component can affect the ability of the plant operator to isolate the scram discharge volume from the Control Room. The plant operator can isolate the scram discharge volume by manually venting the instrument air header.

- Back-up SCRAM Valves (SV-C12-1F110A and SV-C12-1F110B) – An analysis has demonstrated that fire induced damage to these valves will not affect the ability to manually scram the reactor. The plant operator can isolate the scram discharge volume by manually venting the instrument air header.

- ARI Vent and Block Valves (SV-14799, SV-147100, SV-147101 and SV-147102) – An analysis has demonstrated that fire induced damage to these valves will not affect the ability to manually scram the reactor and isolate the scram discharge volume.

- Appendix R Communication System Jackplate JP1102 – This component is a jackplate for Loop 1 of the Appendix R sound power communications system. There are no operator actions resulting from a fire in this Fire Area that require the use of this loop of the sound powered communications system. Therefore, this component is not required for post-fire safe shutdown in this Fire Area.

- Appendix R Communication System Jackplate JP1302 – This component is a jackplate for Loop 3 of the Appendix R sound power communications system. There are no operator actions resulting from a fire in this Fire Area that require the use of this loop of the sound powered communications system. Therefore, this component is not required for post-fire safe shutdown in this Fire Area.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 1-4A-W is addressed in Deviation Requests 4, 6 and 12.

6.2.1.5.13 Fire Zone 1-4E - CRD Rebuild Room

There are no Category I components located in Fire Zone 1-4E.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 1-4E is addressed in Deviation Request 14.

6.2.1.5.14 Fire Zone 1-5A-S - Standby Liquid Control Area

The following Category I components are located in Fire Zone 1-5A-S:

- Reactor Vessel Level Indicating Switch LIS-B21-1N042B) - Addressed by Deviation Request No. 27.

- 120V AC Power Distribution Panel (1Y201B) - Fire induced damage to this RPS Electrical Distribution Panel can result in tripping of the Unit 1 Division II RHRSW Pump (1P506B). If required, the plant operator can reset the trip from the Control Room and start the pump.

- Nuclear Boiler Instrumentation (Reactor Vessel Level Indicating Switches- LIS-B21-1N024C, LIS-B21-1N024D; Reactor Vessel Level Indicating Switches - LIS-B21-1N031B, LIS-B21-1N031D; Reactor Pressure Switches – PIS-B21-1N021B, PS-B21-1N023C, PS-B21-1N023D; Wide Range Level Transmitter – LT-14201B and Wide Range Pressure Transmitter – PT-14201B) - Addressed by Deviation Request No. 27.

- Reactor Vessel High Pressure Switches (PS-B21-1N022A -H, J-N, P, R, S) - Fire damage to these components can result in spurious opening of an SRV. The capability to further depressurize the reactor, as required, and inject with Core Spray in the event of a spurious SRV opening is provided for the plant operator.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 1-5A-S is addressed in Deviation Requests 4, 6, 11, 12 and 27.

Deviation Request 27 justifies limiting the protection of certain equipment and/or cabling for the required safe shutdown path in this fire zone.

6.2.1.5.15 Fire Zone 1-5A-W – Access Corridor

There are no Category I components located in Fire Zone 1-5A-W.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 1-5A-W is addressed in Deviation Requests 3, 4, 11 and 12.

6.2.1.5.16 Fire Zone 1-5E – Penetration Room

There are no Category I components located in Fire Zone 1-5E.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 1-5E is addressed in Deviation Requests 3 and 11.

6.2.1.5.17 Fire Zone 1-5H – I&C Instr Repair Shop

There are no Category I components located in Fire Zone 1-5H.

6.2.1.5.18 Fire Zone 1-6B – Load Center Room

There are no Category I components located in Fire Zone 1-6B.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 1-6B is addressed in Deviation Request 7.

6.2.1.5.19 Fire Zone 1-6C – Electrical Equipment Room

The following Category I components are located in Fire Zone 1-6C.

High Primary Containment Pressure Switches (PS-E11-1N010A and PS-E11-1N010C – The capability to manually depressurize the reactor, if required, using the keylock switches in the Unit 1 Upper and Lower Relay Rooms remains available.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 1-6C is addressed in Deviation Request 7.

6.2.1.5.20 Fire Zone 1-6D – HVAC Equipment Room

There are no Category I components located in Fire Zone 1-6D:

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 1-6D is addressed in Deviation Request 7.

6.2.1.5.21 Fire Zone 1-6E – HVAC Plenum Area

There are no Category I components located in Fire Zone 1-6E.

A fire hazards analysis identified on Drawing E-205954 in Section 8.0 of this document affects the allowable combustible configuration for this fire zone.

6.2.1.5.22 Fire Zone 1-6F – Spent Fuel Pool

There are no Category I components located in Fire Zone 1-6F.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 1-6F is addressed in Deviation Requests 7 and 14.

6.2.1.5.23 Fire Zone 1-7A – HVAC Equipment Area

There are no Category I components located in Fire Zone 1-7A.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 1-7A is addressed in Deviation Request 7.

6.2.1.5.24 Fire Zone 1-7B – Recirculation Fan Room

There are no Category I components located in Fire Zone 1-7B.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 1-7B is addressed in Deviation Request 14.

6.2.1.5.25 Fire Zone 0-6G – Surge Tank Vault

There are no Category I components located in Fire Zone 0-6G.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-6G is addressed in Deviation Request 7.

6.2.1.5.26 Fire Zone 0-6H – Cask Storage Pit

There are no Category I components located in Fire Zone 0-6H.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-6H is addressed in Deviation Requests 7 and 14.

6.2.1.5.27 Fire Zone 0-8A – Refueling Floor

There are no Category I components located in Fire Zone 0-8A.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-8A is addressed in Deviation Request 7.

6.2.1.6 Special Features

The following manual actions may be required in the event of a fire in this fire area when the fire damage is in the specific fire zone listed below:

1. Should a fire in Fire Zone 1-4A-S, 1-5A-S, 1-5A-W, 1-5E or 1-6C result in spuriously tripping the RHRSW Pump 1P506B, reset the pump trip logic by operating HS-11202B3 to the RESET position and start the pump from the Control Room.

2. Should a fire in Fire Zone 1-2A, 1-3A, 1-4A-S or 1-5A-S result in spurious Unit 1 ADS or SRV actuations as indicated by low RPV pressure and/or level, the capability to further depressurize the reactor using Unit 1 Division II ADS and to inject water into the reactor using Unit 1 Division II Core Spray remains available from the Control Room.

3. Should a fire in Fire Zone 1-3A, 1-4A-S, 1-4A-W**, 1-5A-S or 1-5A-W* result in loss of Reactor Recirculation Pump 1P401A and/or 1P401B trip capability, trip pump 1P401A and/or 1P401B by manually tripping the Motor-Generator Set supply breaker 1A10110 and/or 1A10210.

   * Reactor Recirculation Pump 1P401A can be tripped from the Control Room.
   ** Reactor Recirculation Pump 1P401B can be tripped from the Control Room.

4. Fire Zone 1-4A-S or 1-4A-W, actions performed during plant start up lifts lead in Motor Control Center 1B236 cubicle 102 which disables Reactor Head Vent Valve HV-141-F001 preventing a reactor coolant flow diversion through spurious opening of both Head Vent Valves.

5. Should a fire in Fire Zone 1-4A-W result in loss of Unit 1 scram discharge volume isolation capability, isolate the scram discharge volume by manually venting the instrument air header in the Unit 1 Reactor Building.

6. Should a fire in Fire Zone 1-4A-S or 1-5A-S result in loss of the ability to operate Unit 1 ADS from the Control Room, operate the Unit 1 Division II ADS valves individually using the key locked switches located in the Unit 1 Lower Relay Room.

7. Should a fire in Fire Zone 1-6C or 1-6D result in loss of the ability to operate Unit 1 ADS from the Control Room, operate the ADS valves individually using the key locked switches located in the Unit 1 Upper Relay Room for Division I or the Lower Relay Room for Division II.

6.2.1.7 Deviation Requests Affecting Fire Area R-1A:

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area R-1A.

6.2.2 Fire Area R-1B

6.2.2.1 General Description:

Fire Area R-1B is located in the Unit 1 Reactor Building and is comprised of fire zones which generally occupy the northern half of the building. This fire area is shown on Drawings E-205949 thru E-205956 in Section 8.0. Fire Area R-1B predominately contains Division II equipment, components and cabling. Safe Shutdown Path 1, which is comprised primarily of Division I equipment, components and cabling, can be used to achieve safe shutdown in the event of a fire in this fire area. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.2.2 Fire Zones

The following fire zones are located in Fire Area R-1B:

Fire Zone	**Description**
1-1B	Core Spray "B" Pump Room
1-1C	HPCI Pump Room
1-1D	RCIC Pump Room
1-1E	RHR "B" Pump Room
1-1I	Elevator Shaft & Stairwell No. 102
1-1J #	Stairwell No. 101
1-2B	Access Corridor
1-2D	Remote Shutdown Panel
1-3B-N	Equipment Removal Area
1-3B-W * #	Equipment Removal Area
1-3C-N	Equipment Access Area
1-3C-W * #	Equipment Access Area
1-4A-N	Containment Access Area
1-4A-W * #	Containment Access Area
1-4B	Pipe Penetration Room
1-4G	Main Steam Pipeway
1-5A-N	General Access Area
1-5A-W * #	Access Corridor
1-5C	Reactor Backwash Receiving Tank Room
1-5D #	RWCU Pump Room & Heat Exch. Cells

Fire Zone	Description
1-6A	General Access Area & Pump Room
1-6B ** #	Load Center Room
1-6C ** #	Electrical Equipment Room
1-6D ** #	HVAC Equipment Room
1-6F ** #	Spent Fuel Pool
1-6I	Fuel Pool Holding Pump Room
1-7A ** #	HVAC Equipment Area
0-6G ** #	Surge Tank Vault
0-6H ** #	Cask Storage Pit
0-8A ** #	Refueling Floor

* This fire zone is a wraparound area (see Deviation Request No. 4)

** This fire zone is a buffer zone (see Deviation Request No. 7)

\# This fire zone is analyzed as part of a pseudo fire area since protection of both Paths 1 and 3 is required in this zone. Fire Zone 1-7B that is also analyzed as a part of this pseudo-fire area is included in Fire Area R-1A.

6.2.2.3 Combustible Loading

The combustible loading for each fire zone within this fire area has been compiled and has been used for specific fire hazards analysis within this fire area.

Specific combustible configurations in the fire area may also have been reviewed for their fire hazard severity and for their impact on fire barrier integrity. The fire rating of the fire area is established based on the lowest fire rating for any fire barrier in any fire zone forming a part of the boundary of the fire area. The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of fire zones in Fire Area R-1B are addressed in Deviation Requests 3, 4, 6, 7, 8, 11, 12, 13, 14, 29 and 42 as well as several fire hazards analysis for specific configurations. Any fire zones for which specific fire hazards analysis have been prepared are identified on the Drawings contained in Section 8.0 of this document. Any restrictions for a fire zone are described in the deviation requests or fire hazards analyses referenced for that fire zone.

6.2.2.4 Fire Detection/Suppression in the Fire Area

Automatic fire detection is provided throughout Fire Area R-1B except in the following fire zones:

Fire Zone	Description
1-1J	Stairwell No. 101
1-5C	Reactor Backwash Receiving Tank Room
1-6F	Spent Fuel Pool
0-6H	Cask Storage Pit

The justification for lack of detection in these fire zones is presented in Deviation Request No. 14.

Automatic fire suppression systems are installed in local areas where fire hazards have the most severe potential. These systems are designed to control and suppress any fire which could develop in the fire zones which they protect. Fire suppression has been provided in the following fire zones:

Fire Zone	**Description**
1-2B	Access Corridor
1-3B-N	Equipment Removal Area (Partial)
1-3B-W	Equipment Removal Area
1-4A-N	Containment Access Area (Partial)
1-4A-W	Containment Access Area
1-5A-W	Access Corridor

Automatic deluge systems are provided for the following equipment listed by fire zones:

Fire Zone	**Description**
1-1C	HPCI Pump
1-1D	RCIC Pump

Manual deluge systems are provided for charcoal filters 1F217A, 1F217B, 1F257A, and 1F257B in Fire Zone 1-7A.

6.2.2.5 Consequences of a Fire in Fire Area R-1B

In the event of a design basis fire in Fire Area R-1B, Safe Shutdown Path 1 systems will be available for safe shutdown. Electrical cabling located in Fire Area R-1B associated with Path 1 safe shutdown systems and components has been specifically evaluated to assure that its failure would not impact the ability of both reactors to reach a safe shutdown condition. This is accomplished using one of the methods outlined in Section 6.1.2.4.

A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.2.5.1 Fire Zone 1-1B – Core Spray "B" Pump Room

There are no Category I components located in Fire Zone 1-1B.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 1-1B is addressed in Deviation Request 3.

6.2.2.5.2 Fire Zone 1-1C – HPCI Pump Room

The following Category I components are located in Fire Zone 1-1C:

- HPCI Turbine Auxiliary Oil Pump (1P213) – This component is not required in support of post-fire safe shutdown in Fire Area R-1B. A spurious operation of this component along with other HPCI system components has been evaluated in regards to a reactor vessel overfill condition. A fire induced spurious start of the HPCI system in conjunction with the loss of the HPCI high water level trip in Fire Area R-1B can be mitigated by closing the HPCI Inboard Steam Supply Isolation Valve (HV-E41-1F002).

- HPCI Steam Supply to Turbine Valve (HV-E41-1F001) - This component is not required in support of post-fire safe shutdown in Fire Area R-1B. A spurious operation of this component along with other HPCI system components has been evaluated in regards to a reactor vessel overfill condition. A fire induced spurious start of the HPCI system in conjunction with the loss of the HPCI high water level trip in Fire Area R-1B can be mitigated by closing the HPCI Inboard Steam Supply Isolation Valve (HV-E41-1F002).

- HPCI Turbine Trip Solenoid Valve (SV-15661) - This component is not required in support of post-fire safe shutdown in Fire Area R-1B. A spurious operation of HPCI system components has been evaluated in regards to a reactor vessel overfill condition. A fire induced spurious start of the HPCI system in conjunction with the loss of the HPCI high water level trip in Fire Area R-1B can be mitigated by closing the HPCI Inboard Steam Supply Isolation Valve (HV-E41-1F002).

6.2.2.5.3 Fire Zone 1-1D – RCIC Pump Room

The following Category I components are located in Fire Zone 1-1D:

- RCIC Turbine Stop Valve (HV-15012) - This component is not required in support of post-fire safe shutdown in Fire Area R-1B. A spurious operation of this component along with other RCIC system components has been evaluated in regards to a reactor vessel overfill condition. A fire induced spurious start of the RCIC system in conjunction with the loss of the RCIC high water level trip in Fire Area R-1B can be mitigated by using the protected safe shutdown path for Fire Area R-1B.

- RCIC Steam Supply Line Valve (HV-E51-1F045) - This component is not required in support of post-fire safe shutdown in Fire Area R-1B. A spurious operation of this component along with other RCIC system components has been evaluated in regards to a reactor vessel overfill condition. A fire induced spurious start of the RCIC system in conjunction with the loss of the RCIC high water level trip in Fire Area R-1B can be mitigated by using the protected safe shutdown path for Fire Area R-1B.

6.2.2.5.4 Fire Zone 1-1E – RHR "B" Pump Room

The following Category I components are located in Fire Zone 1-1E:

- RHR Pump B Shutdown Cooling Suction Valve (HV-E11-1F006B) – This valve must remain closed when RHR is running in the Shutdown Cooling Mode. RHR Shutdown Cooling is not a credited safe shutdown system in Fire Area R-1B.

- RHR Pump D Shutdown Cooling Suction Valve (HV-E11-1F006D) – This valve must remain closed when RHR is running in the Shutdown Cooling Mode. RHR Shutdown Cooling is not a credited safe shutdown system in Fire Area R-1B.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 1-1E is addressed in Deviation Requests 3 and 6.

6.2.2.5.5 Fire Zone 1-1I – Elevator Shaft & Stairwell No. 102

There are no Category I components located in Fire Zone 1-1I.

6.2.2.5.6 Fire Zone 1-1J – Stairwell No. 101

There are no Category I components located in Fire Zone 1-1J.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 1-1J is addressed in Deviation Request 14.

6.2.2.5.7 Fire Zone 1-2B – Access Corridor

There are no Category I components located in Fire Zone 1-2B.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 1-2B is addressed in Deviation Request 3.

6.2.2.5.8 Fire Zone 1-2D – Remote Shutdown Panel

There are no Category I components located in Fire Zone 1-2D.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 1-2D is addressed in Deviation Request 8.

6.2.2.5.9 Fire Zone 1-3B-N – Equipment Removal Area

There are no Category I components located in Fire Zone 1-3B-N.
The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 1-3B-N is addressed in Deviation Requests 3, 4, 11 and 13.

6.2.2.5.10 Fire Zone 1-3B-W – Equipment Removal Area

There are no Category I components located in Fire Zone 1-3B-W.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 1-3B-W is addressed in Deviation Requests 4, 6 and 42. In addition, the fire hazards analysis identified on Drawing E-205951in Section 8.0 of this document affects the allowable combustible configuration for this fire zone.

Deviation Request 42 justifies limiting the protection of certain equipment and/or cabling for the required safe shutdown path in this fire zone.

6.2.2.5.11 Fire Zone 1-3C-N – Equipment Access Area

There are no Category I components located in Fire Zone 1-3C-N.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 1-3C-N is addressed in Deviation Request 4.

6.2.2.5.12 Fire Zone 1-3C- W – Equipment Access Area

The following Category I components are located in Fire Zone 1-3C-W:

- RHR Injection Inboard Isolation Valves (HV-E11-1F015A and HV-E11-1F015B) - Addressed in Deviation Request No. 29.

- RHR Heat Exchanger Bypass Valves (HV-E11-1F048A and HV-E11-1F048B) - Addressed in Deviation Request No. 29.

- RHR Shutdown Cooling Outboard Isolation Valve (HV-E11-1F008) - Addressed in Deviation Request No. 29.

- RHR Heat Exchanger Outlet Temperature Elements (TE-E11-1N027A and TE-E11-1N027B) - Addressed in Deviation Request No. 29.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 1-3C-W is addressed in Deviation Requests 4 and 29.

Deviation Request 29 justifies limiting the protection of certain equipment and/or cabling for the required safe shutdown path in this fire zone.

6.2.2.5.13 Fire Zone 1-4A-N – Containment Access Area

The following Category I components are located in Fire Zone 1-4A-N:

- CRD Hydraulic Control Units (1C3003, 1C3011, 1C3019, 1C3027, 1C3035, 1C3043, 1C3051, 1C3059, 1C3403, 1C3407, 1C3411, 1C3415, 1C3419, 1C3423, 1C3427, 1C3431, 1C3435, 1C3439, 1C3443, 1C3447, 1C3451, 1C3455, 1C3459, 1C3803, 1C3807 1C3811, 1C3815, 1C3819, 1C3823, 1C3827, 1C3831, 1C3835, 1C3839, 1C3843, 1C3847, 1C3851, 1C3855, 1C3859, 1C4203, 1C4207, 1C4211, 1C4215, 1C4219, 1C4223, 1C4227, 1C4231, 1C4235, 1C4239, 1C4243, 1C4247, 1C4251, 1C4255, 1C4259, 1C4607, 1C4611, 1C4615, 1C4619, 1C4623, 1C4627, 1C4631, 1C4635, 1C4639, 1C4643, 1C4647, 1C4651, 1C4655, 1C5011, 1C5015, 1C5019, 1C5023, 1C5027, 1C5031, 1C5035, 1C5039, 1C5043, 1C5051, 1C5415, 1C5419, 1C5423, 1C5427, 1C5431, 1C5435, 1C5439, 1C5443, 1C5447, 1C5819, 1C5823, 1C5827, 1C5831, 1C5835, 1C5839, 1C5843)

- Fire damage to this component could affect the scram capability and the ability to isolate the scram discharge volume. An analysis has determined that damage to this HCU will not prevent scram. If required, the plant operator will isolate the scram discharge volume by manually venting the instrument air header.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 1-4A-N is addressed in Deviation Requests 4, 6 and 13.

6.2.2.5.14 Fire Zone 1-4A-W – Containment Access Area

The following Category I components are located in Fire Zone 1-4A-W:

- SCRAM Discharge Volume Vent and Drain Pilot Solenoid Valves (SV-C12-1F009 and SV-C12-1F182) - Fire induced damage to this component can affect the ability of the plant operator to isolate the scram discharge volume from the Control Room. The plant operator can isolate the scram discharge volume by manually venting the instrument air header.

- Back-up SCRAM Valves (SV-C12-1F110A and SV-C12-1F110B) – An analysis has demonstrated that fire induced damage to these valves will not affect the ability to manually scram the reactor. The plant operator can isolate the scram discharge volume by manually venting the instrument air header.

- ARI Vent and Block Valves (SV-14799, SV-147100, SV-147101 and SV-147102) – An analysis has demonstrated that fire induced damage to these valves will not affect the ability to manually scram the reactor and isolate the scram discharge volume.

- Appendix R Communication System Jackplate JP1102 – This component is a jackplate for Loop 1 of the Appendix R sound power communications system. Since this component is located in the Wraparound Area approximately 50 feet south of Fire Area R-1B, a fire in Fire Area R-1B will not damage this component.

- Appendix R Communication System Jackplate JP1302 – This component is a jackplate for Loop 3 of the Appendix R sound power communications system. There are no operator actions resulting from a fire in this Fire Area that require the use of this loop of the sound powered communications system. Therefore, this component is not required for post-fire safe shutdown in this Fire Area.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 1-4A-W is addressed in Deviation Requests 4, 6 and 12.

6.2.2.5.15 Fire Zone 1-4B – Pipe Penetration Room

There are no Category I components located in Fire Zone 1-4B.

6.2.2.5.16 Fire Zone 1-4G – Main Steam Pipeway

The following Category I components are located in Fire Zone 1-4G:

- Main Steam Line Outboard Drain Isolation Valve (HV-B21-1F019) - For a fire in Fire Zone 1-4G closure of the Main Steam Line Drain Inboard Isolation Valve (HV-B21-1F016) has been assured in the event that isolation of the Main Steam Line Drain is required.

- HPCI Pump Discharge Valve (HV-E41-1F006) – This component is not required in support of post-fire safe shutdown in Fire Area R-1B. A spurious operation of this component along with other HPCI system components has been evaluated in regards to a reactor vessel overfill condition. A fire induced spurious start of the HPCI system in conjunction with the loss of the HPCI high water level trip in Fire Area R-1B can be mitigated by closing the HPCI Inboard Steam Supply Isolation Valve (HV-E41-1F002).

- Main Steam Line Outboard Isolation Valve HV-1F028A Pilot Solenoid Valves (SV-14129A1, SV-14129A2) – For a fire in Fire Zone 1-4G closure of the MSIV Inboard Isolation Valve (HV-1F022A) has been assured in the event that isolation of the MSL is required.

- Main Steam Line Outboard Isolation Valve HV-1F028B Pilot Solenoid Valves (SV-14129B1, SV-14129B2) – For a fire in Fire Zone 1-4G closure of the MSIV Inboard Isolation Valve (HV-1F022B) has been assured in the event that isolation of the MSL is required.

- Main Steam Line Outboard Isolation Valve HV-1F028C Pilot Solenoid Valves (SV-14129C1, SV-14129C2) – For a fire in Fire Zone 1-4G closure of the MSIV Inboard Isolation Valve (HV-1F022C) has been assured in the event that isolation of the MSL is required.

- Main Steam Line Outboard Isolation Valve HV 1F028D Pilot Solenoid Valves (SV-14129D1 and SV-14129D2) – For a fire in Fire Zone 1-4G closure of the MSIV Inboard Isolation Valve (HV-1F022D) has been assured in the event that isolation of the MSL is required.

- RCIC Pump Injection Shutoff Valve (HV-E51-1F013) – This component is not required in support of post-fire safe shutdown in Fire Area R-1B. A spurious operation of this component along with other RCIC system components has been evaluated in regards to a reactor overfill condition. A fire induced spurious start of the RCIC system in conjunction with the loss of the RCIC high water level trip in Fire Area R-1B can be mitigated by using the protected safe shutdown path for Fire Area R-1B.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 1-4G is addressed in Deviation Requests 3, 6 and 11.

6.2.2.5.17 Fire Zone 1-5A-N – General Access Area

The following Category I components are located in Fire Zone 1-5A-N:

- Reactor Water Clean-up Pressure Switches (PSH-G33-1N014 and PSL-G33-1N013), Demin Dump Valve I/P Converter (HY-G33-1K001) and Demin Dump Solenoid Valve (SV-14433) – For a fire in Fire Zone 1-5A-N closure of the RWCU Inboard Isolation Valve (HV-G33-1F001) has been assured in the event that isolation of the RWCU is required.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 1-5A-N is addressed in Deviation Requests 3, 4 and 11.

6.2.2.5.18 Fire Zone 1-5A-W – Access Corridor

There are no Category I components located in Fire Zone 1-5A-W.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 1-5A-W is addressed in Deviation Requests 3, 4, 11 and 12.

6.2.2.5.19 Fire Zone 1-5C – Reactor Backwash Receiving Tank Room

There are no Category components located in Fire Zone 1-5C.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 1-5C is addressed in Deviation Request 14.

6.2.2.5.20 Fire Zone 1-5D – RWCU Pump Room & Heat Exchanger Cells

The following Category I component is located in Fire Zone 1-5D:

- Reactor Water Cleanup Outboard Isolation Valve (HV-G33-1F004) - For a fire in Fire Zone 1-5D closure of the RWCU Inboard Isolation Valve (HV-G33-1F001) has been assured in the event that isolation of the RWCU is required.

6.2.2.5.21 Fire Zone 1-6A – General Access Area & Pump Room

There are no Category I Components located in Fire Zone 1-6A.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 1-6A is addressed in Deviation Request 12. In addition, the fire hazards analysis identified on Drawing E-205954 in Section 8.0 of this document affects the combustible configuration in this fire zone.

6.2.2.5.22 Fire Zone 1-6B – Load Center Room

There are no Category I components located in Fire Zone 1-6B.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 1-6B is addressed in Deviation Request 7.

6.2.2.5.23 Fire Zone 1-6C – Electrical Equipment Room

The following Category I components are located in Fire Zone 1-6C.

High Primary Containment Pressure Switches (PS-E11-1N010A and PS-E11-1N010C – The capability to manually depressurize the reactor, if required, using the keylock switches in the Unit 1 Upper and Lower Relay Rooms remains available.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 1-6C is addressed in Deviation Request 7.

6.2.2.5.24 Fire Zone 1-6D – HVAC Equipment Room

There are no Category I components located in Fire Zone 1-6D:

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 1-6D is addressed in Deviation Request 7.

6.2.2.5.25 Fire Zone 1-6F – Spent Fuel Pool

There are no Category I components located in Fire Zone 1-6F.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 1-6F is addressed in Deviation Requests 7 and 14.

6.2.2.5.26 Fire Zone 1-6I – Fuel Pool Holding Pump Room

There are no Category I components located in Fire Zone 1-6I.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 1-6I is addressed in Deviation Request 13. In addition, the fire hazards analysis identified on Drawing E-205954 in Section 8.0 of this document affects the combustible configuration in this fire zone.

6.2.2.5.27 Fire Zone 1-7A – HVAC Equipment Area

There are no Category I components located in Fire Zone 1-7A.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 1-7A is addressed in Deviation Request 7.

6.2.2.5.28 Fire Zone 0-6G – Surge Tank Vault

There are no Category I components located in Fire Zone 0-6G.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-6G is addressed in Deviation Request 7.

6.2.2.5.29 Fire Zone 0-6H – Cask Storage Pit

There are no Category I components located in Fire Zone 0-6H.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-6H is addressed in Deviation Request 7 and 14.

6.2.2.5.30 Fire Zone 0-8A – Refueling Floor

There are no Category I components located in Fire Zone 0-8A.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-8A is addressed in Deviation Request 7.

6.2.2.6 Special Features

The following manual actions may be required in the event of a fire in this fire area when the fire damage is in the specific fire zone listed below:

1. Should a fire in Fire Zone 1-3B-N, 1-4A-N*, 1-4A-W**, 1-4B*, or 1-5A-W* result in loss of Reactor Recirculation Pump 1P401A and/or 1P401B trip capability, trip pump 1P401A

and/or 1P401B by manually tripping the Motor-Generator Set supply breaker 1A10110 and/or 1A10210.

* Reactor Recirculation Pump 1P401A can be tripped from the Control Room.
** Reactor Recirculation Pump 1P401B can be tripped from the Control Room.

2. Should a fire in Fire Zone 1-2B, 1-2D, 1-3B-N, 1-4A-N or 1-4B result in spurious Unit 1 ADS or SRV actuations as indicated by low RPV pressure and/or level, the capability to further depressurize the reactor using Unit 1 Division I ADS and to inject water into the reactor using Unit 1 Division I Core Spray remains available from the Control Room.

3. Should a fire in Fire Zone 1-3B-N result in HPCI spuriously starting while disabling the 54” high water level trip, manually take control of HPCI from the Control Room or close the HPCI Turbine Steam Supply Inboard Isolation Valve HV-155-F002.

4. Should a fire in Fire Zone 1-4A-W result in loss of Unit 1 scram discharge volume isolation capability, isolate the scram discharge volume by manually venting the instrument air header in the Unit 1 Reactor Building.

5. Should a fire in Fire Zone 1-5A-W or 1-6C result in spuriously tripping the RHRSW Pump 1P506B, reset the pump trip logic by operating HS-11202B3 to the RESET position and start the pump from the Control Room.

6. Fire Zone 1-4A-W, actions performed during plant start up lifts lead in Motor Control Center 1B236 cubicle 102 which disables Reactor Head Vent Valve HV-141-F001 preventing a reactor coolant flow diversion through spurious opening of both Head Vent Valves.

7. Should a fire in Fire Zone 1-6C or 1-6D result in loss of the ability to operate Unit 1 ADS from the Control Room, operate the ADS valves individually using the key locked switches located in the Unit 1 Upper Relay Room for Division I or the Lower Relay Room for Division II.

8. Should a fire in Fire Zone 1-2B or 1-2D result in loss of the ability to operate Unit 1 ADS from the Control Room, operate the Unit 1 Division 1 ADS valves individually using the key locked switches located in the Unit 1 Upper Relay Room.

6.2.2.7 Deviation Requests Affecting Fire Area R-1B:

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area R-1B.

6.2.3 Fire Area R-1C

6.2.3.1 General Description

Fire Area R-1C is the Unit 1 Primary Containment. Its location is shown on Drawings E-205949 thru E-205954 in Section 8.0. Primary Containment has an inerted nitrogen environment during normal operation. Based on this inerted environment, the potential for a fire while at full power operation is not possible. Therefore, equipment damage due to fire while operating is not postulated and the ability to achieve and maintain safe shutdown is assured.

6.2.3.2 Fire Zones

The following fire zones are located in Fire Area R-1C:

Fire Zone	Description
1-1H	Suppression Chamber
1-4F	Drywell

6.2.3.3 Combustible Loading

The inerted nitrogen atmosphere inside Primary Containment will prevent combustion at power operation.

6.2.3.4 Fire Detection/Suppression in the Fire Area

Due to the normally inerted nitrogen environment, there is no automatic fire detection or suppression in Primary Containment. Manual hose reels and portable extinguishers are located just outside the containment entrance. During extended outages, additional portable extinguishers are available at the drywell entrance.

6.2.3.5 Consequences of a Fire in Fire Area R-1C

The inerted nitrogen atmosphere of Primary Containment will prevent combustion at power operation.

6.2.3.6 Special Features

Primary Containment has an inerted nitrogen atmosphere.

There are no special features in Fire Area R-1C. There are no manual actions required.

6.2.3.7 Deviation Requests Affecting Fire Area R-1C

Section 7.0 provides a complete listing of Deviation Requests that affect the fire zones in Fire Area R-1C.

6.2.4 Fire Area R-1D

6.2.4.1 General Description

Fire Area R-1D is the Unit 1 Valve Access Area located in the Unit 1 Reactor Building at Elevation 761'-10". This fire area is a single room. Its location is shown on Drawing E-205953 in Section 8.0. Fire Area R-1D predominately contains Division II equipment, components and cabling. Safe Shutdown Path 1, which is comprised primarily of Division I equipment, components and cabling, with the following system substitutions can be used to achieve safe shutdown in the event of a fire:

a) Since both Core Spray Injection Valves for both divisions are located in this fire area, Core Spray is not available for Path 1, and

b) In its place, RCIC is used for reactor vessel inventory control and RHR shutdown cooling is used for decay heat removal on Path 1.

c) For Unit 2, the non-fire unit for this fire area, Path 3 is available to achieve and maintain safe shutdown.

Deviation Request No. 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown is applicable, in general, to this fire area. In this fire area, ADS and RHR LPCI in the Alternate Shutdown Cooling Mode may be used to achieve and maintain post-fire safe shutdown in the event that fire damage occurs that effects RCIC and/or RHR Shutdown Cooling.

6.2.4.2 Fire Zones

The following fire zone is located in Fire Area R-1D:

Fire Zone	Description
1-5B	Valve Access Area

6.2.4.3 Combustible Loading

The combustible loading in Fire Area R-1D is low and the only combustible material in the room is lube oil from the valves in the room. There are minimal unwrapped cables in this room.

The fire rating of the fire area is established based on the lowest fire rating for any fire barrier in any fire zone forming a part of the boundary of the fire area. The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Area R-1D (Fire Zone 1-5B) is addressed in Deviation Requests 3, 6, 11 and 13. Any specific Fire Hazard Analyses applicable to the fire zone in this fire area are identified on the Drawings in Section 8.0 and referenced below along with any other combustible restrictions.

6.2.4.4 Fire Detection/Suppression in the Fire Area

The fire area has heat detectors which alarm in the main control room. There is no automatic suppression in the room, however, portable extinguishers and manual hose reels are located just outside the room.

6.2.4.5 Consequences of a Fire in Fire Area R-1D

Electrical cabling located in Fire Area R-1D associated with Unit 1 Path 1 and Unit 2 Path 3 safe shutdown systems and components has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition for a fire in this Fire Area. This is accomplished using one of the methods outlined in Section 6.1.2.4.

A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.4.5.1 Fire Zone 1-5B - Valve Access Area

The following Category I components are located in Fire Zone 1-5B:

- Core Spray Outboard Injection Valves (HV-E21-1F004A and HV-E21-1F004B) and Core Spray Inboard Injection Valves (HV-E21-1F005A and HV-E21-1F005B) – The inboard and outboard isolation valves for both divisions of Core Spray are located in Fire Area R-1D. Therefore, Core Spray is not credited for post-fire safe shutdown in Fire Area R-1D. RCIC is protected to perform the inventory make up function for Fire Area R-1D. RHR Shutdown Cooling is protected for the decay heat removal function in Fire Area R-1D.

- RHR Drywell Spray Outboard Isolation Valve (HV-E11-1F016B) – This valve is normally closed and required to remain closed in support of post-fire safe shutdown on Safe Shutdown Path 3. Safe Shutdown Path 1 is credited for post-fire safe shutdown for

Unit 1 in Fire Area R-1D. Safe Shutdown Path 3 is credited for post-fire safe shutdown for Unit 2 in Fire Area R-1D. Fire induced damage to this valve has no impact on Safe Shutdown Path 3 for Unit 2.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 1-5B is addressed in Deviation Requests 3, 6, 11 and 13. In addition, the fire hazards analysis identified on Drawing E-205953 in Section 8.0 of this document affects the allowable combustible configuration for this fire zone.

6.2.4.6 Special Features

There are no special features in Fire Area R-1D. There are no manual actions required.

6.2.4.7 Deviation Requests Affecting Fire Area R-1D

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area R-1D.

6.2.5 Fire Area R-1E

6.2.5.1 General Description

Fire Area R-1E is the Division II 4.16 KV Switchgear Room on Elevation 719'-1" in the Unit 1 Reactor Building. This fire area consists of a single room. Its location is shown on Drawing E-205952 in Section 8.0. Fire Area R-1E predominately contains Division II equipment, components and cabling. Safe Shutdown Path 1, which is comprised primarily of Division I equipment, components and cabling, can be used to achieve safe shutdown in the event of a fire in this fire area. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.5.2 Fire Zones

The following fire zone is located in Fire Area R-1E:

Fire Zone	Description
1-4C	4.16 KV Switchgear Room Div II

6.2.5.3 Combustible Loading

The combustible loading in Fire Area R-1E is well below the fire barrier rating of the fire area boundary. The prime contributor to the combustible loading in this fire area is cables in cable tray. Switchgear panels, motor control centers and load centers also contribute to the overall combustible loading. There is no mechanical equipment (i.e., pumps, valves, etc.) in this fire area. Any specific Fire Hazard Analyses applicable to the fire zone in this fire area are identified on the Drawings in Section 8.0 and referenced below along with any other combustible restrictions.

6.2.5.4 Fire Detection/Suppression in the Fire Area

Fire Area R-1E is equipped with ionization smoke detectors which alarm in the main control room. The fire area does not have an automatic suppression system due to the nature of the electrical equipment in the room. However, manual hose reels and portable fire extinguishers are located nearby.

6.2.5.5 Consequences of a Fire in Fire Area R-1E

In the event of a fire in Fire Area R-1E, Safe Shutdown Path 1 systems and components will be available for safe shutdown. Electrical cabling located in Fire Area R-1E associated with Path 1 safe shutdown systems and components has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. This is accomplished using one of the methods outlined in Section 6.1.2.4.

A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.5.5.1 Fire Zone 1-4C – 4.16 KV Switchgear Room Div II

There are no Category I components located in Fire Zone 1-4C.

6.2.5.6 Special Features

There are no special features in Fire Area R-1E. There is no manual actions required.

6.2.5.7 Deviation Requests Affecting Fire Area R-1E

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area R-1E.

6.2.6 Fire Area R-1F

6.2.6.1 General Description

Fire Area R-1F is the Division I 4.16 KV Switchgear Room at Elevation 719'-1" in the Unit 1 Reactor Building. This fire area consists of a single room. Its location is shown on Drawing E-205952 in Section 8.0. Fire Area R-1F predominately contains Division I equipment, components and cabling. Safe Shutdown Path 3, which is comprised primarily of Division II equipment, components and cabling, can be used to achieve safe shutdown in the event of a fire in this area. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.6.2 Fire Zones

The following fire zone is located in Fire Area R-1F:

Fire Zone	Description
1-4D	4.16 KV Switchgear Room Div I

6.2.6.3 Combustible Loading

The combustible loading in Fire Area R-1F is well below the fire barrier rating of the fire area boundary. The prime contributor to the combustible loading in this fire area is cables in cable tray. Switchgear panels, motor control centers and load centers also contribute to the overall combustible loading. There is no mechanical equipment (i.e., pumps, valves, etc.) in this fire area. Any specific Fire Hazard Analyses applicable to the fire zone in this fire area are identified on the Drawings in Section 8.0 and referenced below along with any other combustible restrictions.

6.2.6.4 Fire Detection/Suppression in the Fire Area

Fire Area R-1F is equipped with ionization smoke detectors which alarm in the main control room. The fire area does not have an automatic suppression system due to the nature of the electrical equipment in the room. However, manual hose reels and portable fire extinguishers are located nearby.

6.2.6.5 Consequences of a Fire in Fire Area R-1F

In the event of a fire in Fire Area R-1F, Safe Shutdown Path 3 systems and components will be available for safe shutdown. Electrical cabling located in Fire Area R-1F associated with Path 3 safe shutdown systems and components has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. This is accomplished by one of the methods described in Section 6.1.2.4.

A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.6.5.1 Fire Zone 1-4D – 4.16 KV Switchgear Room Div I

There are no Category I components located in Fire Zone 1-4D.

6.2.6.6 Special Features

There are no special features in Fire Area R-1F. There are no manual actions required.

6.2.6.7 Deviation Requests Affecting Fire Area R-1F

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area R-1F.

6.2.7 Fire Area R-1G

6.2.7.1 General Description

Fire Area R-1G is the Division II 4.16 KV Switchgear Room at Elevation 749'-1" in the Unit 1 Reactor Building. This fire area consists of a single room. Its location is shown on Drawing E-205953 in Section 8.0. Fire Area R-1G predominately contains Division II equipment, components and cabling. Safe Shutdown Path 1, which is comprised primarily of Division I equipment, components and cabling, can be used to achieve safe shutdown in the event of a fire in this fire area. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.7.2 Fire Zones

The following fire zone is located in Fire Area R-1G:

Fire Zone	Description
1-5F	4.16 KV Switchgear Room Div II

6.2.7.3 Combustible Loading

The combustible loading in Fire Area R-1G is well below the fire barrier rating of the fire area boundary. The principle contributor to the combustible loading in this fire area is cables in cable tray. Switchgear panels, motor control centers and load centers also contribute to the overall combustible loading. There is no mechanical equipment (i.e., pumps, valves, etc.) in this fire area. Any specific Fire Hazard Analyses applicable to the fire zone in this fire area are identified on the Drawings in Section 8.0 and referenced below along with any other combustible restrictions.

6.2.7.4 Fire Detection/Suppression in the Fire Area

Fire Area R-1G is equipped with ionization smoke detectors which alarm in the main control room. The fire area does not have an automatic suppression system due to the nature of the electrical equipment in the room. However, manual hose reels and portable fire extinguishers are located nearby.

6.2.7.5 Consequences of a Fire in Fire Area R-1G

In the event of a fire in Fire Area R-1G, Safe Shutdown Path 1 systems and components will be available for safe shutdown. Electrical cabling located in Fire Area R-1G associated with Path 1 safe shutdown systems and components has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. This is accomplished using one of the methods outlined in Section 6.1.2.4.

A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.7.5.1 Fire Zone 1-5F – 4.16 KV Switchgear Room Div II

There are no Category I components located in Fire Zone 1-5F.

6.2.7.6 Special Features

The following manual action may be required in the event of a fire in this fire area when the fire damage is in the specific fire zone listed below:

1. Should a fire in Fire Zone 1-5F result in loss of Reactor Recirculation Pump 1P401A and/or 1P401B trip capability, trip pump 1P401A and/or 1P401B by manually tripping the Motor-Generator Set supply breaker 1A10110 and/or 1A10210.

6.2.7.7 Deviation Requests Affecting Fire Area R-1G

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area R-1G.

6.2.8 Fire Area R-1H

6.2.8.1 General Description

Fire Area R-1H is the Division I 4.16 KV Switchgear Room at Elevation 749'-1" in the Unit 1 Reactor Building. This fire area consists of a single room. Its location is shown on Drawing E-205953 in Section 8.0. Fire Area R-1H predominately contains Division I equipment, components and cabling. Safe Shutdown Path 3, which is comprised primarily of Division II equipment, components and cabling, can be used to achieve safe shutdown in the event of a fire in this fire area. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.8.2 Fire Zones

The following fire zone is located in Fire Area R-1H:

Fire Zone	Description
1-5G	4.16 KV Switchgear Room Div I

6.2.8.3 Combustible Loading

The combustible loading in Fire Area R-1H is well below the fire barrier rating of the fire area boundary. The principle contributor to the combustible loading in this fire area is cables in cable tray. Switchgear panels, motor control centers and load centers also contribute to the overall combustible loading. There is no mechanical equipment (i.e., pumps, valves, etc.) in this fire area. Any specific Fire Hazard Analyses applicable to the fire zone in this fire area are identified on the Drawings in Section 8.0 and referenced below along with any other combustible restrictions.

6.2.8.4 Fire Detection/Suppression in the Fire Area

Fire Area R-1H is equipped with ionization smoke detectors which alarm in the main control room. The fire area does not have an automatic suppression system due to the nature of the electrical equipment in the room. However, manual hose reels and portable fire extinguishers are located nearby.

6.2.8.5 Consequences of a Fire in Fire Area R-1H

In the event of a fire in Fire Area R-1H, Safe Shutdown Path 3 systems and components will be available for safe shutdown. Electrical cabling located in Fire Area R-1H associated with Path 3 safe shutdown systems and components has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. This is accomplished using one of the methods outlined in Section 6.1.2.4.

A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.8.5.1 Fire Zone 1-5G – 4.16 KV Switchgear Room Div I

There are no Category I components located in Fire Zone 1-5G.

6.2.8.6 Special Features

The following manual action may be required in the event of a fire in this fire area when the fire damage is in the specific fire zone listed below:

1. Should a fire in Fire Zone 1-5G** result in loss of Reactor Recirculation Pump 1P401A and/or 1P401B trip capability, trip pump 1P401A and/or 1P401B by manually tripping the Motor-Generator Set supply breaker 1A10110 and/or 1A10210.

   ** Reactor Recirculation Pump 1P401B can be tripped from the Control Room.

6.2.8.7 Deviation Requests Affecting Fire Area R-1H

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area R-1H.

6.2.9 Fire Area R-2A

6.2.9.1 General Description

Fire Area R-2A is located in the Unit 2 Reactor Building and is comprised of fire zones which generally occupy the southern half of the building. This fire area is shown on Drawings E-205957 thru E-205964, E-205967 and E-213485 in Section 8.0. Fire Area R-2A predominately contains Division I equipment, components and cabling. Safe Shutdown Path 3, which is comprised primarily of Division II equipment, components and cabling, can be used to achieve safe shutdown in the event of a fire in Fire Area R-2A. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.9.2 Fire Zones

The following fire zones are located in Fire Area R-2A:

Fire Zone	Description
2-1B	Core Spray "A" Pump Room
2-1F	RHR "A" Pump Room
2-1G	Sump Room
2-1I #	Elevator Shaft & Stairwell No. 202
2-2A	Remote Shutdown Panel Room
2-2C	Vehicle Airlock
2-3A	Heat Exchanger Pump Room
2-3B-S	Equipment Removal Area
2-3B-W * #	Equipment Removal Area
2-3C-S	Equipment Access Area
2-3C-W * #	Equipment Access Area
2-4A-S	Containment Access Area
2-4A-W * #	Containment Access Area
2-4E	CRD Rebuild Room
2-4G	Main Steam Pipeway
2-5A-S	General Access Area
2-5A-W * #	Access Corridor

2-5C	Reactor Backwash Receiving Tank Room
2-5D #	RWCU Pump Room & Heat Exchanger Cells
2-5E	Pipe Penetration Room
2-5H #	I&C Instrument Repair Shop
2-6B ** #	Load Center Room
2-6D ** #	HVAC Equipment Room
2-6E ** #	HVAC Plenum Area
2-6F ** #	Spent Fuel Pool
2-7A ** #	HVAC Equipment Area
0-8A ** #	Refueling Floor

* This fire zone is a wraparound area (see Deviation Request No. 4)

** This fire zone is a buffer zone (see Deviation Request No. 7)

This fire zone is analyzed as part of a pseudo fire area since protection of both Paths 1 and 3 is required in this zone. Fire Zone 2-1J that is also analyzed as a part of this pseudo-fire area is included in Fire Area R-2B.

6.2.9.3 Combustible Loading

The combustible loading for each fire zone within this fire area has been compiled and has been used for specific fire hazards analysis within this fire area. Specific combustible configurations in the fire area may also have been reviewed for their fire hazard severity and for their impact on fire barrier integrity. The fire rating of the fire area is established based on the lowest fire rating for any fire barrier in any fire zone forming a part of the boundary of the fire area. The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of fire zones in Fire Area R-2A are addressed in Deviation Requests 3, 4, 6, 7, 11, 12, 13, 14, 24, 29, 38 and 42 as well as by several fire hazards analysis for specific configurations. Any fire zones for which specific fire hazards analysis have been prepared are identified on the Drawings contained in Section 8.0 of this document. Any restrictions for a fire zone are described in the deviation requests or fire hazards analyses referenced for that fire zone.

6.2.9.4 Fire Detection/Suppression in the Fire Area

Automatic fire detection is provided throughout Fire Area R-2A except in the following fire zones:

Fire Zone	Description
2-2C	Vehicle Airlock
2-4E	CRD Rebuild Room
2-6F	Spent Fuel Pool

The justification for lack of detection in these fire zones is presented in Deviation Request No. 14.

Automatic fire suppression systems have been installed in local areas where fire hazards have the most severe potential. These systems are designed to control and suppress any fire which could develop in the fire zones which they protect.

Fire suppression has been provided in the following fire zones:

Fire Zone	Description
2-2C	Vehicle Airlock
2-3B-S	Equipment Removal Area
2-3B-W	Equipment Removal Area
2-4A-S	Containment Access Area (Partial)
2-4A-W	Containment Access Area
2-5A-W	Access Corridor
2-5A-S	General Access Area (Partial)

Automatic deluge systems are provided for the following equipment listed by fire zones:

Fire Zone	Description
2-1C	HPCI Pump
2-1D	HPCI Pump

Manual deluge systems are provided for charcoal filters 2F217A, 2F217B, 2F257A, and 2F257B in Fire Zone 2-7A.

6.2.9.5 Consequences of a Fire in Fire Area R-2A

In the event of a design basis fire in Fire Area R-2A, Safe Shutdown Path 3 systems will be available for safe shutdown. Electrical cabling located in Fire Area R-2A associated with Path 3 safe shutdown systems and components has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. This is accomplished using one of the methods outlined in Section 6.1.2.4.

A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.9.5.1 Fire Zone 2-1B – Core Spray "A" Pump Room

The following Category I components are located in Fire Zone 2-1B:

- Suppression Pool Filter Pump Suction Valve (HV-25766) - Fire induced spurious opening of this normally closed valve in conjunction with a fire induced spurious opening of normally closed valve HV-25768 could result in a flow diversion from the Suppression Pool. Fire induced spurious opening of HV-25768 is prevented for a fire in Fire Area R-2A.

- Suppression Pool Filter Pump Suction Valve (HV-25768) - Fire induced spurious opening of this normally closed valve in conjunction with a fire induced spurious opening of normally closed valve HV-25766 could result in a flow diversion from the Suppression Pool. A fire induced hot short on the circuits for HV-25768 in Fire Zone 2-1B cannot cause a spurious opening of this valve. Any circuits with the potential to cause a spurious opening of HV-25768 in Fire Area R-2A are protected with fire rated barrier.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 2-1B is addressed in Deviation Request 3.

6.2.9.5.2 Fire Zone 2-1F – RHR "A" Pump Room

There are no Category I components located in Fire Zone 2-1F.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 2-1F is addressed in Deviation Requests 3 and 6.

6.2.9.5.3 Fire Zone 2-1G – Sump Room

There are no Category I components located in Fire Zone 2-1G.

6.2.9.5.4 Fire Zone 2-1I – Elevator Shaft & Stairwell No. 202

There are no Category I components located in Fire Zone 2-1I.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 2-1I is addressed in Deviation Request 3.

6.2.9.5.5 Fire Zone 2-2A – Remote Shutdown Panel Room

There are no Category I components located in Fire Zone 2-2A.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 2-2A is addressed in Deviation Request 3. In addition, the fire hazards analysis identified on Drawing E-205959 in Section 8.0 of this document affects the combustible configuration in this fire zone.

6.2.9.5.6 Fire Zone 2-2C – Vehicle Airlock

There are no Category I components contained in Fire Zone 2-2C.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 2-2C is addressed in Deviation Request 14.

6.2.9.5.7 Fire Zone 2-3A – Heat Exchanger Pump Room

There are no Category I components located in Fire Zone 2-3A.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 2-3A is addressed in Deviation Request 3. In addition, the fire hazards analysis identified on Drawing E-205959 in Section 8.0 of this document affects the combustible configuration in this fire zone.

6.2.9.5.8 Fire Zone 2-3B-S – Equipment Removal Area

There are no Category I components located in Fire Zone 2-3B-S.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 2-3B-S is addressed in Deviation Request 4.

6.2.9.5.9 Fire Zone 2-3B-W – Equipment Removal Area

There are no Category I components located in Fire Zone 2-3B-W.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 2-3B-W is addressed in Deviation Requests 4, 6 and 42. In addition, the fire hazards analysis identified on Drawing E-205959 in Section 8.0 of this document affects the allowable combustible configuration for this fire zone.

Deviation Request 42 justifies limiting the protection of certain equipment and/or cabling for the required safe shutdown path in this fire zone.

6.2.9.5.10 Fire Zone 2-3C-S – Equipment Access Area

There are no Category I components located in Fire Zone 2-3C-S.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 2-3C-S is addressed in Deviation Request 4. In addition, the fire hazards analysis identified on Drawing E-205959 in Section 8.0 of this document affects the combustible configuration in this fire zone.

6.2.9.5.11 Fire Zone 2-3C-W – Equipment Access Area

The following Category I components are located in Fire Zone 2-3C-W:

- RHR Shutdown Cooling Outboard Isolation Valve (HV-E11-2F008) - Addressed by Deviation Request No. 29.
- RHR Injection Inboard Isolation Valves (HV- E11-2F015A and HV-E11-2F015B) - Addressed by Deviation Request No. 29.
- RHR Heat Exchanger Bypass Valves (HV-E11-2F048A and HV-E11-2F048B) - Addressed by Deviation Request No. 29.
- RHR Heat Exchanger Outlet Temperature Elements (TE-E11-2N027A and TE-E11-2N027B) - Addressed by Deviation Request No. 29.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 2-3C-W is addressed in Deviation Requests 4 and 29.

Deviation Request 29 justifies limiting the protection of certain equipment and/or cabling for the required safe shutdown path in this fire zone.

6.2.9.5.12 Fire Zone 2-4A-S – Containment Access Area

The following Category I components are located in Fire Zone 2-4A-S:

- CRD Hydraulic Control Units (2C0219, 2C0223, 2C0227, 2C0231,
  2C0235, 2C0239, 2C0243, 2C0615, 2C0619, 2C0623, 2C0627,
  2C0631, 2C0635, 2C0639, 2C0643, 2C0647, 2C1011, 2C1015,
  2C1019, 2C1023, 2C1027, 2C1031, 2C1035, 2C1039, 2C1043,
  2C1047, 2C1051, 2C1407, 2C1411, 2C1415, 2C1419, 2C1423,

2C1427, 2C1431, 2C1435, 2C1439 2C1443, 2C1447, 2C1451,
2C1455, 2C1803, 2C1807, 2C1811, 2C1815, 2C1819, 2C1823,
2C1827, 2C1831, 2C1835, 2C1839 2C1843, 2C1847, 2C1851,
2C1855, 2C1859, 2C2203, 2C2207, 2C2211, 2C2215, 2C2219,
2C2223, 2C2227, 2C2231, 2C2235, 2C2239, 2C2243, 2C2247,
2C2251, 2C2255, 2C2259, 2C2603, 2C2607, 2C2611, 2C2615,
2C2619, 2C2623, 2C2627, 2C2631, 2C2635, 2C2639, 2C2643,
2C2647, 2C2651, 2C2655, 2C2659, 2C3007, 2C3015, 2C3023,
2C3031, 2C3039, 2C3047, 2C3055)

– Fire damage to this component could affect the scram capability and the ability to isolate the scram discharge volume. An analysis has determined that damage to the HCU will not prevent scram. If required, the plant operator will isolate the scram discharge volume by manually venting the instrument air header.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 2-4A-S is addressed in Deviation Requests 3, 4, 6, 11, 12 and 13.

6.2.9.5.13 Fire Zone 2-4A-W – Containment Access Area

The following Category I components are located in Fire Zone 2-4A-W:

- SCRAM Discharge Volume Vent and Drain Pilot Solenoid Valves (SV-C-2F009A and SV-C12-2F009B) - Fire induced damage to this component can affect the ability of the plant operator to isolate the scram discharge volume from the Control Room. The plant operator can isolate the scram discharge volume by manually venting the instrument air header.

- Back-up SCRAM Valves (SV-C12-2F110A and SV-C12-2F110B) - An analysis has demonstrated that fire induced damage to these valves will not affect the ability to manually scram the reactor. The plant operator can isolate the scram discharge volume by manually venting the instrument air header.

- ARI Vent and Block Valves (SV-24799, SV-247100, SV-247101 and SV-247102) - An analysis has demonstrated that fire induced damage to these valves will not affect the ability to manually scram the reactor and isolate the scram discharge volume.

- Appendix R Communication System Jackplate JP2102 – This component is not required for post-fire safe shutdown in this Fire Area. This component is a jackplate for Loop 1 of the Appendix R sound powered communications system. There are no operator actions resulting from a fire in this Fire Area that require the use of this loop of the sound powered communications system.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 2-4A-W is addressed in Deviation Requests 4 and 6.

6.2.9.5.14 Fire Zone 2-4E – CRD Rebuild Room

There are no Category I components located in Fire Zone 2-4E.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 2-4E is addressed in Deviation Request 14.

6.2.9.5.15 Fire Zone 2-4G – Main Steam Pipeway

The following Category I component is located in Fire Zone 2-4G:

- Main Steam Line Outboard Drain Isolation Valve (HV-B21-2F019) – Fire induced damage to the Main Steam Inboard and Outboard Drain Isolation Valves can result in a flow diversion from the reactor coolant system when Alternate Shutdown Cooling is being used. If required, the plant operator can manually close HV-B21-2F019.

- Main Steam Line Outboard Isolation Valve HV-241-F028A, HV-241-F028B, HV-241-F028C and HV-241-F028D Pilot Solenoid Valves (SV-24129A1, SV-24129A2, SV-24129B1, SV-24129B2, SV-24129C1, SV-24129C2, SV-24129D1 and SV-24129D2) – Addressed by Deviation Request 38.

- HPCI Pump Discharge Valve (HV-E41-2F006) – This component is not required in support of post-fire safe shutdown in Fire Area R-2A. A spurious operation of this component along with other HPCI System components has been evaluated in regards to a reactor vessel overfill condition. A fire induced spurious start of the HPCI System is not possible in this fire area.

- RCIC Pump Injection Shutoff Valve (HV-E51-2F013) – This component is not required in support of post-fire safe shutdown in Fire Area R-2A. A spurious operation of this component along with other RCIC System components has been evaluated in regards to a reactor vessel overfill condition. A fire induced spurious start of the RCIC System in conjunction with the loss of the RCIC high water level trip in Fire Area R-2A can be mitigated by the protected safe shutdown path for Fire Area R-2A.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 2-4G is addressed in Deviation Requests 3, 6, 11 and 38.

6.2.9.5.16 Fire Zone 2-5A-S – General Access Area

The following Category I components are located in Fire Zone 2-5A-S:

- RWCU Demin Dump Valve I/P Converter (HY-G33-2K001); RWCU Pressure Switches (PSH-G33-2N014, PSL-G33-2N013) and RWCU Demin Dump Solenoid Valve (SV-24433) – For a fire in Fire Zone 2-5A-S closure of the RWCU Outboard Isolation Valve (HV-G33-2F004) has been assured in the event that isolation of the RWCU is required.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 2-5A-S is addressed in Deviation Requests 3, 4, 6 and 11.

6.2.9.5.17 Fire Zone 2-5A-W – Access Corridor

There are no Category I components located in Fire Zone 2-5A-W.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 2-5A-W is addressed in Deviation Requests 3, 4, 11 and 12.

6.2.9.5.18 Fire Zone 2-5C – Reactor Backwash Receiving Tank Room

There are no Category I components located in Fire Zone 2-5C.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 2-5C is addressed in Deviation Requests 6 and 13. In addition, the fire hazards analysis identified on Drawing E-205961 in Section 8.0 of this document affects the combustible configuration in this fire zone.

6.2.9.5.19 Fire Zone 2-5D - RWCU Pump Room & Heat Exchanger Cells

The following Category I component is located in Fire Zone 2-5D:

- RWCU Outboard Isolation Valve (HV-G33-2F004) - Addressed by Deviation Request No. 24.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 2-5D is addressed in Deviation Request 24.

6.2.9.5.20 Fire Zone 2-5E – Pipe Penetration Room

There are no Category I components located in Fire Zone 2-5E.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 2-5E is addressed in Deviation Requests 3 and 11.

6.2.9.5.21 Fire Zone 2-5H – I&C Instrument Repair Shop

There are no Category I components located in Fire Zone 2-5H.

6.2.9.5.22 Fire Zone 2-6B – Load Center Room

There are no Category I components located in Fire Zone 2-6B.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 2-6B is addressed in Deviation Request 7.

6.2.9.5.23 Fire Zone 2-6D – HVAC Equipment Room

There are no Category I components located in Fire Zone 2-6D:

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 2-6D is addressed in Deviation Request 7.

6.2.9.5.24 Fire Zone 2-6E – HVAC Plenum Area

There are no Category I components located in Fire Zone 2-6E.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 2-6E is addressed in Deviation Request 7.

6.2.9.5.25 Fire Zone 2-6F – Spent Fuel Pool

There are no Category I components located in Fire Zone 2-6F.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 2-6F is addressed in Deviation Request 7 and 14.

6.2.9.5.26 Fire Zone 2-7A – HVAC Equipment Area

There are no Category I components located in Fire Zone 2-7A.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 2-7A is addressed in Deviation Request 7.

6.2.9.5.27 Fire Zone 0-8A – Refueling Floor

There are no Category I components located in Fire Zone 0-8A.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-8A is addressed in Deviation Request 7.

6.2.9.6 Special Features

The following manual actions may be required in the event of a fire in this fire area when the fire damage is in the specific fire zone listed below:

1. Should a fire in Fire Zone 2-3A, 2-4A-S**, 2-4A-W**, 2-4G***, 2-5A-W**, 2-5A-S*** or 2-5E*** result in loss of Reactor Recirculation Pump 2P401A and/or 2P401B trip capability, trip pump 2P401A and/or 2P401B by manually tripping the Motor-Generator Set supply breaker 2A10110 and/or 2A10210.

   * Reactor Recirculation Pump 2P401A can be tripped from the Control Room.
   ** Reactor Recirculation Pump 2P401B can be tripped from the Control Room.
   *** Reactor Recirculation Pumps 2P401A and 2P401B can be tripped from the Control Room.

2. Should a fire in Fire Zone 2-2A, 2-3A, 2-4A-S or 2-4G result in spurious Unit 2 ADS or SRV actuations as indicated by low RPV pressure and/or level, the capability to further depressurize the reactor using Unit 2 Division II ADS and to inject water into the reactor using Unit 2 Division II Core Spray remains available from the Control Room.

3. Should a fire in Fire Zone 2-5A-W or 2-5D result in spuriously tripping the RHRSW Pump 2P506A, reset the pump trip logic by operating HS-21202A3 to the RESET position and start pump 2P506A from the Control Room.

4. Fire Zone 2-4A-W, actions performed during plant start up lifts lead in Motor Control Center 2B236 cubicle 102 which disables the Reactor Head Vent Valve HV-241-F001 preventing a reactor coolant flow diversion through spurious opening of both Head Vent Valves.

5. Should a fire in Fire Zone 2-4A-W result in loss of Unit 2 scram discharge volume isolation capability, isolate the scram discharge volume by manually venting the instrument air header in the Unit 2 Reactor Building.

6. Should a fire in Fire Zone 2-4G result in a Unit 2 Reactor Coolant System flow diversion when operating in the alternate shutdown cooling mode caused by the MSIV drain valves “Spuriously Opening “, open Unit 2 250 VDC Motor Control Center 2D274 Breaker 041 and manually close MSIV Drain Valve HV-241-F019.

6.2.9.7 Deviation Requests Affecting Fire Area R-2A

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area R-2A.

6.2.10 Fire Area R-2B

6.2.10.1 General Description

Fire Area R-2B is located in the Unit 2 Reactor Building and is comprised of fire zones which generally occupy the northern half of the building and are shown on Drawings E-205957 thru E-205964 in Section 8.0. Fire Area R-2B predominantly contains Division II equipment, components and cabling. Safe Shutdown Path 1, which is comprised primarily of Division I equipment, components and cabling, can be used to achieve safe shutdown in the event of a fire in Fire Area R-2B. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.10.2 Fire Zones

The following fire zones are located in Fire Area R-2B:

Fire Zone	Description
2-1A	Core Spray "B" Pump Room
2-1C	HPCI Pump Room
2-1D	RCIC Pump Room
2-1E	RHR "B" Pump Room
2-1J #	Stairwell No. 201
2-2B	Personnel Access Corridor
2-3B-N	Equipment Removal Area
2-3B-W * #	Equipment Removal Area
2-3C-N	Equipment Access Area
2-3C-W * #	Equipment Access Area
2-4A-N	Containment Access Area
2-4A-W * #	Containment Access Area

Fire Zone	Description
2-4B	Pipe Penetration Room
2-5A-N	Standby Liquid Control Area
2-5A-W * #	Access Corridor
2-6A	General Access Area & Pump Room
2-6B ** #	Load Center Room
2-6C	Electrical Equipment Room
2-6D ** #	HVAC Equipment Room
2-6E ** #	HVAC Plenum Area
2-6F ** #	Spent Fuel Pool
2-7A ** #	HVAC Equipment Area
0-8A ** #	Refueling Floor

* This fire zone is a wraparound area (see Deviation Request No. 4)

** This fire zone is a buffer zone (see Deviation Request No. 7)

\# This fire zone is analyzed as part of a pseudo fire area since protection of both Paths 1 and 3 is required in this zone. Fire Zone 2-1I, 2-5D and 2-5H that are also analyzed as a part of this pseudo-fire area are included in Fire Area R-2A.

6.2.10.3 Combustible Loading

The combustible loading for each fire zone within this fire area has been compiled and has been used for specific fire hazards analysis within this fire area. Specific combustible configurations in the fire area may also have been reviewed for their fire hazard severity and for their impact on fire barrier in integrity. The fire rating of the fire area is established based on the lowest fire rating for any fire barrier in any fire zone forming a part of the boundary of the fire area. The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and f3, 4, 6, 7, 11, 12, 13, 14, 26, 28, 29 and 42 as well as by several fire hazards analysis for specific configurations. Any fire zones for which specific fire hazards analyses have been prepared are identified on the drawings contained in Section 8.0 of this document. Any restrictions to a particular fire zone are described in the deviation requests or fire hazards analyses referenced for that fire zone.

6.2.10.4 Fire Detection/Suppression in the Fire Area

Automatic fire detection is provided throughout Fire Area R-2B except in the following fire zones:

Fire Zone	Description
2-1J	Stairwell No. 201
2-6F	Spent Fuel Pool

The justification for lack of detection in these fire zones is presented in Deviation Request No. 14.

Automatic fire suppression systems have been installed in local areas based upon fire hazards. These systems are designed to control and suppress any fire which could develop in the fire zones which they protect. Fire suppression has been provided in the following fire zones:

Fire Zone	Description
2-3B-N	Equipment Removal Area (Partial)
2-3B-W	Equipment Removal Area
2-4A-N	Containment Access Area
2-4A-W	Containment Access Area
2-5A-N	Standby Liquid Control Area
2-5A-W	Access Corridor

Automatic deluge systems are provided for the equipment listed by fire zone below:

Fire Zone	Description
2-1C	HPCI Pump
2-1D	HPCI Pump

6.2.10.5 Consequences of a Fire in Fire Area R-2B

In the event of a design basis fire in Fire Area R-2B, Safe Shutdown Path 1 systems will be available for safe shutdown. Electrical cabling located in Fire Area R-2B associated with Path 1 safe shutdown systems and components has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. This has been accomplished using one of the methods outlined in Section 6.1.2.4.

A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.10.5.1 Fire Zone 2-1A – Core Spray "B" Pump Room

There are no Category I components located in Fire Zone 2-1A.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 2-1A is addressed in Deviation Requests 3 and 6.

6.2.10.5.2 Fire Zone 2-1C – HPCI Pump Room

The following Category I components are located in Fire Zone 2-1C:

- HPCI Turbine Auxiliary Oil Pump (2P213) – This component is not required in support of post-fire safe shutdown in Fire Area R-2B. A spurious operation of this component along with other HPCI system components has been evaluated in regards to a reactor vessel overfill condition. A fire induced spurious start of the HPCI system in conjunction with the loss of the HPCI high water level trip in Fire Area R-2B can be mitigated by closing the HPCI Inboard Steam Supply Isolation Valve (HV-E41-2F002).

- HPCI Steam Supply to Turbine Valve (HV-E41-2F001) - This component is not required in support of post-fire safe shutdown in Fire Area R-2B. A spurious operation of this component along with other HPCI system components has been evaluated in regards to a reactor vessel overfill condition. A fire induced spurious start of the HPCI system in conjunction with the loss of the HPCI high water level trip in Fire Area R-2B can be mitigated by closing the HPCI Inboard Steam Supply Isolation Valve (HV-E41-2F002).

- HPCI Turbine Trip Solenoid Valve (SV-25661) - This component is not required in support of post-fire safe shutdown in Fire Area R-2B. A spurious operation of HPCI system components has been evaluated in regards to a reactor vessel overfill condition. A fire induced spurious start of the HPCI system in conjunction with the loss of the HPCI high water level trip in Fire Area R-2B can be mitigated by closing the HPCI Inboard Steam Supply Isolation Valve (HV-E41-2F002).

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 2-1C is addressed in Deviation Request 6.

6.2.10.5.3 Fire Zone 2-1 D – RCIC Pump Room

The following Category I components are located in Fire Zone 2-1D:

- RCIC Turbine Stop Valve (HV-25012) - This component is not required in support of post-fire safe shutdown in Fire Area R-2B. A spurious operation of this component along with other RCIC system components has been evaluated in regards to a reactor vessel overfill condition. A fire induced spurious start of the RCIC system in conjunction with the loss of the RCIC high water level trip in Fire Area R-2B can be mitigated by using the protected safe shutdown path for Fire Area R-2B.

- RCIC Steam Supply Line Valve (HV-E51-2F045) - This component is not required in support of post-fire safe shutdown in Fire Area R-2B. A spurious operation of this component along with other RCIC system components has been evaluated in regards to a reactor vessel overfill condition. A fire induced spurious start of the RCIC system in conjunction with the loss of the RCIC high water level trip in Fire Area R-2B can be mitigated by using the protected safe shutdown path for Fire Area R-2B.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 2-1D is addressed in Deviation Request 6. In addition, the fire hazards analysis identified on Drawing E-205957 and E205958 in Section 8.0 of this document affects the combustible configuration in this fire zone.

6.2.10.5.4 Fire Zone 2-1E – RHR "B" Pump Room

The following Category I components are located in Fire Zone 2-1E:

- RHR Pump B Shutdown Cooling Suction Valve (HV-E11-2F006B) – This valve must remain closed when RHR is running in the Shutdown Cooling Mode. RHR Shutdown Cooling is not a credited safe shutdown system in Fire Area R-2B.

- RHR Pump D Shutdown Cooling Suction Valve (HV-E11-2F006D) – This valve must remain closed when RHR is running in the Shutdown Cooling Mode. RHR Shutdown Cooling is not a credited safe shutdown system in Fire Area R-2B.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 2-1E is addressed in Deviation Requests 3 and 6.

6.2.10.5.5 Fire Zone 2-1J – Stairwell No. 201

There are no Category I components located in Fire Zone 2-1J.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 2-1J is addressed in Deviation Request 14.

6.2.10.5.6 Fire Zone 2-2B – Personnel Access Corridor

There are no Category I components located in Fire Zone 2-2B.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 2-2B is addressed in Deviation Request 3. In addition, the fire hazards analysis identified on Drawing E205958 in Section 8.0 of this document affects the combustible configuration in this fire zone.

6.2.10.5.7 Fire Zone 2-3B-N – Equipment Removal Area

The following Category I components are located in Fire Zone 2-3B-N:

- Reactor Low Pressure Permissive Switch for RHR System (PIS-B31-2N018A) - Addressed by Deviation Request No. 26.

- Core Spray System Loop A Flow Transmitter (FT-E21-2N003A) and Core Spray Minimum Flow Switch (FIS-E21-2N006A) - Addressed by Deviation Request No. 26.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 2-3B-N is addressed in Deviations Requests 3, 4, 6,13 and 26. In addition, the fire hazards analysis identified on Drawing E-205959 in Section 8.0 of this document affects the combustible configuration in this fire zone.

Deviation Request 26 justifies limiting the protection of certain equipment and/or cabling for the required safe shutdown path in this fire zone.

6.2.10.5.8 Fire Zone 2-3B-W – Equipment Removal Area

There are no Category I components located in Fire Zone 2-3B-W.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 2-3B-W is addressed in Deviation Requests 4, 6 and 42. In addition, the fire hazards analysis identified on Drawing E-205959 in Section 8.0 of this document affects the allowable combustible configuration for this fire zone.

Deviation Request 42 justifies limiting the protection of certain equipment and/or cabling for the required safe shutdown path in this fire zone.

6. 2.10.5.9 Fire Zone 2-3C-N – Equipment Access Area

There are no Category I components located in Fire Zone 2-3C-N.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 2-3C-N is addressed in Deviation Request 4.

6.2.10.5.10 Fire Zone 2-3C-W – Equipment Access Area

The following Category I components are located in Fire Zone 2-3C-W:

- RHR Injection Inboard Isolation Valves (HV-E11-2F015A and HV-E11-2F015B) - Addressed by Deviation Request No. 29.

- RHR Shutdown Cooling Outboard Isolation Valve (HV-E11-2F008) - Addressed by Deviation Request No. 29.

- RHR Heat Exchanger Outlet Temperature Elements (TE-E11-2N027A and TE-E11-2N027B) - Addressed by Deviation Request No. 29.

- RHR Heat Exchanger Bypass Valves (HV-E11-2F048A and HV-E11-2F048B) - Addressed by Deviation Request No. 29.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 2-3C-W is addressed in Deviation Requests 4 and 29.

Deviation Request 29 justifies limiting the protection of certain equipment and/or cabling for the required safe shutdown path in this fire zone.

6.2.10.5.11 Fire Zone 2-4A-N – Containment Access Area

The following Category I components are located in Fire Zone 2-4A-N:

- CRD Hydraulic Control Units (2C3003, 2C3011, 2C3019, 2C3027, 2C3035, 2C3043, 2C3051, 2C3059, 2C3403, 2C3407, 2C3411, 2C3415, 2C3419, 2C3423, 2C3427, 2C3431, 2C3435, 2C3439, 2C3443, 2C3447, 2C3451, 2C3455, 2C3459, 2C3803, 2C3807, 2C3811, 2C3815, 2C3819, 2C3823, 2C3827, 2C3831, 2C3835, 2C3839, 2C3843, 2C3847, 2C3851, 2C3855, 2C3859, 2C4203, 2C4207, 2C4211, 2C4215, 2C4219, 2C4223, 2C4227, 2C4231, 2C4235, 2C4239, 2C4243, 2C4247, 2C4251, 2C4255, 2C4259, 2C4607, 2C4611, 2C4615, 2C4619, 2C4623, 2C4627, 2C4631, 2C4635, 2C4639, 2C4643, 2C4647, 2C4651, 2C4655, 2C5011, 2C5015, 2C5019, 2C5023, 2C5027, 2C5031, 2C5035, 2C5039, 2C5043, 2C5047, 2C5051, 2C5415, 2C5419, 2C5423, 2C5427, 2C5431, 2C5435, 2C5439, 2C5443, 2C5447, 2C5819, 2C5823, 2C5827, 2C5831, 2C5835, 2C5839, 2C5843)

- Fire damage to this component could affect the scram capability and the ability to isolate the scram discharge volume. An analysis has determined that damage to this HCU will not prevent scram. If required, the plant operator will isolate the scram discharge volume by manually venting the instrument air header.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 2-4A-N is addressed in Deviation Requests 4 and 6.

6.2.10.5.12 Fire Zone 2-4A-W – Containment Access Area

The following Category I components are located in Fire Zone 2-4A-W:

- SCRAM Discharge Volume Vent and Drain Pilot Solenoid Valves (SV-C12-2F009A and SV-C12-2F009B) - Fire induced damage to this component can affect the ability of the plant operator to isolate the scram discharge volume from the Control Room. The plant operator can isolate the scram discharge volume by manually venting the instrument air header.

- Back-up SCRAM Valves (SV-C12-2F110A and SV-C12-2F110B) – An analysis has demonstrated that fire induced damage to these valves will not affect the ability to manually scram the reactor. The plant operator can isolate the scram discharge volume by manually venting the instrument air header.

- ARI Vent and Block Valves (SV-24799, SV-247100, SV-247101 and SV-247102) - An analysis has demonstrated that fire induced damage to these valves will not affect the ability to manually scram the reactor and isolate the scram discharge volume.

- Appendix R Communication System Jackplate JP2102 – This component is not required for post-fire safe shutdown in this Fire Area. This component is a jackplate for Loop 1 of the Appendix R sound powered communications system. There are no operator actions resulting from a fire in this Fire Area that require the use of this loop of the sound powered communications system.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 2-4A-W is addressed in Deviation Requests 4 and 6.

6.2.10.5.13 Fire Zone 2-4B – Pipe Penetration Room

There are no Category I components located in Fire Zone 2-4B.

6.2.10.5.14 Fire Zone 2-5A-N – Standby Liquid Control Area

The following Category I components are located in Fire Zone 2-5A-N:

- Reactor Vessel Level Indicating Switch (LIS-B21-2N042A) - Addressed by Deviation Request No. 28.

- 120V AC Power Distribution Panel (2Y201A) - Fire induced damage to this RPS Electrical Distribution Panel can result in tripping of the Unit 2 Division I RHRSW Pump (2P506A). If required, the plant operator can reset the trip from the Control Room and start the pump.

- Nuclear Boiler Instrumentation (Reactor Vessel Level Switches- LIS-B21-2N024A, LIS-B21-2N024B; Reactor Vessel Level Switches - LIS-B21-2N031A, LIS-B21-2N031C; Reactor Pressure Switches – PIS-B21-2N021A, PS-B21-2N023A, PS-B21-2N023B; Wide Range Level Transmitter – LT-24201A and Wide Range Pressure Transmitter – PT-24201A) - Addressed by Deviation Request No. 28.

- Reactor Vessel High Pressure Switches (PS-B21-2N022A-H, J-N, P, R, S) - Fire damage to this component can result in spurious opening of an SRV. The capability to further depressurize the reactor, as required, and inject with Core Spray in the event of spurious SRV opening is provided for the plant operator.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 2-5A-N is addressed in Deviation Requests 4, 6, 11, 13 and 28. In addition, the fire hazards analysis identified on Drawing E-205961 in Section 8.0 of this document affects the combustible configuration in this fire zone.

Deviation Request 28 justifies limiting the protection of certain equipment and/or cabling for the required safe shutdown path in this fire zone.

6.2.10.5.15 Fire Zone 2-5A-W – Access Corridor

There are no Category I components located in Fire Zone 2-5A-W.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 2-5A-W is addressed in Deviation Requests 3, 4, 11 and 12.

6.2.10.5.16 Fire Zone 2-6A – General Access Area & Pump Room

There are no Category I components located in Fire Zone 2-6A.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 2-6A is addressed in Deviation Requests 3, 6 and 13. In addition, the fire hazards analysis identified on Drawing E-205962 in Section 8.0 of this document affects the combustible configuration in this fire zone.

6.2.10.5.17 Fire Zone 2-6B – Load Center Room

There are no Category I components located in Fire Zone 2-6B.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 2-6B is addressed in Deviation Request 7.

6.2.10.5.18 Fire Zone 2-6C – Electrical Equipment Room

The following Category I components are located in Fire Zone 2-6C.

- High Primary Containment Pressure Switches (PS-E11-2N010A and PS-E11-2N010C) - The capability to manually depressurize the reactor, if required, using keylock switches in the Unit 2 Upper Relay Room remains available.

6.2.10.5.19 Fire Zone 2-6D – HVAC Equipment Room

There are no Category I components located in Fire Zone 2-6D:

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 2-6D is addressed in Deviation Request 7.

6.2.10.5.20 Fire Zone 2-6E – HVAC Plenum Area

There are no Category I components located in Fire Zone 2-6E.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 2-6E is addressed in Deviation Request 7.

6.2.10.5.21 Fire Zone 2-6F – Spent Fuel Pool

There are no Category I components located in Fire Zone 2-6F.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 2-6F is addressed in Deviation Requests 7 and 14.

6.2.10.5.22 Fire Zone 2-7A – HVAC Equipment Area

There are no Category I components located in Fire Zone 2-7A.
The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 2-7A is addressed in Deviation Request 7.

6.2.10.5.23 Fire Zone 0-8A – Refueling Floor

There are no Category I components located in Fire Zone 0-8A.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-8A is addressed in Deviation Request 7.

6.2.10.6 Special Features

The following manual actions may be required in the event of a fire in this fire area when the fire damage is in the specific fire zone listed below:

1. Should a fire in Fire Zone 2-5A-N, 2-5A-W or 2-6A result in spuriously tripping the RHRSW Pump 2P506A, reset the pump trip logic by operating HS-21202A3 to the RESET position and start pump 2P506A from the Control Room.

2. Should a fire in Fire Zone 2-4A-N, 2-4B or 2-5A-N result in spurious Unit 2 ADS or SRV actuations as indicated by low RPV pressure and/or level, the capability to further depressurize the reactor using Unit 2 Division I ADS and to inject water into the reactor using Unit 2 Division I Core Spray remains available from the Control Room.

3. Should a fire in Fire Zone, 2-3B-N, 2-4A-N,* 2-4A-W**, 2-4B, 2-5A-N or 2-5A-W** result in loss of Reactor Recirculation Pump 2P401A and/or 2P401B trip capability, trip pump 2P401A and/or 2P401B by manually tripping the Motor-Generator Set supply breaker 2A10110 and/or 2A10210.

   * Reactor Recirculation Pump 2P401A can be tripped from the Control Room.
   ** Reactor Recirculation Pump 2P401B can be tripped from the Control Room.

4. Should a fire in Fire Zone 2-3B-N result in HPCI spuriously starting while disabling the 54" high water level trip, manually take control of HPCI from the Control Room or close the HPCI Turbine Steam Supply Inboard Isolation Valve HV-255-F002.

5. Should a fire in Fire Zone 2-4A-W result in loss of Unit 2 scram discharge volume isolation capability, isolate the scram discharge volume by manually venting the instrument air header in the Unit 2 Reactor Building.

6. Fire Zone 2-4A-N, 2-4A-W or 2-5A-N, actions performed during plant start up lifts lead in Motor Control Center 2B236 cubicle 102 which disables the Reactor Head Vent Valve HV-241-F001 preventing a reactor coolant flow diversion through spurious opening of both Head Vent Valves.

7. Should a fire in Fire Zone 2-5A-N or 2-6C result in loss of the ability to operate Unit 2 ADS from the Control Room, operate the Unit 2 Division I ADS valves individually using the key locked switches located in the Unit 2 Upper Relay Room.

6.2.10.7 Deviation Requests Affecting Fire Area R-2B

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area R-2B.

6.2.11 Fire Area R-2C

6.2.11.1 General Description

Fire Area R-2C is the Unit 2 Primary Containment. Its location is shown on Drawings E-205957 thru E-205962 in Section 8.0. Primary containment has an inerted nitrogen environment during normal operation. Based on this inerted environment, the potential for a fire while at full power operation is not possible. Therefore, equipment damage due to fire while operating is not postulated and the ability to achieve and maintain safe shutdown is assured.

6.2.11.2 Fire Zones

The following fire zones are located in Fire Area R-2C:

Fire Zone	**Description**
2-1H	Suppression Chamber
2-4F	Drywell

6.2.11.3 Combustible Loading

The inerted nitrogen atmosphere inside Primary Containment will prevent combustion at power operation.

6.2.11.4 Fire Detection/Suppression in the Fire Area

Due to the normally inerted nitrogen environment, there is no automatic fire detection or suppression in Primary Containment. Manual hose reels and portable extinguishers are located just outside the containment entrance. During extended outages, additional portable extinguishers are available at the drywell entrance.

6.2.11.5 Consequences of a Fire in Fire Area R-2C

The inerted nitrogen atmosphere of Primary Containment will prevent combustion at power operation.

6.2.11.6 Special Features

Primary Containment has an inerted nitrogen atmosphere. There are no special features in Fire Area R-2C. There are no manual actions required.

6.2.11.7 Deviation Requests Affecting Fire Area R-2C

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area R-2C.

6.2.12 Fire Area R-2D

6.2.12.1 General Description

Fire Area R-2D is the Valve Access Area located in the Unit 2 Reactor Building at Elevation 761'-10". This fire area is a single room. Its location is on Drawing E-205961 in Section 8.0. Fire Area R-2D predominately contains Division II equipment, components and cabling. Safe shutdown Path 1, which is comprised primarily of Division I equipment, components and cabling, with the following system substitutions can be used to achieve safe shutdown in the event of a fire:

a) Since both Core Spray Injection Valves for both divisions are located in this fire area, Core Spray is not available for Path 1, and

b) In its place, RCIC is used for reactor vessel inventory control and RHR shutdown cooling is used for decay heat removal on Path 1.

c) For Unit 1, the non-fire unit for this fire area, Path 3 is available to achieve and maintain safe shutdown.

Deviation Request No. 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown is applicable, in general, to this fire area. In this fire area, ADS and RHR LPCI in the Alternate Shutdown Cooling Mode may be used to achieve and maintain post-fire safe shutdown in the event that fire damage occurs that effects RCIC and/or RHR Shutdown Cooling.

6.2.12.2 Fire Zones

The following fire zone is located in Fire Area R-2D:

Fire Zone	Description
2-5B	Valve Access Area

6.2.12.3 Combustible Loading

The combustible loading in Fire Area R-2D is low. The only combustible material in the room is a small amount of lube oil from the valves in the room, minimal cable insulation and protective fire barriers.

The fire rating of the fire area is established based on the lowest fire rating for any fire barrier in any fire zone forming a part of the boundary of the fire area. The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Area R-2D (Fire Zone 2-5B) is addressed in Deviation Requests 3, 6 and 11. Any specific Fire Hazard Analyses applicable to the fire zone in this fire area are identified on the Drawings in Section 8.0 and referenced below along with any other combustible restrictions.

6.2.12.4 Fire Detection/Suppression in the Fire Area

The fire area has photoelectric smoke detectors which alarm in the main control room. Automatic sprinkler protection is provided. Portable extinguishers and manual hose reels are located nearby the area. This equipment is not located inside the fire area since it is a high radiation area during normal operation.

6.2.12.5 Consequences of a Fire in Fire Area R-2D

Electrical cabling located in Fire Area R-2D associated with Unit 2 Path 1 and Unit 1 Path 3 safe shutdown systems and components has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition for a fire in this Fire Area. This is accomplished using one of the methods outlined in Section 6.1.2.4.

6.2.12.5.1 Fire Zone 2-5B – Valve Access Area

The following Category I components are located in Fire Zone 2-5B:

- Core Spray Outboard Injection Valves (HV-E21-2F004A and HV-E21-2F004B) and Core Spray Inboard Injection Valves (HV-E21-2F005A and HV-E21-2F005B) – The inboard and outboard isolation valves for both divisions of Core Spray are located in Fire Area R-2D. Therefore, Core Spray is not credited for post-fire safe shutdown in Fire Area R-2D. RCIC is protected to perform the inventory make up function for Fire Area R-2D. RHR Shutdown Cooling is protected for the decay heat removal function in Fire Area R-2D.

- RHR Drywell Spray Outboard Isolation Valve (HV-E11-2F016B) – This valve is normally closed and required to remain closed in support of post-fire safe shutdown on Safe Shutdown Path 3. Safe Shutdown Path 1 is credited for post-fire safe shutdown for Unit 2 in Fire Area R-2D. Safe Shutdown Path 3 is credited for post-fire safe shutdown for Unit 1 in Fire Area R-2D. Fire induced damage to this valve has no impact on Safe Shutdown Path 3 for Unit 1.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Area R-2D (Fire Zone 2-5B) is addressed in Deviation Requests 3, 6 and 11.

6.2.12.6 Special Features

There are no special features in Fire Area R-2D. There are no manual actions required.

6.2.12.7 Deviation Requests Affecting Fire Area R-2D

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area R-2D.

6.2.13 Fire Area R-2E

6.2.13.1 General Description

Fire Area R-2E is the Division II 4.16 KV Switchgear Room at Elevation 719'-1" in the Unit 2 Reactor Building. This fire area consists of a single room. Its location is shown on Drawing E-205960 in Section 8.0. Fire Area R-2E predominately contains Division II equipment, components and cabling. Safe Shutdown Path 1, which is comprised primarily of Division I equipment, components and cabling, can be used to achieve safe shutdown in the event of a fire in Fire Area R-2E. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.13.2 Fire Zones

The following fire zone is located in Fire Area R-2E:

Fire Zone	**Description**
2-4C	4.16 KV Switchgear Room Div II

6.2.13.3 Combustible Loading

The combustible loading in Fire Area R-2E is well below the fire barrier rating of the fire area boundary. The principle contributor to the combustible loading in this fire area is cables in cable tray. Switchgear panels, motor control centers and load centers also contribute to the overall combustible loading. There is no mechanical equipment (i.e., pumps, valves, etc.) in this fire area. Any specific Fire Hazard Analyses applicable to the fire zone in this fire area are identified on the Drawings in Section 8.0 and referenced below along with any other combustible restrictions.

6.2.13.4 Fire Detection/Suppression in the Fire Area

Fire Area R-2E is equipped with ionization smoke detectors which alarm in the main control room. The fire area does not have an automatic suppression system due to the nature of the electrical equipment in the room. However, manual hose reels and portable fire extinguishers are located nearby.

6.2.13.5 Consequences of a Fire in Fire Area R-2E

In the event of a fire in Fire Area R-2E, Safe Shutdown Path 1 systems and components will be available for safe shutdown. Electrical cabling located in Fire Area R-2E associated with Path 1 safe shutdown systems and components has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. This is accomplished by one of the methods described in Section 6.1.2.4.

A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.13.5.1 Fire Zone 2-4C – 4.16 KV Switchgear Room Div II

There are no Category I components located in Fire Zone 2-4C.

6.2.13.6 Special Features

There are no special features in Fire Area R-2E. There are no manual actions required.

6.2.13.7 Deviation Requests Affecting Fire Area R-2E

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area R-2E.

6.2.14 Fire Area R-2F

6.2.14.1 General Description

Fire Area R-2F is the Division I 4.16 KV Switchgear Room at Elevation 719'-1" in the Unit 2 Reactor Building. This fire area consists of a single room. Its location is shown on Drawing E-205960 in Section 8.0. Fire Area R-2F predominately contains Division I equipment, components and cabling. Safe Shutdown Path 3, which is comprised primarily of Division II equipment, components and cabling, can be used to achieve safe shutdown in the event of a fire in Fire Area R-2F. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.14.2 Fire Zones

The following fire zone is located in Fire Area R-2F:

Fire Zone	Description
2-4D	4.16 KV Switchgear Room Div I

6.2.14.3 Combustible Loading

The combustible loading in Fire Area R-2F is well below the fire barrier rating of the fire area boundary. The principle contributor to the combustible loading in this fire area is cables in cable tray. Switchgear panels, motor control centers and load centers also contribute to the overall combustible loading. There is no mechanical equipment (i.e., pumps, valves, etc.) in this fire area. Any specific Fire Hazard Analyses applicable to the fire zone in this fire area are identified on the Drawings in Section 8.0 and referenced below along with any other combustible restrictions.

6.2.14.4 Fire Detection/Suppression in the Fire Area

Fire Area R-2F is equipped with ionization smoke detectors which alarm in the main control room. The fire area does not have an automatic suppression system due to the nature of the electrical equipment in the room. However, manual hose reels and portable fire extinguishers are located nearby.

6.2.14.5 Consequences of a Fire in Fire Area R-2F

In the event of a fire in Fire Area R-2F, Safe Shutdown Path 3 systems and components will be available for safe shutdown. Electrical cabling located in Fire Area R-2F associated with Path 3 safe shutdown systems and components has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. This is accomplished by one of the methods described in Section 6.1.2.4.

A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6. 2.14.5.1 Fire Zone 2-4D – 4.16 KV Switchgear Room Div I

There are no Category I components located in Fire Zone 2-4D.

6.2.14.6 Special Features

There is no special features in Fire Area R-2F. There are no manual actions required.

6.2.14.7 Deviation Requests Affecting Fire Area R-2F

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area R-2F.

6.2.15 Fire Area R-2G

6.2.15.1 General Description

Fire Area R-2G is the Division II 4.16 KV Switchgear Room at Elevation 749'-1" in the Unit 2 Reactor Building. This fire area consists of a single room. Its location is shown on Drawing E-205961 in Section 8.0. Fire Area R-2G predominately contains Division II equipment, components and cabling. Safe Shutdown Path 1, which is comprised primarily of Division I equipment, components and cabling, can be used to achieve safe shutdown in the event of a fire in Fire Area R-2G. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.15.2 Fire Zones

The following fire zone is located in Fire Area R-2G:

Fire Zone	Description
2-5F	4.16 KV Switchgear Room Div II

6.2.15.3 Combustible Loading

The combustible loading in Fire Area R-2G is well below the fire barrier rating of the fire area boundary. The prime contributor to the combustible loading in this fire area is cables in cable tray. Switchgear panels, motor control centers and load centers also contribute to the overall combustible loading. There is no mechanical equipment (i.e., pumps, valves, etc.) in this fire area. Any specific Fire Hazard Analyses applicable to the fire zone in this fire area are identified on the Drawings in Section 8.0 and referenced below along with any other combustible restrictions.

6.2.15.4 Fire Detection/Suppression in the Fire Area

Fire Area R-2G is equipped with ionization smoke detectors which alarm in the main control room. The fire area does not have an automatic suppression system due to the nature of the electrical equipment in the room. However, manual hose reels and portable fire extinguishers are located nearby.

6.2.15.5 Consequences of a Fire in Fire Area R-2G

In the event of a fire in Fire Area R-2G, Safe Shutdown Path 1 systems and components will be available for safe shutdown. Electrical cabling located in Fire Area R-2G associated with Path 1 safe shutdown systems and components has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. This is accomplished by one of the methods described in Section 6.1.2.4.

A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.15.5.1 Fire Zone 2-5F – 4.16 KV Switchgear Room Div II

There are no Category I components contained in Fire Zone 2-5F.

6.2.15.6 Special Features

The following manual action may be required in the event of a fire in this fire area when the fire damage is in the specific fire zone listed below:

1. Should a fire in Fire Zone 2-5F* result in loss of Reactor Recirculation Pump 2P401A and/or 2P401B trip capability, trip pump 2P401A and/or 2P401B by manually tripping the Motor-Generator Set supply breaker 2A10110 and/or 2A10210.

   * Reactor Recirculation Pump 2P401A can be tripped from the Control Room.

6.2.15.7 Deviation Requests Affecting Fire Area R-2G

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area R-2G.

6.2.16 Fire Area R-2H

6.2.16.1 General Description

Fire Area R-2H is the Division I 4.16 KV Switchgear Room at Elevation 749'-1" in the Unit 2 Reactor Building. This fire area consists of a single room. Its location is shown on Drawing E-205961 Section 8.0. Fire Area R-2H predominately contains Division I equipment, components and cabling. Safe Shutdown Path 3, which is comprised primarily of Division II equipment, components and cabling, can be used to achieve safe shutdown in the event of a fire in Fire Area R-2H. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.16.2 Fire Zones

The following fire zone is located in Fire Area R-2H:

Fire Zone	Description
2-5G	4.16 KV Switchgear Room Div I

6.2.16.3 Combustible Loading

The combustible loading in Fire Area R-2H is well below the fire barrier rating of the fire area boundary. The principle contributor to the combustible loading in this fire area is cables in cable tray. Switchgear panels, motor control centers and load centers also contribute to the overall combustible loading. There is no mechanical equipment (i.e., pumps, valves, etc.) in this fire area. Any specific Fire Hazard Analyses applicable to the fire zone in this fire area are identified on the Drawings in Section 8.0 and referenced below along with any other combustible restrictions.

6.2.16.4 Fire Detection/Suppression in the Fire Area

Fire Area R-2H is equipped with ionization smoke detectors which alarm in the main control room. The fire area does not have an automatic suppression system due to the nature of the electrical equipment in the room. However, manual hose reels and portable fire extinguishers are located nearby.

6.2.16.5 Consequences of a Fire in Fire Area R-2H

In the event of a fire in Fire Area R-2H, Safe Shutdown Path 3 systems and components will be available for safe shutdown. Electrical cabling located in Fire Area R-2H associated with Path 3 safe shutdown systems and components has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. This is accomplished by one of the methods described in Section 6.1.2.4.

A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.16.5.1 Fire Zone 2-5G – 4.16 KV Switchgear Room Div I

There are no Category I components located in Fire Zone 2-5G.

6.2.16.6 Special Features

The following manual action may be required in the event of a fire in this fire area when the fire damage is in the specific fire zone listed below:

1. Should a fire in Fire Zone 2-5G** result in loss of Reactor Recirculation Pump 2P401A and/or 2P401B trip capability, trip pump 2P401A and/or 2P401B by manually tripping the Motor-Generator Set supply breaker 2A10110 and/or 2A10210.

   * * Reactor Recirculation Pump 2P401B can be tripped from the Control Room.

6.2.16.7 Deviation Requests Affecting Fire Area R-2H

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area R-2H.

6.2.17 Fire Area CS-1

6.2.17.1 General Description

Fire Area CS-1 is the Control Structure freight elevator and access stairway. It extends from elevation 656'-0" to 825'-0". The location of this fire area is shown on Drawings E-205985 thru E-205995 in Section 8.0. Safe Shutdown Path 1 or 3 can be used to achieve safe shutdown in the event of a fire in Fire Area CS-1. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.17.2 Fire Zones

The following fire zones are located in Fire Area CS-1:

Fire Zone	**Description**
0-21B	Freight Elevator & Stairwell No. 221
0-29A	Stairwell Vestibule

6.2.17.3 Combustible Loading

There are minimal combustibles in this fire area. The fire area boundaries are adequate to contain any fire initiated in Fire Area CS-1. Any specific Fire Hazard Analyses applicable to the fire zones in this fire area are identified on the Drawings in Section 8.0 and referenced below along with any other combustible restrictions.

6.2.17.4 Fire Detection/Suppression in the Fire Area

Due to minimal amounts of combustibles, there is no automatic suppression in the fire area. Although there is no fire detection in this fire area, the ionization detectors located in the foyer at each elevation would serve to alert control room personnel of a fire in this fire area.

6.2.17.5 Consequences of a Fire in Fire Area CS-1

In the event of a fire in Fire Area CS-1, Safe Shutdown Paths 1 or 3 systems and components will be available for safe shutdown. Electrical cabling located in Fire Area CS-1 associated with Path 1 or 3 safe shutdown systems and components has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. This is accomplished using one of the methods outlined in Section 6.1.2.4.

A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.17.5. 1 Fire Zone 0-21 B – Freight Elevator & Stairwell No. 221

The fire hazards analysis identified on Drawing E-205986 in Section 8.0 of this document affects the allowable combustible configuration for this fire zone.

There are no Category I components located in Fire Zone 0-21B.

6.2.17.5.2 Fire Zone 0-29A – Stairwell Vestibule

There are no Category I components located in Fire Zone 0-29A.

6.2.17.6 Special Features

There are no special features in Fire Area CS-1. There are no manual actions required.

6.2.17.7 Deviation Requests Affecting Fire Area CS-1

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area CS-1.

6.2.18 Fire Area CS-2

6.2.18.1 General Description

Fire Area CS-2 is the Control Structure passenger elevator and access stairway. It extends from elevation 656'-0" to 806'-0". The location of this fire area is shown on Drawings E-205985 thru E-205994 in Section 8.0. Safe Shutdown Path 1 or 3 can be used to achieve safe shutdown in the event of a fire in Fire Area CS-2. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.18.2 Fire Zones

The following fire zones are located in Fire Area CS-2:

Fire Zone	**Description**
0-22B	Passenger Elevator & Stairwell No. 120
0-29C	Stairwell Vestibule

6.2.18.3 Combustible Loading

There are minimal combustibles in this fire area. The fire area boundaries are adequate to contain any fire initiated in Fire Area CS-2. Any specific Fire Hazard Analyses applicable to the fire zones in this fire area are identified on the Drawings in Section 8.0 and referenced below along with any other combustible restrictions.

6.2.18.4 Fire Detection/Suppression in the Fire Area

Due to the minimal amount of combustibles, there is no automatic fire suppression in the fire area. Although there is no fire detection in this fire area, the ionization detectors located in the foyer at each elevation would serve to alert control room personnel of a fire in this fire area.

6.2.18.5 Consequences of a Fire in Fire Area CS-2

In the event of a fire in Fire Area CS-2, Safe Shutdown Path 1 or 3 systems and components will be available for safe shutdown. Electrical cabling located in Fire Area CS-2 associated with Path 1 or 3 safe shutdown systems and components has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. This is accomplished using one of the methods outlined in Section 6.1.2.4.

A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.18.5.1 Fire Zone 0-22B - Passenger Elevator & Stairwell No. 120

There are no Category I components located in Fire Zone 0-22B.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-22B is addressed in Deviation Request 6.

6.2.18.5.2 Fire Zone 0-29C – Stairwell Vestibule

There are no Category I components located in Fire Zone 0-29C.

6.2.18.6 Special Features

There are no special features in Fire Area CS-2. There are no manual actions required.

6.2.18.7 Deviation Requests Affecting Fire Area CS-2

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area CS-2.

6.2.19 Fire Area CS-3

6.2.19.1 General Description

Fire Area CS-3 is comprised of the Computer Room (located on Elevation 698’-0”), and is a general access area comprising some of the lower level rooms in the Control Structure from elevation 656'-0" to 714'-0". Its location is shown on Drawings E-205985 thru E-205988 in Section 8.0. Safe Shutdown Path 1 would be available to achieve safe shutdown in the event of a fire in Fire Area CS-3. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.19.2 Fire Zones

The following fire zones are located in Fire Area CS-3:

Fire Zone	**Description**
0-21A	Common Equipment Area
0-22A	Central Access Area
0-22C	Entrance Corridor & Lobby
0-23	Control Structure Egress Corridor
0-24A	UPS Panel Room (U2)
0-24B	Corridor (C-200, C-204)
0-24C	UPS Panel Room (U1)
0-24E	Computer Room
0-24F	Computer Maintenance Room & Office

6.2.19.3 Combustible Loading

The combustibles in this fire area are primarily computer and electrical panels and cables in cable tray in those fire zones containing the UPS equipment. Although the combustibles are low in these areas, the small area of these zones drives the equivalent fire duration to a value that is unrepresentative of the low combustible quantities in each zone.

In Fire Zone 0-24E, the cable insulation in the Computer Room underfloor area is considered in the combustible loading for this area even though the General Electric Fire hazards analysis in Licensing Topical Report NEDO-10466A dated February 1979 which describes that even in a degraded condition with two floor plates removed, a fire does not propagate along the cables. Ionization type detectors in the PGCC floor provide an alarm in the Control Room and grates are installed in the floor to allow the CO_2 automatic flooding system in the room to migrate to the underfloor area. The flooring in this Fire Zone is no longer considered to be a PGCC Floor system.

In any case, the fire barrier rating of the fire area boundary is adequate to contain any fire initiated within the fire area and to prevent the propagation of the fire to any other fire area in the plant. The fire rating of the fire area is established based on the lowest fire rating for any fire barrier in any fire zone forming a part of the boundary of the fire area. The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of the fire zones in Fire Area CS-3 is addressed in Deviation Request 6. Any specific Fire Hazard Analyses applicable to the fire zones in this fire area are identified on the Drawings in Section 8.0 and referenced below along with any other combustible restrictions.

6.2.19.4 Fire Detection/Suppression in the Fire Area

Fire area CS-3 has fire detection and suppression in those portions of the area where potential fire hazards exist. In the UPS panel rooms there are heat detectors and ionization detectors. These rooms also have a total flooding CO_2 system for fire suppression. Computer service areas are provided with only ionization detectors. In addition to these automatic suppression systems in the UPS panel rooms, manual hose reels and portable fire extinguishers are located throughout the fire area for use.

Fire Zone 0-24E is equipped with ionization type smoke detectors and heat detectors. Ionization detectors are located within the PGCC flooring system. An automatic total flooding CO_2 extinguishing system is located inside the room.

Manual deluge systems are provided for charcoal filters OF135, OF138, OF141, and OF144 in Fire Zone 0-22A.

6.2.19.5 Consequences of a Fire in Fire Area CS-3

In the event of a fire in Fire Area CS-3, Safe Shutdown Path 1 systems and components will be available for safe shutdown. Electrical cabling located in Fire Area CS-3 associated with Path 1 safe shutdown systems and components has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. This is accomplished using one of the methods outlined in Section 6.1.2.4.

A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.19.5.1 Fire Zone 0-21A – Common Equipment Area

There are no Category I components located in Fire Zone 0-21A.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-21A is addressed in Deviation Request 6.

6.2.19.5.2 Fire Zone 0-22A – Central Access Area

There are no Category I components located in Fire Zone 0-22A.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-22A is addressed in Deviation Request 6.

6.2.19.5.3 Fire Zone 0-22C – Entrance Corridor & Lobby

There are no Category I components located in Fire Zone 0-22C.

6.2.19.5.4 Fire Zone 0-23 – Control Structure Egress Corridor

There are no Category I components located in Fire Zone 0-23.

6.2.19.5.5 Fire Zone 0-24A – UPS Panel Room (U2)

There are no Category I components located in Fire Zone 0-24A.

6.2.19.5.6 Fire Zone 0-24B - Corridor (C-200, C-204)

There are no Category I components located in Fire Zone 0-24B.

6.2.19.5.7 Fire Zone 0-24C – UPS Panel Room (U1)

There are no Category I components located in Fire Zone 0-24C.

6.2.19.5.8 Fire Zone 0-24E – Computer Room

There are no Category I components located in Fire Zone 0-24E.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-24E is addressed in Deviation Request 6.

6.2.19.5.9 Fire Zone 0-24F – Computer Maintenance Room & Office

There are no Category I components located in Fire Zone 0-24F.

6.2.19.6 Special Features

The following manual actions may be required in the event of a fire in this fire area when the fire damage is in the specific fire zone listed below:

1. Should a fire in Fire Zone 0-24B, 0-24E or 0-24F result in loss of Reactor Recirculation Pump 2P401A and/or 2P401B trip capability, trip pump 2P401A and/or 2P401B by manually tripping the Motor-Generator set supply breaker 2A10110 and/or 2A10210.

2. Should a fire in Fire Zone 0-24B, 0-24E or 0-24F result in disabling the low condenser vacuum signal which prevents the Unit 1 MSIVs from closing on low main condenser vacuum, initiate isolation of the Main Steam Lines from the Control Room and verify isolation of the Main Steam Line Drains.

3. Should a fire in Fire Zone 0-24B, 0-24E or 0-24F result in disabling the low condenser vacuum signal which prevents the Unit 2 MSIVs from closing on low main condenser vacuum, initiate isolation of the Main Steam Lines from the Control Room and verify isolation of the Main Steam Line Drains.

6.2.19.7 Deviation Requests Affecting Fire Area CS-3

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area CS-3.

6.2.20 Fire Area CS-4

6.2.20.1 General Description

Fire Area CS-4 consists of the HVAC Plenum, Fan Room and Duct chases in the Control Structure. The location of the fan rooms and the plenum is shown on Drawings E-205988 thru E-205995. The duct chases run vertically through various elevations along the west side of the Control Structure. Safe Shutdown Path 1 or 3 can be used in the event of a fire in Fire Area CS- 4. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.20.2 Fire Zones

The following fire zones are located in Fire Area CS-4:

Fire Zone	**Description**
0-24I	HVAC Duct Chase
0-24K	HVAC Duct Chase
0-28S	HVAC Duct Chase
0-29B	Fan Room & Associated HVAC Equipment
0-29D	Pipe & Duct Chase
0-30A	Control Structure HVAC & SBGTS
0-30B	Stairwell No. 125

6.2.20.3 Combustible Loading

The HVAC duct chases in this Fire Area have no combustible materials and they are isolated from other fire areas in the plant by fire rated dampers. The combustibles in Fire Zone 0-29B are minimal and consist of cables in electrical panels and cable tray. The major combustible materials in Fire Zone 0-30A are the charcoal in the Standby Gas Treatment System Filters and the charcoal in the Emergency Outside Air Filters. The fire rating of the fire area is established based on the lowest fire rating for any fire barrier in any fire zone forming a part of the boundary of the fire area. The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of the fire zones in Fire Area CS-4 is addressed in Deviation Request 6. Any specific Fire Hazard Analyses applicable to the fire zones in this fire area are identified on the Drawings in Section 8.0 and referenced below along with any other combustible restrictions.

6.2.20.4 Fire Detection/Suppression in the Fire Area

Fire detection is located throughout this fire area except in the HVAC duct chases and the stairway. The charcoal filter beds for the Standby Gas Treatment System and the Emergency Outside Air Filters have deluge systems specifically designed for the fire hazard posed by the charcoal. Additionally, Fire Zone 0-29B and 0-30A have an automatic suppression system installed throughout each zone. Manual hose reels and portable extinguishers are located throughout the fire area.

6.2.20.5 Consequences of a Fire in Fire Area CS-4

In the event of a fire in Fire Area CS-4, safe shutdown Path 1 or 3 systems and components will be available for safe shutdown. Electrical cabling located in Fire Area CS-4 associated with Path 1 or 3 safe shutdown systems and components has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. This is accomplished using one of the methods outlined in Section 6.1.2.4.

A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.20.5.1 Fire Zone 0-24I – HVAC Duct Chase

There are no Category I components located in Fire Zone 0-24I.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-24I is addressed in Deviation Request 6.

6.2.20.5.2 Fire Zone 0-24K – HVAC Duct Chase

There are no Category I components located in Fire Zone 0-24K.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-24K is addressed in Deviation Request 6.

6.2.20.5.3 Fire Zone 0-28S – HVAC Duct Chase

There are no Category I components located in Fire Zone 0-28S.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-28S is addressed in Deviation Request 6.

6.2.20.5.4 Fire Zone 0-29B – Fan Room & Associated HVAC Equip

The following Category I components are located in Fire Zone 0-29B:

- Appendix R Communication System Jackplate JP1105 – This component is a jackplate for Loop 1 of the Appendix R sound powered communications system. There are no operator actions resulting from a fire in Fire Area CS-4 that require the use of this loop of the sound powered communications system. Therefore, this component is not required for post-fire safe shutdown in this fire area.

- Appendix R Communication System Jackplate JP1305 – This component is a jackplate for Loop 3 of the Appendix R sound powered communications system. There are no operator actions resulting from a fire in Fire Area CS-4 that require the use of this loop of the sound powered communications system. Therefore, this component is not required for post-fire safe shutdown in this fire area.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-29B is addressed in Deviation Request 6.

6.2.20.5.5 Fire Zone 0-29D – Pipe & Duct Chase

There are no Category I components located in Fire Zone 0-29D.

6.2.20.5.6 Fire Zone 0-30A – Control Structure HVAC & SBGTS

There are no Category I components located in Fire Zone 0-30A.

6.2.20.5.7 Fire Zone 0-30B – Stairwell No. 125

There are no Category I components located in Fire Zone 0-30B.

6.2.20.6 Special Features

There are no special features in Fire Area CS-4. There are no manual actions required.

6.2.20.7 Deviation Requests Affecting Fire Area CS-4

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area CS-4.

6.2.21 Fire Area CS-5

6.2.21.1 General Description

Fire Area CS-5 is the Unit 2 Lower Relay Room located on elevation 698'-0" of the control structure. This fire area is a single room fire zone which primarily contains Division II equipment. The location of this fire area is shown on Drawing E-205988 in Section 8.0. Safe Shutdown Path 1 would be available for use in the event of a fire in Fire Area CS-5. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.21.2 Fire Zones

The following fire zone is located in Fire Area CS-5:

Fire Zone	**Description**
0-24G	U2 Div II Lower Relay Room

6.2.21.3 Combustible Loading

Fire Zone 0-24G is its own Fire Area CS-5. The principle combustibles in Fire Zone 0-24G are cables located in electrical panels and underfloor ducts and a limited amount of non-metallic PGCC floor paneling. There is no mechanical equipment (i.e. pumps, valves, etc.) in Fire Zone 0-24G. Fire Zone 0-24G is constructed in a manner that is similar to the PGCC design originally supplied by General Electric and described in the GE Fire Hazards Analysis in Licensing Topical Report NEDO 10466A dated February 1979. This NEDO Document describes the separation of Class 1E systems in the floor with 3/16” steel barriers, utilization of semi-permanent fire stop material, provision of heat detectors in the PGCC flooring and rooms and unitized halon system in the PGCC underfloor. Based on these characteristics the NEDO Document provides a reasonable basis for excluding the cable insulation in the PGCC underfloor area from the combustible loading for this fire zone. Due to a difference in the amount of non-metallic floor paneling used in Fire Zone 0-24G as compared to the NEDO Document, the cable insulation in the underfloor area has been included in the combustible loading analysis for Fire Zone 0-24G. Additional fire suppression beyond that discussed in the NEDO Document is provided in Fire Zone 0-24G. Fire Zone 0-24G includes a CO_2 automatic total room flooding system. This additional fire suppression is available to rapidly extinguish any fire that might originate in Fire Zone 0-24G.

The fire area boundaries are adequate to contain the effects of any fire originating in Fire Zone 0-24G. The level of combustible in Fire Zone 0-24G, including the contribution from the underfloor cable insulation in the PGCC floor and the non-metallic PGCC floor paneling, is maintained to assure that the total combustible loading does not exceed the fire resistance rating for the boundaries of Fire Area CS-5. Any specific Fire Hazard Analyses applicable to the fire zone in this fire area are identified on the Drawings in Section 8.0 and referenced below along with any other combustible restrictions.

6.2.21.4 Fire Detection/Suppression in the Fire Area

Fire Area CS-5 is equipped with ionization detectors and heat detectors. The fire area has a Halon extinguishing system located in the PGCC modules which protect the safety related cabinets with the exception of panels 2C636 and 2C699B. The room is also equipped with an automatic total flooding CO_2 system. With the exception of panels 2C636 and 2C699B, safety related cabinets are protected with Halon. In addition, a manual hose station and portable fire extinguishers are located nearby.

6.2.21.5 Consequences of a Fire in Fire Area CS-5

In the event of a fire in Fire Area CS-5, Safe Shutdown Path 1 systems and components will be available for safe shutdown. Electrical cabling located in Fire Area CS-5 associated with Path 1 safe shutdown systems and components has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. This is accomplished using one of the methods outlined in Section 6.1.2.4.

A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.21.5.1 Fire Zone 0-24G – U2 Div II Lower Relay Room

The following Category I components are located in Fire Zone 0-24G:

- Unit 2 HPCI Division II Automatic Actuation Logic – This component is the automatic initiation logic for the HPCI system. Automatic initiation of safety systems in support of post-fire safe shutdown is not required. The automatic initiation logic is evaluated for the potential affects of a spurious initiation of the system. A fire induced spurious start of the HPCI system in conjunction with the loss of the HPCI high water level trip in Fire Area CS-5 can be mitigated by closing the HPCI Inboard Steam Supply Isolation Valve (HV-E41-2F002).

- Unit 2 RCIC Division II Automatic Actuation Logic – This component is the automatic initiation logic for the RCIC system. Automatic initiation of safety systems in support of post-fire safe shutdown is not required. The automatic initiation logic is evaluated for the potential affects of a spurious initiation of the system. A fire induced spurious start of the RCIC system in conjunction with the loss of the RCIC high water level trip in Fire Area

CS-5 can be mitigated by closing the RCIC Outboard Steam Line Isolation Valve (HV-E51-2F008).

6.2.21.6 Special Features

The following manual actions may be required in the event of a fire in this fire area when the fire damage is in the specific fire zone listed below:

1. Should a fire in Fire Zone 0-24G result in loss of Unit 2 reactor scram capability and/or scram discharge volume isolation capability from the Control Room, scram Unit 2 and isolate the scram discharge volume by manually isolating and venting the instrument air header in the Unit 2 Reactor Building.

2. Should a fire in Fire Zone 0-24G result in loss of Reactor Recirculation Pump 2P401A and/or 2P401B trip capability, trip pump 2P401A and/or 2P401B from the Control Room.

3. Should a fire in Fire Zone 0-24G result in spurious Unit 2 ADS or SRV actuations as indicated by low RPV pressure and/or level, the capability to further depressurize the reactor using Unit 2 Division I ADS and to inject water into the reactor using Unit 2 Division I Core Spray remains available from the Control Room.

4. Should a fire in Fire Zone 0-24G spuriously open the Unit 2 RHR Injection Isolation Valve HV-251-F015A, close the RHR Injection Control Valve HV-251-F017A from the Control Room.

5. Should a fire in Fire Zone 0-24G result in Unit 2 HPCI spuriously starting while disabling the 54” high water level trip, manually take control of HPCI from the Control Room or close the HPCI Turbine Steam Supply Inboard Isolation Valve HV-255-F002.

6. Should a fire in Fire Zone 0-24G result in disabling the low condenser vacuum signal which prevents the Unit 2 MSIVs from closing on low main condenser vacuum, initiate isolation of the Main Steam Lines from the Control Room and verify isolation of the Main Steam Line Drains.

6.2.21.7 Deviation Requests Affecting Fire Area CS-5

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area CS-5.

6.2.22 Fire Area CS-6

6.2.22.1 General Description

Fire Area CS-6 is a vertical electrical cable chase which extends from elevation 698'-0" to 783'-0" along the west wall of the control structure. The location of this fire area is shown on Drawings E-205988 thru E-205993 in Section 8.0. Safe Shutdown Path 3 would be available in the event of a fire in Fire Area CS-6. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.22.2 Fire Zones

The following fire zones are located in Fire Area CS-6:

Fire Zone	Description
0-24J	South Electrical Cable Chase
0-25B	South Electrical Cable Chase
0-26B	South Electrical Cable Chase
0-26S	South Electrical Cable Chase
0-27F	South Electrical Cable Chase
0-28P	South Electrical Cable Chase

6.2.22.3 Combustible Loading

The combustible materials in this fire area are cables. Due to the nature of this fire area, the standard method of expressing the combustible loading in equivalent fire severity (in minutes) yields unrealistic results. This is due to the small cross-sectional floor area of each of the fire zones in this area. This cable chase is a vertical shaft with sealed barriers at each main floor elevation for the purpose of limiting fire spread and controlling the concentration of carbon dioxide if the fire protection system is activated. This cable chase is essentially 'gas tight' between each fire zone. Early detection and actuation of the CO_2 systems that protect these fire zones would quickly extinguish a fire within any fire zone and would prevent fire propagation into an adjacent fire zone or into another fire area.

The fire rating of the fire area is established based on the lowest fire rating for any fire barrier in any fire zone forming a part of the boundary of the fire area. The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of the fire zones in Fire Area CS-6 is addressed in Deviation Request 37. Any specific Fire Hazard Analyses applicable to the fire zones in this fire area are identified on the Drawings in Section 8.0 and referenced below along with any other combustible restrictions.

6.2.22.4 Fire Detection/Suppression in the Fire Area

Fire Zones 0-24J, 0-25B, 0-26S, 0-27F and 0-28P contain one heat detector each and an automatic total flooding CO_2 extinguishing system. Fire Zone 0-26B is on the same elevation as the main control room, contains one ionization smoke detector each and a manual spurt CO_2 system.

6.2.22.5 Consequences of a Fire in Fire Area CS-6

In the event of a fire in Fire Area CS-6, Safe Shutdown Path 3 systems and components will be available for safe shutdown. Electrical cabling located in Fire Area CS-6 associated with Path 3 safe shutdown systems and components has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. This is accomplished using one of the methods outlined in Section 6.1.2.4.

A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.22.5.1 Fire Zone 0-24J - South Electrical Cable Chase

There are no Category I components located in Fire Zone 0-24J.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-24J is addressed in Deviation Request 37.

Deviation Request 37 justifies limiting the protection of certain equipment and/or cabling for the required safe shutdown path in this fire zone.

6.2.22.5.2 Fire Zone 0-25B - South Electrical Cable Chase

There are no Category I components located in Fire Zone 0-25B.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-25B is addressed in Deviation Request 37.

Deviation Request 37 justifies limiting the protection of certain equipment and/or cabling for the required safe shutdown path in this fire zone.

6.2.22.5.3 Fire Zone 0-26B - South Electrical Cable Chase

There are no Category I components located in Fire Zone 0-26B.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-26B is addressed in Deviation Request 37.

Deviation Request 37 justifies limiting the protection of certain equipment and/or cabling for the required safe shutdown path in this fire zone.

6.2.22.5.4 Fire Zone 0-26S - South Electrical Cable Chase

There are no Category I components located in Fire Zone 0-26S.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-26S is addressed in Deviation Request 37.

Deviation Request 37 justifies limiting the protection of certain equipment and/or cabling for the required safe shutdown path in this fire zone.

6.2.22.5.5 Fire Zone 0-27F – South Electrical Cable Chase

There are no Category I components located in Fire Zone 0-27F.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-27F is addressed in Deviation Request 37.

Deviation Request 37 justifies limiting the protection of certain equipment and/or cabling for the required safe shutdown path in this fire zone.

6.2.22.5.6 Fire Zone 0-28P – South Electrical Cable Chase

There are no Category I components located in Fire Zone 0-28P.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-28P is addressed in Deviation Request 37.

Deviation Request 37 justifies limiting the protection of certain equipment and/or cabling for the required safe shutdown path in this fire zone.

6.2.22.6 Special Features

The following manual actions may be required in the event of a fire in this fire area when the fire damage is in the specific fire zone listed below:

1. Should a fire in Fire Zone 0-24J or 0-27F result in loss of Reactor Recirculation Pump 2P401A and/or 2P401B trip capability, trip pump 2P401A and/or 2P401B by manually tripping the Motor-Generator set supply breaker 2A10110 and/or 2A10210.

2. Fire Zones 0-26B, 0-26S and 0-27F, actions performed during plant start up lifts lead in Motor Control Center 2B236 cubicle 102 which disables Reactor Head Vent Valve HV-241-F001 preventing a reactor coolant flow diversion through spurious opening of both Head Vent Valves.

3. Should a fire in Fire Zone 0-24J result in disabling the low condenser vacuum signal which prevents the Unit 2 MSIVs from closing on low main condenser vacuum, initiate isolation of the Main Steam Lines from the Control Room and verify isolation of the Main Steam Line Drains.

6.2.22.7 Deviation Requests Affecting Fire Area CS-6

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area CS-6.

6.2.23 Fire Zone CS-7

6.2.23.1 General Description

Fire Area CS-7 is a vertical electrical cable chase which extends from elevation 698'-0" to 783'-0" along the west wall of the control structure. The location of this fire area is shown on Drawings E-205988 thru E-205993 in Section 8.0. Safe Shutdown Path 3 would be available for use in the event of a fire in Fire Area CS-7. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.23.2 Fire Zones

The following fire zones are located in Fire Area CS-7:

Fire Zone	**Description**
0-24L	Center Electrical Cable Chase
0-24M	North Electrical Cable Chase
0-25C	Center Electrical Cable Chase
0-25D	North Electrical Cable Chase
0-26C	Center Electrical Cable Chase
0-26D	North Electrical Cable Chase
0-26T	Center Electrical Cable Chase
0-26V	North Electrical Cable Chase
Fire Zone	**Description**
0-27G	Center Electrical Cable Chase
0-27H	North Electrical Cable Chase
0-28Q	Center Electrical Cable Chase
0-28R	North Electrical Cable Chase

6.2.23.3 Combustible Loading

The combustible materials in this fire area are cables. Due to the nature of this fire area, the standard method of expressing the combustible loading in equivalent fire severity in minutes yields unrealistic results. This is due to the small cross-sectional with sealed barriers at each main floor elevation for the purpose of limiting fire spread floor area of each of the fire zones in this area. These cable chases are vertical shafts and controlling the concentration of carbon dioxide if the fire protection system is activated. These cable chases are essentially 'gas-tight' between each fire zone. Early detection and actuation of the CO_2 systems that protect these fire zones would quickly extinguish a fire within any zone and would prevent fire propagation into an adjacent fire zone or into another fire area.

The fire rating of the fire area is established based on the lowest fire rating for any fire barrier in any fire zone forming a part of the boundary of the fire area. The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of the fire zones in Fire Area CS-7 is addressed in Deviation Request 37. Any specific Fire Hazard Analyses applicable to the fire zones in this fire area are identified on the Drawings in Section 8.0 and referenced below along with any other combustible restrictions.

6.2.23.4 Fire Detection/Suppression in the Fire Area

Fire Zones 0-24L, 0-24M, 0-25C, 0-25D, 0-26T, 0-26V, 0-27G, 0-27H, 0-28Q and 0-28R contain one heat detector each and an automatic total flooding CO_2 extinguishing system. Fire Zones 0-26C and 0-26D which are on the same elevations as the main control room fire area, contain one ionization smoke detector each and a manual spurt CO_2 extinguishing system.

6.2.23.5 Consequences of a Fire in Fire Area CS-7

In the event of a fire in Fire Area CS-7, Safe Shutdown Path 3 systems and components will be available for safe shutdown. Electrical cabling located in Fire Area CS-7 associated with Path 3 safe shutdown systems and components or has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. This is accomplished using one of the methods outlined in Section 6.1.2.4.

A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.23.5.1 Fire Zone 0-24L – Center Electrical Cable Chase

There are no Category I components located in Fire Zone 0-24L.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-24L is addressed in Deviation Request 37.

Deviation Request 37 justifies limiting the protection of certain equipment and/or cabling for the required safe shutdown path in this fire zone.

6.2.23.5.2 Fire Zone 0-24M – North Electrical Cable Chase

There are no Category I components located in Fire Zone 0-24M.
The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-24M is addressed in Deviation Request 37.

Deviation Request 37 justifies limiting the protection of certain equipment and/or cabling for the required safe shutdown path in this fire zone.

6.2.23.5.3 Fire Zone 0-25C – Center Electrical Cable Chase

There are no Category I components located in Fire Zone 0-25C.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-25C is addressed in Deviation Request 37.

Deviation Request 37 justifies limiting the protection of certain equipment and/or cabling for the required safe shutdown path in this fire zone.

6.2.23.5.4 Fire Zone 0-25D – North Electrical Cable Chase

There are no Category I components located in Fire Zone 0-25D.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-25D is addressed in Deviation Request 37.

Deviation Request 37 justifies limiting the protection of certain equipment and/or cabling for the required safe shutdown path in this fire zone.

6.2.23.5.5 Fire Zone 0-26 C – Center Electrical Cable Chase

There are no Category I components located in Fire Zone 0-26C.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-26C is addressed in Deviation Request 37.

Deviation Request 37 justifies limiting the protection of certain equipment and/or cabling for the required safe shutdown path in this fire zone.

6.2.23.5.6 Fire Zone 0-26D – North Electrical Cable Chase

There are no Category I components located in Fire Zone 0-26D.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-26D is addressed in Deviation Request 37.

Deviation Request 37 justifies limiting the protection of certain equipment and/or cabling for the required safe shutdown path in this fire zone.

6.2.23.5.7 Fire Zone 0-26T – Center Electrical Cable Chase

There are no Category I components located in Fire Zone 0-26T.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-26T is addressed in Deviation Request 37.

Deviation Request 37 justifies limiting the protection of certain equipment and/or cabling for the required safe shutdown path in this fire zone.

6.2.23.5.8 Fire Zone 0-26V – North Electrical Cable Chase

There are no Category I components located in Fire Zone 0-26V.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-26V is addressed in Deviation Request 37.

Deviation Request 37 justifies limiting the protection of certain equipment and/or cabling for the required safe shutdown path in this fire zone.

6.2.23.5.9 Fire Zone 0- 27G – Center Electrical Cable Chase

There are no Category I components located in Fire Zone 0-27G.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-27G is addressed in Deviation Request 37.

Deviation Request 37 justifies limiting the protection of certain equipment and/or cabling for the required safe shutdown path in this fire zone.

6.2.23.5.10 Fire Zone 0-27 H – North Electrical Cable Chase

There are no Category I components located in Fire Zone 0-27H.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-27H is addressed in Deviation Request 37.

Deviation Request 37 justifies limiting the protection of certain equipment and/or cabling for the required safe shutdown path in this fire zone.

6.2.23.5.11 Fire Zone 0-28Q – Center Electrical Cable Chase

There are no Category I components located in Fire Zone 0-28Q.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-28Q is addressed in Deviation Request 37.

Deviation Request 37 justifies limiting the protection of certain equipment and/or cabling for the required safe shutdown path in this fire zone.

6.2.23.5.12 Fire Zone 0-28R – North Electrical Cable Chase

There are no Category I components located in Fire Zone 0-28R.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-28R is addressed in Deviation Request 37.

Deviation Request 37 justifies limiting the protection of certain equipment and/or cabling for the required safe shutdown path in this fire zone.

6.2.23.6 Special Features

The following manual actions may be required in the event of a fire in this fire area when the fire damage is in the specific fire zone listed below:

1. Should a fire in Fire Zones 0-26D, 0-26V or 0-27H result in spurious Unit 1 ADS or SRV actuations as indicated by low RPV pressure and/or level, the capability to further depressurize the reactor using Unit 1 Division II ADS and to inject water into the reactor using Unit 1 Division II Core Spray remains available from the Control Room.

2. Should a fire in Fire Zone 0-24L result in disabling the low condenser vacuum signal which prevents the Unit 1 MSIVs from closing on low main condenser vacuum, initiate isolation of the Main Steam Lines from the Control Room and verify isolation of the Main Steam Line Drains.

6.2.23.7 Deviation Requests Affecting Fire Area CS-7

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area CS-7.

6.2.24 Fire Area CS-8

Fire Area CS-8 is eliminated. Fire Area CS-8 contained Fire Zone 0-24E, Computer Room. Fire Zone 0-24E is included in Fire Area CS-3.

6.2.25 Fire Area CS-9

6.2.25.1 General Description

Fire Area CS-9 is the Main Control Room and associated fire zones. The floor of the Main Control Room is at elevation 729'-1" of the Control Structure and the overlooking mezzanine Technical Support Center is at elevation 741'-1". This fire area is shown on Drawings E-205990 and E-205991 in Section 8.0. Safe Shutdown Path 2 would be available for use in the event of a fire in Fire Area CS-9. Deviation Request No. 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown is applicable, in general, to this fire area. In this fire area, ADS/SRVs and RHR LPCI in the Alternate Shutdown Cooling Mode may be used to achieve and maintain post-fire safe shutdown in the event that fire damage occurs that effects RCIC and/or RHR Shutdown Cooling.

6.2.25.2 Fire Zones

The following fire zones are located in Fire Area CS-9:

Fire Zone	**Description**
0-26A	Copy Room
0-26E	Locker Room
0-26F	Vestibule (U1)
0-26G	Shift Outage/STA Office
0-26H	Control Room
0-26I	Shift Supervisor’s Office
0-26J	Vestibule (U2)
0-26K	Technical Support Center
0-26L	TSC Conference Room/Library
0-26M	TSC North Soffit
Fire Zone	**Description**
0-26N	Control Room U1 Soffit
0-26P	Control Room U2 Soffit
0-26R	TSC South Office Soffit

6.2.25.3 Combustible Loading

The combustible loading in Fire Area C-9 consists primarily of cables in panels, cabinets and tray. Control Room reference manuals and drawings contribute a small portion to the combustible loading. Any fire initiated within this fire area will not propagate to any other fire area in the Control Structure.

The fire rating of the fire area is established based on the lowest fire rating for any fire barrier in any fire zone forming a part of the boundary of the fire area. The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of the fire zones in Fire Area CS-9 is addressed in Deviation Requests 2, 6, 23 and 37. Any specific Fire Hazard Analyses applicable to the fire zones in this fire area are identified on the Drawings in Section 8.0 and referenced below along with any other combustible restrictions.

6.2.25.4 Fire Detection/Suppression in the Fire Area

Fire detection is located throughout Fire Area CS-9. The control room has a manual spurt CO_2 system located under the floor and portable fire extinguishers. Manual hose reels are located outside the control room. Since the control room is constantly staffed, the early detection and suppression of any fire is assured.

6.2.25.5 Consequences of a Fire in Fire Area CS-9

In the event of a fire in Fire Area CS-9 which would cause evacuation of control room personnel, control room operators would manually scram both units, close the MSIVs on each unit, trip the reactor feed pump turbine on each unit, close the reactor feed pump discharge valves on each unit and man each unit's remote shutdown panels. From each remote shutdown panel (Fire Zone 1-2D in Unit 1 and 2-2A in Unit 2) the operator could control each unit and maintain it in a safe shutdown condition. Due to the unique nature of this fire area, the standard format will not be used. Rather, a description of the detailed analysis performed for the above mentioned scenario follows.

In order to properly achieve and maintain safe shutdown in the event of a fire which causes evacuation of the main control room, the availability of all of the Path 2 components and cables was examined. The objective of this study was to ensure that any systems required for Path 2 shutdown from each units Remote Shutdown Panel would not be affected by a fire in Fire Area CS-9.

Our control room fire analysis assures that a fire in the main control room or any of its associated fire zones in Fire Area CS-9 would be contained within Fire Area CS-9 and would not propagate to any other fire area in the plant.

6.2.25.5.1 Fire Zone 0-26A – Copy Room

There are no Category I components located in Fire Zone 0-26A.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-26A is addressed in Deviation Requests 6 and 23.

6.2.25.5.2 Fire Zone 0-26E – Locker Room

There are no Category I components located in Fire Zone 0-26E.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-26E is addressed in Deviation Requests 6 and 23.

6.2.25.5.3 Fire Zone 0-26F - Vestibule (U1)

There are no Category I components located in Fire Zone 0-26F.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-26F is addressed in Deviation Requests 2, 6, 23 and 37.

Deviation Request 37 justifies limiting the protection of certain equipment and/or cabling for the required safe shutdown path in this fire zone.

6.2.25.5.4 Fire Zone 0-26G – Shift Outage/STA Office

There are no Category I components located in Fire Zone 0-26G.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-26G is addressed in Deviation Requests 2, 6, 23 and 37.

Deviation Request 37 justifies limiting the protection of certain equipment and/or cabling for the required safe shutdown path in this fire zone.

6.2.25.5.5 Fire Zone 0-26H – Control Room

The following Category I components are located in Fire Zone 0-26H:

- Nuclear Steam Supply Shutoff System Instrument Power Supplies (B21H1T1, B21H1T2) - Fire induced damage to this 24 VDC Instrument Power Supply has been determined to have no impact on any safe shutdown components or functions. Instrument loops powered by this power supply are not required for post-fire safe shutdown and these loops are properly isolated from any required safe shutdown loops.

- Suppression Pool Temperature Indicators (TIAH-15751, TIAH-15752, TIAH-25751, TIAH-25752), Suppression Pool Water Temperature Transducers (TX-15751, TX-15752, TX-25751, TX25752) – Addressed in Deviation Request No. 2.

- RHR Leak Detection System Temperature Switches (TSH-E11-2N600A, TSH-E11-2N600B, TSH-E11-2N600C, TSH-E11-2N600D, TDSH-E11-2N601A, TDSH-E11-2N601B, TDSH-E11-2N601C, TDSH-E11-2N601D) – This isolation function is bypassed when the transfer switch is actuated at the Remote Shutdown Panel. Therefore, a fire induced failure of this component will have no impact on post-fire safe shutdown.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-26H is addressed in Deviation Requests 2, 6, 23 and 37.

Deviation Request 37 justifies limiting the protection of certain equipment and/or cabling for the required safe shutdown path in this fire zone.

6.2.25.5.6 Fire Zone 0-26I – Shift Supervisor's Office

There are no Category I components located in Fire Zone 0-26I.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-26I is addressed in Deviation Requests 2, 6, 23 and 37.

Deviation Request 37 justifies limiting the protection of certain equipment and/or cabling for the required safe shutdown path in this fire zone.

6.2.25.5.7 Fire Zone 0-26J - Vestibule (U2)

There are no Category I components located in Fire Zone 0-26J.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-26J is addressed in Deviation Requests 2, 6, 23 and 37.

Deviation Request 37 justifies limiting the protection of certain equipment and/or cabling for the required safe shutdown path in this fire zone.

6.2.25.5.8 Fire Zone 0-26K – Technical Support Center

There are no Category I components located in Fire Zone 0-26K.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-26K is addressed in Deviation Requests 6 and 23.

6.2.25.5.9 Fire Zone 0-26L – TSC Conference Room/Library

There are no Category I components located in Fire Zone 0-26L.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-26L is addressed in Deviation Requests 6 and 23.

6.2.25.5.10 Fire Zone 0-26M – TSC North Soffit

There are no Category I components located in Fire Zone 0-26M.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-26M is addressed in Deviation Requests 2, 6, 23 and 37.

Deviation Request 37 justifies limiting the protection of certain equipment and/or cabling for the required safe shutdown path in this fire zone.

6.2.25.5.11 Fire Zone 0-26N – Control Room U1 Soffit

There are no Category I components located in Fire Zone 0-26N.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-26N is addressed in Deviation Requests 6 and 23.

6.2.25.5.12 Fire Zone 0-26P – Control Room U2 Soffit

There are no Category I components located in Fire Zone 0-26P.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-26P is addressed in Deviation Requests 6 and 23.

6.2.25.5.13 Fire Zone 0-26R – TSC South Office Soffit

There are no Category I components located in Fire Zone 0-26R.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-26R is addressed in Deviation Requests 6, 23 and 37.

Deviation Request 37 justifies limiting the protection of certain equipment and/or cabling for the required safe shutdown path in this fire zone.

6.2.25.6 Special Features

The following manual actions may be required in the event of a fire in this fire area when the fire damage is in the specific fire zone listed below:

1. Should a fire in Fire Zone 0-26H result in spurious actuation of Unit 1 SRVs as indicated by low RPV pressure and/or level, one of the following actions can be taken.

    a. If SRVs A, B, or C spuriously actuate, operate transfer switch to LOCAL at the Unit 1 Remote Shutdown Panel to preclude spurious operation.

    b. If SRVs D, E, F, G, H, J, K, L, M, N, P, R or S spuriously actuate, provide makeup as necessary with RCIC or LPCI.

2. Should a fire in Fire Zones 0-26H, 0-26I or 0-26R result in spurious actuation of Unit 2 SRVs as indicated by low RPV pressure and/or level, one of the following actions can be taken.

    a. If SRVs A, B, or C spuriously actuate, operate transfer switch to LOCAL at the Unit 2 Remote Shutdown Panel to preclude spurious operation.

    b. If SRVs D, E, F, G, H, J, K, L, M, N, P, R or S spuriously actuate, provide makeup as necessary with RCIC or LPCI.

3. Should a fire in Fire Zone 0-26H result in the Unit 1 SRVs A, B and C being unavailable for RPV de-pressurization due to depletion of their accumulators, operate the Unit 1 ADS valves sequentially using the key locked switches located in the Unit 1 Upper Relay Room.

4. Should a fire in Fire Zone 0-26H result in the Unit 2 SRVs A, B and C being unavailable for RPV de-pressurization due to depletion of their accumulators, operate the Unit 2 ADS valves sequentially using the key locked switches located in the Unit 2 Upper Relay Room.

5. Should a fire in Fire Zones 0-26G, 0-26H or 0-26M result in the spurious starting of the Unit 1 RHR Pump 1P202A, trip Pump 1P202A by manually tripping Unit 1 4.16 KV Switchgear breaker 1A20102. This action is performed in order to operate the Unit 2 RHR Pump 2P202A.

6. Should a fire in Fire Zone 0-26H result in spurious starting of the Unit 2 RHR Pump 2P202B, trip Pump 2P202B by manually tripping Unit 2 4.16 KV Switchgear breaker 2A20202. This action is performed in order to operate the Unit 1 RHR Pump 1P202B.

7. Should a fire in Fire Zone 0-26H result in loss of Reactor Recirculation Pump 1P401A and/or 1P401B trip capability, trip pump 1P401A and/or 1P401B by manually tripping the Motor-Generator set supply breaker 1A10110 and/or 1A10210.

8. Fire Zone 0-26H, actions performed during plant start up lifts lead in Motor Control Center 1B236 cubicle 102 which disables Reactor Head Vent Valve HV-141-F001 preventing a reactor coolant flow diversion through spurious opening of both Head Vent Valves.

9. Fire Zone 0-26H, actions performed during plant start up lifts lead in Motor Control Center 2B236 cubicle 102 which disables Reactor Head Vent Valve HV-241-F001 preventing a reactor coolant flow diversion through spurious opening of both Head Vent Valves.

10. Should a fire in Fire Zones 0-26G, 0-26H or 0-26M result in loss of Unit 1 scram discharge volume isolation capability, isolate the scram discharge volume by manually venting the instrument air header in the Unit 1 Reactor Building.

11. Should a fire in Fire Zones 0-26H, 0-26I, 0-26J or 0-26R result in loss of Unit 2 scram discharge volume isolation capability, isolate the scram discharge volume by manually venting the instrument air header in the Unit 2 Reactor Building.

12. Should a fire in Fire Zones 0-26H or 0-26M result in failure of the RWCU Inlet Outboard Isolation Valve HV-144-F004 causing loss of isolation capability of the RWCU System at the Unit 1 Remote Shutdown Panel, open the Unit 1 Distribution Panel 1Y219 Breaker 18 to close the RWCU Filter Demineralizer Outlet Valve HV-144-F033 and prevent potential RPV inventory loss.

13. Should a fire in Fire Zones 0-26H, 0-26I or 0-26R result in failure of the RWCU Inlet Inboard Isolation Valve HV-244-F001 causing loss of isolation capability of the RWCU System at the Unit 2 Remote Shutdown Panel, open the Unit 2 Distribution Panel 2Y219 Breaker 18 to close the RWCU Filter Demineralizer Outlet Valve HV-244-F033 and prevent potential RPV inventory loss.

14. Should a fire in Fire Zones 0-26H or 0-26N result in spurious opening of the Unit 1 Suppression Pool Inboard/Outboard Drain Valves HV-15766/68 as indicated by decreasing Suppression Pool Level, locally close manual valve 157025.

15. Should a fire in Fire Zones 0-26H, 0-26I or 0-26R result in spurious opening of the Unit 2 Suppression Pool Inboard/Outboard Drain Valves HV-25766/68 as indicated by decreasing Suppression Pool Level, locally close manual valve 257025.

16. Should a fire in Fire Zones 0-26H, 0-26G or 0-26M result in loss of the automatic and manual close capability from the Control Room for the Unit 1 and/or Unit 2 Diesel Generator 4.16 KV supply breakers 1A20104, 1A20204, 1A20304, 1A20404, 2A20104, 2A20204, 2A20304 or 2A20404, locally close the breaker at the 4.16 KV Switchgear.

17. Should a fire in Fire Zones 0-26H or 0-26M result in a Unit 1 Reactor Coolant System flow diversion when operating in the alternate shutdown cooling mode caused by the MSIV drain valves “Spuriously Opening”, one of the following actions can be taken to prevent the flow diversion.

    a. Open Unit 1 250 VDC Motor Control Center 1D274 Breaker 041 and manually close MSIV Drain Valve HV-141-F019, or

    b. Open Unit 1 480 VAC Motor Control Centers 1B216 Breaker 112 and 1B217 Breaker 024 and manually close Main Steam Line Drain to Condenser Valve HV-141-F021, Main Steam Line Warm-up Valve HV-141-F020 and Main Steam Line Drain Valve to Condenser Bypass Valve 141F033.

18. Should a fire in Fire Zones 0-26H, 0-26I or 0-26R result in a Unit 2 Reactor Coolant System flow diversion when operating in the alternate shutdown cooling mode caused by the MSIV drain valves “Spuriously Opening”, one of the following action can be taken to prevent the flow diversion.

    a. Open Unit 2 250 VDC Motor Control Center 2D274 Breaker 041 and manually close MSIV Drain Valve HV-241-F019, or

    b. Open Unit 2 480 VAC Motor Control Centers 2B227 Breaker 081 and 2B217 Breaker 024 and manually close Main Steam Line Drain to Condenser Valve HV-241-F021, Main Steam Line Warm-up Valve HV-241-F020 and Main Steam Line Drain Valve to Condenser Bypass Valve 241F033.

19. Should a fire in Fire Zones 0-26H, result in loss of Reactor Recirculation Pump 2P401A and/or 2P401B trip capability, trip pump 2P401A and/or 2P401B by manually tripping the Motor-Generator set supply breaker 2A10110 and/or 2A10210.

6.2.25.7 Deviation Requests Affecting Fire Area CS-9

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area CS-9.

6.2.26 Fire Area CS-10

6.2.26.1 General Description

Fire Area CS-10 is the Unit 1 Division I Upper Cable Spreading Room at elevation 754'-0" of the control structure. Its location is shown on Drawing E-205992 in Section 8.0. Safe Shutdown Path 3 is available for use in the event of a fire in Fire Area CS-10. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.26.2 Fire Zones

The following fire zones are located in Fire Area CS-10:

Fire Zone	Description
0-27C	U1 Div I Upper Cable Spreading Room
0-27D	Electricians Office

6.2.26.3 Combustible Loading

The principle combustibles in Fire Area CS-10 are cables in cable tray and are dispersed throughout the fire area. There is no mechanical equipment (i.e., pumps, valves, etc.) in this fire area.

The fire rating of the fire area is established based on the lowest fire rating for any fire barrier in any fire zone forming a part of the boundary of the fire area. The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of the zones in Fire Area CS-10 is affected by the fire hazards analysis for specific configurations. Any fire zones for which specific fire hazards analysis have been prepared are identified on the drawings contained in Section 8.0 of this document. Any restrictions applicable to a particular fire zone are described in the deviation requests or fire hazards analyses referenced for that fire zone.

6.2.26.4 Fire Detection/Suppression in the Fire Area

Fire Area CS-10 is equipped with ionization type smoke detectors and heat detectors. The entire area is covered by a pre-action sprinkler system, and manual hose reels and portable fire extinguishers are available.

6.2.26.5 Consequences of a Fire in Fire Area CS-10

In the event of a fire in Fire Area CS-10, Safe Shutdown Path 3 systems and components will be available for safe shutdown. Electrical cabling located in Fire Area CS-10 associated with Path 3 safe shutdown systems and components has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. This is accomplished using one of the methods outlined in Section 6.1.2.4.

A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.26.5.1 Fire Zone 0-27C – U1 Div I Upper Cable Spreading Room

There are no Category I components located in Fire Zone 0-27C.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-27C is affected by the fire hazards analysis identified on Drawing E-205992 in Section 8.0.

6.2.26.5.2 Fire Zone 0-27D – Electricians Office

There are no Category I components located in Fire Zone 0-27D.

6.2.26.6 Special Features

The following manual actions may be required in the event of a fire in this fire area when the fire damage is in the specific fire zone listed below:

1. Should a fire in Fire Zone 0-27C result in loss of Unit 1 reactor scram capability and/or scram discharge volume isolation capability from the Control Room, scram Unit 1 and isolate the scram discharge volume by manually venting the instrument air header in the Unit 1 Reactor Building.

2. Should a fire in Fire Zone 0-27C result in loss of Reactor Recirculation Pump 1P401A and/or 1P401B trip capability, trip pump 1P401A and/or 1P401B from the Control Room.

3. Should a fire in Fire Zone 0-27C result in loss of Reactor Recirculation Pump 2P401A and/or 2P401B trip capability, trip pump 2P401A and/or 2P401B from the Control Room.

4. Should a fire in Fire Zone 0-27C result in spurious Unit 1 ADS or SRV actuations as indicated by low RPV pressure and/or level, the capability to further depressurize the reactor using Unit 1 Division II ADS and to inject water into the reactor using Unit 1 Division II Core Spray remains available from the Control Room.

5. Should a fire in Fire Zone 0-27C spuriously open the Unit 1 RHR Injection Isolation Valve HV-151-F015B, close the RHR Injection Control Valve HV-151-F017B from the Control Room.

6. Should a fire in Fire Zone 0-27C result in disabling the low condenser vacuum signal which prevents the Unit 1 MSIVs from closing on low main condenser vacuum, initiate isolation of the Main Steam Lines from the Control Room and verify isolation of the Main Steam Line Drains.

6.2.26.7 Deviation Requests Affecting Fire Area CS-10

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area CS-10.

6.2.27 Fire Area CS-11

6.2.27.1 General Description

Fire Area CS-11 is the Unit 2 Equipment Room which contains Division II load centers, battery chargers and distribution panels. It is located on elevation 771'-0" of the control structure. The location of this fire area is shown on Drawing E-205993 in Section 8.0. Safe Shutdown Path 1 would be available in the event of a fire in Fire Area CS-11. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.27.2 Fire Zones

The following fire zone is located in Fire Area CS-11:

Fire Zone	Description
0-28A-I	U2 Div II Equipment Room

6.2.27.3 Combustible Loading

The combustible loading is relatively low in this fire area and any fire initiated within the fire area would be contained by the fire boundary. The principle combustibles in this area are cables in electrical panels. There is no mechanical equipment (i.e., pumps, valves, etc.) in this fire area.

The fire rating of the fire area is established based on the lowest fire rating for any fire barrier in any fire zone forming a part of the boundary of the fire area. The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) in Fire Area CS-11 are addressed in Deviation Requests 6 and 15, as well as, by some fire hazards analysis for specific configurations. Any fire zones for which specific fire hazards analysis have been prepared are identified on the drawings contained in Section 8.0 of this document. Any restrictions applicable to a particular fire zone are described in the deviation requests or fire hazards analyses referenced for that fire zone.

6.2.27.4 Fire Detection/Suppression in the Fire Area

Fire Area CS-11 has ionization smoke detection which alarms in the main control room. The fire area does not have automatic suppression due to the nature of the electrical equipment in the area. However, a manual hose station and portable fire extinguishers are located nearby.

Deviation Request No. 15 further addresses the lack of an automatic suppression system in this fire area.

6.2.27.5 Consequences of a Fire in Fire Area CS-11

In the event of a fire in Fire Area CS-11, Safe Shutdown Path 1 systems and components will be available for safe shutdown. Electrical cabling located in Fire Area CS-11 associated with Path 1 safe shutdown systems and components has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. This is accomplished using one of the methods outlined in Section 6.1.2.4.

A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.27.5.1 Fire 0-28A-1 – U2 Div II Equipment Room

There are no Category I components located in Fire Zone 0-28A-I.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-28A-I is addressed in Deviation Requests 6 and 15. In addition, the fire hazards analysis identified on Drawing E-205993 in Section 8.0 affects the combustible configuration in this fire zone.

6.2.27.6 Special Features

There are no special features in Fire Area CS-11. There are no manual actions required in this fire area.

6.2.27.7 Deviation Requests Affecting Fire Area CS-11

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area CS-11.

6.2.28 Fire Area CS-12

6.2.28.1 General Description

Fire Area CS-12 is the Unit 2 Division I 125V Battery Room located on elevation 771'-0" of the control structure. The location of this fire area is shown on Drawing E-205993 in Section 8.0. Safe Shutdown Path 3 would be available for use in the event of a fire in Fire Area CS-12. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.28.2 Fire Zones

The following fire zone is located in Fire Area CS-12:

Fire Zone	Description
0-28C	U2 Div I 125V Battery Room

6.2.28.3 Combustible Loading

The combustible loading in Fire Area CS-12 is well below the fire barrier rating of the fire area boundary. The principle contributors to the combustible loading in this fire area are cables and the battery cell material. There is no mechanical equipment (i.e., pumps, valves, etc.) in this fire area.

The fire rating of the fire area is established based on the lowest fire rating for any fire barrier in any fire zone forming a part of the boundary of the fire area. The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of fire zones in Fire Area CS-12 are addressed in Deviation Request 6, as well as, by some fire hazards analysis for specific configurations. Any fire zones for which specific fire hazards analysis have been prepared are identified on the drawings contained in Section 8.0 of this document. Any restrictions applicable to a particular fire zone are described in the deviation requests or fire hazards analyses referenced for that fire zone.

6.2.28.4 Fire Detection/Suppression in the Fire Area

Fire Area CS-12 is equipped with ionization smoke detection which alarms in the main control room. The fire area does not have an automatic suppression system due to the nature of the electrical equipment in the room. However, a manual hose station and portable fire extinguishers are located nearby.

6.2.28.5 Consequences of a Fire in Fire Area

In the event of a fire in Fire Area CS-12, Safe Shutdown Path 3 systems and components will be available for safe shutdown. Electrical cabling located in Fire Area CS-12 associated with Path 3 safe shutdown systems and components has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. This is accomplished using one of the methods outlined in Section 6.1.2.4.

A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.28.5.1 Fire Zone 0-28C - U2 Div I 125V Battery Room

There are no Category I components located in Fire Zone 0-28C.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-28C is addressed in Deviation Request 6. In addition, the fire hazards analysis identified on Drawing E-205993 in Section 8.0 affects the combustible configuration in this fire zone.

6.2.28.6 Special Features

There are no special features in Fire Area CS-12. There are no manual actions required.

6.2.28.7 Deviation Requests Affecting Fire Area CS-12

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area CS-12.

6.2.29 Fire Area CS-13

6.2.29.1 General Description

Fire Area CS-13 is the Unit 2 Division II 125V Battery Room located on Elevation 771'-0" of the control structure. The location of this fire area is shown on Drawing E-205993 in Section 8.0. Safe Shutdown Path 1 would be available for use in the event of a fire in Fire Area CS-13. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.29.2 Fire Zones

The following fire zone is located in Fire Area CS-13:

Fire Zone	Description
0-28E	U2 Div II 125V Battery Room

6.2.29.3 Combustible Loading

The combustible loading in Fire Area CS-13 is well below the fire barrier rating of the fire area boundary. The principle contributors to the combustible loading in this fire area are cables and the battery cell materials. There is no mechanical equipment (i.e., pumps, valves, etc.) in this fire area.

The fire rating of the fire area is established based on the lowest fire rating for any fire barrier in any fire zone forming a part of the boundary of the fire area. The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) in Fire Area CS-13 are addressed in Deviation Request 6, as well as, by some fire hazards analysis for specific configurations. Any fire zones for which specific fire hazards analysis have been prepared are identified on the drawings contained in Section 8.0 of this document. Any restrictions applicable to a particular fire zone are described in the deviation requests or fire hazards analyses referenced for that fire zone.

6.2.29.4 Fire Detection/Suppression in the Fire Area

Fire Area CS-13 is equipped with ionization smoke detection which alarms in the main control room. The fire area does not have an automatic suppression system due to the nature of the electrical equipment in the room. However, a manual hose station and portable fire extinguishers are located nearby.

6.2.29.5 Consequences of a Fire in Fire Area CS-13

In the event of a fire in Fire Area CS-13, Safe Shutdown Path 1 systems and components will be available for safe shutdown. Electrical cabling located in Fire Area CS-13 associated with Path 1 safe shutdown systems and components has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. This is accomplished using one of the methods outlined in Section 6.1.2.4.

A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.29.5.1 Fire Zone 0-28E - U2 Div II 125V Battery Room

There are no Category I components located in Fire 0-28E.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-28E is addressed in Deviation Request 6. In addition, the fire hazards analysis identified on Drawing E-205993 in Section 8.0 affects the combustible configuration in this fire zone.

6.2.29.6 Special Features

There are no special features in Fire Area CS-13. There are no manual actions required.

6.2.29.7 Deviation Requests Affecting Fire Area CS-13

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area CS-13.

6.2.30 Fire Area CS-14

6.2.30.1 General Description

Fire Area CS-14 is the Unit 2 Division II 250V Battery Room located on Elevation 771'-0" of the control structure. The location of this fire area is shown on Drawing E-205993 in Section 8.0. Safe Shutdown Path 1 would be available for use in the event of a fire in Fire Area CS-14. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.30.2 Fire Zones

The following fire zone is located in Fire Area CS-14:

Fire Zone	Description
0-28G	U2 Div II 250V Battery Room

6.2.30.3 Combustible Loading

The combustible loading in Fire Area CS-14 is well below the fire barrier rating of the fire area boundary. The principle contributors to the combustible loading in this fire area are cables and the battery cell materials. There is no mechanical equipment (i.e., pumps, valves, etc.) in this fire area.

The fire rating of the fire area is established based on the lowest fire rating for any fire barrier in any fire zone forming a part of the boundary of the fire area. The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of fire zones in Fire Area CS-14 are addressed in Deviation Request 6, as well as, by some fire hazards analysis for specific configurations. Any fire zones for which specific fire hazards analysis have been prepared are identified on the drawings contained in Section 8.0 of this document. Any restrictions applicable to a particular fire zone are described in the deviation requests or fire hazards analyses referenced for that fire zone.

6.2.30.4 Fire Detection/Suppression in the Fire Area

Fire Area CS-14 is equipped with ionization smoke detection which alarms in the main control room. The fire area does not have an automatic suppression system due to the nature of the electrical equipment in the room. However, a manual hose station and portable fire extinguishers are located nearby.

6.2.30.5 Consequences of a Fire in Fire Area CS-14

In the event of a fire in Fire Area CS-14, a Safe Shutdown Path 1 systems and components will be available for safe shutdown. Electrical cabling located in Fire Area CS-14 associated with Path 1 safe shutdown systems and components has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. This is accomplished using one of the methods outlined in Section 6.1.2.4.

A description of the effect of a fire on safe shutdown is detailed below.

6.2.30.5.1 Fire Zone 0-28G - U2 Div II 250V Battery Room

There are no Category I components located in Fire Zone 0-28G.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-28G is addressed in Deviation Request 6. In addition, the fire hazards analysis identified on Drawing E-205993 in Section 8.0 affects the combustible configuration in this fire zone.

6.2.30.6 Special Features

There are no special features in Fire Area CS-14. There are no manual actions required.

6.2.30.7 Deviation Requests Affecting Fire Area CS-14

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area CS-14.

6.2.31 Fire Area CS-15

6.2.31.1 General Description

Fire Area CS-15 is the Cold Instrument Repair Shop located on Elevation 771'-0" of the control structure. The location of this Fire Area is shown on Drawing E-205993 in Section 8.0. Safe Shutdown Path 1 would be available for use in the event of a fire in Fire Area CS-15. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.31.2 Fire Zones

The following fire zone is located in Fire Area CS-15:

Fire Zone	Description
0-28H	Cold Instrument Repair Shop

6.2.31.3 Combustible Loading

There are minimal combustibles in this fire area. All cables in this area are in conduits and those conduits with safe shutdown cables are protected with fire wrapping material as required.

The fire rating of the fire area is established based on the lowest fire rating for any fire barrier in any fire zone forming a part of the boundary of the fire area. The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) in Fire Area CS-15 are addressed in Deviation Request 6 and 8, as well as, by some fire hazards analysis for specific configurations. Any fire zones for which specific fire hazards analysis have been prepared are identified on the drawings contained in Section 8.0 of this document. Any restrictions applicable to a particular fire zone are described in the deviation requests or fire hazards analyses referenced for that fire zone.

6.2.31.4 Fire Detection/Suppression in the Fire Area

This fire area has ionization smoke detectors. Manual hose reels and portable fire extinguishers are also located nearby.

6.2.31.5 Consequences of a Fire in Fire Area CS-15

In the event of a fire in Fire Area CS-15, Safe Shutdown Path 1 systems and components will be available for safe shutdown. Electrical cabling located in Fire Area CS-15 associated with Path 1 safe shutdown systems and components has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. This is accomplished using one of the methods outlined in Section 6.1.2.4.

A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.31.5.1 Fire Zone 0-28H - Cold Instrument Repair Shop

There are no Category I components located in Fire Zone 0-28H.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-28H is addressed in Deviation Requests 6 and 8. In addition, the fire hazards analysis identified on Drawing E-205993 in Section 8.0 affects the combustible configuration in this fire zone.

6.2.31.6 Special Features

The following manual actions may be required in the event of a fire in this fire area when the fire damage is in the specific fire zone listed below:

1. Should a fire in Fire Zone 0-28H result in loss of Reactor Recirculation Pump 1P401A and/or 1P401B trip capability, trip pump 1P401A and/or 1P401B by manually tripping the Motor-Generator set supply breaker 1A10110 and/or 1A10210.

2. Should a fire in Fire Zone 0-28H result in loss of Reactor Recirculation Pump 2P401A and/or 2P401B trip capability, trip pump 2P401A and/or 2P401B by manually tripping the Motor-Generator set supply breaker 2A10110 and/or 2A10210.

6.2.31.7 Deviation Requests Affecting Fire Area CS-15

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area CS-15.

6.2.32 Fire Area CS-16

6.2.32.1 General Description

Fire Area CS-16 is the Unit 1 Division II 250V Battery Room located on Elevation 771'-0" of the control structure. The location of this fire area is shown on Drawing E-205993 in Section 8.0. Safe Shutdown Path 1 is available for use in the event of a fire in Fire Area CS-16. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.32.2 Fire Zones

The following fire zone is located Fire Area CS-16:

Fire Zone	**Description**
0-28J	U1 Div II 250V Battery Room

6.2.32.3 Combustible Loading

The combustible loading in Fire Area CS-16 is well below the fire barrier rating of the fire area boundary. The principle contributors to the combustible loading in this fire area are cables and the battery cell materials. There is no mechanical equipment (i.e., pumps, valves, etc.) in this fire area.

The fire rating of the fire area is established based on the lowest fire rating for any fire barrier in any fire zone forming a part of the boundary of the fire area. The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of fire zones in Fire Area CS-16 are addressed in Deviation Request 6, as well as, by some fire hazards analysis for specific configurations. Any fire zones for which specific fire hazards analysis have been prepared are identified on the drawings contained in Section 8.0 of this document. Any restrictions applicable to a particular fire zone are described in the deviation requests or fire hazards analyses referenced for that fire zone.

6.2.32.4 Fire Detection/Suppression in the Fire Area

Fire Area CS-16 is equipped with ionization smoke detection which alarms in the main control room. The fire area does not have an automatic suppression system due to the nature of the electrical equipment in the room. However, a manual hose station and portable fire extinguishers are located nearby.

6.2.32.5 Consequences of a Fire in Fire Area CS-16

In the event of a fire in Fire Area CS-16, Safe Shutdown Path 1 systems and components will be available for safe shutdown. Electrical cabling located in Fire Area CS-16 associated with Path 1 safe shutdown systems and components has been specifically evaluated to assure its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. This is accomplished using one of the methods outlined in Section 6.1.2.4.

A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.32.5.1 Fire Zone 0-28J - U1 Div II 250V Battery Room

There are no Category I components located in Fire Zone 0-28J.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-28J is addressed in Deviation Request 6. In addition, the fire hazards analysis identified on Drawing E-205993 in Section 8.0 affects the combustible configuration in this fire zone.

6.2.32.6 Special Features

There are no special features in Fire Area CS-16. There are no manual actions required.

6.2.32.7 Deviation Requests Affecting Fire Area CS-16

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area CS-16.

6.2.33 Fire Area CS-17

6.2.33.1 General Description

Fire Area CS-17 is the Unit 1 Equipment Room which contains Division II load centers, battery chargers and distribution panels. It is located on Elevation 771'-0" of the control structure. The location of this fire area is shown on Drawing E-205993 in Section 8.0. Safe Shutdown Path 1 is available for use in the event of a fire in Fire Area CS-17. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.33.2 Fire Zones

The following fire zone is located in Fire Area CS-17:

Fire Zone	Description
0-28B-I	U1 Div II Equipment Room

6.2.33.3 Combustible Loading

The combustible loading is relatively low in this fire area and any fire initiated within the fire area would be contained by the construction of the fire area boundary. The principle combustibles in this area are cables in electrical panels. There is no mechanical equipment (i.e., pumps, valves, etc.) in this fire area.

The fire rating of the fire area is established based on the lowest fire rating for any fire barrier in any fire zone forming a part of the boundary of the fire area. The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of fire zones in Fire Area CS-17 are addressed in Deviation Requests 6 and 8, as well as, by some fire hazards analysis for specific configurations. Any fire zones for which specific fire hazards analysis have been prepared are identified on the drawings contained in Section 8.0 of this document. Any restrictions applicable to a particular fire zone are described in the deviation requests or fire hazards analyses referenced for that fire zone.

6.2.33.4 Fire Detection/Suppression in the Fire Area

Fire Area CS-17 has ionization smoke detection which alarms in the main control room. The fire area does not have automatic suppression due to the nature of the electrical equipment in the area. However, a manual hose station and portable fire extinguishers are located in the vicinity. Deviation Request No. 8 further addresses the lack of an automatic fire suppression system in this fire area.

6.2.33.5 Consequences of a Fire in Fire Area CS-17

In the event of a fire in Fire Area CS-17, Safe Shutdown Path 1 systems and components will be available for safe shutdown. Electrical cabling located in Fire Area CS-17 associated with Path 1 safe shutdown systems and components has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. This is accomplished using one of the methods outlined in Section 6.1.2.4.

A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.33.5.1 Fire Zone 0-28B-I - U1 Div II Equipment Room

There are no Category I components located in Fire Zone 0-28B-I.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-28B-I is addressed in Deviation Requests 6 and 8. In addition, the fire hazards analysis identified on Drawing E-205993 in Section 8.0 affects the combustible configuration in this fire zone.

6.2.33.6 Special Features

There are no special features in Fire Area CS-17. There are no manual actions required.

6.2.33.7 Deviation Requests Affecting Fire Area CS-17

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area CS-17.

6.2.34 Fire Area CS-18

6.2.34.1 General Description

Fire Area CS-18 is the Unit 1 Division II 125V Battery Room located on Elevation 771'-0" of the control structure. The location of this fire area is shown on Drawing E-205993 in Section 8.0. Safe Shutdown Path 1 is available for use in the event of a fire in Fire Area CS-18. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.34.2 Fire Zones

The following fire zone is located in Fire Area CS-18:

Fire Zone	Description
0-28M	U1 Div II 125V Battery Room

6.2.34.3 Combustible Loading

The combustible loading in Fire Area CS-18 is well below the fire barrier rating of the fire area boundary. The principle contributors to the combustible loading in this fire area are cables and the battery cell materials. There is no mechanical equipment (i.e., pumps, valves, etc.) in this fire area.

The fire rating of the fire area is established based on the lowest fire rating for any fire barrier in any fire zone forming a part of the boundary of the fire area. The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of fire zones in Fire Area CS-18 are addressed in Deviation Request 6, as well as, by some fire hazards analysis for specific configurations. Any fire zones for which specific fire hazards analysis have been prepared are identified on the drawings contained in Section 8.0 of this document. Any restrictions applicable to a particular fire zone are described in the deviation requests or fire hazards analyses referenced for that fire zone.

6.2.34.4 Fire Detection/Suppression in the Fire Area

Fire Area CS-18 is equipped with ionization smoke detection which alarms in the main control room. The fire area does not have an automatic suppression system due to the nature of the electrical equipment in the room. However, a manual hose station and portable fire extinguishers are located nearby.

6.2.34.5 Consequences of a Fire in Fire Area CS-18

In the event of a fire in Fire Area CS-18, Safe Shutdown Path 1 systems and components will be available for safe shutdown. Electrical cabling located in Fire Area CS-18 associated with Path 1 safe shutdown systems and components has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. This is accomplished using one of the methods outlined in Section 6.1.2.4.

A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.34.5.1 Fire Zone 0-28M - U1 Div II 125V Battery Room

There are no Category I components located in Fire Zone 0-28M.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-28M is addressed in Deviation Request 6. In addition, the fire hazards analysis identified on Drawing E-205993 in Section 8.0 affects the combustible configuration in this fire zone.

6.2.34.6 Special Features

There are no special features in Fire Area CS-18. There are no manual actions required

6.2.34.7 Deviation Requests Affecting Fire Area CS-18

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area CS-18.

6.2.35 Fire Area CS-19

6.2.35.1 General Description

Fire Area CS-19 is the Unit 1 Division II 125V Battery Room located on Elevation 771'-0" of the control structure. The location of this fire area is shown on Drawing E-205993 in Section 8.0. Safe Shutdown Path 1 is available for use in the event of a fire in Fire Area CS-19. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.35.2 Fire Zones

The following fire zone is located in Fire Area CS-19:

Fire Zone	**Description**
0-28N	U1 Div II 125V Battery Room

6.2.35.3 Combustible Loading

The combustible loading in Fire Area CS-19 is well below the fire barrier rating of the fire area boundary. The principle contributors to the combustible loading in this fire area are cables and the battery cell materials. There is no mechanical equipment (i.e., pumps, valves, etc.) in this fire area.

The fire rating of the fire area is established based on the lowest fire rating for any fire barrier in any fire zone forming a part of the boundary of the fire area. The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of fire zones in Fire Area CS-19 are addressed in Deviation Request 6, as well as, by some fire hazards analysis for specific configurations. Any fire zones for which specific fire hazards analysis have been prepared are identified on the drawings contained in Section 8.0 of this document. Any restrictions applicable to a particular fire zone are described in the deviation requests or fire hazards analyses referenced for that fire zone.

6.2.35.4 Fire Detection/Suppression in the Fire Area

Fire Area CS-19 is equipped with ionization smoke detection which alarms in the main control room. The fire area does not have an automatic suppression system due to the nature of the electrical equipment in the room. However, a manual hose station and portable fire extinguishers are located nearby.

6.2.35.5 Consequences of a Fire in Fire Area CS-19

In the event of a fire in Fire Area CS-19, Safe Shutdown Path 1 systems and components will be available for safe shutdown. Electrical cabling located in Fire Area CS-19 associated with Path 1 safe shutdown systems and components has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. This is accomplished using one of the methods outlined in Section 6.1.2.4.

A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.35.5.1 Fire Zone 0-28N - U1 Div II 125V Battery Room

There are no Category I components located in Fire Zone 0-28N.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-28N is addressed in Deviation Request 6. In addition, the fire hazards analysis identified on Drawing E-205993 in Section 8.0 affects the combustible configuration in this fire zone.

6.2.35.6 Special Features

There are no special features in Fire Area CS-19. There are no manual actions required.

6.2.35.7 Deviation Requests Affecting Fire Area CS-19

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area CS-19.

6.2.36 Fire Area CS-20

6.2.36.1 General Description

Fire Area CS-20 is the Unit 2 Equipment Room which contains Division I load centers, battery chargers and distribution panels. It is located on Elevation 771'-0" of the control structure. The location of this fire area is shown on Drawing E-205993 in Section 8.0. Safe Shutdown Path 3 is available for use in the event of a fire in Fire Area CS-20. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.36.2 Fire Zones

The following fire zone is located in Fire Area CS-20:

Fire Zone	Description
0-28A-II	U2 Div I Equipment Room

6.2.36.3 Combustible Loading

The combustible loading is relatively low in this fire area and any fire initiated within the fire area would be contained by the construction of the fire area boundary. The principle combustibles in this area are cables in electrical panels. There is no mechanical equipment (i.e., pumps, valves, etc.) in this fire area.

The fire rating of the fire area is established based on the lowest fire rating for any fire barrier in any fire zone forming a part of the boundary of the fire area. The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of fire zones in Fire Area CS-20 are addressed in Deviation Requests 6 and 15, as well as, by some fire hazards analysis for specific configurations. Any fire zones for which specific fire hazards analysis have been prepared are identified on the drawings contained in Section 8.0 of this document. Any restrictions applicable to a particular fire zone are described in the deviation requests or fire hazards analyses referenced for that fire zone.

6.2.36.4 Fire Detection/Suppression in the Fire Area

Fire Area CS-20 has ionization smoke detection which alarms in the main control room. The fire area does not have automatic suppression due to the nature of the electrical equipment in the area. However, a manual hose station and portable fire extinguishers are located nearby.

Deviation Request No. 15 further addresses the lack of an automatic suppression system in this fire area.

6.2.36.5 Consequences of a Fire in Fire Area CS-20

In the event of a fire in Fire Area CS-20, Safe Shutdown Path 3 systems and components will be available for safe shutdown. Electrical cabling located in Fire Area CS-20 associated with Path 3 safe shutdown systems and components has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. This is accomplished using one of the methods outlined in Section 6.1.2.4.

A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.36.5.1 Fire Zone 0-28A-II - U2 Div I Equipment Room

The following Category I components are located in Fire Zone 0-28A-II:

- 125V DC Distribution Panels (2D624 and 2D644) - This 125 VDC Electrical Distribution Panel is enclosed in a 1 hour rated fire barrier.

- Core Spray System and HPCI Relay Logic (2D624 Breaker 01) – This sub-fused circuit is contained within 2D624 which is enclosed in a 1 hour rated fire barrier.

- RCIC and RHR Relay Logic, HPCI Control Power (2D624 Breaker 06) – This sub-fused circuit is contained within 2D624 which is enclosed in a 1 hour rated fire barrier.

- ADS Relay Logic, ADS Valves, Backup SCRAM Valve (2D624 Breaker 11) – This sub-fused circuit is contained within 2D624 which is enclosed in a 1 hour rated fire barrier.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-28A-II is addressed in Deviation Requests 6 and 15. In addition, the fire hazards analysis identified on Drawing E-205993 in Section 8.0 affects the combustible configuration in this fire zone.

6.2.36.6 Special Features

The following manual action may be required in the event of a fire in this fire area when the fire damage is in the specific fire zone listed below:

1. Should a fire in Fire Zone 0-28A-II result in loss of Reactor Recirculation Pump 2P401A and/or 2P401B trip capability, trip pump 2P401A and/or 2P401B by manually tripping the Motor-Generator set supply breaker 2A10110 and/or 2A10210.

6.2.36.7 Deviation Requests Affecting Fire Area CS-20

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area CS-20.

6.2.37 Fire Area CS-21

6.2.37.1 General Description

Fire Area CS-21 is the Unit 2 Division I 125V Battery Room located on Elevation 771'-0" of the control structure. The location of this fire area is shown on Drawing E-205993 in Section 8.0. Safe Shutdown Path 3 would be available for use in the event of a fire in Fire Area CS-21. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.37.2 Fire Zones

The following fire zone is located in Fire Area CS-21:

Fire Zone	Description
0-28T	U2 Div I 125V Battery Room

6.2.37.3 Combustible Loading

The combustible loading in Fire Area CS-21 is well below the fire barrier rating of the fire area boundary. The principle contributors to the combustible loading in this fire area are cables and the battery cell materials. There is no mechanical equipment (i.e., pumps, valves, etc.) in this fire area.

The fire rating of the fire area is established based on the lowest fire rating for any fire barrier in any fire zone forming a part of the boundary of the fire area. The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of fire zones in Fire Area CS-21 are addressed in Deviation Request 6, as well as, by some fire hazards analysis for specific configurations. Any fire zones for which specific fire hazards analysis have been prepared are identified on the drawings contained in Section 8.0 of this document. Any restrictions applicable to a particular fire zone are described in the deviation requests or fire hazards analyses referenced for that fire zone.

6.2.37.4 Fire Detection/Suppression in the Fire Area

Fire Area CS-21 is equipped with ionization smoke detection which alarms in the main control room. The fire area does not have an automatic suppression system due to the nature of the electrical equipment in the room. However, a manual hose station and portable fire extinguishers are located nearby.

6.2.37.5 Consequences of a fire in Fire Area CS-21

In the event of a fire in Fire Area CS-21, Safe Shutdown Path 3 systems and components will be available for safe shutdown. Electrical cabling located in Fire Area CS-21 associated with Path 3 safe shutdown systems and components has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. This is accomplished using one of the methods outlined in Section 6.1.2.4.

A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.37.5.1 Fire Zone 0-28T - U2 Div I 125V Battery Room

There are no Category I components located in Fire Zone 0-28T.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-28T is addressed in Deviation Request 6. In addition, the fire hazards analysis identified on Drawing E-205993 in Section 8.0 affects the combustible configuration in this fire zone.

6.2.37.6 Special Features

There are no special features in Fire Area CS-21. There are no manual actions required.

6.2.37.7 Deviation Requests Affecting Fire Area CS-21

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area CS-21.

6.2.38 Fire Area CS-22

6.2.38.1 General Description

Fire Area CS-22 is the Unit 2 Division II 125V Battery Room located on Elevation 771'-0" of the control structure. The location of this fire area is shown on Drawing E-205993 in Section 8.0. Safe Shutdown Path 1 would be available for use in the event of a fire in Fire Area CS-22. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.38.2 Fire Zones

The following fire zone is located in Fire Area CS-22:

Fire Zone	Description
0-28D	U2 Div II 125V Battery Room

6.2.38.3 Combustible Loading

The combustible loading in Fire Area CS-22 is well below the fire barrier rating of the fire area boundary. The principle contributors to the combustible loading in this fire area are cables and the battery cell material. There is no mechanical equipment (i.e., pumps, valves, etc.) in this fire area.

The fire rating of the fire area is established based on the lowest fire rating for any fire barrier in any fire zone forming a part of the boundary of the fire area. The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of fire zones in Fire Area CS-22 are addressed in Deviation Request 6, as well as, by some fire hazards analysis for specific configurations. Any fire zones for which specific fire hazards analysis have been prepared are identified on the drawings contained in Section 8.0 of this document. Any restrictions applicable to a particular fire zone are described in the deviation requests or fire hazards analyses referenced for that fire zone.

6.2.38.4 Fire Detection/Suppression in the Fire Area

Fire Area CS-22 is equipped with ionization smoke detection which alarms in the main control room. The fire area does not have an automatic suppression system due to the nature of the electrical equipment in the room. However, a manual hose station and portable fire extinguishers are located nearby.

6.2.38.5 Consequences of a Fire in Fire Area CS-22

In the event of a fire in Fire Area CS-22, Safe Shutdown Path 1 systems and components will be available for safe shutdown. Electrical cabling located in Fire Area CS-22 associated with Path 1 safe shutdown systems and components has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. This is accomplished using one of the methods outlined in Section 6.1.2.4.

A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.38.5.1 Fire Zone 0-28D - U2 Div II 125V Battery Room

There are no Category I components located in Fire Zone 0-28D.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-28D is addressed in Deviation Request 6. In addition, the fire hazards analysis identified on Drawing E-205993 in Section 8.0 affects the combustible configuration in this fire zone.

6.2.38.6 Special Features

There are no special features in Fire Area CS-22. There are no manual actions required.

6.2.38.7 Deviation Requests Affecting Fire Area CS-22

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area CS-22.

6.2.39 Fire Area CS-23

6.2.39.1 General Description

Fire Area CS-23 is the Unit 2 Division I 250V Battery Room located on Elevation 771'-0" of the control structure. The location of this fire area is shown on Drawing E-205993 in Section 8.0. Safe Shutdown Path 3 would be available for use in the event of a fire in Fire Area CS-23. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.39.2 Fire Zones

The following fire zone is located in Fire Area CS-23:

Fire Zone	Description
0-28F	U2 Div I 250V Battery Room

6.2.39.3 Combustible Loading

The combustible loading in Fire Area CS-23 is well below the fire barrier rating of the fire area boundary. The principle contributors to the combustible loading in this fire area are cables and the battery cell material. There is no mechanical equipment (i.e., pumps, valves, etc.) in this fire area.

The fire rating of the fire area is established based on the lowest fire rating for any fire barrier in any fire zone forming a part of the boundary of the fire area. The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of fire zones in Fire Area CS-23 are addressed in Deviation Request 6, as well as, by some fire hazards analysis for specific configurations. Any fire zones for which specific fire hazards analysis have been prepared are identified on the drawings contained in Section 8.0 of this document. Any restrictions applicable to a particular fire zone are described in the deviation requests or fire hazards analyses referenced for that fire zone.

6.2.39.4 Fire Detection/Suppression in the Fire Area

Fire Area CS-23 is equipped with ionization smoke detection which alarms in the main control room. The fire area does not have an automatic suppression system due to the nature of the electrical equipment in the room. However, a manual hose station and portable fire extinguishers are located nearby.

6.2.39.5 Consequences of a Fire in Fire Area CS-23

In the event of a fire in Fire Area CS-23, Safe Shutdown Path 3 systems and components will be available for safe shutdown. Electrical cabling located in Fire Area CS-23 associated with Path 3 safe shutdown systems and components has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. This is accomplished using one of the methods outlined in Section 6.1.2.4.

A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.39.5.1 Fire Zone 0-28F - U2 Div I 250V Battery Room

There are no Category I components located in Fire Zone 0-28F.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-28F is addressed in Deviation Request 6. In addition, the fire hazards analysis identified on Drawing E-205993 in Section 8.0 affects the combustible configuration in this fire zone.

6.2.39.6 Special Features

The following manual action may be required in the event of a fire in this fire area when the fire damage is in the specific fire zone listed below:

1. Should a fire in Fire Zone 0-28F result in loss of Reactor Recirculation Pump 2P401A and/or 2P401B trip capability, trip pump 2P401A and/or 2P401B by manually tripping the Motor-Generator set supply breaker 2A10110 and/or 2A10210,

6.2.39.7 Deviation Requests Affecting Fire Area CS-23

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area CS-23.

6.2.40 Fire Area CS-24

6.2.40.1 General Description

Fire Area CS-24 is the Unit 1 Equipment Room which contains Division I load centers, battery chargers and distribution panels. It is located on Elevation 771'-0" of the control structure. The location of this fire area is shown on Drawing E-205993 in Section 8.0. Safe Shutdown Path 3 is available for use in the event of a fire in Fire Area CS-24. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.40.2 Fire Zones

The following fire zone is located in Fire Area CS-24:

Fire Zone	Description
0-28-B-11	U1 Div I Equipment Room

6.2.40.3 Combustible Loading

The combustible loading is relatively low in this fire area and any fire initiated within the fire area would be contained by the construction of the fire area boundary. The principle combustibles in this area are cables in electrical panels. There is no mechanical equipment (i.e., pumps, valves, etc.) in this fire area.

The fire rating of the fire area is established based on the lowest fire rating for any fire barrier in any fire zone forming a part of the boundary of the fire area. The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of fire zones in Fire Area CS-24 are addressed in Deviation Requests 6 and 8, as well as, by some fire hazards analysis for specific configurations. Any fire zones for which specific fire hazards analysis have been prepared are identified on the drawings contained in Section 8.0 of this document. Any restrictions applicable to a particular fire zone are described in the deviation requests or fire hazards analyses referenced for that fire zone.

6.2.40.4 Fire Detection/Suppression in the Fire Area

Fire Area CS-24 has ionization smoke detection which alarms in the main control room. The fire area does not have automatic suppression due to the nature of the electrical equipment in the area. However, a manual hose station and portable fire extinguishers are located nearby.

Deviation Request No. 8 further addresses the lack of an automatic fire suppression system in this fire area.

6.2.40.5 Consequences of a Fire in Fire Area CS-24

In the event of a fire in Fire Area CS-24, Safe Shutdown Path 3 systems and components will be available for safe shutdown. Electrical cabling located in Fire Area CS-24 associated with Path 3 safe shutdown systems and components has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. This is accomplished using one of the methods outlined in Section 6.1.2.4.

A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.40.5.1 Fire Zone 0-28B-II - U1 Div I Equipment Room

The following Category I components are located in Fire Zone 0-28B-II:

- 125V DC Distribution Panels (1D624 and 1D644) - This 125 VDC Electrical Distribution Panel is enclosed in a 1 hour rated fire barrier.
- 125V DC Distribution Panels (1D625 and 1D645) - This component is required for offsite power. Offsite power is not used for shutdown in Fire Area CS-24.

- Core Spray System and HPCI Relay Logic (1D624 Breaker 01) – This sub-fused circuit is contained within 1D624 which is enclosed in a 1 hour rated fire barrier.

- RCIC and RHR Relay Logic, HPCI Control Power (1D624 Breaker 06) – This sub-fused circuit is contained within 1D624 which is enclosed in a 1 hour rated fire barrier.

- ADS Relay Logic, ADS Valves, Backup SCRAM Valve (1D624 Breaker 11) – This sub-fused circuit is contained within 1D624 which is enclosed in a 1 hour rated fire barrier.

- 4.16 KV Bus 1A202 Breaker Control (1D624 Breaker 34) – This sub-fused circuit is contained within 1D624 which is enclosed in a 1 hour rated fire barrier.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-28B-II is addressed in Deviation Requests 6 and 8. In addition, the fire hazards analysis identified on Drawing E-205993 in Section 8.0 affects the combustible configuration in this fire zone.

6.2.40.6 Special Features

The following manual actions may be required in the event of a fire in this fire area when the fire damage is in the specific fire zone listed below:

1. Should a fire in Fire Zone 0-28B-II result in loss of Reactor Recirculation Pump 1P401A and/or 1P401B trip capability, trip pump 1P401A and/or 1P401B by manually tripping the Motor-Generator set supply breaker 1A10110 and/or 1A10210.

6.2.40.7 Deviation Requests Affecting Fire Area CS-24

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area CS-24.

6.2.41 Fire Area CS-25

6.2.41.1 General Description

Fire Area CS-25 is the Unit 1 Division I 250V Battery Room located on Elevation 771'-0" of the control structure. The location of this fire area is shown on Drawing E-205993 in Section 8.0. Safe Shutdown Path 3 is available for use in the event of a fire in Fire Area CS-25. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.41.2 Fire Zones

The following fire zone is located in Fire Area Area CS-25:

Fire Zone	Description
0-28I	U1 Div I 250V Battery Room

6.2.41.3 Combustible Loading

The combustible loading in Fire Area CS-25 is well below the fire barrier rating of the fire area boundary. The principle contributors to the combustible loading in this fire area are cables and the battery cell material. There is no mechanical equipment (i.e., pumps, valves, etc.) in this fire area.

The fire rating of the fire area is established based on the lowest fire rating for any fire barrier in any fire zone forming a part of the boundary of the fire area. The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of fire zones in Fire Area CS-25 are addressed in Deviation Request 6, as well as, by some fire hazards analysis for specific configurations. Any fire zones for which specific fire hazards analysis have been prepared are identified on the drawings contained in Section 8.0 of this document. Any restrictions applicable to a particular fire zone are described in the deviation requests or fire hazards analyses referenced for that fire zone.

6.2.41.4 Fire Detection/Suppression in the Fire Area

Fire Area CS-25 is equipped with ionization smoke detection which alarms in the main control room. The fire area does not have an automatic suppression system due to the nature of the electrical equipment in the room. However, a manual hose station and portable fire extinguishers are located nearby.

6.2.41.5 Consequences of a Fire in Fire Area CS-25

In the event of a fire in Fire Area CS-25, Safe Shutdown Path 3 systems and components will be available for safe shutdown. Electrical cabling located in Fire Area CS-25 associated with Path 3 safe shutdown systems and components has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. This is accomplished using one of the methods outlined in Section 6.1.2.4.

A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.41.5.1 Fire Zone 0-28I - U1 Div I 250V Battery Room

There are no Category I components located in Fire Zone 0-28I.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-28I is addressed in Deviation Request 6. In addition, the fire hazards analysis identified on Drawing E-205993 in Section 8.0 affects the combustible configuration in this fire zone.

6.2.41.6 Special Features

The following manual action may be required in the event of a fire in this fire area when the fire damage is in the specific fire zone listed below:

1. Should a fire in Fire Zone 0-28I result in loss of Reactor Recirculation Pump 1P401A and/or 1P401B trip capability, trip pump 1P401A and/or 1P401B by manually tripping the Motor-Generator set supply breaker 1A10110 and/or 1A10210.

6.2.41.7 Deviation Requests Affecting Fire Area CS-25

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area CS-25.

6.2.42 Fire Area CS-26

6.2.42.1 General Description

Fire Area CS-26 is the Unit 1 Division I 125V Battery Room located on Elevation 771'-0" of the control structure. The location of this fire area is shown on Drawing E-205993 in Section 8.0. Safe Shutdown Path 3 would be available for use in the event of a fire in Fire Area CS-26. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.42.2 Fire Zones

The following fire zone is located in Fire Area CS-26:

Fire Zone	**Description**
0-28K	U1 Div I 125V Battery Room

6.2.42.3 Combustible Loading

The combustible loading in Fire Area CS-26 is well below the fire barrier rating of the fire area boundary. The principle contributors to the combustible loading in this fire area are cables battery cell material. There is no mechanical equipment (i.e., pumps, valves, etc.) in this fire area.

The fire rating of the fire area is established based on the lowest fire rating for any fire barrier in any fire zone forming a part of the boundary of the fire area. The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of fire zones in Fire Area CS-26 are addressed in Deviation Request 6, as well as, by some fire hazards analysis for specific configurations. Any fire zones for which specific fire hazards analysis have been prepared are identified on the drawings contained in Section 8.0 of this document. Any restrictions applicable to a particular fire zone are described in the deviation requests or fire hazards analyses referenced for that fire zone.

6.2.42.4 Fire Detection/Suppression in the Fire Area

Fire Area CS-26 is equipped with ionization smoke detection which alarms in the main control room. The fire area does not have an automatic suppression system due to the nature of the electrical equipment in the room. However, a manual hose station and portable fire extinguishers are located nearby.

6.2.42.5 Consequences of a Fire in Fire Area CS-26

In the event of a fire in Fire Area CS-26, Safe Shutdown Path 3 systems and components will be available for safe shutdown. Electrical cabling located in Fire Area CS- 26 associated with Path 3 safe shutdown systems and components has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. This is accomplished using one of the methods outlined in Section 6.1.2.4.

A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.42.5.1 Fire Zone 0-28K - U1 Div I 125V Battery Room

There are no Category I components located in Fire Zone 0-28K.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-28K is addressed in Deviation Request 6. In addition, the fire hazards analysis identified on Drawing E-205993 in Section 8.0 affects the combustible configuration in this fire zone.

6.2.42.6 Special Features

There are no special features in Fire Area CS-26. There are no manual actions required.

6.2.42.7 Deviation Requests Affecting Fire Area CS-26

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area CS-26.

6.2.43 Fire Area CS-27

6.2.43.1 General Description

Fire Area CS-27 is the Unit 1 Division I 125V Battery Room located on Elevation 771'-0" of the control structure. The location of this fire area is shown on Drawing E-205993 in Section 8.0. Safe Shutdown Path 3 would be available for use in the event of a fire in Fire Area CS-27. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.43.2 Fire Zones

The following fire zone is located in Fire Area CS-27:

Fire Zone	Description
0-28L	U1 Div I 125V Battery Room

6.2.43.3 Combustible Loading

The combustible loading in Fire Area CS-27 is well below the fire barrier rating of the fire area boundary. The principle contributors to the combustible loading in this fire area are cables and the battery cell material. There is no mechanical equipment (i.e., pumps, valves, etc.) in this fire area.

The fire rating of the fire area is established based on the lowest fire rating for any fire barrier in any fire zone forming a part of the boundary of the fire area. The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of fire zones in Fire Area CS-27 are addressed in Deviation Request 6, as well as, by some fire hazards analysis for specific configurations. Any fire zones for which specific fire hazards analysis have been prepared are identified on the drawings contained in Section 8.0 of this document. Any restrictions applicable to a particular fire zone are described in the deviation requests or fire hazards analyses referenced for that fire zone.

6.2.43.4 Fire Detection/Suppression in the Fire Area

Fire Area CS-27 is equipped with ionization smoke detection which alarms in the main control room. The fire area does not have an automatic suppression system due to the nature of the electrical equipment in the room. However, a manual hose station and portable fire extinguishers are located nearby.

6.2.43.5 Consequences of a Fire in Fire Area CS-27

In the event of a fire in Fire Area CS-27, Safe Shutdown Path 3 systems and components will be available for safe shutdown. Electrical cabling located in Fire Area CS-27 associated with Path 3 safe shutdown systems and components has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. This is accomplished using one of the methods outlined in Section 6.1.2.4.

A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.43.5.1 Fire Zone 0-28L - U1 Div I 125V Battery Room

There are no Category I components located in Fire Zone 0-28L.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-28L is addressed in Deviation Request 6. In addition, the fire hazards analysis identified on Drawing E-205993 in Section 8.0 affects the combustible configuration in this fire zone.

6.2.43.6 Special Features

There are no special features in Fire Area CS-27. There are no manual actions required.

6.2.43.7 Deviation Requests Affecting Fire Area CS-27

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area CS-27.

6.2.44 Fire Area CS-28

6.2.44.1 General Description

Fire Area CS-28 is the Unit 1 Lower Relay Room located on Elevation 698'-0" of the control structure. This fire area is a single room fire zone which primarily contains Division II equipment. The location of this fire area is shown on Drawing E-205988 in Section 8.0. Safe Shutdown Path 1 would be available for use in the event of a fire in Fire Area CS-28. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.44.2 Fire Zones

The following fire zone is located in Fire Area CS-28:

Fire Zone	**Description**
0-24D	U1 Div II Lower Relay Room

6.2.44.3 Combustible Loading

Fire Zone 0-24D is its own Fire Area CS-28. The principle combustibles in Fire Zone 0-24D are cables located in electrical panels and underfloor ducts and a limited amount of non-metallic PGCC floor paneling. There is no mechanical equipment (i.e. pumps, valves, etc.) in Fire Zone 0-24D. Fire Zone 0-24D is constructed in a manner that is similar to the PGCC design originally supplied by General Electric and described in the GE Fire Hazards Analysis in Licensing Topical Report NEDO 10466A dated February 1979. This NEDO Document describes the separation of Class 1E systems in the floor with 3/16" steel barriers, utilization of semi-permanent fire stop material, provision of heat detectors in the PGCC flooring and rooms and unitized halon system in the PGCC underfloor. Based on these characteristics the NEDO Document provides a reasonable basis for excluding the cable insulation in the PGCC underfloor area from the combustible loading for this fire zone. Due to a difference in the amount of non-metallic floor paneling used in Fire Zone 0-24D as compared to the NEDO Document, the cable insulation in the underfloor area has been included in the combustible loading analysis for Fire Zone 0-24D. Additional fire suppression beyond that discussed in the NEDO Document is provided in Fire Zone 0-24D. Fire Zone 0-24D includes a CO_2 automatic total room flooding system. This additional fire suppression is available to rapidly extinguish any fire that might originate in Fire Zone 0-24D.

The fire area boundaries are adequate to contain the effects of any fire originating in Fire Zone 0-24D. The level of combustible in Fire Zone 0-24D, including the contribution from the underfloor cable insulation in the PGCC floor and the non-metallic PGCC floor paneling, is maintained to assure that the total combustible loading does not exceed the fire resistance rating for the boundaries of Fire Area CS-28. Any specific Fire Hazard Analyses applicable to the fire zone in this fire area are identified on the Drawings in Section 8.0 and referenced below along with any other combustible restrictions.

6.2.44.4 Fire Detection/Suppression in the Fire Area

Fire Area CS-28 is equipped with ionization detectors and heat detectors. The fire area has a halon extinguishing system located in the PGCC modules which protect the safety related cabinets with the exception of panels 1C636 and 1C699B. The room is also equipped with an automatic total flooding CO_2 system. In addition, a manual hose station and portable fire extinguishers are located nearby.

6.2.44.5 Consequences of a Fire in Fire Area CS-28

In the event of a fire in Fire Area CS-28, Safe Shutdown Path 1 systems and components will be available for safe shutdown. Electrical cabling located in Fire Area CS-28 associated with Path 1 safe shutdown systems and components has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. This is accomplished using one of the methods outlined in Section 6.1.2.4.

A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.44.5.1 Fire Zone 0-24D - U1 Div II Lower Relay Room

The following Category I components are located in Fire Zone 0-24D:

- Unit 1 HPCI Division II Automatic Actuation Logic – This component is the automatic initiation logic for the HPCI System. Automatic initiation of safety systems in support of post-fire safe shutdown is not required. The automatic initiation logic is evaluated for the potential affects of a spurious initiation of the system. A fire induced spurious start of the HPCI System in conjunction with the loss of the HPCI high water level trip in Fire Area CS-28 can be mitigated by closing the HPCI Inboard Steam Supply Isolation Valve (HV-E41-1F002).

- Unit 1 RCIC Division II Automatic Actuation Logic – This component is the automatic initiation logic for the RCIC System. Automatic initiation of safety systems in support of post-fire safe shutdown is not required. The automatic initiation logic is evaluated for the potential affects of a spurious initiation of the system. A fire induced spurious start of the RCIC System in conjunction with the loss of the RCIC high water level trip in Fire Area CS-28 can be mitigated by closing the RCIC Outboard Steam Line Isolation Valve (HV-E51-1F008).

6.2.44.6 Special Features

The following manual actions may be required in the event of a fire in this fire area when the fire damage is in the specific fire zone listed below:

1. Should a fire in Fire Zone 0-24D result in loss of Unit 1 reactor scram capability and/or scram discharge volume isolation capability from the Control Room, scram Unit 1 and isolate the scram discharge volume by manually venting the instrument air header in the Unit 1 Reactor Building.

2. Should a fire in Fire Zone 0-24D result in loss of Reactor Recirculation Pump 1P401A and/or 1P401B trip capability, trip pump 1P401A and/or 1P401B from the Control Room.

3. Should a fire in Fire Zone 0-24D result in spurious Unit 1 ADS or SRV actuations as indicated by low RPV pressure and/or level, the capability to further depressurize the reactor using Unit 1 Division I ADS and to inject water into the reactor using Unit 1 Division I Core Spray remains available from the Control Room.

4. Should a fire in Fire Zone 0-24D spuriously open the Unit 1 RHR Injection Isolation Valve HV-151-F015A, close the RHR Injection Control Valve HV-151-F017A from the Control Room.

5. Should a fire in Fire Zone 0-24D result in Unit 1 HPCI spuriously starting while disabling the 54” high water level trip, manually take control of HPCI from the Control Room or close the HPCI Turbine Steam Supply Inboard Isolation Valve HV-155-F002.

6. Should a fire in Fire Zone 0-24D result in loss of the Unit 2 RHR Pump 2P202A start capability from the Control Room, initiate RHR Pump 2P202A operation from the Unit 2 Remote Shutdown Panel and open the RHR Loop A Return Valve to Suppression Pool HV-251-F024A.

6.2.44.7 Deviation Requests Affecting Fire Area CS-28

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area CS-28.

6.2.45 Fire Area CS-29

6.2.45.1 General Description

Fire Area CS-29 is the Unit 2 Division II Lower Cable Spreading Room at Elevation 714'-0" of the control structure. Its location is shown on Drawing E-205989 in Section 8.0. Safe Shutdown Path 1 would be available for use in the event of a fire in Fire Area CS-29. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.45.2 Fire Zones

The following fire zone is located in Fire Area CS-29:

Fire Zone	Description
0-25A	U2 Div II Lower Cable Spreading Room

6.2.45.3 Combustible Loading

The principle combustibles in Fire Area CS-29 are cables in cable tray. The combustible loading in this area is bounded by the construction of the fire area boundary. There is no mechanical equipment (i.e., pumps, valves, etc.) in this fire area. Any specific Fire Hazard Analyses applicable to the fire zone in this fire area are identified on the Drawings in Section 8.0 and referenced below along with any other combustible restrictions.

6.2.45.4 Fire Detection/Suppression in the Fire Area

Fire Area CS-29 is equipped with ionization type smoke detectors and heat detectors. The entire area is covered by a pre-action sprinkler system. Manual hose reels and portable fire extinguishers are located nearby.

6.2.45.5 Consequences of a Fire in Fire Area CS-29

In the event of a fire in Fire Area CS-29, Safe Shutdown Path 1 systems and components will be available for safe shutdown. Electrical cabling located in Fire Area CS-29 associated with Path 1 safe shutdown systems and components has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. This is accomplished using one of the methods outlined in Section 6.1.2.4.

A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.45.5.1 Fire Zone 0-25A - U2 Div II Lower Cable Spreading Room

There are no Category I components located in Fire Zone 0-25A.

6.2.45.6 Special Features

The following manual actions may be required in the event of a fire in this fire area when the fire damage is in the specific fire zone listed below:

1. Should a fire in Fire Zone 0-25A result in loss of Reactor Recirculation Pump 2P401A and/or 2P401B trip capability, trip pump 2P401A and/or 2P401B by manually tripping the Motor-Generator set supply breaker 2A10110 and/or 2A10210.

2. Should a fire in Fire Zone 0-25A result in spurious Unit 2 ADS or SRV actuations as indicated by low RPV pressure and/or level, the capability to further depressurize the reactor using Unit 2 Division I ADS and to inject water into the reactor using Unit 2 Division I Core Spray remains available from the Control Room.

3. Should a fire in Fire Zone 0-25A result in Unit 2 HPCI spuriously starting while disabling the 54” high water level trip, manually take control of HPCI from the Control Room or close the HPCI Turbine Steam Supply Inboard Isolation Valve HV-255-F002.

6.2.45.7 Deviation Requests Affecting Fire Area CS-29

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area CS-29.

6.2.46 Fire Area CS-30

6.2.46.1 General Description

Fire Area CS-30 is the Unit 1 Division II Lower Cable Spreading Room at Elevation 714'-0" of the control structure. Its location is shown on Drawing E-205989 in Section 8.0. Safe Shutdown Path 1 would be available for use in the event of a fire in Fire Area CS-30. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.46.2 Fire Zones

The following fire zone is located in Fire Area CS-30:

Fire Zone	Description
0-25E	U1 Div II Lower Cable Spreading Room

6.2.46.3 Combustible Loading

The principle combustibles in Fire Area CS-30 are cables in cable tray. The combustible loading in this area is bounded by the construction of the fire area boundary. There is no mechanical equipment (i.e., pumps, valves, etc.) in this fire area. Any specific Fire Hazard Analyses applicable to the fire zone in this fire area are identified on the Drawings in Section 8.0 and referenced below along with any other combustible restrictions.

6.2.46.4 Fire Detection/Suppression in the Fire Area

Fire Area CS-30 is equipped with ionization type smoke detectors and heat detectors. The combustibles in the area are covered by a pre-action sprinkler system. Manual hose reels and portable fire extinguishers are located nearby.

6.2.46.5 Consequences of a Fire in Fire Area CS-30

In the event of a fire in Fire Area CS-30, Safe Shutdown Path 1 systems and components will be available for safe shutdown. Electrical cabling located in Fire Area CS-30 associated with Path 1 safe shutdown systems and components has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. This is accomplished using one of the methods outlined in Section 6.1.2.4.

A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.46.5.1 Fire Zone 0-25E - U1 Div II Lower Cable Spreading Room

There are no Category I components located in Fire Zone 0-25E.

6.2.46.6 Special Features

The following manual actions may be required in the event of a fire in this fire area when the fire damage is in the specific fire zone listed below:

1. Should a fire in Fire Zone 0-25E result in loss of Unit 1 reactor scram capability and/or scram discharge volume isolation capability from the Control Room, scram Unit 1 and isolate the scram discharge volume by manually venting the instrument air header in the Unit 1 Reactor Building.

2. Should a fire in Fire Zone 0-25E result in loss of Reactor Recirculation Pump 1P401A and/or 1P401B trip capability, trip pump 1P401A and/or 1P401B by manually tripping the Motor-Generator set output breakers.

3. Should a fire in Fire Zone 0-25E result in Unit 1 HPCI spuriously starting while disabling the 54” high water level trip, manually take control of HPCI from the Control Room or close the HPCI Turbine Steam Supply Inboard Isolation Valve HV-155-F002.

4. Should a fire in Fire Zone 0-25E spuriously open the Unit 1 RHR Injection Isolation Valve HV-151-F015A, close the RHR Injection Control Valve HV-151-F017A from the Control Room.

6.2.46.7 Deviation Requests Affecting Fire Area CS-30

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area CS-30.

6.2.47 Fire Area CS-31

6.2.47.1 General Description

Fire Area CS-31 is the Unit 2 Upper Relay Room located on Elevation 754'-0" of the control structure. This fire area is a single room fire zone which primarily contains Division I equipment. The location of this fire area is shown on Drawing E-205992 in Section 8.0. Safe Shutdown Path 3 would be available for use in the event of a fire in Fire Area CS-31. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.47.2 Fire Zones

The following fire zone is located in Fire Area CS-31:

Fire Zone	Description
0-27A	U2 Div I Upper Relay Room

6.2.47.3 Combustible Loading

Fire Zone 0-27A is its own Fire Area CS-31. The principle combustibles in Fire Zone 0-27A are cables located in electrical panels and underfloor ducts and a limited amount of non-metallic PGCC floor paneling. There is no mechanical equipment (i.e. pumps, valves, etc.) in Fire Zone 0-27A. Fire Zone 0-27A is constructed in a manner that is similar to the PGCC design originally supplied by General Electric and described in the GE Fire Hazards Analysis in Licensing Topical Report NEDO 10466A dated February 1979. This NEDO Document describes the separation of Class 1E systems in the floor with 3/16” steel barriers, utilization of semi-permanent fire stop material, provision of heat detectors in the PGCC flooring and rooms and unitized halon system in the PGCC underfloor. Based on these characteristics the NEDO Document provides a reasonable basis for excluding the cable insulation in the PGCC underfloor area from the combustible loading for this fire zone. Due to a difference in the amount of non-metallic floor paneling used in Fire Zone 0-27A as compared to the NEDO Document, the cable insulation in the underfloor area has been included in the combustible loading analysis for Fire Zone 0-27A. Additional fire suppression beyond that discussed in the NEDO Document is provided in Fire Zone 0-27A. Fire Zone 0-27A includes a CO_2 automatic total room flooding system. This additional fire suppression is available to rapidly extinguish any fire that might originate in Fire Zone 0-27A.

The fire area boundaries are adequate to contain the effects of any fire originating in Fire Zone 0-27A. The level of combustible in Fire Zone 0-27A, including the contribution from the underfloor cable insulation in the PGCC floor and the non-metallic PGCC floor paneling, is maintained to assure that the total combustible loading does not exceed the fire resistance rating for the boundaries of Fire Area CS-31.

The fire rating of the fire area is established based on the lowest fire rating for any fire barrier in any fire zone forming a part of the boundary of the fire area. The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-27A is affected by the fire hazards analysis referenced on the drawings in Section 8.0 and referenced below along with any other combustible restrictions.

6.2.47.4 Fire Detection/Suppression in the Fire Area

Fire Area CS-31 is equipped with ionization detectors and heat detectors. The fire area has a halon extinguishing system located in the PGCC modules which protect the safety related cabinets with the exception of panels 2C635 and 2C699A. The room is also equipped with an automatic total flooding CO_2 system. In addition, a manual hose station and portable fire extinguishers are located nearby.

6.2.47.5 Consequences of a Fire in Fire Area CS-31

In the event of a fire in Fire Area CS-31, Safe Shutdown Path 3 systems and components will be available for safe shutdown. Electrical cabling located in Fire Area CS-31 associated with Path 3 safe shutdown systems and components has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. This is accomplished using one of the methods outlined in Section 6.1.2.4.

A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.47.5.1 Fire Zone 0-27A - U2 Div I Upper Relay Room

The following Category I components are located in Fire Zone 0-27A:

- Unit 2 HPCI Division I Automatic Actuation Logic – This component is the automatic initiation logic for the HPCI System. Automatic initiation of safety systems in support of post-fire safe shutdown is not required. The automatic initiation logic is evaluated for the potential affects of a spurious initiation of the system. A fire induced spurious start of the HPCI System in conjunction with the loss of the HPCI high water level trip in Fire Area CS-31 can be mitigated by manually tripping HPCI from the Control Room.

- Unit 2 RCIC Division I Automatic Actuation Logic – This component is the automatic initiation logic for the RCIC System. Automatic initiation of safety systems in support of post-fire safe shutdown is not required. The automatic initiation logic is evaluated for the potential affects of a spurious initiation of the system. A fire induced spurious start of the RCIC System in conjunction with the loss of the RCIC high water level trip in Fire Area CS-31 can be mitigated by closing the RCIC Inboard Steam Supply Isolation Valve (HV-E51-2F007).

- Unit 2 RHR Automatic Actuation Logic (Cross Divisional) – This component is the cross divisional unit logic ties within the automatic initiation logic for the RHR System. It consists of the relays for the RHR preferred pump logic and the relays which control the Diesel Generator loading considerations between the same letter pumps on opposite units. Where fire induced damage can inhibit the starting of the required safe shutdown pump for a particular unit, the plant operator will take actions to trip pumps that are not required to be running and to start the required pumps.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-27A is affected by the fire hazards analysis identified on Drawing E-205992 in Section 8.0.

6.2.47.6 Special Features

The following manual actions may be required in the event of a fire in this fire area when the fire damage is in the specific fire zone listed below:

1. Should a fire in Fire Zone 0-27A result in loss of Unit 2 reactor scram capability and/or scram discharge volume isolation capability from the Control Room, scram Unit 2 and isolate the scram discharge volume by manually isolating and venting the instrument air header in the Unit 2 Reactor Building.

2. Should a fire in Fire Zone 0-27A result in loss of Reactor Recirculation Pump 2P401A and/or 2P401B trip capability, trip pump 2P401A and/or 2P401B from the Control Room.

3. Should a fire in Fire Zone 0-27A result in spurious Unit 2 ADS or SRV actuations as indicated by low RPV pressure and/or level, the capability to further depressurize the

reactor using Unit 2 Division II ADS and to inject water into the reactor using Unit 2 Division II Core Spray remains available from the Control Room.

4. Should a fire in Fire Zone 0-27A spuriously open the Unit 2 RHR Injection Isolation Valve HV-251-F015B, close the RHR Injection Control Valve HV-251-F017B from the Control Room.

5. Should a fire in Fire Zone 0-27A result in disabling the low condenser vacuum signal which prevents the Unit 2 MSIVs from closing on low main condenser vacuum, initiate isolation of the Main Steam Lines from the Control Room and verify isolation of the Main Steam Line Drains.

6.2.47.7 Deviation Requests Affecting Fire Area CS-31

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area CS-31.

6.2.48 Fire Area CS-32

6.2.48.1 General Description

Fire Area CS-32 is the Unit 2 Division I Upper Cable Spreading Room at Elevation 754'-0" of the control structure. Its location is shown on Drawing E-205992 in Section 8.0. Safe Shutdown Path 3 would be available for use in the event of a fire in Fire Area CS-32. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.48.2 Fire Zones

The following fire zone is located in Fire Area CS-32:

Fire Zone	Description
0-27B	U2 Div I Upper Cable Spreading Room

6.2.48.3 Combustible Loading

The principle combustibles in Fire Area CS-32 are cables in cable tray. The combustible loading in this area is bounded by the construction of the fire area boundary. There is no mechanical equipment (i.e. pumps, valves, etc.) in this fire area.

The fire rating of the fire area is established based on the lowest fire rating for any fire barrier in any fire zone forming a part of the boundary of the fire area. The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-27B is affected by the fire hazards analysis for specific configurations. Any fire zones for which specific fire hazards analysis have been prepared are identified on the drawings contained in Section 8.0 of this document. Any restrictions applicable to a particular fire zone are described in the deviation requests or fire hazards analyses referenced for that fire zone.

6.2.48.4 Fire Detection/Suppression in the Fire Area

Fire Area CS-32 is equipped with ionization type smoke detectors and heat detectors. The entire area is covered by a pre-action sprinkler system. Manual hose reels and portable fire extinguishers are located nearby.

6.2.48.5 Consequences of a Fire in Fire Area CS-32

In the event of a fire in Fire Area CS-32, Safe Shutdown Path 3 systems and components will be available for safe shutdown. Electrical cabling located in Fire Area CS-32 associated with Path 3 safe shutdown systems and components has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. This is accomplished using one of the methods outlined in Section 6.1.2.4.

A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.48.5.1 Fire Zone 0-27B - U2 Div I Upper Cable Spreading Room

There are no Category I components located in Fire Zone 0-27B.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-27B is affected by the fire hazards analysis identified on Drawing E-205992 in Section 8.0.

6.2.48.6 Special Features

The following manual actions may be required in the event of a fire in this fire area when the fire damage is in the specific fire zone listed below:

1. Should a fire in Fire Zone 0-27B result in loss of Reactor Recirculation Pump 2P401A and/or 2P401B trip capability, trip pump 2P401A and/or 2P401B by manually tripping the Motor-Generator set supply breaker 2A10110 and/or 2A10210.

2. Should a fire in Fire Zone 0-27B result in spurious Unit 2 ADS or SRV actuations as indicated by low RPV pressure and/or level, the capability to further depressurize the reactor using Unit 2 Division II ADS and to inject water into the reactor using Unit 2 Division II Core Spray remains available from the Control Room.

3. Should a fire in Fire Zone 0-27B spuriously open the Unit 2 RHR Injection Isolation Valve HV-251-F015B, close the RHR Injection Control Valve HV-251-F017B from the Control Room.

4. Should a fire in Fire Zone 0-27B result in disabling the low condenser vacuum signal which prevents the Unit 2 MSIVs from closing on low main condenser vacuum, initiate isolation of the Main Steam Lines from the Control Room and verify isolation of the Main Steam Line Drains.

6.2.48.7 Deviation Requests Affecting Fire Area CS-32

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area CS-32.

6.2.49 Fire Area CS-33

6.2.49.1 General Description

Fire Area CS-33 is the Unit 1 Upper Relay Room located on Elevation 754'-0" of the control structure. This fire area is a single room fire zone which primarily contains Division I equipment. The location of this fire area is shown on Drawing E-205992 in Section 8.0. Safe Shutdown Path 3 would be available for use in the event of a fire in Fire Area CS-33. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.49.2 Fire Zones

The following fire zone is located in Fire Area CS-33:

Fire Zone	Description
0-27E	U1 Div I Upper Relay Room

6.2.49.3 Combustible Loading

Fire Zone 0-27E is its own Fire Area CS-33. The principle combustibles in Fire Zone 0-27E are cables located in electrical panels and underfloor ducts and a limited amount of non-metallic PGCC floor paneling. There is no mechanical equipment (i.e. pumps, valves, etc.) in Fire Zone 0-27E. Fire Zone 0-27E is constructed in a manner that is similar to the PGCC design originally supplied by General Electric and described in the GE Fire Hazards Analysis in Licensing Topical Report NEDO 10466A dated February 1979. This NEDO Document describes the separation of Class 1E systems in the floor with 3/16” steel barriers, utilization of semi-permanent fire stop material, provision of heat detectors in the PGCC flooring and rooms and unitized halon system in the PGCC underfloor. Based on these characteristics the NEDO Document provides a reasonable basis for excluding the cable insulation in the PGCC underfloor area from the combustible loading for this fire zone. Due to a difference in the amount of non-metallic floor paneling used in Fire Zone 0-27E as compared to the NEDO Document, the cable insulation in the underfloor area has been included in the combustible loading analysis for Fire Zone 0-27E. Additional fire suppression beyond that discussed in the NEDO Document is provided in Fire Zone 0-27E. Fire Zone 0-27E includes a CO_2 automatic total room flooding system. This additional fire suppression is available to rapidly extinguish any fire that might originate in Fire Zone 0-27E.

The fire area boundaries are adequate to contain the effects of any fire originating in Fire Zone 0-27E. The level of combustible in Fire Zone 0-27E, including the contribution from the underfloor cable insulation in the PGCC floor and the non-metallic PGCC floor paneling, is maintained to assure that the total combustible loading does not exceed the fire resistance rating for the boundaries of Fire Area CS-33.

The fire rating of the fire area is established based on the lowest fire rating for any fire barrier in any fire zone forming a part of the boundary of the fire area. The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-27E is affected by the fire hazards analysis for specific configurations. Any fire zones for which specific fire hazards analysis have been prepared are identified on the drawings contained in Section 8.0 of this document. Any restrictions applicable to a particular fire zone are described in the deviation requests or fire hazards analyses referenced for that fire zone.

6.2.49.4 Fire Detection/Suppression in the Fire Area

Fire Area CS-33 is equipped with ionization detectors and heat detectors. The fire area has a halon extinguishing system located in the PGCC modules which protect the safety related cabinets with the exception of panels 2C635 and 2C699A. The room is also equipped with an automatic total flooding CO_2 system. In addition, a manual hose station and portable fire extinguishers are located nearby.

6.2.49.5 Consequences of a Fire in Fire Area CS-33

In the event of a fire in Fire Area CS-33, Safe Shutdown Path 3 systems and components will be available for safe shutdown. Electrical cabling located in Fire Area CS-33 associated with Path 3 safe shutdown systems and components has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. This is accomplished using one of the methods outlined in Section 6.1.2.4.

A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.49.5.1 Fire Zone 0-27E - U1 Div I Upper Relay Room

The following Category I components are located in Fire Zone 0-27E:

- Unit 1 HPCI Division I Automatic Actuation Logic – This component is the automatic initiation logic for the HPCI System. Automatic initiation of safety systems in support of post-fire safe shutdown is not required. The automatic initiation logic is evaluated for the potential affects of a spurious initiation of the system. A fire induced spurious start of the HPCI System in conjunction with the loss of the HPCI high water level trip in Fire Area CS-33 can be mitigated by manually tripping HPCI from the Control Room.

- Unit 1 RCIC Division I Automatic Actuation Logic – This component is the automatic initiation logic for the RCIC System. Automatic initiation of safety systems in support of post-fire safe shutdown is not required. The automatic initiation logic is evaluated for the potential affects of a spurious initiation of the system. A fire induced spurious start of the RCIC System in conjunction with the loss of the RCIC high water level trip in Fire Area CS-33 can be mitigated by closing the RCIC Inboard Steam Supply Isolation Valve (HV-E51-1F007).

- Unit 1 RHR Automatic Actuation Logic (Cross Divisional) – This component is the cross divisional unit logic ties within the automatic initiation logic for the RHR System. It consists of the relays for the RHR preferred pump logic and the relays which control the Diesel Generator loading considerations between the same letter pumps on opposite units. Where fire induced damage can inhibit the starting of the required safe shutdown pump for a particular unit, the plant operator will take actions to trip pumps that are not required to be running and to start the required pumps.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-27E is affected by the fire hazards analysis identified on Drawing E-205992 in Section 8.0.

6.2.49.6 Special Features

The following manual actions may be required in the event of a fire in this fire area when the fire damage is in the specific fire zone listed below:

1. Should a fire in Fire Zone 0-27E result in loss of Unit 1 reactor scram capability and/or scram discharge volume isolation capability from the Control Room, scram Unit 1 and isolate the scram discharge volume by manually venting the instrument air header in the Unit 1 Reactor Building.

2. Should a fire in Fire Zone 0-27E result in loss of Reactor Recirculation Pump 1P401A and/or 1P401B trip capability, trip pump 1P401A and/or 1P401B from the Control Room.

3. Should a fire in Fire Zone 0-27E result in spurious Unit 1 ADS or SRV actuations as indicated by low RPV pressure and/or level, the capability to further depressurize the reactor using Unit 1 Division II ADS and to inject water into the reactor using Unit 1 Division II Core Spray remains available from the Control Room.

4. Should a fire in Fire Zone 0-27E spuriously open the Unit 1 RHR Injection Isolation Valve HV-151-F015B, close the RHR Injection Control Valve HV-151-F017B from the Control Room.

5. Should a fire in Fire Zone 0-27E result in disabling the low condenser vacuum signal which prevents the Unit 1 MSIVs from closing on low main condenser vacuum, initiate isolation of the Main Steam Lines from the Control Room and verify isolation of the Main Steam Line Drains.

6.2.49.7 Deviation Requests Affecting Fire Area CS-33

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area CS-33.

6.2.50 Fire Area D-1

6.2.50.1 General Description

Fire Area D-1 is Diesel Generator Bay A as shown on Drawings E-206000 through E-206002 in Section 8.0. This area is isolated from all adjacent safety related fire areas by 3-hour fire rated boundaries. Division I systems and equipment are located in Fire Area D-1. Safe Shutdown Path 3 would be available for use in the event of a fire in Fire Area D-1. Offsite power sources are credited for Safe Shutdown Path 3 in this fire area, because it has been demonstrated that the fire cannot cause a loss of offsite power and, as such, it will be available for fires in this fire area. As a conservative measure, circuits required for the operation of Diesel Generator D located in this fire area are also protected and assured to be available. In addition, HPCI would be available to provide a source of high pressure make up to the reactor in the event of a fire in this fire area. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.50.2 Fire Zones

The following fire zone is located in Fire Area D-1:

Fire Zone	Description
0-41A	Diesel Generator Bay A

6.2.50.3 Combustible Loading

The principle contributor to combustible loading is lube oil contained in the A diesel generator and fuel oil in its day tank. With a fire area boundary rating of 3-hours, a fire initiated in Fire Area D-1 will remain within the fire area.

The fire rating of the fire area is established based on the lowest fire rating for any fire barrier in any fire zone forming a part of the boundary of the fire area. The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of fire zones in Fire Area D-1 are addressed in Deviation Request 19. Any specific Fire Hazard Analyses applicable to the fire zone in this fire area are identified on the Drawings in Section 8.0 and referenced below along with any other combustible restrictions.

6.2.50.4 Fire Detection/Suppression in the Fire Area

Automatic fire detection and suppression is provided in the basement (El. 660'-0") and on the ground floor (El. 677'-0") of this fire area. The top floor (El. 710'-9") of this fire area does not contain any required redundant safe shutdown components or cabling and is not provided with automatic suppression. The top floor (El. 710'-9") of this fire area is provided with fire detection. Manual suppression in the form of portable extinguishers is provided throughout the fire area and in the form of a fire hydrant outside of the building. Deviation Request No. 19 further addresses the lack of complete automatic suppression in this fire area.

6.2.50.5 Consequences of a Fire in Fire Area

In the event of a fire in Fire Area D-1, Safe Shutdown Path 3 systems and components will be available for safe shutdown. Offsite power sources are credited for Safe Shutdown Path 3 in this fire area, because it has been demonstrated that the fire cannot cause a loss of offsite power and, as such, it will be available for fires in this fire area. In addition, HPCI would be available to provide a source of high pressure make up to the reactor in the event of a fire in this fire area. Electrical cabling located in Fire Area D-1 associated with Path 3 safe shutdown systems and components has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. Due to the availability of offsite power for fires in this fire area, circuits for the ‘B’ Diesel Generator located in this fire area are not protected. As a conservative measure, however, circuits required for the operation of Diesel Generator D located in this fire zone are protected and assured to be available. Automatic functions associated with the operation of the HPCI System can be impacted by a fire in this area. The ability to manually operate the HPCI System from the Control Room is assured for fires in this fire area.

Also, the Condensate Storage Tank (CST) low level switch circuits can be impacted. The CST low level signal initiates automatic transfer of the HPCI Pump suction from the CST to the Suppression Pool. The fire is assumed to defeat the automatic HPCI Pump transfer logic on low CST level. Sufficient inventory exists in the CST for HPCI operation and completion of its Appendix R function without the need to transfer to the Suppression Pool. CST level recorder LR00812 at panel 0C653 may be available to determine CST level and initiate manual HPCI Pump suction transfer. If CST level recorder LR00812 is not available HPCI Pump suction from the CST to the Suppression Pool must be transferred within 8 hours. A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.50.5.1 Fire Zone 0-41A - Diesel Generator Bay A

There are no Category I components located in Fire Zone 0-41A.

The minimum fire rating of the fire barriers and therefore the equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-41A is addressed in Deviation Request 19.

6.2.50.6 Special Features

The following manual action may be required in the event of a fire in this fire area when the fire damage is in the specific fire zone listed below:

1. Should a fire in Fire Zone 0-41A result in loss of Unit 1 automatic HPCI suction transfer on Condensate Storage Tank low level, manually transfer the Unit 1 HPCI pump suction from the CST to the Suppression Pool.

6.2.50.7 Deviation Requests Affecting Fire Area D-1

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area D-1.

6.2.51 Fire Area D-2

6.2.51.1 General Description

Fire Area D-2 is Diesel Generator Bay B as shown on Drawings E-206000 through E-206002 in Section 8.0. This area is isolated from all other fire areas by 3-hour fire rated boundaries. Division II systems and equipment are located in Fire Area D-2. Safe Shutdown Path 1 would be available for use in the event of a fire in Fire Area D-2. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.51.2 Fire Zones

The following fire zone is located in Fire Area D-2:

Fire Zone	**Description**
0-41B	Diesel Generator Bay B

6.2.51.3 Combustible Loading

The principle contributor to combustible loading is lube oil contained in the B diesel generator and fuel oil in its day tank. With a fire area boundary rating of 3-hours, a fire initiated in Fire Area D-2 will remain within the fire area. Any specific Fire Hazard Analyses applicable to the fire zone in this fire area are identified on the Drawings in Section 8.0 and referenced below along with any other combustible restrictions.

6.2.51.4 Fire Detection/Suppression in the Fire Area

Automatic fire detection and suppression is provided in the basement (El. 660'-0") and on the ground floor (El. 677'-0") of this fire area. The top floor (El. 710'-9") of this fire area does not contain any required redundant safe shutdown components or cables and is not provided with automatic suppression. The top floor (El. 710'-9") of this fire area is provided with fire detection. Manual suppression in the form of portable extinguishers is provided throughout the fire area and in the form of a fire hydrant outside of the building.

6.2.51.5 Consequences of a Fire in Fire Area D-2

In the event of a fire in Fire Area D-2, Safe Shutdown Path 1 systems and components will be available for safe shutdown. Electrical cabling located in Fire Area D-2 associated with Path 1 safe shutdown systems and components has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.51.5.1 Fire Zone 0-41B - Diesel Generator Bay B

There are no Category I components located in Fire Zone 0-41B.

6.2.51.6 Special Features

There are no special features in Fire Area D-2. There are no manual actions required.

6.2.51.7 Deviation Requests Affecting Fire Area D-2

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area D-2.

6.2.52 Fire Area D-3

6.2.52.1 General Description

Fire Area D-3 is Diesel Generator Bay C as shown on Drawings E-206000 through E-206002 in Section 8.0. This area is isolated from all other fire areas by 3-hour fire rated boundaries. Division I systems and equipment are located in Fire Area D-3. Safe Shutdown Path 3 would be available for use in the event of a fire in Fire Area D-3. Offsite power sources are credited for Safe Shutdown Path 3 in this Fire Area, because it has been demonstrated that the fire cannot cause a loss of offsite power and, as such, it will be available for fires in this fire area. In addition, HPCI would be available to provide a source of high pressure make up to the reactor in the event of a fire in this fire area. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.52.2 Fire Zones

The following fire zone is located in Fire Area D-3:

Fire Zone	Description
0-41C	Diesel Generator Bay C

6.2.52.3 Combustible Loading

The average in-situ combustible loading of Fire Area D-3 could exceed the fire area boundary limits. The combustible loading in this diesel bay is significantly higher than the other diesel bays since the lube oil drain tank and the dirty lube oil tank for the diesel generators is located in Fire Area D-3. This condition was described to the NRC in Revision 3 to the FPRR under Deviation Request No. 10. The NRC in an SER dated August 9, 1989 related to Revision 3 of the FPRR determined that this deviation was not required and asked that it be withdrawn. Deviation Request No. 10 was withdrawn as a part of Revision 4 to the FPRR. Any specific Fire Hazard Analyses applicable to the fire zone in this fire area are identified on the Drawings in Section 8.0 and referenced below along with any other combustible restrictions.

6.2.52.4 Fire Detection/Suppression in the Fire Area

Automatic fire detection and suppression is provided in the basement (El. 660'-0") and on the ground floor (El. 677'-0") of this fire area. The top floor (El. 710'-9") of this fire area does not contain any required redundant safe shutdown components or cables and is not provided with automatic suppression. The top floor (El. 710'-9") of this fire area is provided with fire detection. Manual suppression in the form of portable extinguishers is provided throughout the fire area and in the form of a fire hydrant outside of the building.

6.2.52.5 Consequences of a Fire in Fire Area D-3

In the event of a fire in Fire Area D-3, Safe Shutdown Path 3 systems and components will be available for safe shutdown. Offsite power sources are credited for Safe Shutdown Path 3 in this Fire Area, because it has been demonstrated that the fire cannot cause a loss of offsite power and, as such, it will be available for fires in this fire area. In addition, HPCI would be available to provide a source of high pressure make up to the reactor in the event of a fire in this fire area. Electrical cabling located in Fire Area D-3 associated with Path 3 safe shutdown systems and components has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. Due to the availability of offsite power for fires in this fire area, circuits for the 'B' Diesel Generator located in this fire area are not protected. A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.52.5.1 Fire Zone 0-41C - Diesel Generator Bay C

There are no Category I components located in Fire 0-41C.

6.2.52.6 Special Features

There are no special features in Fire Area D-3. There are no manual actions required.

6.2.52.7 Deviation Requests Affecting Fire Area D-3

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area D-3.

6.2.53 Fire Area D-4

6.2.53.1 General Description

Fire Area D-4 is Diesel Generator Bay D as shown on Drawings E-206000 through E-206002 in Section 8.0. This area is isolated from all other fire areas by 3-hour fire rated boundaries. Division II systems and equipment are located in Fire Area D-4. Safe Shutdown Path 1 would be available for use in the event of a fire Fire Area D-4. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.53.2 Fire Zones

The following fire zone is located in Fire Area D-4:

Fire Zone	Description
0-41D	Diesel Generator Bay D

6.2.53.3 Combustible Loading

The principle contributor to combustible loading is lube oil contained in the D diesel generator and fuel oil in its day tank. With a fire area boundary rating of 3-hours, a fire initiated in Fire Area D-4 will remain within the fire area. Any specific Fire Hazard Analyses applicable to the fire zone in this fire area are identified on the Drawings in Section 8.0 and referenced below along with any other combustible restrictions.

6.2.53.4 Fire Detection/Suppression in the Fire Area

Automatic fire detection and suppression is provided in the basement (El. 660'-0") and on the ground floor (El. 677'-0") of this fire area. The top floor (El. 710'-9") of this fire area does not contain any required redundant safe shutdown components or cables and is not provided with automatic suppression. The top floor (El. 710'-9") of this fire area is provided with fire detection. Manual suppression in the form of portable extinguishers is provided throughout the fire area and in the form of a fire hydrant outside of the building.

6.2.53.5 Consequences of a Fire in Fire Area D-4

In the event of a fire in Fire Area D-4, Safe Shutdown Path 1 systems and components will be available for safe shutdown. Electrical cabling located in Fire Area D-4 associated with Path 1 safe shutdown systems and components has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.53.5.1 Fire Zone 0-41D - Diesel Generator Bay D

There are no Category I components located in Fire Zone 0-41D.

6.2.53.6 Special Features

There are no special features in Fire Area D-4. There are no manual actions required.

6.2.53.7 Deviation Requests Affecting Fire Area D-4

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area D-4.

6.2.54 Fire Area D-5

6.2.54.1 General Description

Fire Area D-5 is the Diesel Generator E Building. This structure is remote from the plant power block and stands at least 50 feet from the nearest structure. The general layout of this is shown on Drawings E-213410 through E-213413 in Section 8.0. Safe Shutdown Path 1 and 3 would be available for use in the event of a fire in Fire Area D-5. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.54.2 Fire Zones

The following fire zone is located in Fire Area D-5:

Fire Zone	Description
0-41E	Diesel Generator "E" Building

6.2.54.3 Combustible Loading

This fire area is remote from any other structures containing safe shutdown equipment. The principle combustible materials in this fire area are the lube oil and diesel fuel associated with operation of Diesel Generator E. A fire in this area would not propagate to any other fire area at the plant. Any specific Fire Hazard Analyses applicable to the fire zone in this fire area are identified on the Drawings in Section 8.0 and referenced below along with any other combustible restrictions.

6.2.54.4 Fire Detection/Suppression in the Fire Area

Fire Area D-5 has fire detection and automatic suppression provided throughout the area. Manual suppression in the form of portable extinguishers and hose reels are also available in the fire area.

6.2.54.5 Consequences of a Fire in Fire Area D-5

Fire Area D-5 is a separate building from the four original diesels built during plant construction. This diesel generator is connected to the operating plant through a transfer switching system whenever this diesel is used to replace any one of the four original diesels. The transfer switching system assures that a fault in the cabling system caused by a fire in Fire Area D-5 will result in the isolation of this fire area from the remainder of the plant Safe Shutdown Path 1 and 3 (depending on which existing diesel this diesel is being substituted for) would be used for safe shutdown.

6.2.54.5.1 Fire Zone 0-41E - Diesel Generator "E" Building

Diesel Generator “E” may be substituted for any one of the other diesel generators.

When not substituted for another diesel generator, the Diesel “E” components are not required for post-fire safe shutdown. Therefore, in this condition, there are no Category I components located in Fire Zone 0-41E.

When Diesel Generator “E” is substituted for one of the other diesel generators, the Diesel Generator “E” components become required components on the safe shutdown path associated with the diesel generator for which Diesel Generator “E” is substituted . In this condition, all Diesel Generator “E” components become Category I components. The post-fire safe shutdown analysis, however, has concluded that a fire in Fire Zone O-41E will have no impact on safe shutdown since the impact for this condition is the same as if the fire were to occur in the diesel generator building for which Diesel Generator “E” is substituted.

6.2.54.6 Special Features

Fire Area D-5 is the Diesel Generator E Building and is a separate, remote structure from the four original diesel generators. It is connected to the original plant through a transfer switching system whenever the Diesel Generator E is used to replace any of the four original diesel generators.

The transfer switching system involves operation of transfer switches on panels located in the Diesel Generator Building and in each of the existing diesel generator buildings. Several of the controls, indications, alarms and computer inputs will be transferred.

The transfer switches in the specific transfer panels in the Diesel Generator "E" Facility are used to select the path to the controls of the specific diesel generator to be replaced. The transfer switch at the individual transfer panel in each existing diesel generator building is used to transfer controls of the specific diesel generator to be replaced to Diesel Generator E. These two switches in series provide a double break in the circuits to preclude problems (i.e., a fire) in the Diesel Generator E building from being propagated into any of the other diesel generator circuits.

This same double break principle also applies to the power circuits. There are always two breaks between Diesel Generator E and any of the other four diesel generators.

This double isolation provided by the two transfer switches in two different buildings precludes any cable faults from Diesel Generator E from affecting any of the other four diesel generators while Diesel Generator E is not substituted.

Similarly, when Diesel Generator E is substituted for any one of the existing diesel generators, this double-break concept prevents any cable faults from affecting more than the Diesel Generator E. Thus, the other diesel generators are unaffected by faults involving any of these cables for all conditions involving Diesel Generator E (i.e., test mode, not substituted and not running; substituted for an existing diesel generator). There are no manual actions required.

6.2.54.7 Deviation Requests Affecting Fire Area D-5

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area D-5.

6.2.55 Fire Area E-1

6.2.55.1 General Description

Fire Area E-1 is the east side of the Emergency Systems Service Water (ESSW) Pumphouse. This structure is located remotely from the power block at the spray pond. Its layout and fire area boundaries are shown on Drawing E-205998 in Section 8.0. Safe Shutdown Path 3 would be available for use in the event of a fire in Fire Area E-1. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.55.2 Fire Zones

The following fire zone is located in Fire Area E-1:

Fire Zone	**Description**
0-51	East Side Of ESSW Pumphouse

6.2.55.3 Combustible Loading

There are minimal combustibles in this fire area. The principle contributor to the combustible loading in this area is the lube oil in the RHR service water and Emergency Service Water Pump motors. Cables inside electrical panels also contribute to the overall combustible loading. Any fire initiated within this fire area would be contained by the fire area barriers which would prevent propagation of the fire into Fire Area E-2. Any specific Fire Hazard Analyses applicable to the fire zone in this fire area are identified on the Drawings in Section 8.0 and referenced below along with any other combustible restrictions.

6.2.55.4 Fire Detection/Suppression in the Fire Area

This fire area has ionization smoke detection but no automatic suppression system. Manual suppression in the form of portable fire extinguishers is provided throughout this fire area and in the form of a fire hydrant outside of the building.

6.2.55.5 Consequences of a Fire in Fire Area E-1

In the event of a fire in Fire Area E-1, Safe Shutdown Path 3 systems and components will be available for safe shutdown. Electrical cabling located in Fire Area E-1 associated with Path 3 safe shutdown systems and components has been evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.55.5.1 Fire Zone 0-51 - East Side Of ESSW Pumphouse

There are no Category I components located in Fire Zone 0-51.

6.2.55.6 Special Features

There are no special features in Fire Area E-1. There are no manual actions required.

6.2.55.7 Deviation Requests Affecting Fire Area E-1

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area E-1.

6.2.56 Fire Area E-2

6.2.56.1 General Description

Fire Area E-2 is the west side of the Emergency Systems Service Water (ESSW) Pumphouse. This structure is located remotely from the power block at the spray pond. Its layout and fire area boundaries are shown on Drawing E-205998 in Section 8.0. Safe Shutdown Path 1 would be available for use in the event of a fire in Fire Area E-2. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.56.2 Fire Zones

The following fire zone is located in Fire Area E-2:

Fire Zone	Description
0-52	West Side of ESSW Pumphouse

6.2.56.3 Combustible Loading

There are minimal combustibles in this fire area. The principle contributor to the combustible loading in this area is the lube oil in the RHR service water and Emergency Service Water Pump motors. Cables inside electrical panels also contribute to the overall combustible loading. Any fire initiated within this fire area would be contained by the fire area barriers which would prevent propagation of the fire into Fire Area E-1. Any specific Fire Hazard Analyses applicable to the fire zone in this fire area are identified on the Drawings in Section 8.0 and referenced below along with any other combustible restrictions.

6.2.56.4 Fire Detection/Suppression in the Fire Area

This fire area has ionization smoke detection but no automatic suppression system. Manual suppression in the form of portable fire extinguishers are provided throughout this fire area and in the form of a fire hydrant outside of the building.

6.2.56.5 Consequences of a Fire in Fire Area E-2

In the event of a fire in Fire Area E-2, Safe Shutdown Path 1 systems and components will be available for safe shutdown. Electrical cabling located in Fire Area E-2 associated with Path 1 safe shutdown systems and components has been specifically evaluated to assure that its potential failure would not impact the ability of both reactors to reach a safe shutdown condition. A description of the effect of a fire on safe shutdown systems by fire zone is detailed below.

6.2.56.5.1 Fire Zone 0-52 - West Side of ESSW Pumphouse

There are no Category I components located in Fire Zone 0-52.

6.2.56.6 Special Features

There are no special features in Fire Area E-2. There are no manual actions required.

6.2.56.7 Deviation Requests Affecting Fire Area E-2

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area E-2.

6.2.57 Fire Area T-1

6.2.57.1 General Description

Fire Area T-1 is the Unit 1 and Unit 2 Turbine Buildings. Its location is shown on Drawing E-105002 in Section 8.0. An analysis has been performed that considered the effects of a fire in the Turbine Building on the limited amount of Class 1E cable and on adjacent buildings. Safe shutdown Path 1, 2 and 3 would be available for use in the event of a fire in Fire Area T-1. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.57.2 Fire Zones

For the safe shutdown analysis, the Turbine Buildings were considered as one fire area. Although there are various fire zones within the Turbine Buildings, Fire Zone 0-TB was assigned to both buildings for the purpose of the safe shutdown analysis. The analysis for the Turbine Buildings considered the possible effects of a fire on the safe shutdown.

The following fire zone is located in Fire Area T-1:

Fire Zone	Description
0-TB	Unit 1 and 2 Turbine Building

6.2.57.3 Combustible Loading

The common walls, doors, and penetrations between the Turbine Building and the Reactor Buildings, the Control Structure and the Radwaste Building, have 3-hour fire rated barriers. The principle combustibles located within the turbine building are lube oil in the six reactor feed pump turbines and their lube oil reservoirs, the two main turbine-generators and their lube oil systems and the hydrogen seal oil systems. Each of these hazards are protected by a fire suppression system. A fire initiated within the turbine building would not propagate to any other fire area outside the turbine building. Any specific Fire Hazard Analyses applicable to the fire zone in this fire area are identified on the Drawings in Section 8.0 and referenced below along with any other combustible restrictions.

6.2.57.4 Fire Detection/Suppression in the Fire Area

Fire detection and suppression systems are located in the Turbine Building where specific fire hazards warrant. The major combustibles listed above are all protected by automatic suppression systems. Each truck/railroad bay in the Turbine Building are also protected by suppression systems.

The Hydrogen Water Chemistry System injects hydrogen into the suction of the reactor feed water pumps. The system has, for protection, hydrogen detectors installed in accordance with NRC approved report EPRI NP-5283-SR-A, “Guidelines for Permanent BWR Hydrogen Water Chemistry Installation-1987 Revision”. In addition to the detectors, there are excess flow control devices to protect against a large system leak. Therefore, the system will not affect the safe shutdown capability of the plant.

Manual fire suppression in the form of hose reels and portable fire extinguishers are located throughout the turbine building.

Manual deluge systems are provided for charcoal filters 1F258A, 1F258B, 2F258A, and 2F258B in Unit 1 and Unit 2 Turbine Buildings respectively.

6.2.57.5 Consequences of a Fire in Fire Area

A study has been performed and has shown that although some safe shutdown equipment is located in the turbine building, the redundancy of the instrumentation, the separation between the equipment of concern and the fire protection methods employed assure safe shutdown capability.

6.2.57.5.1 Fire Zone 0-TB - Unit 1 and 2 Turbine Building

The following Category I components are located in Fire Zone 0-TB:

- Main Condenser Low Vacuum Switches (PSH-B21-1N056A, PSH-B21-1N056B, PSH-B21-1N056C, PSH-B21-1N056D, PSH-B21-2N056A, PSH-B21-2N056B, PSH-B21-2N056C, PSH-B21-2N056D) – Fire damage to this component can affect the automatic closure of the MSIVs in the event of a loss of condenser vacuum. The plant operator will manually close the MSIVs in the event of a loss of condenser vacuum.

- 13.8 KV Startup Bus 10 (0A103), Startup Bus 20 (0A104), Non-Segmented Bus (0A105, 0A106, 0A107) – This component is required for offsite power. Offsite power is not used for shutdown in Fire Area T-1.

- Appendix R Communication System Jackplate JP1208 – For Paths 1 and 3 JP1208 is not required for communications for a fire in this fire area. For a fire in fire zone 0-TB causing an inadvertent control room evacuation, manual actions 42 and 44 will require an alternative means of communication such as portable radios; plant page or cell phone. [Note: This latter case is not a design basis fire.

- Appendix R Communication System Jackplate JP1502 – This component is a jackplate for Loop 5 of the Appendix R sound powered communications system. There are no operator actions resulting from a fire in Fire Area T-1 that require the use of this loop of the sound powered communications system. Therefore, this component is not required for post-fire safe shutdown in Fire Area T-1.

6.2.57.6 Special Features

The following manual actions may be required in the event of a fire in this fire area when the fire damage is in the specific fire zone listed below:

1. Should a fire in Fire Zone 0-TB result in loss of Reactor Recirculation Pump 1P401A and/or 1P401B trip capability, trip pump 1P401A and/or 1P401B by manually tripping the Motor-Generator set output breakers.

2. Should a fire in Fire Zone 0-TB result in loss of Reactor Recirculation Pump 2P401A and/or 2P401B trip capability, trip pump 2P401A and/or 2P401B by manually tripping the Motor-Generator set output breakers.

3. Should a fire in Fire Zone 0-TB result in disabling the low condenser vacuum signal which prevents the Unit 1 MSIVs from closing on low main condenser vacuum, initiate isolation of the Main Steam Lines from the Control Room and verify isolation of the Main Steam Line Drains.

4. Should a fire in Fire Zone 0-TB result in disabling the low condenser vacuum signal which prevents the Unit 2 MSIVs from closing on low main condenser vacuum, initiate isolation of the Main Steam Lines from the Control Room and verify isolation of the Main Steam Line Drains.

6.2.57.7 Deviation Requests Affecting Fire Area T-1

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area T-1.

6.2.58 Fire Area W-1

6.2.58.1 General Description

Fire Area W-1 is the Radwaste Building. The Radwaste Building is separated from the Turbine Building and Service and Administration Building by walls, doors, and penetrations that have a 3-hour fire rating and does not share any common walls with either the control structure or the reactor building. The general location of the Radwaste Building is shown on Drawing E-105002 in Section 8.0. A fire in the Radwaste Building would have no impact on any of the safe shutdown paths described in Section 3.0. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.58.2 Fire Zones

For the safe shutdown analysis, the Radwaste Building was considered as one fire area. Although there are various fire zones within the Radwaste Building, there are no components or cables in the building that will affect safe shutdown of either reactor unit. The fire hazard analysis for the Radwaste Building considered the possible effects of a fire in the building with respect to potential radioactive releases.

6.2.58.3 Combustible Loading

Fire Area W-1 is separated from the Turbine Building and the Service and Administration Building by 3-hour fire rated barriers. These fire barriers are sufficient to contain any fire originating in the Radwaste Building and would prevent the propagation of a fire to any other fire area in the plant.

6.2.58.4 Fire Detection/Suppression in the Fire Area

Fire detection and suppression systems are located in portions of the Radwaste Building. Additionally, manual hose reels and portable fire extinguishers are provided throughout the fire area.

Manual deluge systems are provided for the following filters listed by fire zone:

Fire Zone	Description
0-61H	Radwaste Building Vent Charcoal Filter 0F359

6.2.58.5 Consequences of a Fire in Fire Area W-1

Within the Radwaste Building, there is located solid, liquid and gaseous radioactive waste treatment systems. A fire could occur in the main charcoal adsorber beds of the offgas treatment system. The probability of such a fire is rather low, since several factors preclude fire. The process stream is primarily air at a maximum pressure of 3 psig. Normal flow rate is 40 scfm with a maximum of 300 scfm during startup through over 15 tons of charcoal. No ignition sources are present other than the noble gas decay heat. This heat is removed by 100% redundant air conditioning which maintains the rooms below 65□□F. Furthermore, the entire train of charcoal adsorber tanks can be isolated at both the inlet and outlet, thus if a fire were to start in a bed it would self-extinguish once the available oxygen was consumed. The charcoal adsorber tanks are constructed of 1-3/16 inch carbon steel and this would act as a barrier to prevent the spread of the fire. The minimum design pressure of the tank is 375 psig at 150°F.

A fire in these charcoal beds might result in the release of some radioactive gases. This accident is analyzed in Subsection 15.7.1.1 of the Final Safety Analysis Report (FSAR) and, as indicated therein, the radiological dose consequences are a small percentage of the guideline values of 10CFR100.

A fire could also cause the rupture of a liquid radwaste tank. The tank with the worst radiological consequences selected for this evaluation was the radwaste evaporator concentrate storage tank. The probability of a fire in the immediate area of this tank is rather low since the combustible loading is insignificant. Nonetheless, even if it is that a fire caused the rupture of this tank, the radiological dose consequences would be a small fraction of the guideline values of 10CFR100. An analysis of the radiological consequences for this tank is provided in FSAR Subsection 15.7.3.

6.2.58.6 Special Features

There are no special features in Fire Area W-1. There are no manual actions required.

6.2.58.7 Deviation Requests Affecting Fire Area W-1

Section 7.0 provides a complete listing of Deviation Requests that affect Fire Area W-1.

6.2.59 Fire Area A-1

6.2.59.1 General Description

Fire Area A-1 is the general area outside of the power block. It includes site outside areas, the Cooling Tower, S&A Building, Circulating Water Pumphouse and other miscellaneous site support buildings & facilities. The general arrangement of the plant outside areas is shown on Drawing E-105002 in Section 8.0. Safe Shutdown Path 1 or 3 would be available for use in the event of a fire in Fire Area A-1. Deviation Request 33 that justifies the use of ADS and Core Spray for achieving and maintaining post-fire safe shutdown generically applies to this fire area.

6.2.59.2 Fire Zones

The following fire zone is located in Fire Area A-1:

Fire Zone	Description
0-00	Outside/Yard Areas

6.2.59.3 Combustible Loading

A fire hazard analysis was performed to examine specific combustible configurations in the outside areas. This analysis studied the effect of an outside area fire on Class 1 electrical manholes which contain safe shutdown cables.

The study concluded that adequate safe shutdown path separation exists for the fire hazards identified and that safe shutdown could be achieved by using safe shutdown path 1 or 3 in the event of a fire anywhere in the outside areas.

The Hydrogen Water Chemistry storage facility is located southwest of the South Gatehouse, outside of the plant security Protected Area. This facility consists of cryogenic liquid storage tanks (one each for hydrogen, oxygen and nitrogen), ambient air vaporizers, automatic valves to isolate the tanks, liquid hydrogen pumps, hydrogen gas receivers and excess flow control devices to protect against a large system leak. This facility is designed and installed in accordance with NRC approved report EPRI NP-5283-SR-A, “Guidelines for Permanent BWR Hydrogen Water Chemistry Installation-1987 Revision”.

The cooling towers at Susquehanna SES are used as a source of water for the fire protection system.

The Unit 1 cooling tower is constructed of non-combustible structural components. The Unit 1 fill material is non-combustible, cement fiber boards.

The Unit 2 cooling tower is constructed of non-combustible structural components. The Unit 2 fill material is primarily non-combustible, cement fiber boards. Approximately 1.5% of the fill has been replaced with PVC film fill material having a flame spread rating of less than or equal to 25.

A fire in the cooling towers would not adversely affect any safety-related structures, systems, or components. Therefore, no additional suppression systems or other fire protection features are required.

The equivalent fire duration (for in-situ and transient combustibles) of fire zones in Fire Area A-1 are addressed in Deviation Request 32.

6.2.59.4 Fire Detection/Suppression in the Fire Area

Outside manual hose installations have been installed to protect safety related and non-safety related buildings. For the yard main loop surrounding the power block (i.e. Turbine, Reactor, and Radwaste Buildings), this is accomplished by installing hydrants at intervals of approximately 250 feet on average along the yard loop surrounding the power block. For other safety related buildings, hydrants have been installed within 250 feet of the building. Fire fighting equipment, such as fire hose, nozzles, adaptors, etc., is provided for each hydrant using NFPA 24 as guidance.

The yard main laterals to the hydrants are controlled by a post indicator valve.

Fire detection and suppression equipment is provided in the site support structures for life safety. The in-service oil-filled transformers immediately adjacent to structures housing safe shutdown equipment are equipped with deluge systems and the transformers are provided with a pit to contain the oil and water released in the event of a fire.

6.2.59.5 Consequences of a Fire in Fire Area A1

Class I electrical manholes 16, 17, 18, 19, 22, 23, 27, 28, 31 and 32 are located at a sufficient distance from in-situ combustibles such as oil storage tanks and transformers to satisfy the separation criterion of 10CFR50, Appendix R, Section III.G. The analysis also postulated various outdoor worst case accidents (i.e., oil truck overturned, oil seepage into manholes, etc.) and concluded that adequate redundancy and separation exist to satisfy the safe shutdown criteria of Appendix R.

The Hydrogen Water Chemistry System storage facility is located away from safety related systems, structures and components, in accordance with NRC approved report EPRI NP-5283-SR-A, “Guidelines for Permanent BWR Hydrogen Water Chemistry Installation-1987 Revision”, and will not affect the safe shutdown capability of the plant.

6.2.59.5.1 Fire Zone 0-00 - Outside/Yard Areas

The following Category I components are located in Fire Zone 0-00:

- Diesel Generator Fuel Oil Transfer Pumps (0P514A, 0P514B, 0P514C, 0P514D)- Addressed in Deviation Request No. 32.

- 13.8 KV Startup Transformer 10 (0X103), Startup Transformer 20 (0X104), Non-Segmented Bus (0A108, 0A110), Motor Operated Air Breakers (1R105, 2R105), High Speed Ground Switch (1R106, 2R106) – These components are required for offsite power. Offsite power is not used for shutdown in Fire Area A-1.

- 4.16 KV ESS Transformer 101 (0X201), Transformer 201 (0X203), Transformer 111 (0X211), Transformer 211 (0X213) - These components are required for offsite power. Offsite power is not used for shutdown in Fire Area A-1.

- ESW Spray Pond Bypass Valves (HV-01222A, HV-01222B), Header Valves (HV-01224A1, HV-01224A2, HV-01224B1, HV-01224B2) – Addressed in Deviation Request No. 32.

- Condensate Storage Tank Low Level Switch for Suction Transfer (LSLL-E41-2N002) – An analysis has demonstrated that fire induced damage to this level switch and LSLL-E41-2N003 is not possible as a result of a single fire.

- Condensate Storage Tank Low Level Switch for Suction Transfer (LSLL-E41-2N003) – An analysis has demonstrated that fire induced damage to this level switch and LSLL-E41-2N002 is not possible as a result of a single fire.

- Condensate Storage Tank Low Level Switch for Suction Transfer (LSL-E51-2N035A) – An analysis has demonstrated that fire induced damage to this level switch and LSL-E51-2N035E is not possible as a result of a single fire.

- Condensate Storage Tank Low Level Switch for Suction Transfer (LSL-E51-2N035E) – An analysis has demonstrated that fire induced damage to this level switch and LSL-E51-2N035A is not possible as a result of a single fire.

The equivalent fire duration (for in-situ and transient combustibles) of Fire Zone 0-00 is addressed in Deviation Request 32.

6.2.59.6 Special Features

There are no special features in Fire Area A-1. There are no manual actions required.

6.2.59.7 Deviation Requests Affecting Fire Area A-1

Section 7.0 provides a complete listing of Deviation Requests that affect the fire zones in Fire Area A-1.

7.0 DEVIATION REQUESTS

7.1 INTRODUCTION

The purpose of Section 7.0 is to provide a complete listing of the deviations which were taken with respect to 10CFR50, Appendix R, Sections III.G, III.J, III.L and III.O.

Each deviation consists of the following sections: Deviation from Requirements, Fire Areas/Zones Affected, Reason for Deviation Request, Existing Arrangement, and Justification.

Fire Hazards Analysis may be used as an alternate approach to or to supplement the use of deviation requests. These Fire Hazard Analyses and changes to previously approved deviation requests can be made in accordance with the License Condition identified in the NRC Letter of 6-24-98, Amendment No. 177 to Unit 1 License No. NPF-14 paragraph 2.C.(6) and Amendment No. 150 to Unit 2 License No. NPF-22 paragraph 2.C.(3) applicable to the Susquehanna Fire Protection Program as described below:

> The licensee may make changes to the approved fire protection program without prior approval of the Commission only if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire.

A deviation request reference matrix is provided as Table 7.1-1.

TABLE 7.1-1

APPENDIX R DEVIATION REQUEST REFERENCE MATRIX

Unit 1 Reactor Building Fire Areas

Deviation Request #	R-1A	R-1B	R-1C	R-1D	R-1E	R-1F	R-1G	R-1H
2								
3	X	X		X				
4	X	X						
6	X	X		X				
7	X	X						
8		X						
11	X	X		X				
12	X	X						
13		X		X				
14	X	X						
15								
19								
20	X	X		X	X	X	X	X
23								
24								
25	X							
26								
27	X							
28								
29	X	X						
32								
33	X	X		X	X	X	X	X
37								
38								
42	X	X						

TABLE 7.1-1

APPENDIX R DEVIATION REQUEST REFERENCE MATRIX

Unit 2 Reactor Building Fire Areas

Deviation Request #	R-2A	R-2B	R-2C	R-2D	R-2E	R-2F	R-2G	R-2H
2								
3	X	X		X				
4	X	X						
6	X	X		X				
7	X	X						
8								
11	X	X		X				
12	X	X						
13	X	X						
14	X	X						
15								
19								
20	X	X		X	X	X	X	X
23								
24	X							
25								
26		X						
27								
28		X						
29	X	X						
32								
33	X	X		X	X	X	X	X
37								
38	X							
42	X	X						

TABLE 7.1-1

APPENDIX R DEVIATION REQUEST REFERENCE MATRIX

	Control Structure Fire Areas									
Deviation Request #	CS-01	CS-02	CS-03	CS-04	CS-05	CS-06	CS-07	CS-09	CS-10	CS-11
2								X		
3										
4										
6		X	X	X				X		X
7										
8										
11										
12										
13										
14										
15										X
19										
20	X	X	X	X	X	X	X	X	X	X
23								X		
24										
25										
26										
27										
28										
29										
32										
33	X	X	X	X	X	X	X	X	X	X
37						X	X	X		
38										
42										

TABLE 7.1-1

APPENDIX R DEVIATION REQUEST REFERENCE MATRIX

	Control Structure Fire Areas										
Deviation Request #	**CS-12**	**CS-13**	**CS-14**	**CS-15**	**CS-16**	**CS-17**	**CS-18**	**CS-19**	**CS-20**	**CS-21**	**CS-22**
2											
3											
4											
6	X	X	X	X	X	X	X	X	X	X	X
7											
8				X		X					
11											
12											
13											
14											
15									X		
19											
20	X	X	X	X	X	X	X	X	X	X	X
23											
24											
25											
26											
27											
28											
29											
32											
33	X	X	X	X	X	X	X	X	X	X	X
37											
38											
42											

Table Rev. 11

TABLE 7.1-1

APPENDIX R DEVIATION REQUEST REFERENCE MATRIX

	Control Structure Fire Areas										
Deviation Request #	CS-23	CS-24	CS-25	CS-26	CS-27	CS-28	CS-29	CS-30	CS-31	CS-32	CS-33
2											
3											
4											
6	X	X	X	X	X						
7											
8		X									
11											
12											
13											
14											
15											
19											
20	X	X	X	X	X	X	X	X	X	X	X
23											
24											
25											
26											
27											
28											
29											
32											
33	X	X	X	X	X	X	X	X	X	X	X
37											
38											
42											

TABLE 7.1-1

APPENDIX R DEVIATION REQUEST REFERENCE MATRIX

	Common Fire Areas									
Deviation Request #	D-1	D-2	D-3	D-4	D-5	E-1	E-2	T-1	W-1	A-1
2										
3										
4										
6										
7										
8										
11										
12										
13										
14										
15										
19	X		X							
20	X	X	X	X	X	X	X	X		
23										
24										
25										
26										
27										
28										
29										
32										X
33	X	X	X	X	X	X	X	X	X	X
37										
38										
42										

7.2 DEVIATION REQUEST INDEX

Deviation Request No.	Subject	Appendix R Requirement Deviated From
1	This Deviation Request has been withdrawn	N/A
2	Suppression Pool Temperature Indication	Section III.G.3/III.L
3	Fire Doors - Non-Rated	Section III.G.2
4	Wraparound Area	Section III.G.2
5	This Deviation Request has been withdrawn	N/A
6	Non Fireproofed Structural Steel	Section III.G.2
7	Fire Spread Limitations	Section III.G.2
8	One Hour Fire Barrier Wrap With Limited Suppression	Section III.G.2.a
9	This Deviation Request has been withdrawn	N/A
10	This Deviation Request has been withdrawn	N/A
11	HVAC Penetrations Reactor Building Fire Walls	Section III.G.2
12	Fire Barriers Without Fire Dampers in Vertical Ventilation Duct Penetrations	Section III.G.2
13	Essential Redundant Raceway Protection	Section III.G.2.a,b,c
14	Reactor Building Fire Zones Without Fire Detection	Section III.G.2
15	Fire Areas Control Structure Without Fire Suppression	Section III.G.2.c
16	This Deviation Request has been withdrawn	N/A
17	This Deviation Request has been withdrawn	N/A
18	This Deviation Request has been withdrawn	N/A
19	Incomplete Automatic Suppression In Diesel Generator Fire Area D-1	Section III.G.2.c
20	Penetration Seals – Conduits	Section III.G.2
21	This Deviation Request has been withdrawn	N/A
22	This Deviation Request has been withdrawn	N/A
23	Control Structure Fire Area CS-9 Partial Fire Suppression	Section III.G.3
24	Automatic Fire Suppression in Fire Zone 2-5D	Section III.G.2.b
25	Separation of Redundant Safe Shutdown Capability in Fire Zone 1-3A	Section III.G.2.b
26	Separation of Redundant Safe Shutdown Capability in Fire Zone 2-3B-N	Section III.G.2.b

Deviation Request No.	Subject	Appendix R Requirement Deviated From
27	Nuclear Boiler Instrumentation in Fire Zone 1-5A-S	Section III.G.2.b
28	Nuclear Boiler Instrumentation in Fire Zone 2-5A-N	Section III.G.2.b
29	Category I Components and Safe Shutdown Raceway in Fire Zone 1-3C-W and 2-3C-W	Section III.G.2.b
30	This Deviation Request has been withdrawn	N/A
31	This Deviation Request has been withdrawn	N/A
32	Outside Areas - Lack of Separation of Safe Shutdown Components and Electrical Cables	Section III.G.2.b
33	Reactor Coolant Makeup and Depressurization Systems	Section III.G/III.L (Guidance provided in IN84-09, Para. V)
34	This Deviation Request has been withdrawn	N/A
35	This Deviation Request has been withdrawn	N/A
36	This Deviation Request has been withdrawn	N/A
37	Control Room Raised Floor and Control Structure Cable Chase Fire Protection	Section III.G.2
38	Protection of Redundant Safe Shutdown Raceways in the Unit 2 Main Steam Pipeway (Fire Zone 2-4G)	Section III.G.2
39	This Deviation Request has been withdrawn	N/A
40	This Deviation Request has been withdrawn	N/A
41	This Deviation Request has been withdrawn	N/A
42	Protection of Safe Shutdown Raceway in Fire Zone I-3B-W and 2-3B-W	Section III.G.2.b

DEVIATION REQUEST NO. 1 HAS BEEN WITHDRAWN

APPENDIX R DEVIATION REQUEST NO. 2

SUPPRESSION POOL TEMPERATURE INDICATION

DEVIATION REQUEST:

The existing Suppression Pool Temperature Monitoring System (SPOTMOS) configuration is considered acceptable. The alternative indirect methods (described herein) to determine suppression pool temperature are acceptable in the event both divisions of SPOTMOS becomes unavailable due to a fire in Fire Area CS-9.

FIRE AREAS/ZONES AFFECTED:

This condition would only occur due to a fire in Fire Area CS-9. The affected locations are the Unit 1 and 2 Remote Shutdown Panels. (Fire Zones 1-2D and 2-2A).

REASON FOR DEVIATION REQUEST:

Suppression pool temperature monitoring for the remote shutdown panels is provided by the SPOTMOS for each unit. While two redundant divisions of the system are provided for each unit and displayed at the units remote shutdown panel, there is a possibility that a failure induced by a control room fire could result in the loss of suppression pool temperature indication at the remote shutdown panels.

EXISTING ARRANGEMENT:

Fire Area CS-9

- Fire Area CS-9 has fire rated boundaries to all adjacent fire areas except at the boundary supporting floor elevator where structural steel at that elevation is addressed in Deviation Request No. 6.

- Fixed manual CO_2 protection is provided for under the floor space containing cables.

- Automatic detection is provided throughout the fire area.

- The control room fire zone is constantly staffed.

- Each division of the Unit's SPOTMOS provides a temperature averaging signal to the remote shutdown panel. Each division is contained in a separate control panel, located side by side and separated by steel plates totaling 3/8" in thickness.

JUSTIFICATION:

The primary function of the SPOTMOS is to monitor the suppression pool temperature to ensure that suppression pool temperatures will remain below defined limits and, thereby, containment integrity will be maintained. The system also functions as an indirect indication that the reactor is shutdown.

In the event of a fire resulting in a control room evacuation, the operators will scram the reactor before leaving the control room to go to the remote shutdown panel. When the remote shutdown panel is used, SPOTMOS serves solely to provide helpful confirmatory information on the condition of the reactor. The operator monitors and controls reactor pressure and water level from the remote shutdown panel. Procedures also direct operators to verify reactor pressure and level indication from local instrument racks. During operation from the remote shutdown panel, explicit procedures allow operators to provide makeup water to the reactor using the Reactor Core Isolation Cooling (RCIC) system and depressurize the reactor pressure vessel with safety relief valves.

In the event that both divisions of suppression pool temperature indication at the remote shutdown panel fail:

- Loss of temperature indication would be detected by operators by off-scale readings.
- Operators would be aware of heat transferred to the pool through observation of the reactor pressure vessel level and pressure and emergency core cooling system discharge valve alignment indication.
- Emergency remote shutdown procedures direct and instruct operators to start Suppression Pool Cooling.
- Emergency primary containment control procedures direct operators to start suppression pool cooling upon increasing temperature in the pool.

Verification of suppression pool cooling system function is accomplished by observing valve line-ups and primary (RHR) and secondary (RHRSW) flow indication.

Suppression pool temperature can be inferred from suppression chamber air temperature and air pressure indication which are available at the remote shutdown panel. Because the chamber remains a relatively constant volume, the pool heat-up or cooldown rate will be related to these two air parameters.

Control and indication for one loop of suppression pool cooling valves is available at the remote shutdown panel. This includes primary (RHR) and secondary (RHRSW) system valves and pumps presented in "mimic" board fashion for easy alignment verification.

In addition an existing analysis demonstrates that suppression pool temperature during a shutdown will not exceed 200°F. This calculation conservatively assumes:

1. Lowest pool level and highest initial temperature
2. Full reactor vessel depressurization to the pool
3. HPCI or RCIC systems rejecting heat into pool
4. Minimum coolant level in the RPV (maximum heat to pool)
5. Absence of Suppression Pool cooling for approximately 30 minutes.

The required NPSH for the RHR pumps at their required 10,000 gpm rating is 7.3 feet.

Susquehanna SES FSAR calculations (Subsection 6.3.2.2.4.1) in accordance with Regulatory Guide 1.1 demonstrate that the RHR pumps have an NPSH of 20.25 feet at atmospheric pressure and 200°F suppression pool water temperature. Therefore the ECCS functions are not affected by a pool temperature of 200°F.

Primary containment integrity in this operating region is not in jeopardy until a static pressure of about 53 psig is reached, which cannot be achieved without a minimum temperature of 300°F (saturation). Again, both of these parameters are indicated at the remote shutdown panel and are more important for primary containment control than pool temperature.

APPENDIX R DEVIATION REQUEST NO. 3

FIRE DOORS - NON-RATED

DEVIATION REQUEST:

Existing unlabeled, untested, doors are acceptable for use as fire doors based on confirmation by Factory Mutual that the doors are of sufficient construction to provide equal or better fire resistance to that of a rated fire door.

Existing watertight doors which have not been fire tested are acceptable as 1-1/2 hour fire doors based on Factory Mutual's evaluation of these doors.

FIRE AREAS/ZONES AFFECTED:

For the effected fire zones see Table DR 3-1.

REASON FOR DEVIATION REQUEST:

Various fire barriers within the Unit 1 and 2 Reactor Buildings have been identified as requiring 3 hour fire rating to meet the requirements of Appendix R. Existing doors within these barriers are not fire rated (see Table DR 3-1 for a listing of these doors).

JUSTIFICATION:

There are three types of doors within the Reactor Buildings. Factory Mutual has reviewed each door type, and door within that type, and compared them to either known data or an existing fire rated door at Susquehanna.

Water Tight Doors (Type I)

Factory Mutual in their January 1985 and August 1987 Reports concluded that these special purpose (flood) doors would be expected to provide at least 1-1/2 hours of fire resistance (see Attachments 1 and 5).

Pressure Resistance Doors (Type II)

Factory Mutual in their August 1985 and June 1986 Reports compared various non-labeled pressure resistant doors, with pressure resistant door number 279 which is an Underwriter's Laboratories labeled 3 hour fire door. Factory Mutual concluded that the doors would be expected to provide at least 1-1/2 hours of fire resistance (see Attachments 2 and 3).

In their March 1994 Technical Report (Supplement 5), Factory Mutual compared door number 505 with the requirements for fire resistance ratings of fire doors. Factory Mutual concluded that door number 505 may be considered to be equivalent to a 1-1/2 hour rated assembly. (See Attachment 6).

Hollow Steel Doors (Type III)

Factory Mutual in their August 1985 and June 1986 Reports compared various non-labeled hollow metal doors with hollow metal door number 421 which is an Underwriter's Laboratories labeled 3 hour fire door. Factory Mutual concluded that the doors should be expected to provide at least 1-1/2 hours of fire resistance.

In their May 1987 Report (see Attachment 4), Factory Mutual compared various non-labeled hollow metal doors with hollow metal door number 115-R which is an Underwriter's Laboratories labeled 1-1/2 hour fire door. Factory Mutual concluded that these doors should be expected to provide at least 1-1/2 hours of fire resistance.

The combustible loadings in the Reactor Buildings have been conservatively calculated and the average combustible loading in each Reactor Building Fire Zone is less than 1-1/2 hours. Changes in these combustible loadings are programmatically controlled. This Deviation Request is valid so long as:

- The calculated maximum average combustible loading in the fire zones adjacent to these fire barriers is below the minimum rating of the door.
- The concentrated combustible loading adjacent to these fire barriers is calculated to be below the minimum fire rating of the door.

All the recommendations proposed by Factory Mutual for the fire doors listed in Table DR 3-1 have to be completed to meet the requested rates as specified in this deviation request.

APPENDIX A
DEVIATION REQUEST NO. 3

FIRE PROTECTION PROGRAM – CONCERN #1

ATTACHMENT 1

TECHNICAL REPORT

EVALUATION OF SELECTED FIRE DOOR AND DOOR FRAME ASSEMBLIES

By

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"Susquehanna Steam Electric Station"
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FM Index No. 38492.55
NS

January 1985

Approved by

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PURPOSE

An evaluation of selected fire doors protecting safety-related areas was conducted for Pennsylvania Power and Light Company (PP&L) at Susquehanna Steam Electric Station Units 1 and 2. The purpose of the evaluation was to examine selected fire doors to determine whether field modifications made to labeled fire doors (doors which have been tested and accepted by a nationally recognized laboratory) since their installation voided the fire resistance rating of the doors; and to examine other nonlabeled door assemblies and render an opinion on their fire resistance rating.

SUMMARY AND CONCLUSIONS

1. The labeled fire door and frame assemblies and the labeled access panel are expected to provide the level of fire resistance stated on the label.
2. The special purpose (water tight) door and frame assembly examined should provide a minimum of 1-1/2 hr fire resistance.
3. To meet FM recommendations ventilation louvers in the doors to the four chases containing electrical panels and cables at elevation 771 of the Control Building should be relocated to the face of the cable chase near the ceiling to achieve fast response.

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I

INTRODUCTION

The plant was visited during January 7 and 8, 1985. The writer was accompanied by Messrs. T. Baileys, PP&L Fire Protection Engineer, and L. J. Mattern, FMEA, Resident Loss Prevention Specialist. Sixty-six doors and door frames, one labeled access panel, and one unlabeled special-purpose door were examined during this visit. These assemblies were located in the Control Building and Unit 1 and Unit 2 Reactor Buildings.

The writer is a Project Engineer with 20 years experience at Factory Mutual Research Corporation (FMRC). His primary responsibility is: 1) testing and determination of fire rating for fire doors; and 2) examination of installed unlabeled doors to determine their fire resistance rating for building authorities. The writer has served on the National Fire Protection Association "Fire Door and Window" Committee (NFPA 80) for 18 years.

II

FIRE DOOR EVALUATION

Labeled fire doors and door frames, a labeled access panel, and an unlabeled special purpose door and frame were examined during this visit to Susquehanna Steam Electric Station at the request of Pennsylvania Power and Light Company (PP&L).

2.1 FIRE DOORS AND DOOR FRAME ASSEMBLIES AND ACCESS PANELS

Sixty-six doors and door frames and one access panel were examined determine whether 1) labels were in place and properly attached, 2) modifications had been made to the door or panel, and 3) modifications made would void the fire resistance rating of the door or panel.

Of the 66 doors examined, 62 doors were labeled, 4 doors were not label or had labels loosely attached. Forty-two of the labeled fire doors had modified.

2.1.1 Labeled Doors with No Modifications

Labeled doors were visually examined to determine that there was no physical damage to the door and that hardware supplied as part of th assembly functioned properly to close and latch the door when the door released from the open position.

Fire door assemblies which have not been modified should have the fire resistance rating indicated on the label.

2.1.2 Labeled Fire Doors and Panel with Modifications

Fire door and door frame assemblies which have been tested a nationally recognized laboratory, such as Factory Mutual Research Corporation (FMRC) or Underwriter's Laboratories (UL), have a label attach to both the door and the frame. The fire resistance rating is noted on th label.

A generally accepted precept of FMRC and UL is that any alteration of assembly from the successfully fire tested construction voids the fire resistance rating indicated on the label. However, there are reasons in nuclear industry for modifying a fire door assembly; a major reason is security. Care must be used when adding security hardware to the door an frame to assure that this hardware will have minimum impact on fire resis rating of the assembly.

In the examination, fire door assemblies with modifications had one or more of the following additions or alterations:

1. Switches or electromagnets attached to the header of the door frame. Wiring is in rigid metal conduit from the card reader to the face of the door frame.
2. Steel or aluminum angle strips 2 in. to 4 in. wide, 1/8 in. thick, and 4 in. to 6 in. long attached to the top of the door by machine screws. The angle strips act in concert with the switch or electromagnet.
3. Weather stripping used to minimize air leakage around doors where a pressure differential exists between adjoining areas. Weather stripping was attached to the door or door frame by means of machine screws.

The labeled fire doors examined are identified in Appendix A. Also included in this Appendix are comments on additions/modifications to doors and frames.

A 1-1/2 hr labeled access panel No. 7006 is located in the Control Building at elevation 754. The panel is 3 ft by 3 ft and is equipped with a microswitch on the frame.

Modifications made to labeled fire doors and frames and the access panel are not expected to affect the fire resistance rating of these assemblies.

2.1.3 Fire Doors Not Labeled

Door No. 111 (elevation 670, Reactor Bldg. Unit 1) and Door No. 201 (elevation 683, Reactor Bldg. Unit 1) had no labels. These doors were compared with Door No. 110 (elevation 670, Reactor Bldg, Unit 2) which had a 1-1/2 hr label with the following results:

1. All three had the same dimensions (height, width and thickness) and the same identification tags (except for the opening number) riveted to the latch edge of the door.
2. The spacing of internal horizontal stiffeners was determined to be approximately 8 to 12 in. on center on all three doors. This was done by means of a stethoscope.

3. The same type of insulation was used in the core of all three (glass fiber batts). This was established by removing screws fr door hinges on all doors and extracting door filler material.
4. The thickness of the metal face sheet on all doors was the same (0.045 in. or 18 ga). This was determined by measuring metal thickness by means of a specially adapted micrometer.

Door No. 115 (elevation 670 of Reactor Bldg. Unit 1) also had no label. This door was apparently designed as a bullet proof door with hinges welded place. It could not be internally examined in the manner described above. The door was manufactured by the Chicago Bullet Proof Door Company. Other doors made by the same company were located in the Control Building (Door 4 at elevation 729) and in the Reactor Building (Door 571 at elevation 818). Both the above doors have 1-1/2 hr labels. All three doors have 1) the sam dimensions, 2) the same hardware, 3) a solid core. Based on the writer's experience auditing fire door manufacturing plants it is believed that Door No. 115 would also have a 1-1/2 hr fire rating. However, since the door c not be internally examined, the manufacturer would have to be contacted an asked to compare the construction of this door with the 1-1/2 hr fire ra doors to confirm the above.

Door 587 had a loosely attached label. This door would normally be treated as if it had no label. The door was not physically examined as ab because it was located in a short corridor with a labeled fire door on eit side (Door 586 and a stairway door).

2.2 SPECIAL PURPOSE DOOR

An evaluation was made of an unlabeled special-purpose (flood) dc to determine whether it would provide a 1-1/2 hr fire resistance rating. door examined was at elevation 645 in the Core Spray Pump Room of Unit 1. This area is indicated as Area 1-1B in the "Fire Protection Review Report"

The door was 3 ft by 7 ft and consisted of 1/4 in. plate steel with 1 in. x 2 in. x 3/16 in. steel channel for peripheral framing and horizon stiffening 10 in. on center. The door was latched by twelve 1 in. square steel bar latches engaging the 5/8 in. thick steel frame on the top, bott and sides. Gasketing is employed to make a waterproof seal with the 5/8 thick steel frame.

Steel doors of this type have not been tested for fire resistance ir country. The construction of this door was compared to the Rules of t Offices' Committee (FOC), Section 1, Specification 1, from Great Brita which states that doors fabricated in accordance with those rules may be expected to provide 6 hrs' fire resistance when there is one door on each side of the opening. This is based on numerous successful fire tests of these doors in that configuration.

Fire tests on single doors of this design, conducted to requirements of British Standard 476, Part 8, have satisfied requirements of that standard for 2 hours. This test method is equivalent to the test procedure used in the U.S., ASTM E-152, in determining a door's fire resistance rating, with one exception: a hose stream test is not required in BS476. This exception is not considered critical for steel doors since the hose stream is applied to the hinge side of the door which drives the door against the frame stop.

Rules of the FOC require two point latches of no less than 3/8 in. diameter steel in such doors. The waterproof door in question has twelve 1 in. square steel latch bars which engage the frame; hence, the desired 1-1/2 hr fire resistant performance can reasonably be expected in a fire situation.

2.3 ELECTRICAL EQUIPMENT CHASES

An evaluation was made of doors to chases containing electrical equipment at elevation 771 in the Control Building. These doors were numbered 594, 595, 598, and one unnumbered. The doors are fitted with a fusible link-actuated louver (11 in. x 11 in.) located in the top third of the door. The doors and louvers bore 1-1/2 hr UL labels.

FM does not approve labeled fire doors with louvers. However, UL tests and lists louvers for installation in labeled fire doors. The National Fire Protection Association (NFPA) allows the use of louvers in labeled fire doors where the opening is not in an exit or located where products of combustion flowing through the louver opening prior to its operation could jeopardize the use of exits.

The wall construction of the cable chases consists of two 1 in. thick layers of Type X gypsum wallboard on steel studs. The wallboard is on the corridor side only with no sheathing provided on the chase side of the studs. This is not a tested fire rated construction.

To meet FM recommendations louvers should be relocated to the face of the cable chase near the ceiling to achieve fast response. Louver openings in the door should be closed with 16 gage sheet metal with a minimum 2 in. overlap around the opening. The sheet metal covering should be attached with machine screws 5 in. on center.

The construction of the electrical equipment chase is such that a l[illegible] fire resistance can be expected if fire exposure is on the corridor side. However, if the fire exposure came from within the chase, fire resistance rating would be minimal. Expansion of the exposed steel studs due to a fire inside would result in movement of fasteners holding the gypsum wallboard in place with possible loss of structural integrity of the wall.

III

RECOMMENDATIONS

Eight door assemblies in Control and Reactor Buildings, require the following:

1. Door No. 115 (Elevation 670, Reactor Building, Unit 1): The manufacturer should be contacted to determine the fire rating of this door.
2. Door No. 559, Elevation 771, Control Building: The latch mechanism on this fire exit device needs repair. Latching is not reliable and bolt retraction is erratic.
3. Door No. 586, Elevation 783, Control Building: This door was prepared for a dead bolt which has not been provided. The 1 in. diameter hole in the face sheet should be covered with 16 gage sheet metal fastened with machine screws.
4. To meet FM recommendations ventilation louvers in the doors to the four chases containing electrical panels and cables at Elevation 771, Control Building (Doors No. 594, 595, 598, and one unnumbered) should be relocated to the face of the cable chase near the ceiling to achieve fast response. Louver openings in the door should be closed with 16 gage sheet metal with a minimum 2 in. overlap around the opening. The sheet metal should be attached with machine screws 5 in. on center.
5. Door No. 601, Elevation 779 Reactor Building: One bolt attaching the frame to the wall is missing and should be replaced. Also, the closer attachment to the frame header is loose and should be tightened.

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APPENDIX A
FIRE DOOR OBSERVATIONS

BUILDING	DOOR NO.	ELEV-ATION	DOOR LABELED	MODIFICATIONS				COMMENTS
				None	Card Reader	Weather Stripped	Other (Comments)	
CONTROL BLDG	263	698	Yes		X			
	317	698	Yes		X			
	457	729	Yes		X			
	462	729	Yes		X		X	
	463	729	Yes	X				
	465	729	Yes	X				
	466	729	Yes	X				
	468	729	Yes	X				
	538	754	Yes		X			
	542	754	Yes	X				
	544	754	Yes	X				
	553	771	Yes			X		
	554	771	Yes			X		
	555	771	Yes			X		
	556	771	Yes			X		
	557	771	Yes			X		
	558	771	Yes			X		
	559	771	Yes			X		See Section III
	560	771	Yes			X		
	561	771	Yes			X		
	562	771	Yes			X		
	563	771	Yes			X		
	564	771	Yes			X		
	567	771	Yes			X		
	568	771	Yes			X		
	569	771	Yes			X		
	570	771	Yes			X		
	571	771	Yes			X		
	572	771	Yes			X		
	573	771	Yes			X		
	580	783	Yes	X				
	585	783	Yes	X				
	586	783	Yes				X	See Section III

APPENDIX A
FIRE DOOR OBSERVATIONS

BUILDING	DOOR NO.	ELEVATION	DOOR LABELED	MODIFICATIONS				COMMENTS
				None	Card Reader	Weather Stripped	Other (Comments)	
CONTROL BLDG	587	783	(See Note 1)	X				
	594	771	Yes			X		See Section III
	595	771	Yes			X		See Section III
	598	771	Yes			(See Note 2)		See Section III
	730	806	Yes			X		
	731	806	Yes		X	X		
	7006	754	Yes				X	Microswitch on frame,(see Note
REACTOR BLDG UNIT 1	70	670	Yes		X			
	109	670	Yes			X	X	Extra heavy duty hinges
	111	670	No	X				Appears same as Door No. 110 (elev. 670 Reactor Bldg. Unit
	115	670	No		X			Appears same as Door No. 462 (elev. 729 Control Bldg.) and Door No. 571 (elev 818 Reactor Bldg.)
	201	683	No	X				Appears same as Door No. 110 (elev. 670 Reactor Bldg. Unit
	415	719	Yes	X				
	419	719	Yes	X				
	421	719	Yes	X				
	425	719	Yes	X				
	517	749	Yes	X				
	519	749	Yes	X				
	523	749	Yes	X				
	525	749	Yes	X				
	571	818	Yes		X	X		
	601	779	Yes	X				See Section III
	627	779	Yes		X	X		
	803	818	Yes		X	X		
	806	818	Yes			X		
	807	818	Yes		X	X		

APPENDIX A
FIRE DOOR OBSERVATIONS

BUILDING	DOOR NO.	ELEVATION	DOOR LABELED	MODIFICATIONS				COMMENTS
				None	Card Reader	Weather Stripped	Other (Comments)	
REACTOR BLDG UNIT 2	72	670	Yes	X				
	110	670	Yes	X				
	112	670	Yes	X				
	113	779	Yes			X	X	Air lock switch
	114	779	Yes			X	X	Air lock switch
	116	670	Yes		X	X		
	518	749	Yes				X	New closer reinforcement on face of door

NOTES:

1. The label on this door has minor damage and is loosely attached. This casts a question as to its legitimacy. In this instance, the question is moot, as this location is in a short corridor with an acceptable fire door on either side of it. (Door No. 586 and a stairway door.)
2. There is a fourth door adjacent to this door with no opening identification.
3. This is a 3 ft x 3 ft, 1-1/2 hr rated access panel.

APPENDIX A

DEVIATION REQUEST NO. 3

ATTACHMENT 2

EVALUATION OF SELECTED FIRE DOOR AND DOOR FRAME ASSEMBLIES
(SUPPLEMENT 1)

By

Samuel M. Knight

Prepared for:

Pennsylvania Power and Light Company
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Route 11
Salem Township, Pennsylvania 15635

August 1985

Approved By

Paul H Dobson

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PURPOSE

An evaluation of selected fire doors protecting safety related areas was conducted for the Pennsylvania Power and Light Co. (PP&L) at Susquehanna Steam Electric Station, Units 1 & 2. The purpose of the evaluation was to examine certain unlabeled doors and compare them with labeled door constructions to render an opinion on their expected fire resistance.

This evaluation was requested by PP&L as a supplement to the original evaluation in a Factory Mutual report dated January 1983.

SUMMARY AND CONCLUSIONS

1. Door No. 279 on Level 676, had a 3 hour label attached. The door may be expected to provide that level of protection.
2. Door No. 421 on Level 719, had a 3 hour label attached. The door may be expected to provide that level of protection.
3. Door Nos. 111 and 201, were compared to Door No. 279 and found to be of the same construction and of the same materials, and were judged to be equivalent, hence, may be expected to provide up to 3 hours of fire resistance.
4. Door No. 515 on Level 749, was compared to Door No. 421 and found to be of the same construction and of the same materials and was judged to be equivalent, hence, may be expected to provide up to 3 hours of fire resistance.
5. To meet FM recommendations, the louver in Door No. 606 on Elevation 779, should be removed and the opening protected. The door was compared to Door No. 421, and if protected as noted in paragraph 2.3, may be expected to provide up to 1-1/2 hour's fire resistance.
6. Should it be necessary to have additional doors at this site analyzed as to their expected fire resistance rating, this may be accomplished by one of the following procedures:
   a. For doors needing up to a 1-1/2 hour equivalency; contact the manufacturer and obtain written confirmation that the doors in question and at least one similar door previously examined by the writer and qualified for 1-1/2 hour rating were fabricated to the appropriate PP&L specification. This should be corroborated by determining that sizes, face sheet thickness and hinge reinforcement thickness are the same. Installation shall conform to the requirements of NFPA Standard 80, "Fire Doors and Windows."
   b. For doors needing up to a 3 hour equivalency; request an additional visit by the writer to determine that peripheral channel framing and latch reinforcements are the same and that internal stiffener quantity and locations are the same.

I

INTRODUCTION

The plant was visited on May 7, 1985. The writer was accompanied by Mr. D. Kohn of PP&L. Four doors and frames were examined during this visit. The assemblies were located in Unit 1 and 2 Reactor Buildings.

The writer is a Project Engineer with 20 years' experience at the Factory Mutual Research Corporation (FMRC). The writer has served on the National Fire Protection Association "Fire Doors and Windows" Committee (NFPA 80) for 18 years. His primary responsibilities are: 1) Testing and determination of fire ratings for fire doors; and 2) Examination of installed unlabeled doors to determine their fire resistance rating for building authorities.

II

FIRE DOOR AND FRAME EVALUATION

Two labeled fire doors and frames, and two unlabeled fire doors and frames, were examined during this visit to the Susquehanna Steam Electric Station at the request of the Pennsylvania Power and Light Company (PP&L).

2.1 Door Frame Assemblies

All frames were found to be fabricated in accordance with the American National Standards Institute, Standard A155.1, and may be expected to provide up to 3 hours fire resistance.

2.2 Fire Doors

Unlabeled fire doors were examined by comparing their construction features with labeled fire doors.

2.2.1 Door Nos. 111 and 201

Door Nos. 111 and 201 were ~~re-evaluated~~ during this visit. They were previously covered in the FMRC report dated January 1985. At that time, those doors were compared against a 1-1/2 hour labeled door (No. 110 at Level 670) and our opinion was that these doors could be expected to provide at least a 1-1/2 hour fire resistance. Door No. 279 on Level 676 bears a label indicating a 3 hour fire resistance.

The construction details of Door No. 279 were compared to Door No. 110 with the following results:

1) All doors had the same dimensions (height, width and thickness).
2) Internal stiffeners were determined to be approximately 6 in. to 8 in. on center. This was done by means of a stethescope.
3) Face sheet, hinge reinforcement and peripheral channel framing were found to be essentially the same. This was done by means of a specially adapted micrometer.

2.2.2 Door No. 515

Door No. 515, on Level 749, was not labeled and was examined to compare its construction details against Door No. 421 using the criteria outlined in Paragraph 2.2.1. Door 421 has a 3 hour label. Both doors have essentially the same construction details.

2.2.3 Door No 606

Door No. 606, on Level 779, was examined to compare its construction against Door No. 421. Door No. 606 contained a louver (6 in. x 8 in.) which precludes the door frame having any fire resistance, unless modified. All other details as outlined in Paragraph 2.2.1 were essentially the same between these two doors. Door No. 421 is a 3 hour rated fire door. If Door No. 606 is modified, it can provide at least 1-1/2 hour's fire resistance. The modification should consist of attaching one 18 gage steel plate to each door face. The plate should be large enough to overlap the louver by 2 in. on all sides. Fasteners should be sheet metal screws, spaced no more than 6 in. on center.

III

RECOMMENDATIONS

1. If a fire resistance rating of up to 1-1/2 hours for Door No. 606, on Level 779, is desired, the louver should be covered on both faces by 18 gage steel plates, overlapping all sides by 2 in., fastened by sheet metal screws spaced no more than 6 in. on center.

APPENDIX A

DEVIATION REQUEST NO. 3

ATTACHMENT 3

TECHNICAL REPORT

EVALUATION OF SELECTED FIRE DOOR AND DOOR FRAME ASSEMBLIES
(SUPPLEMENT 2)

By

Samuel M. Knight

Prepared for:

Pennsylvania Power & Light Company
"Susquehanna Steam Electric Station"
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June 1986

Approved by:

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SUMMARY AND CONCLUSIONS

An evaluation of selected fire doors protecting safety related areas was conducted for the Pennsylvania Power & Light Company (PP&L) at Susquehanna Steam Electric Station, Units 1 & 2. The purpose of the evaluation was to examine certain unlabeled doors and compare them with labeled door construction, and render an opinion on their expected fire resistance.

This evaluation was requested by PP&L as a supplement to the original evaluation in a Factory Mutual report dated January 1985, and Supplement 1, dated August 1985.

The following conclusions were reached:

1. Door 112 on Level 670 may be expected to provide 3 hours of fire resistance.
2. Door 202 on Level 683 may be expected to provide 3 hours of fire resistance.
3. Door 407 on Level 719 may be expected to provide 3 hours of fire resistance when the four 1/8 in. diameter holes in the face sheet are sealed with sheet metal screws.
4. Door 514 on Level 749 may be expected to provide 1-/2 hours of fire resistance. If the existing latch bolt is replaced with a latch having a 3/4 in. throw, this door may be expected to provide 3 hours fire resistance.
5. Door 530 on Level 761 may be expected to provide 1-1/2 hours of fire resistance. If the existing latch bolt is replaced with a latch having a 3/4 in. throw, this door may be expected to provide 3 hours fire resistance.
6. Door 711 on Level 799 may be expected to provide 1-1/2 hours of fire resistance. If the existing latch bolt is replaced with a latch having a 3/4 in. throw, this door may be expected to provide 3 hours fire resistance.

I

INTRODUCTION

The Susquehanna Steam Electric Station was visited on April 4, 1986 and May 16, 1986. The writer was accompanied by Mr. S. E. Davis of PP&L; Mr. L. J. Mattern of FMEA was present during the April visit. Three unlabeled doors and frames were examined during each visit. The door assemblies are located in Unit 1 & 2 Reactor Buildings.

The writer is a Project Engineer with 20 years' experience at the Factory Mutual Research Corporation (FMRC). The writer has served on the National Fire Protection Association "Fire Doors and Windows" Committee (NFPA 80) for 18 years. His primary responsibilities are: 1) Testing and determination of fire ratings for fire doors; and 2) Examination of installed unlabeled doors to determine their fire resistance rating for building authorities.

II

FIRE DOOR AND FRAME EVALUATION

Six unlabeled fire doors and frames were examined during two visits to the Susquehanna Steam Electric Station at the request of the Pennsylvania Power & Light Company (PP&L). Expected fire resistance ratings for each door were determined through comparison with labeled doors.

2.1 FIRE DOOR FRAMES

All frames are fabricated in accordance with the American National Standards Institute, Standard A155.1, and may be expected to provide 3 hours of fire resistance.

2.2 FIRE DOORS

The following unlabeled fire doors were examined by comparing their construction features with labeled fire doors.

2.2.1 Door 112

Door 112 on Level 670 was compared to Door 421, a 3-hour labeled door on Level 719; it is concluded that Door 112 has an expected 3-hour rating based on the following results:

1. Both doors are the same size.
2. Internal stiffeners in both doors are 6 to 8 in. on center. This was determined by means of a stethoscope.
3. Face sheets, hinge reinforcements and peripheral channel framing are essentially the same. Measurements were made using a specially adapted micrometer. In addition latch throws in Door 670 are equal to or greater than the 3-hour labeled door.
4. Door 421 has a low-density glass fiber insulation in the door cavity while Door 112 does not. This low density insulation has no significant bearing on the performance of a door in a fire situation.

2.2.2 Door 202

Door 202 on Level 683 was examined and its construction details were compared with those of Door 110 a 1-1/2-hour (subsequently upgraded to 3 hours) labeled door on Level 670; it is concluded that Door 202 has an expected 3-hour rating based on the following observations:

1. Both doors are the same size.
2. Internal stiffeners in both doors are 6 to 8 in. on center.
3. Face sheets, hinge reinforcements and peripheral channel framing have the same measurements. The 3-hr rated door has a 3/4 in. latch throw, whereas Door 202 has a 1/2 in. throw; however, because Door 202 employs a three point latch mechanism, (i.e. three points of engagement between door and frame) it is concluded that this mechanism offsets the shorter throw and justifies extending the expected fire resistance rating to 3 hours.

2.2.3 Door 407

Door 407 on Level 719 was examined to compare its construction details against Door 421, a 3-hour labeled fire door on Level 719; it is concluded that Door 407 has an expected 3-hour rating based on the following observations:

1. The labeled door is 2 in. higher than Door 407. Tests have shown that doors smaller than tested will provide equivalent performance if all other construction features are the same.
2. Internal stiffeners in both doors are 6 to 8 in. on center.
3. Faces sheets, hinge reinforcements and peripheral channel framing are the same, except there are four holes of approximately 1/8 in. diameter in one face sheet of Door 407. In addition, latch throws in Door 407 are equal to or greater than Door 421.

2.2.4 Door 514

Door 514 on Level 749 was examined to compare its construction details against Door 421, a 3-hour labeled fire door on Level 719; it is concluded that Door 514 has an expected 3-hour rating based on the following observations:

1. Both doors are the same size.
2. Internal stiffeners in both doors are 8 to 12 in. on center.
3. Face sheets, hinge reinforcements, and peripheral channel framing are essentially the same.
4. The labeled door is fitted with a single point latch having a 3/4 in. throw, while Door 514 has a 5/8 in. throw. Although the construction of Door 514 is comparable with the 3-hour rated door, this shorter latch throw dictates a shorter expected fire resistance of 1-1/2 hours. Since greater forces are generated in the assembly during a 3-hour exposure, there is increased possibility that the shorter latch bolt will be pulled out of the strike during expansion and distortion of the door and frame, resulting in failuire. Experience has shown that if the construction of the door is adequate, a 1/2-in. latch throw is adequate to achieve a 1-1/2-hour expected fire resistance. If the 5/8-in. bolt is replaced with a 3/4-in. bolt, the door may be expected to provide up to 3 hours fire resistance.

2.2.5 Door 530

Door 530 on Level 761 was examined to compare its construction details against Door 421, a 3-hour labeled fire door on Level 719; it is concluded that Door 530 has an expected 3-hour rating based on the following evidence:

1. Both doors are of the same size.
2. Internal stiffeners in both doors are 8 to 12 in. on center.
3. Face sheets, hinge reinforcements and peripheral channel framing are essentially the same.
4. The labeled door is fitted with a single point latch having a 3/4 in. throw, while Door 530 has a 5/8 in. throw. Although the construction of Door 530 is comparable with the 3-hour rated door, this shorter latch throw dictates a shorter expected fire resistance of 1-1/2 hours. Since greater forces are generated in the assembly during a 3-hour exposure, there is increased possibility that the shorter latch bolt will be pulled out of the strike during expansion and distortion of the door and frame, resulting in failuire. Experience has shown that if the construction of

the door is adequate, a 1/2-in. latch throw is adequate to achieve a 1-1/2-hour expected fire resistance. If the 5/8-in. bolt is replaced with a 3/4-in. bolt, the door may be expected to provide up to 3 hours fire resistance.

2.2.6 Door 711

Door 711 on Level 799 was examined to compare its construction details against Door 421, a 3-hour labeled fire door on Level 719; it is concluded that Door 711 has an expected 3-hour rating based on the following evidence:

1. Door 711 was 6 in. narrower than Door 799. Tests have shown that doors smaller than tested will provide equivalent performance if all other construction details are the same.
2. Internal stiffeners are 8 to 12 in. on center.
3. Face sheets, hinge reinforcements and peripheral channel framing are essentially the same.
4. The labeled door is fitted with a single point latch having a 3/4 in. throw, while Door 711 has a 5/8 in. throw. Although the construction of Door 711 is comparable with the 3 hr. rated door, this shorter latch throw dictates a shorter expected fire resistance of 1-1/2 hours. Since greater forces are generated in the assembly during a 3-hour exposure, there is increased possibility that the shorter latch bolt will be pulled out of the strike during expansion and distortion of the door and frame, resulting in failuire. Experience has shown that if the construction of the door is adequate, a 1/2-in. latch throw is adequate to achieve a 1-1/2-hour expected fire resistance. If the 5/8-in. bolt is replaced with a 3/4-in. bolt, the door may be expected to provide up to 3 hours fire resistance.

III

RECOMMENDATIONS

1. To obtain a 3-hour fire resistance rating the four 1/8-in. diameter holes in the face sheet of Door 407 on Level 719 should be filled using sheet metal screws.
2. To increase the 1-1/2-hour fire resistance rating to 3 hours, the 5/8 in. throw latch bolts on Door 514 on Level 749; Door 530 on Level 761; and Door 711 on Level 799 should be replaced with latch bolts having a 3/4 in. throw.

APPENDIX A

DEVIATION REQUEST NO. 3

ATTACHMENT 4

TECHNICAL REPORT

EVALUATION OF SELECTED FIRE DOOR AND DOOR FRAME ASSEMBLIES
(SUPPLEMENT 3)

by

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May 1987

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SUMMARY AND CONCLUSIONS

An evaluation of selected fire doors and frames protecting safety related areas was conducted for the Pennsylvania Power and Light Co. (PP&L) at Susquehanna Steam Electric Station, Units 1 & 2. The purpose of the evaluation was to examine certain unlabeled or modified doors and frames, compare them with labeled units and render an opinion on their expected fire resistance.

This evaluation was requested by PP&L as a supplement to the original evaluation contained in a Factory Mutual report dated January 1985, Supplement 1 dated August 1985 and Supplement 2 dated June 1986.

The following conclusions were reached:

1. All frames examined may be expected to provide 3 hours fire resistance subject to the completion of Recommendations 1 and 2 noted in this report.
2. Door 115R on Level 779 had a 1-1/2 hour label attached. The door may be expected to provide that level of protection.
3. Door 175 on Level 676 had a 1-1/2 hour label attached. The door may be expected to provide that level of protection.
4. Door 408 on Level 719 may be expected to provide 1-1/2 hours fire resistance.
5. Door 531 on Level 749 may be expected to provide 1-1/2 hours fire resistance subject to replacement of the missing silencers and installation of a 16 ga. cover plate over the hole which was provided to receive an electromagnetic switch mechanism.
6. The active leaf of Door 712 on Level 799 has been sprung at the top and should be replaced.

I

INTRODUCTION

The plant was visited on April 9, 1987 by W. F. Shield and C. A. Spencer of FMRC. We were accompanied by Mr. S. Davis of PP&L. Five doors and frames were examined during this visit. The assemblies were located in Unit 1 and 2 Reactor Buildings and the Control Building.

Mr. C. A. Spencer is a Registered Professional Engineer in fire protection with 17 years' experience at Factory Mutual. Mr. Spencer has been involved in field and plan review evaluation of fire walls and fire rated assemblies and is now involved in testing and evaluation of fire resistance of building materials and fire rated assemblies.

II

FIRE DOOR AND FRAME EVALUATION

Two labeled fire doors and frames, and three unlabeled fire doors and frames, were examined during this visit to the Susquehanna Steam Electric Station at the request of the Pennsylvania Power and Light Company (PP&L).

2.1 FIRE DOOR FRAMES

All frames examined were found to be fabricated in accordance with the American National Standards Institute, Standard A155.1, and may be expected to provide 3 hours fire resistance subject to completion of Recommendations 1 and 2.

2.2 FIRE DOORS

Two labeled doors with modifications were examined and three unlabeled doors were compared to labeled fire doors to obtain an estimated fire resistance rating.

2.2.1 Labeled Fire Doors with Modifications

Labeled doors with modifications were examined to determine whether the door would still be expected to provide the level of fire resistance indicated on the label.

Door 115-R [illegible]

Door 115R (Elevation 779, Reactor Building, Unit 2) had a 1-1/2 hour label attached. This door had been modified by addition of an electromagnetic card reading device. Examination indicates this door may be expected to provide 1-1/2 hours fire resistance. (Note: The report of the original fire door evaluation dated January 1985 referenced a Door No. 115 on Elevation 670 of Reactor Building, Unit 1. This is not the same door.)

Door 175

Door 175 (Elevation 676, Control Structure, Lunch Room C-109) had a 1-1/2 hour label attached. This door had been modified by addition of a 10 in x 10 in wired glass light (Model T4G manufactured by Leslie Locke Inc., Atlanta, Georgia). Examination indicates that since this is within the maximum exposed glass area allowed by National Fire Protection Association, NFPA 80, Standard for Fire Doors and Windows, this door may be expected to provide 1-1/2 hours fire resistance.

2.2.2 Unlabeled Fire Doors

Unlabeled fire doors were examined by comparing their construction features with labeled doors.

Door 408

Door 408 (Elevation 719, Reactor Building, Unit 2) had no label. This door was compared to Door 115 A 7-6-87 with the following results:

a. Both doors are the same size.

b. Both doors have vertical internal stiffeners at approximately 6 in. on center.

c. Face sheet thickness (18 ga.) and hinge reinforcement (16 ga.) were the same on both doors.

d. Both doors have mineral wool insulation in the cavity.

e. Door 408 has a latch throw of 1/2 in. compared to 5/8 in. for Door 115. A 7-6-87 However, this satisfies the minimum latch throw requirement specified in NFPA 80 for a 1-1/2 hour door.

Based on the above observations, it is concluded that Door 408 would have an expected rating of 1-1/2 hours.

Door 531

Door 531 (Elevation 749, Reactor Building, Unit 1) had no label. This door was compared with Door 115 A 7-6-87 with the following results:

a. Both doors had the same dimensions.

b. Both doors have vertical internal stiffeners at approximately 6 in. on center as determined using a stethoscope.

c. Face sheet thickness (18 ga.) and hinge reinforcement (16 ga.) were the same on both doors as determined using a specially adapted micrometer.

d. Both doors have latch throws of 5/8 in.

e. Both doors have mineral wool insulation in the cavity.

It is concluded that Door No. 531 would have an expected rating of 1-1/2 hours subject to completion of the recommended improvements in Section III of this report.

Door 712

An examination of Door 712 (Elevation 799, Reactor Building, Unit 1) showed that the active leaf of this pair of doors had been sprung at the top edge and should be replaced.

III

RECOMMENDATIONS

1. The silencers missing from the frame of Door 531 should be replaced.
2. The opening in the frame of Door 531 which was intended to receive an electromagnetic switch mechanism for a card reader, should be covered with a 16 ga. cover plate.
3. The active leaf of Door 712, which has been sprung at the top, should be replaced with a labeled 1-1/2 hour rated fire door.

APPENDIX A

DEVIATION REQUEST NO. 3

ATTACHMENT 5

TECHNICAL REPORT

EVALUATION OF SELECTED FIRE DOOR AND DOOR FRAME ASSEMBLIES
(SUPPLEMENT 4)

by

Jeffrey E. Gould

Prepared for

Pennsylvania Power and Light Company
Susquehanna Steam Electric Station
Route 11
Salem Township, Pennsylvania 15635

August 1987

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SUMMARY AND CONCLUSIONS

An evaluation of selected fire doors and frames protecting safety related areas was conducted for the Pennsylvania Power and Light Co. (PP&L) at Susquehanna Steam Electric Station, Units 1 & 2. The purpose of the evaluation was to examine certain unlabeled door assemblies and render an opinion on their fire resistance rating.

This evaluation was requested by PP&L as a supplement to the original evaluation contained in a Factory Mutual report dated January 1985, Supplement 1 dated August 1985, Supplement 2 dated June 1986 and Supplement 3 dated May 1987.

It was concluded that the special purpose (water tight) door assemblies identified as Doors 14, 23 and 24 should provide a minimum of 1-1/2 hours fire resistance.

I

INTRODUCTION

The plant was visited in July 1987 by L. J. Mattern, FMEA, Loss Prevention Specialist. Three doors and frames were examined during this visit. The information gathered during this examination was then forwarded to the FMRC Approvals Division for evaluation. The assemblies are located in Unit 1 and 2 Reactor Buildings.

The writer is an Engineer in the Approvals Division of Factory Mutual and has 7 years of experience, primarily in the nuclear industry. His primary responsibility is testing and determination of fire resistance of building materials and fire rated assemblies.

II

FIRE DOOR ASSEMBLY EVAULATIONS

Three unlabeled special purpose (water tight) fire door assemblies were examined during this visit to the Susquehanna Steam Electric Station at the request of the Pennsylvania Power and Light Company (PP&L)

2.1 FIRE DOOR ASSEMBLIES

2.1.1 Location

The doors examined were located at Elevation 645 and were identified as Doors 14, 23 and 24. Door 14 separates Unit 2, A and B, Core Spray Pump Rooms; Door 23 separates Unit 1, A and B, RHR Pump Rooms and Door 24 separates Unit 2, A and B, RHR Pump Rooms.

2.1.2 Construction

The three doors were inspected and found to be identical to one another. They measure 3 ft wide x 7 ft high and consist of a 1/4 in. steel plate with 1 in. x 2 in. x 3/16 in. steel channel. There are 2 hinges welded to the door and frame provided with 5/8 in. diameter pins. Each door is equipped with twelve steel bar latches operated by a center mounted wheel type operator. The latch throws are 1-1/4 in. long and engage the 5/8 in. thick steel frame on the top, bottom and sides. The doors are rubber gasketed to make a waterproof seal with the 5/8 in. thick steel frame. Doors 23 and 24 are mounted in 36 in. thick reinforced concrete walls. Door 14 is mounted in a 30 in. thick reinforced concrete wall.

2.1.3 Evaluation

These 3 doors were found to be identical to a door which had been previously evaluated by Samuel M. Knight of Factory Mutual Research Corporation with conclusion contained in a report entitled "Evaluation of Selected Fire Door and Door Frame Assemblies" dated January 1985. The door previously evaluated is identified as Door 13 and referenced in Section 2.2, Special Purpose Door, in the above noted report. The conclusion in that report is that Door 13 would provide a minimum of 1-1/2 hours of fire resistance.

2.1.4 Conclusion

Doors 14, 23 and 24 would provide a minimum of 1-1/2 hours fire resistance.

APPENDIX A

DEVIATION REQUEST NO. 3

ATTACHMENT 6

TECHNICAL REPORT

EVALUATION OF SELECTED FIRE DOOR AND DOOR FRAME ASSEMBLIES (SUPPLEMENT 5)

Susquehanna Steam Electric Station
Units 1 & 2

By
Jeffrey E. Gould

Prepared for:
Pennsylvania Power and Light Company
"Susquehanna Steam Electric Station"
Route 11
Salem Township, Pennsylvania 15635

J.I. 3X0Q2.AM
(Class File 4104)

March 1994

Factory Mutual System

Factory Mutual Research

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TECHNICAL REPORT

EVALUATION OF SELECTED FIRE DOOR AND DOOR FRAME ASSEMBLIES

(SUPPLEMENT 5)

Prepared for

Pennsylvania Power and Light Company
Susquehanna Steam Electric Station
Route 11
Salem Township, Pennsylvania 15635

March 1994

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DR3A6-3

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SUMMARY AND CONCLUSIONS

An evaluation of selected fire doors and frames was conducted for the Pennsylvania Power and Light Co. (PP&L) at Susquehanna Steam Electric Station, Units 1 & 2. The purpose of the evaluation was to examine certain openings in an attempt to determine an anticipated fire resistance rating or to make recommendations regarding modifications that could be made in order to achieve anticipated fire resistance ratings.

This evaluation was requested by PP&L as a supplement to the original evaluation contained in a Factory Mutual Research Corporation (FMRC) report dated January 1985, Supplement 1, dated August 1985; Supplement 2, dated June 1986; Supplement 3, dated May 1987; and Supplement 4, dated August 1987.

It was concluded that the openings met anticipated fire resistance ratings or could be modified to meet anticipated fire resistance ratings.

INTRODUCTION

The facility was visited on March 7, 1994 by Jeffrey E. Gould, Assistant Section Manager/Project Engineer of the Building Materials Section in the Approvals Division of FMRC.

The writer has 14 years of experience, half in the nuclear industry and the other half in fire endurance testing of building materials, including fire doors and frames.

FIRE DOOR ASSEMBLY EVALUATION

An examination was conducted of 11 openings. Each opening contained an existing fire door frame and a door (or pair of doors). The assemblies were examined for overall general condition, size of opening, type and condition of the wall, type of frame, number and location of hinges,and clearances between doors and frames.

The results were then compared to documented industry standards and requirements and engineering judgment acquired from past experience. Based on this, an assessment was made as to the anticipated fire endurance capabilities of the assemblies.

Many of the openings contained labeled doors and frames, but had either been modified or contained excessive clearances. An assessment was made as to the impact, if any, of the modifications or corrective action necessary to reduce the clearances to acceptable levels.

The following information applies to all openings unless noted otherwise:

a. All frames were standard profile steel frames incorporating 5/8 in. (16 mm) minimum stops. Several had been modified to include additional material for air leakage resistance. This will not adversely effect the anticipated ratings.

b. All frames were installed in solid, reinforced concrete walls. As such, it was not possible to examine the system used to anchor the frames to the wall without destroying the integrity of the assembly. It is assumed that all frames were properly anchored when installed.

c. All doors were constructed of steel, were of fire rated construction, were 1-3/4 in. (44 mm) nominal thickness, sized for a nominal opening of 36 in. x 86 in. (.9 m x 2.2 m), and contained three steel hinges properly located.

d. Latch throws on all doors were adequate.

e. Anticipated hourly ratings shown below assume that all recommended corrective actions, if required, have been completed.

Overview of Findings

Door ID	Rating (Hrs)	Deficiency	Corrective Action Req'd.	Comments
505	1-1/2	No label	No	–
415	3	Clearances	Yes	–
70	3	Clearances	Yes	–
543	3	Clearances	Yes	–
469R	1-1/2	Clearances	Yes	–
S187	1-1/2	Cracks	Yes	–
S190	3	Clearances	Yes	Pair of doors
1491	1-1/2	Clearances	Yes	Pair of doors
1496	1-1/2	Crack	Yes	Pair of doors
1495	1-1/2	Hardware	Yes	Pair of doors
1477	1-1/2	Clearances	Yes	–

Findings/Recommendations

1) Door 505 was examined and found to be missing labels denoting fire resistance ratings. No other deficiencies were noted. No corrective action is required and the assembly may be considered to be equivalent to a 1-1/2 hour rated assembly.

2) Door 415 was examined and found to contain excessive clearances (> 1/4 in.) between the top of the door and frame (on both sides). An excessive clearance was also noted along the latch edge near the top of the door. Small holes were also noted at the latch location on both sides of the door due to a change in hardware from that originally installed.
Recommendation: This door should be replaced with a 3 hour fire rated (and labeled) door. While modifications can be made to correct the gap at the top, I am hesitant to modify the side of the door or patch the holes at the latch location since this is a 3 hour rated assembly. If the door could be rehung such that the clearance of the side was 1/4 in. or less and the hardware was replaced with hardware that completely covered the holes at the latch location, then the top of the door could be modified in accordance with Ill. 1 and the door not replaced. Short of this, the door should be replaced.

3) Door 70 was examined and found to have excessive clearance at the bottom of the door, holes in the head and sill for top and bottom bolts, and two (2) screws in the upper right corner of the door to fill in small holes.

Recommendation: A sloping sill made from noncombustible material (concrete, mortar, etc.) should be provided at the base of the door such that the maximum clearance under the door is no greater than 3/4 in. The sill should extend through the opening. The presence of the screws in the area where they are located, while not desirable, will not adversely affect the rating in my opinion. The holes in the top and bottom of the door should be repaired in accordance with Ill. 2.

4) Door 543 was examined and found to have excessive clearance along the top edge of the door.
Recommendation: Repair the top of the door in accordance with Ill. 1.

5) Door 469R was examined and found to have excessive clearance along the top edge of the door.
Recommendation: Repair the top of the door in accordance with Ill. 1 or 3.

6) Door S-187 was examined and found to have a significant crack in the metal near the hinge. I do not feel that this can be adequately repaired.
Recommendation: Replace the door with a 1-1/2 hour fire rated and labeled fire door.

7) Door S-190 was examined and found to be a pair of doors. The only deficiency noted was the absence of an astragal.
Recommendation: Add an astragal as shown in Ill. 4. A door coordinator should also be provided.

8) Door 1491 was examined and found to be similar to door S-190 mentioned above.
Recommendation: Add an astragal as shown in Ill. 4. Since one door is inactive, a coordinator is not needed.

9) Door 1496 was examined and found to be a pair of doors. The inactive door was splitting and cracking due to unexpected contact/friction with the active door at their meeting edge. The active door did not appear to be hung properly.
Recommendation: Replace the inactive door with a 1-1/2 hour rated and labeled fire door. If the active door cannot be satisfactorily rehung, it should also be replaced with a 1-1/2 hour rated and labeled fire door.

10) Door 1495 was examined and found to be a pair of doors. The only deficiency noted was a missing bottom bolt in the inactive door.

Recommendation: Replace the bottom bolt in the inactive door leaf.

11) Door 1477 was examined and found to have excessive clearance between the top of the door and the frame.
Recommendation: Repair the top of the door in accordance with Ill. 1.

CONCLUSIONS

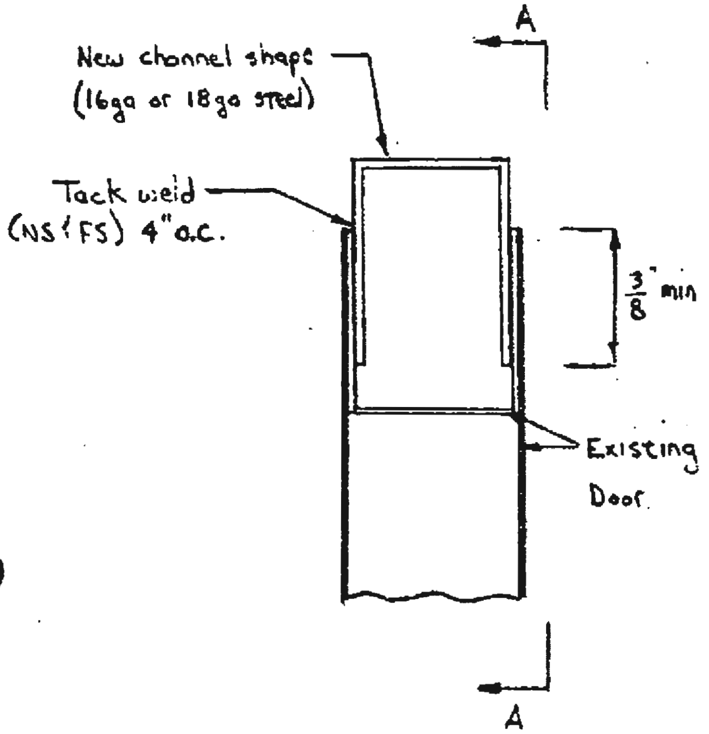
The above referenced fire door and frame assemblies will provide the anticipated fire resistance, as noted, upon completion of all recommended corrective actions, if any, or when replaced by rated and labeled fire doors when noted.

Attachments: Ill. 1-4

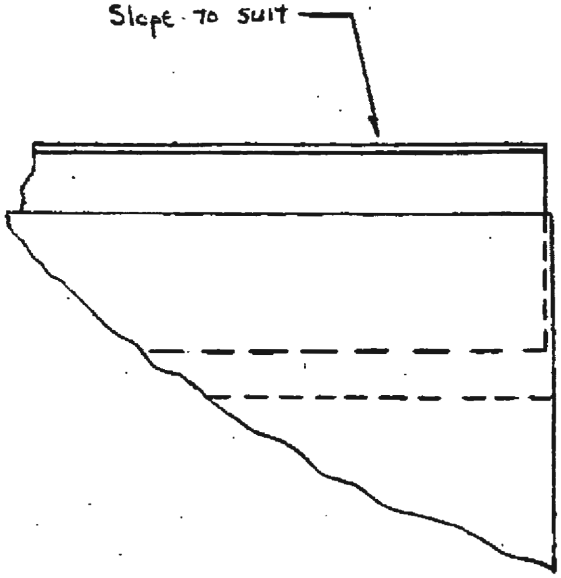
COMPUTATION SHEET

FMRC
J.I. 3X0Q2.Am
APPENDIX -
ILLUSTRATION 3 & 4

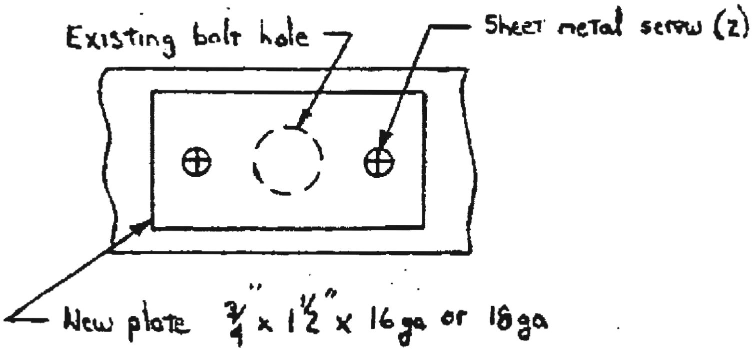
JECT	DATE	SHEET NO.	REPORT NO.
Not to Scale			3X1Q0.AM



ILL. 1
(ELEV)



A-A

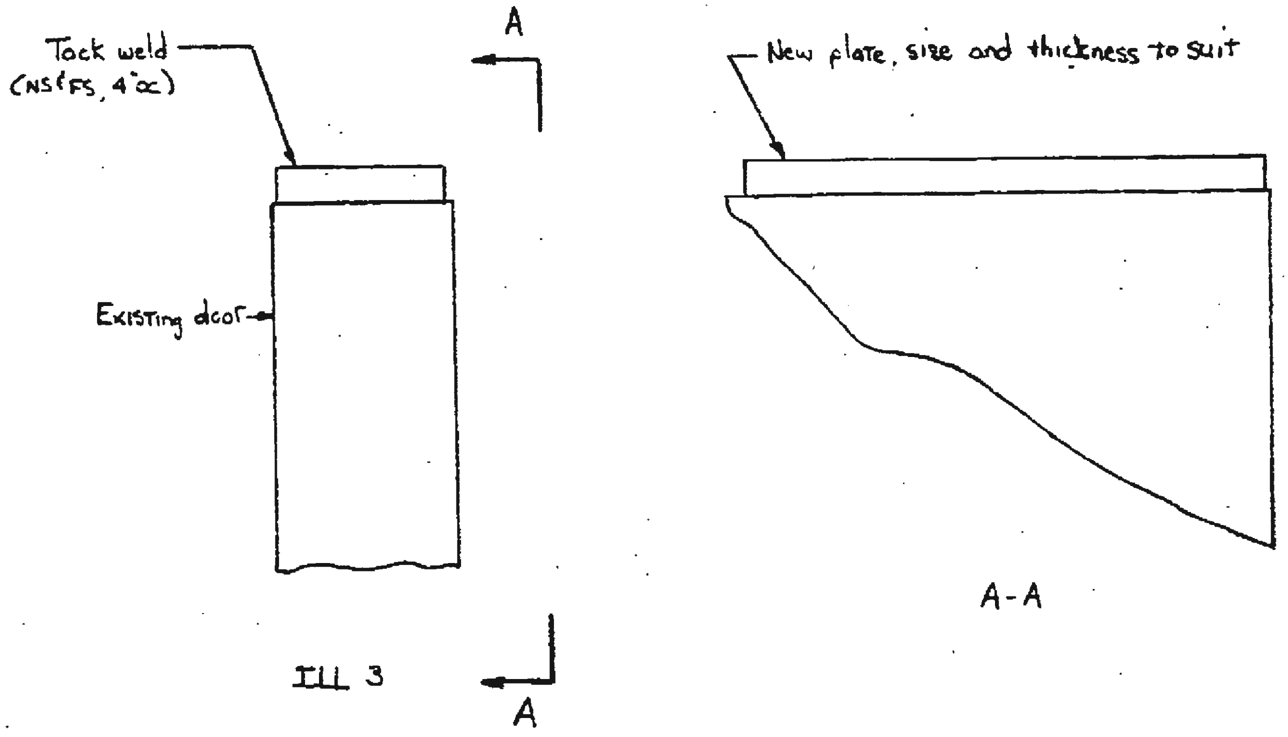


ILL. 2
(PLAN)

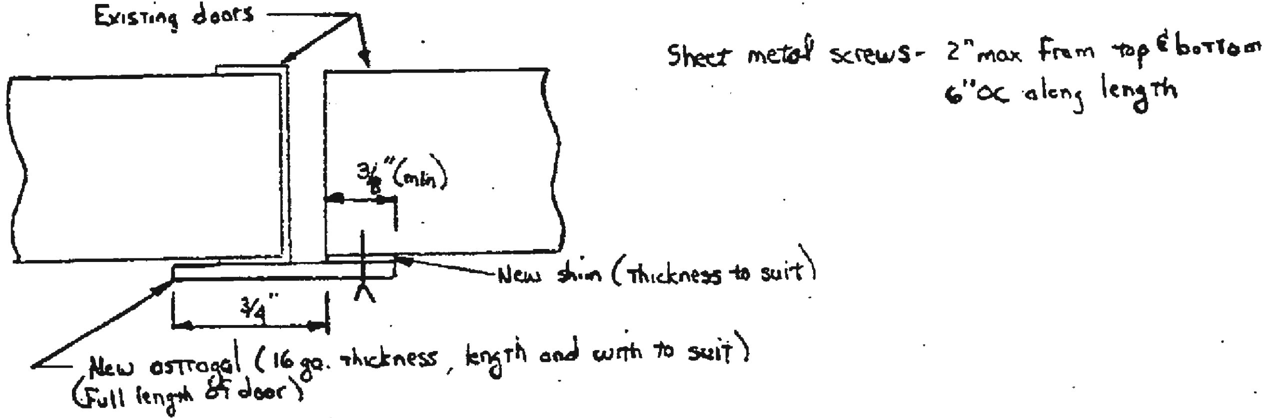
COMPUTATION SHEET

FMRC
J.I. 3X0Q2.AM
APPENDIX –
ILLUSTRATION 1 & 2

SUBJECT	DATE	SHEET NO.	REPORT NO.
Not to Scale			



ILL 3



ILL 4
(PLAN)

TABLE DR3-1

FIRE DOORS – NON-RATED

Wall Between Fire Zones	Unit Number	Door Number	Door Type	FM Report
1-1A/1-1B	1	13	I	1/85
1-1E/1-1F	1	23	I	8/87
1-2A/1-2B	1	111	II	8/85
1-3A/1-3B-N	1	201	II	8/85
1-4A-S/1-4G	1	407	II	6/86
1-5A-W/1-5E	1	515	III	8/85
1-5B/1-5A-N	1	531	III	5/87
2-1A-/2-1B	2	14	I	8/87
2-1E/2-1F	2	24	I	8/87
2-1I/2-6A	2	115-R	III	5/87
2-2A/2-2B	2	112	II	6/86
2-3A/2-3B-N	2	202	II	6/86
2-4A-S/2-4G	2	408	III	5/87
2-5E/2-5A-W	2	514	III	6/86
2-5A-S/2-5B	2	530	III	6/86
2-4G/2-6A	2	711	II	6/86
2-5A-S/2-4G	2	505	II	3/94

APPENDIX R DEVIATION REQUEST NO. 4

WRAPAROUND AREA

DEVIATION REQUEST:

On the east side of each reactor building at elevations 683'-0", 719'-1", and 749'-1", there is no physical fire rated barrier separating the north and south fire areas. To meet the intent of 10CFR50 Appendix R Section III.G, an area 66-feet wide (i.e., 50 foot wide with a plus 8 foot tolerance on either side) has been provided as a spatial separation distance between the north and south fire areas. This area is called the Wraparound Area and it is intended to function in a manner equivalent to a fire barrier having a 3-hour fire rating as required by Appendix R Section III.G.2.a.

The Wraparound Area has a physical volume associated with it and the potential exists for having components and/or cables from both redundant safe shutdown paths contained within it. To provide a level of protection equivalent to that required by Appendix R Section III.G, any one of the following methods may be used to protect the redundant safe shutdown systems within the Wraparound Area:

1. Providing raceway wrap as protection for cables on both redundant paths for a distance of 50 feet, unless damage to the circuits can be justified based on other criteria acceptable under the requirements of Appendix R.

2. Providing a deviation request which specifically justifies the existing conditions.

FIRE ZONES AFFECTED

Unit 1	Unit 2
Elevation 683'-0"	
1-3B-N	2-3B-N
1-3B-W	2-3B-W
1-3B-S	2-3B-S
1-3C-N	2-3C-N
1-3C-W	2-3C-W
1-3C-S	2-3C-S
Elevation 719'-1"	
1-4A-N	2-4A-N
1-4A-W	2-4A-W
1-4A-S	2-4A-S
Elevation 749'-1"	
1-5A-N	2-5A-N
1-5A-W	2-5A-W
1-5A-S	2-5A-S

REASON FOR DEVIATION REQUEST:

The north and south sides of the reactor building, each of which use different redundant shutdown paths in achieving safe shutdown, are not separated by a continuous rated fire barrier on the east side of the building. In order to prevent a single fire from damaging both shutdown paths, the Wraparound Area was created to provide spatial separation between the north and south sides of the reactor buildings. Within the Wraparound Area, both shutdown paths are protected.

EXISTING ARRANGEMENT:

The table below provides a description of each Wraparound Area which includes, the fire zones comprising each Wraparound Area, the fire protection features provided in each Wraparound Area and the presently calculated average combustible loading within each Wraparound Area.

Wraparound Area Elevation	Zones Comprising Wraparound Area	Detection Provided	Automatic Supp. Provided	In-Situ Average Combustible Loading In Each Zone (See Note Below)
Unit 1:				
683'-0"	1-3B-W	YES	YES	6 MIN
	1-3C-W	YES	NO	22 MIN
719'-1"	1-4A-W	YES	YES	14 MIN
749'-1"	1-5A-W	YES	YES	3 MIN
Unit 2:				
683'-0"	2-3B-W	YES	YES	6 MIN
	2-3C-W	YES	NO	28 MIN
719'-1"	2-4A-W	YES	YES	21 MIN
749'-1"	25A-W	YES	YES	5 MIN

Actual in-situ combustible loading durations are provided to document existing arrangement and justify the deviation request. These values are based on the initial combustible loading analysis. Modifications subsequent to this analysis have revised these values with the possibility of future modifications revising them again. The governing criteria for the combustible loading analysis is that the fire resistance rating of the fire area boundaries exceed the combustible loading duration. The combustible loading durations specified in the deviation request will not be updated in the future since program commitments require that all modifications be evaluated to assure that additional combustibles are controlled to remain below the fire area fire resistance rating.

JUSTIFICATION:

In order for a fire originating in either the north or south sides of the reactor buildings to damage equipment located in the opposite fire area, the fire must spread across the Wraparound Area.

The Wraparound Area is a 66 foot wide physical area of the plant. The intent of the area is to provide a minimum 50 foot spatial separation between redundant shutdown paths in adjacent fire areas. To accomplish this, an additional 16 feet was added to the separation distance to conservatively compensate for drawing tolerance of ±8 feet for conduit locations within the Wraparound Area.

It is not considered feasible for a fire to propagate across any of the Wraparound Areas. This conclusion is based on consideration of the following for the two configurations associated with the areas designated as Wraparound Areas:

Configuration #1:

Fire Zones 1-3B-W, 2-3B-W, 1-4A-W, 1-5A-W, 2-4A-W, and 2-5A-W are all provided with automatic sprinkler protection. Additionally, the present calculated average combustible loading (in-situ and transient) in each fire zone is less than 45 minutes. The combination of low combustible load with sprinkler protection precludes a single fire involving both the north and south fire areas.

Configuration #2:

Fire Zones 1-3C-W and 2-3C-W are not provided with automatic sprinkler protection; however, the physical features of these fire zones preclude the need for such protection. These fire zones would not be expected to have transient combustibles present during normal operation as they are high radiation areas and access is limited. Additionally, the physical arrangement of valves, piping, platforms, etc. inhibits the introduction and movement of transient combustibles.

Each fire zone also contains a space approximately 25 feet wide which divides the zone and contains no cable trays. Therefore, there is minimal in-situ combustibles and no available path for a fire to spread between the North and South areas.

Finally, combustible loadings values, which are expected to change throughout the life of the plant, are being programmatically controlled. The original calculated average combustible loading values have been provided above. This Deviation Request remains valid so long as:

- The calculated average combustible loading remains below 1-1/2 hours in the Wraparound Areas.

- The potential for transient combustibles in Fire Zones 1-3C-W and 2-3C-W remains as described.
- The potential for fire spread via in-situ combustibles in Fire Zones 1-3C-W and 2-3C-W remains as described.
- The increase in the average combustible loading is not a result of the addition of a concentration of combustibles which could result in a single fire that could damage redundant equipment and cables in the north, south and wraparound areas.

DEVIATION REQUEST NO. 5 HAS BEEN WITHDRAWN

APPENDIX R DEVIATION REQUEST NO. 6

NON FIREPROOFED STRUCTURAL STEEL

DEVIATION REQUEST:

Exposed structural steel supporting the fire area barriers identified below are acceptable and do not require fireproofing.

FIRE AREA/ZONES AFFECTED:

Tables DR 6-1 and 6-2 provide a list of the affected fire zones. These tables also refer to a series of drawings associated with each fire rated floor slab with non fireproofed structural steel showing the extent of the required fire protection.

REASON FOR DEVIATION REQUEST:

Within the Unit 1 and 2 Reactor Buildings and Control Structure, certain floor/ceiling assemblies are to be upgraded to a 3 hour fire rating, to separate redundant safe shutdown equipment. The structural steel supporting these floors is not protected.

JUSTIFICATION:

UNIT #1 AND #2 REACTOR BUILDINGS:

Structural steel associated with each of the Unit #1 and #2 Reactor Building fire barriers required to be upgraded was examined and the evaluation criteria applied to demonstrate that fireproofing of this structural steel is not required was developed in the "Summary Report for Structural Steel Evaluation". To clearly demonstrate the applicability of this criteria to the fire area barriers in question, a drawing of each area, corresponding to the Fire Zones listed in Table DR 6-1, is attached to this deviation request along with an area unique justification for each drawing. These drawings show the barrier area in question, the structural steel members supporting the barrier and the primary combustibles relevant to each area. Each drawing's corresponding unique justification references the section of the Summary Report for Structural Steel Evaluation that provides the basis for that justification.

CONTROL STRUCTURE:

There are several floor fire barriers in the Control Structure whose structural steel beams are not fireproofed. The extent of each of these barriers vary throughout the building; they are clearly defined in the drawings referenced in Table DR 6-2 of this exemption request.

The following sections provide justification for each upgraded floor barrier where steel beams are not fireproofed.

STEEL BELOW SLABS ELEVATION 676'-0, 686'-0, 698'-0 AND 714'-0

An analysis of the floor fire barriers for these elevations demonstrate that the structural steel beams are adequate for the combustible loading present in Fire Zones 0-21A, 0-22A and 0-24E.

NOTE: Only the steel above Fire Zone 0-24E (below elevation 714' 0) is not fireproofed. The remaining main floor steel below elevation 714'-0 is fireproofed.

The analysis for each of these fire barrier has been done utilizing the criteria developed in the "Summary Report for Structural Steel Evaluation". In particular, Section 3.2 - Energy Balance Method and Section 3.3 - Two Horizontal Cable Tray Criteria were utilized to demonstrate the adequacy of the structural steel beams.

Based on the results of the analysis, steel beams above Fire Zones 0-21A, 0-22A and 0-24E will not be adversely affected as a result of a postulated fire in any of these fire zones.

STEEL BELOW SLAB ELEVATION 754'-0

Automatic detection and protection is provided below the exposed structural steel. The majority of the combustibles in the area below the exposed structural steel are cables. The majority of the cables are located either below the raised (computer type) floor or along the south walls of the Control Structure where only one structural member is effected. There is approximately 20 feet between the raised computer floor and the exposed structural steel supporting elevation 754'-0. Finally, the Control Room comprises the majority of the area beneath this steel and it is continuously staffed.

STEEL INSIDE HVAC CHASES

Structural steel beams inside the HVAC chases do not require fire proofing.

The analysis which considers Fire Zones 0-24I, 0-24K and 0-28S indicate that these fire zones contain minimal amounts of combustibles; therefore, damage to the steel is highly unlikely.

STEEL BELOW SLAB ELEVATION 783'-0

Only the steel above Fire Zones 0-28A-I, 0-28A-II, 0-28B-I, 0-28B-II and 0-28H need justification. This steel (below elevation 783'-0) is considered adequate for the combustible loading present.

1. Fire Zone 0-28H is the Cold Instrument Repair Shop containing minimal combustibles; therefore, damage to steel due to a fire is highly unlikely.

2. The primary in-situ combustibles in Fire Zones 0-28A-I, 0-28A-II, 0-28B-I and 0-28B-II are due to various electrical panels and electrical raceway firewrap (Thermo-Lag).

   The reasons for the justification are as follows:

   a) All of the panels are separated by either a block wall, or by distance. If a fire was to occur in one of the panels, it will be delayed or contained within the panel.

   b) All of these fire zones have ionization detection. This will give early indication for site personnel to respond.

   c) Various electrical raceways are wrapped with fire barrier material in these fire zones. Even though firewrapping (Thermo-Lag) on these electrical raceways is considered a combustible material, it has a high ignition temperature (1000°F) and requires a large amount of heat (from an external source) before it will ignite or spread a flame laterally. Other combustible loads in the fire zones discussed above will not be sufficient to ignite or propagate a Thermo-Lag fire based on inspection.

Because of the nature and arrangement of the combustibles in these fire zones, it is rather unlikely to ever have a raging fire where all of the panels will be on fire at the same time. This in fact eliminates the possibility of generating sufficient heat to produce structural damage to the steel.

Based on the above justification, steel beams above fire zones 0-28A-I, 0-28A-II, 0-28B-I, 0-28B-II and 0-28H will not be adversely affected as a result of a postulated fire in any of these fire zones.

The structural steel beams above the 125V and 250V Battery Rooms (Fire Zones 0-28C, 0-28D, 0-28E, 0-28F, 0-28G, 0-28I, 0-28J, 0-28K, 0-28L, 0-28M, 0-28N and 0-28T) do not require fireproofing due to the minimal amount of combustibles contained within each battery room. A specific fire hazards analysis was performed to evaluate the impact of the combustible configuration of each fire zone on the overhead structural steel beams. The analysis conservatively evaluated the ideal burning rates of the batteries in each room and calculated the time required to heat the structural steel beams in each room to the assumed failure temperature. Based on this analysis, fireproofing of the overhead structural steel beams is not required.

STEEL BELOW SLAB ELEVATION 806'-0

Steel beams below slab elevation 806'-0 are adequate because there are minimal combustibles in Fire Zones 0-22B and 0-29A. These fire zones are part of the north and south Control Structure stairwells.

Therefore, steel beams above Fire Zones 0-22B and 0-29A, below elevation 806'-0, cannot be adversely affected by a fire because of the lack of combustibles.

UNIT 1 FIRE RATED FLOOR SLAB ABOVE FIRE ZONE 1-1F

Reference Drawing C-206006, Sheet 1

DESCRIPTION:

The fire rated floor slab in question is 2'-9" thick and the top of slab is at elevation 683'-0". This reinforced concrete slab acts compositely with the structural steel beams to support this elevation as shown on the reference drawing. The source of combustibles in this area is two horizontal cable trays located approximately 12' beneath the bottom of the structural steel beams.

EVALUATION:

Section 3.3 of the Summary Report for Structural Steel Evaluation provides justification for the adequacy of structural steel for a combustible configuration of two horizontally stacked cable trays. The two cable trays in this fire zone are located approximately 12' beneath the bottom of the structural steel beams whereas the cable trays discussed in Section 3.3 of the report are only one foot below the steel beams. This increased distance adds to the margin of safety already contained in the Section 3.3 analysis.

CONCLUSION:

The fire rated floor slab above Fire Zone 1-1F as shown on Drawing C-206006, Sheet 1, will not be adversely affected by a fire in Fire Zone 1-1F since a postulated fire in Fire Zone 1-1F would not generate sufficient heat to weaken the structural steel beams supporting the fire rated floor slab.

UNIT 1 FIRE RATED FLOOR SLAB
ABOVE FIRE ZONE 1-1E

Reference Drawing C-206006, Sheet 2

DESCRIPTION:

The fire rated floor slab in question is 2'-9" thick and the top.of slab is at elevation 683'-0". This reinforced concrete slab acts compositely with the structural steel beams to support this elevation as shown on the reference drawing. There are no cable trays in Fire Zone 1-1E located beneath this fire rated floor slab.

EVALUATION:

With no cable trays located beneath this fire rated floor slab, sufficient heat to adversely affect the fire rated floor slab would not be generated. Section 3.3 of the Summary Report for Structural Steel Evaluation provides justification for the adequacy of structural steel for a combustible configuration of two horizontally stacked cable trays. This area has no cable trays.

CONCLUSION:

The fire rated floor slab above Fire Zone 1-1E as shown on Drawing C-206006, Sheet 2, will not be adversely affected by a fire in Fire Zone 1-1E since a postulated fire in Fire Zone 1-1E would not generate sufficient heat to weaken the structural steel beams supporting the fire rated floor slab.

UNIT 1 FIRE RATED FLOOR SLAB
ABOVE FIRE ZONE 1-3A

Reference Drawing C-206007, Sheets 1 & 2

DESCRIPTION:

The fire rated floor slab in question varies in thickness from 2'-9" to 4'-9" as shown on the reference drawing, Sheet 2. The top of the entire slab is at elevation 719'-1". The source of combustibles beneath this fire rated floor slab is a series of horizontal and vertical cable trays as depicted on the reference drawing. It should be noted that the top two trays are fire wrapped with Thermo-Lag 330-1.

EVALUATION:

A structural analysis was performed on the 4'-9" thick portion of the reinforced concrete slab above the fire zone in question. The analysis demonstrated that this reinforced concrete slab is capable of supporting itself without the W21x127 beams which underlie it. The only required structural steel beams beneath the 4'-9" thick slab are the W21X127 steel beams (with a 2" thick steel plate on the bottom flange) which lie directly under the 4'-6" thick walls.

The required steel beam south of column line 25 is protected from the effects of a fire by the NFPA 13 sprinkler system. Section 3.4 of the Summary Report for Structural Steel Evaluation provides the justification for the NFPA 13 sprinkler system's heat absorption capability with respect to cable tray fires. Even though the top two cable trays are wrapped with Thermo-Lag which is considered to be a combustible material, the combustibility effects of the Thermo-Lag are enveloped by the cable tray combustibility analysis. The cables within the protected raceway are protected so they do not contribute to the fire. Since the Thermo-Lag material has combustibility characteristics which are enveloped by the cable jacketing and insulation characteristics, the analysis in the Section 3.4 which is performed for cable jacketing and insulation effects will bound those effects from the Thermo-Lag material. Therefore, the combustible configuration beneath this required steel beam is bounded by the analysis in Section 3.4.

The required W21X127 steel beam north of column line 25 was analyzed by the Energy Balance Method as developed in Section 3.2 of the Summary Report. Even though this area is now protected by a NFPA 13 sprinkler system, this analysis method is still valid. This analysis calculated the ratio of the critical energy needed to heat this structural steel beam to the critical temperature (E_{Ct}) to the predicted heat release for this combustible configuration (H') to be 1.17 which is greater than the required minimum value of 1.0.

Even though the top two cable trays are wrapped with Thermo-Lag which is considered to be a combustible material, the heat release of the Thermo-Lag is bounded by the cable tray heat release analysis. The cables within the cable tray will not contribute to the fire, since the Thermo-Lag firewrap will protect them from burning. This analysis verifies the structural integrity of the required W21X127 steel beam.

A structural analysis was also performed on the 2'-9" thick portion of the reinforced concrete slab above the fire zone in question. This analysis demonstrated that this reinforced concrete slab is capable of supporting itself without the two W24X55 steel beams which underlie it. This slab is supported on the south end by the W21X127 (acceptability as discussed above) and on the north end by the 2'-0" thick concrete wall beneath the slab. Therefore, the heat effect on the W24X55 steel beams is inconsequential since the 2'-9" concrete slab is structurally acceptable without these 2 steel beams.

CONCLUSION:

Based on the above evaluation, the fire rated floor slab above Fire Zone 1-3A will not be adversely affected as the result of a postulated fire in this area.

UNIT 1 FIRE RATED FLOOR SLAB
ABOVE FIRE ZONE 1-3B-W

Reference Drawing C-206021, Sheet 1

DESCRIPTION:

The fire rated floor slab in question is 2'-3" thick with the top of slab at elevation 719'-1". This reinforced concrete slab acts compositely with the structural steel beams which support this floor elevation. The primary source of combustibles in this area is cable trays.

EVALUATION:

The portion of Fire Zone 1-3B-W located beneath the fire rated floor slab in question is protected by an automatic fire suppression sprinkler system which has been installed in accordance with NFPA 13. In the event of a fire in this portion of Fire Zone 1-3B-W, actuation of the automatic sprinkler system would mitigate the heat effect the fire would have on the structural steel beams supporting the fire rated floor slab. The basis for this evaluation is presented in Section 3.4 of the Summary Report for Structural Steel Evaluation. This section of the report provides the justification for the NFPA 13 sprinkler system's heat absorption capability with respect to cable tray fires. The combustible configuration beneath this fire rated floor slab is bounded by the analysis in Section 3.4.

CONCLUSION:

Based on the above evaluation and the specific combustible configuration beneath the fire rated floor slab in question, the existing automatic fire suppression sprinkler system can be expected to protect the structural steel beams with a wide margin of safety in the event of a postulated fire in this area.

UNIT 1 FIRE RATED FLOOR SLAB
ABOVE FIRE ZONE 1-3B-W

Reference Drawing C-206021, Sheet 2

DESCRIPTION:

The fire rated floor slab in question is 2'-3" thick with the top of slab at elevation 719'-1". This reinforced concrete slab acts compositely with the structural steel beams which support this floor elevation. The primary source of combustibles in this area is cable trays.

EVALUATION:

The portion of Fire Zone 1-3B-W located beneath the fire rated floor slab in question is protected by an automatic fire suppression sprinkler system which has been installed in accordance with NFPA 13. In the event of a fire in this portion of Fire Zone 1-3B-W, actuation of the automatic sprinkler system would mitigate the heat effect the fire would have on the structural steel beams supporting the fire rated floor slab. The basis for this evaluation is presented in Section 3.4 of the Summary Report for Structural Steel Evaluation. This section of the report provides the justification for the NFPA 13 sprinkler system's heat absorption capability with respect to cable tray fires. The combustible configuration beneath this fire rated floor slab is bounded by the analysis in Section 3.4.

CONCLUSION:

Based on the above evaluation and the specific combustible configuration beneath the fire rated floor slab in question, the existing automatic fire suppression sprinkler system can be expected to protect the structural steel beams with a wide margin of safety in the event of a postulated fire in this area.

UNIT 1 FIRE RATED FLOOR SLAB
ABOVE FIRE ZONE 1-4A-W

Reference Drawing C-206008, Sheets 1 & 3

DESCRIPTION:

The fire rated floor slab in question is 1'-9" thick south of column line 26.5 and 3'-3" thick north of column line 26.5 as depicted on the reference drawing. The top of the entire slab is at elevation 749'-1". This reinforced concrete slab acts compositely with a series of structural steel beams which support this floor elevation. The source of combustibles in Fire Zone 1-4A-W consist of a number of cable trays located throughout the fire zone. Some of these cable trays are wrapped with Thermo-Lag which has been determined to be a combustible material.

EVALUATION:

The portion of Fire Zone 1-4A-W located beneath the fire rated floor slab in question is protected by an automatic fire suppression sprinkler system which has been installed in accordance with NFPA 13. In the event of a fire in this portion of Fire Zone 1-4A-W, actuation of the automatic sprinkler system would mitigate the heat effect the fire would have on the structural steel beams supporting the fire rated floor slab. The basis for this evaluation is presented in Section 3.4 of the Summary Report for Structural Steel Evaluation. This section of the report provides the justification for the NFPA 13 sprinkler system's heat absorption capability with respect to cable tray fires. Even though some of the cable trays in the vicinity of the structural steel are wrapped with Thermo-Lag which is considered to be a combustible material, the combustibility effects of the Thermo-Lag are enveloped by the cable tray combustibility analysis. The cables within the protected raceway are protected so they do not contribute to the fire. Since the Thermo-Lag material has combustibility characteristics which are enveloped by the cable jacketing and insulation characteristics, the analysis in the Section 3.4 which is performed for cable jacketing and insulation effects will bound those effects from the Thermo-Lag material. Therefore, the combustible configuration beneath this fire rated floor slab is bounded by the analysis in Section 3.4.

CONCLUSION:

Based on the above evaluation and the specific combustible configuration beneath the fire rated floor slab in question, the existing automatic fire suppression sprinkler system can be expected to protect the structural steel beams with a wide margin of safety in the event of a postulated fire in this area.

UNIT 1 FIRE RATED FLOOR SLAB
ABOVE FIRE ZONES 1-4A-W AND 1-4A-N

Reference Drawing C-206008, Sheet 2

DESCRIPTION:

The fire rated floor slab in question is 1'-9" thick and the top of the slab is at elevation 749'-1". This reinforced concrete slab acts compositely with a series of structural steel beams to support this floor elevation as shown on the reference drawing. The primary source of combustibles in this area is two cable trays spaced approximately 12' from each other. Some of these cable trays are wrapped with Thermo-Lag which has been determined to be a combustible material.

EVALUATION:

The portion of Fire Zones 1-4A-W and 1-4A-N located beneath the fire rated floor slab in question is protected by an automatic fire suppression sprinkler system which has been installed in accordance with NFPA 13. In the event of a fire in this portion of Fire Zones 1-4A-W and 1-4A-N, actuation of the automatic sprinkler system would mitigate the heat effect the fire would have on the structural steel beams supporting the fire rated floor slab system. The basis for this evaluation is presented in Section 3.4 of the Summary Report for Structural Steel Evaluation. This section of the report provides the justification for the NFPA 13 sprinkler system's heat absorption capability with respect to cable tray fires. Even though some of the cable trays in the vicinity of the structural steel are wrapped with Thermo-Lag which is considered to be a combustible material, the combustibility effects of the Thermo-Lag are enveloped by the cable tray combustibility analysis. The cables within the protected raceway are protected so they do not contribute to the fire. Since the Thermo-Lag material has combustibility characteristics which are enveloped by the cable jacketing and insulation characteristics, the analysis in the Section 3.4 which is performed for cable jacketing and insulation effects will bound those effects from the Thermo-Lag material. Therefore, the combustible configuration beneath this fire rated floor slab is bounded by the analysis in Section 3.4.

CONCLUSION:

Based on the above evaluation and the specific combustible configuration beneath the fire rated floor slab in question, the existing automatic fire suppression sprinkler system can be expected to protect the structural steel beams with a wide margin of safety in the event of a postulated fire in this area.

UNIT 1 FIRE RATED FLOOR SLAB ABOVE FIRE ZONES 1-4A-W AND 1-4A-S

Reference Drawing C-206008, Sheet 4

DESCRIPTION:

The fire rated floor slab in question is 1'-9" thick with the top of slab at elevation 749'-1". This reinforced concrete floor slab acts compositely with the structural steel beams to support this elevation as shown on the reference drawing. The source of combustibles beneath this fire rated floor slab is two vertical cable trays which are separated from each other by approximately 20'. These cable trays are wrapped with Thermo-Lag which has been determined to be a combustible material.

EVALUATION:

The portions of Fire Zones 1-4A-W and 1-4A-S located beneath the fire rated floor slab in question are protected by an automatic fire suppression sprinkler system which has been installed in accordance with NFPA 13. In the event of a fire in these portions of Fire Zones 1-4A-W and 1-4A-S, actuation of the automatic fire suppression sprinkler system would mitigate the heat effect the fire would have on the structural steel beams supporting the fire rated floor slab system. The basis for this evaluation is presented in Section 3.4 of the Summary Report for structural steel evaluation. This section of the report provides the justification for the NFPA 13 sprinkler system's heat absorption capability with respect to cable tray fires. Even though the cable trays in the vicinity of the structural steel are wrapped with Thermo-Lag which is considered to be a combustible material, the combustibility effects of the Thermo-Lag are enveloped by the cable tray combustibility analysis. The cables within the protected raceway are protected so they do not contribute to the fire. Since the Thermo-Lag material has combustibility characteristics which are enveloped by the cable jacketing and insulation characteristics, the analysis in the Section 3.4 which is performed for cable jacketing and insulation effects will bound those effects from the Thermo-Lag material. Therefore, the combustible configuration beneath this fire rated floor slab is bounded by the analysis in Section 3.4.

CONCLUSION:

Based on the above evaluation and the specific combustible configuration beneath the fire rated floor slab in question, the existing automatic fire suppression sprinkler system can be expected to protect the structural steel beams with a wide margin of safety in the event of a postulated fire in this area.

UNIT 1 FIRE RATED FLOOR SLAB
ABOVE FIRE ZONES 1-4A-W AND 1-4A-N

Reference Drawing C-206008, Sheet 5

DESCRIPTION:

The fire rated floor slab in question is 1'-9" thick with the top of slab at elevation 749'-1". This reinforced concrete slab acts compositely with the structural steel beams to support this elevation as shown on the reference drawing. The source of combustibles beneath this fire rated floor slab is cable trays. Some of these cable trays are wrapped with Thermo-Lag which has been determined to be a combustible material.

EVALUATION:

The portions of Fire Zones 1-4A-W and 1-4A-N located beneath the fire rated floor slab in question are protected by an automatic fire suppression sprinkler system which has been installed in accordance with NFPA 13. In the event of a fire in these portions of Fire Zones 1-4A-W and 1-4A-N, actuation of the automatic sprinkler system would mitigate the heat effect the fire would have on the structural steel beams supporting the fire rated floor slab system. The basis for this evaluation is presented in Section 3.4 of the Summary Report for Structural Steel Evaluation. This section of the report provides the justification for the NFPA 13 sprinkler system's heat absorption capability with respect to cable tray fires. Even though some of the cable trays in the vicinity of the structural steel are wrapped with Thermo-Lag which is considered to be a combustible material, the combustibility effects of the Thermo-Lag are enveloped by the cable tray combustibility analysis. The cables within the protected raceway are protected so they do not contribute to the fire. Since the Thermo-Lag material has combustibility characteristics which are enveloped by the cable jacketing and insulation characteristics, the analysis in the Section 3.4 which is performed for cable jacketing and insulation effects will bound those effects from the Thermo-Lag material. Therefore, the combustible configuration beneath this fire rated floor slab is bounded by the analysis in Section 3.4.

CONCLUSION:

Based on the above evaluation and the specific combustible configuration beneath the fire rated floor slab in question, the existing automatic fire suppression sprinkler system can be expected to protect the structural steel beams with a wide margin of safety in the event of a postulated fire in this area.

UNIT 1 FIRE RATED FLOOR SLAB
ABOVE FIRE ZONE 1-4G

Reference Drawing C-206009, Sheets 1 & 2

DESCRIPTION:

The fire rated slab in question is 1'-2-1/2" thick with the top of slab at elevation 761'-10". This slab acts compositely with a series of structural steel beams as shown on the reference drawing. The source of combustibles beneath the fire rated slab consist of two cable trays which vary in elevation but are no closer than 18' from the bottom of the floor slab.

EVALUATION:

Section 3.3 of the Summary Report for Structural Steel Evaluation provides justification that two horizontally stacked cable trays will not adversely affect the integrity of the structural steel beams. The two cable trays in this fire zone are located approximately 16' below the overhead structural steel beams whereas the cable trays discussed in Section 3.3 of the report are only one foot below the steel beams. This increased distance adds to the margin of safety already contained in the Section 3.3 analysis. Furthermore, an analysis using the Energy Balance Method as developed in Section 3.2 of the Summary Report showed the ratio of the critical energy needed to heat the minimum required structural steel members to the critical temperature (Ec_t) to the predicted heat release for this combustible configuration (H') to be 6.4 which is much greater than the required minimum value of 1.0. This analysis substantiates the integrity of the structural steel beams above this combustible configuration.

CONCLUSION:

Based on the above evaluation and the specific combustible configuration beneath the fire rated floor slab in question, the structural steel beams supporting elevation 761'-10" above Fire Zone 1-4G will not be adversely affected as the result of a postulated fire in this area.

UNIT 1 FIRE RATED FLOOR SLAB
ABOVE FIRE ZONE 1-5A-S

Reference Drawing C-206010, Sheets 1 & 2

DESCRIPTION:

The fire rated slab in question is 3'-0" thick approximately 5-1/2' south of column line 27.5 and 1'-9" thick north of this point. The top of the entire slab is at elevation 779'-1". This slab acts compositely with a series of structural steel beams as shown on the reference drawing. The combustibles in Fire Zone 1-5A-S consist of a number of horizontal and vertical cable trays located throughout the fire zone.

EVALUATION:

The portion of Fire Zone 1-5A-S located beneath the fire rated slab in question is protected by an automatic fire suppression sprinkler system which has been installed in accordance with NFPA 13. In the event of a fire in this portion of Fire Zone 1-5A-S, actuation of the automatic suppression system would mitigate the effects of the fire on the structural steel beams supporting this fire rated floor slab. The basis for this evaluation is presented in Section 3.4 of the Summary Report for Structural Steel Evaluation. This section of the report provides the justification for the NFPA 13 sprinkler system's heat absorption capability with respect to cable tray fires. The combustible configuration beneath this fire rated floor slab is bounded by the analysis in Section 3.4.

CONCLUSION:

Based on the above evaluation and the specific combustible configuration beneath the fire rated floor slab in question, the existing automatic fire suppression sprinkler system can be expected to protect the structural steel beams with a wide margin of safety in the event of a postulated fire in this area.

UNIT 1 FIRE RATED FLOOR SLAB
ABOVE FIRE ZONE 1-5B

Reference Drawing C-206010 Sheets 3 & 4

DESCRIPTION:

The fire rated floor slab in question is 1'-9" thick and the top of the entire slab is at elevation 779'-1". This reinforced concrete slab acts compositely with the structural steel beams to support this elevation as shown on the reference drawing. The primary source of combustibles in these fire zones located beneath the fire rated floor slab are cable trays of varying elevation and location as shown on the reference drawing.

EVALUATION:

The fire rated floor slab in question is exposed by only two horizontal cable trays. Section 3.3 of the Summary Report for Structural Steel Evaluation provides a discussion of this configuration and justifies the structural steel for a combustible configuration of two horizontally stacked cable trays not less than one foot beneath the bottom of the steel beam. Although these trays are not stacked, one tray is less than one foot from the bottom of the steel beam.

The W24X68 beams in this area as well as the G309-5 girder were analyzed by the Energy Balance Method as developed in Section 3.2 of the Summary Report for Structural Steel Evaluation. This analysis determined the ratio of the critical energy needed to heat each required structural steel member to the critical temperature (Ec_t) to the predicted heat release for the combustible configuration surrounding each beam (H'). In the bounding case, this ratio (Ec_t/H') was determined to be greater than the minimum value of 1.0. This analysis verifies the integrity of all of the structural steel beams in this area in the event of a postulated fire.

CONCLUSION:

Based on the above evaluation and the specific combustible configuration beneath the fire rated floor slab in question, a postulated fire in Fire Zone 1-5B would not generate sufficient heat to adversely impact the required structural steel beams supporting the fire rated floor slab.

UNIT 2 FIRE RATED FLOOR SLAB ABOVE FIRE ZONES 2-1A, 1C, 1D

Reference Drawing C-213472, Sheets 1 & 2

DESCRIPTION:

The fire rated floor slab in question is 2'-2" thick west of Column Line R and is 3'-11" thick east of Column Line R. The top of slab is at elevation 670'-2". This reinforced concrete slab acts compositely with the structural steel beams to support this elevation as shown on the reference drawings. The primary source of combustibles in this area is two stacked horizontal cable trays (minimum 2'-4" beneath the bottom of the structural steel beams) and a single horizontal tray which is located approximately 7' horizontally from the stacked trays (minimum 1'-0" beneath the bottom of the structural steel beams).

EVALUATION:

Section 3.3 of the Summary Report for Structural Steel Evaluation provides justification for the adequacy of structural steel for a combustible configuration comprised of no more than two horizontal cable trays with no other cable trays within a four foot distance and not less than one foot below the structural steel. The combustible configuration beneath the fire rated floor slab being reviewed here is bounded by the analysis in Section 3.3

CONCLUSION:

The fire rated floor slab above Fire Zones 2-1A, 1C, 1D as shown on Drawings C-213472, Sheets 1 & 2, will not be adversely affected by a fire in Fire Zones 2-1A, 1C, 1D since a postulated fire would not generate sufficient heat to weaken the structural steel beams supporting the fire rated floor slab.

UNIT 2 FIRE RATED FLOOR SLAB
ABOVE FIRE ZONE 2-1F

Reference Drawing C-206011, Sheet 1

DESCRIPTION:

The fire rated floor slab in question is 2'-9" thick and the top of slab is at elevation 683'-0". This reinforced concrete slab acts compositely with the structural steel beams to support this elevation as shown on the reference drawing. The source of combustibles in this area is two horizontal cable trays located approximately 11' beneath the bottom of the structural steel beams.

EVALUATION:

Section 3.3 of the Summary Report for Structural Steel Evaluation provides justification for the adequacy of structural steel for a combustible configuration of two horizontally stacked cable trays. The two horizontally stacked cable trays in this fire zone are located approximately 11' beneath the bottom of the structural steel beams whereas the cable trays discussed in Section 3.3 of the report are only one foot below the steel beams. This increased distance adds to the margin of safety already contained in the Section 3.3 analysis.

CONCLUSION:

The fire rated floor slab above Fire Zone 2-IF as shown on Drawing C-206011, Sheet 1, will not be adversely affected by a fire in Fire Zone 2-1F since a postulated fire in Fire Zone 2-1F would not generate sufficient heat to weaken the structural steel beams supporting the fire rated floor slab.

UNIT 2 FIRE RATED FLOOR SLAB ABOVE FIRE ZONE 2-1E

Reference Drawing C-206011, Sheet 2

DESCRIPTION:

The fire rated floor slab in question is 2'-9" thick and the top of slab is at elevation 683'-0". This reinforced concrete slab acts compositely with the structural steel beams to support this elevation as shown on the reference drawing. There are no cable trays in Fire Zone 2-1E located beneath this fire rated floor slab.

EVALUATION:

With no cable trays located beneath this fire rated floor slab, sufficient heat to adversely affect the fire rated floor slab would not be generated. Section 3.3 of the Summary Report for Structural Steel Evaluation provides justification for the adequacy of structural steel for a combustible configuration of two horizontally stacked cable trays. This area has no cable trays.

CONCLUSION:

The fire rated floor slab above Fire Zone 2-1E as shown on Drawing C-206011, Sheet 2, will not be adversely affected by a fire in Fire Zone 2-1E since a postulated fire in Fire Zone 2-1E would not generate sufficient heat to weaken the structural steel beams supporting the fire rated floor slab.

UNIT 2 FIRE RATED FLOOR SLAB
ABOVE FIRE ZONE 2-3B-N

Reference Drawing C-206012, Sheets 1 & 2

DESCRIPTION:

The fire rated floor slab in question is 4'-9" thick and the top of slab is at elevation 719'-1". This reinforced concrete slab acts compositely with the structural steel beams to support this elevation as shown on the reference drawing. The primary source of combustibles in Fire Zone 2-3B-N located beneath the fire rated floor slab consist of a number of horizontal and vertical cable trays. The location of these cable trays are shown on the reference drawing. One of these cable trays is wrapped with Thermo-Lag which has been determined to be a combustible material.

EVALUATION:

The entire section of Fire Zone 2-3B-N located beneath the fire rated floor slab in question is protected by an automatic fire suppression sprinkler system which has been installed in accordance with NFPA 13. In the event of a fire in this portion of Fire Zone 2-3B-N, actuation of-the automatic fire suppression sprinkler system would mitigate the heat effects of the fire on the structural steel beams supporting the fire rated floor slab. The basis for this evaluation is presented in Section 3.4 of the Summary Report for Structural Steel Evaluation. This section of the report provides the justification for the NFPA 13 sprinkler system's heat absorption capability with respect to cable tray fires. Even though a cable tray in the vicinity of the structural steel is wrapped with Thermo-Lag which is considered to be a combustible material, the combustibility effects of the Thermo-Lag are enveloped by the cable tray combustibility analysis. The cables within the protected raceway are protected so they do not contribute to the fire. Since the Thermo-Lag material has combustibility characteristics, which are enveloped by the cable jacketing and insulation characteristics, the analysis in the Section 3.4 which is performed for cable jacketing and insulation effects will bound those effects from the Thermo-Lag material. Therefore, the combustible configuration beneath this fire rated floor slab is bounded by the analysis in Section 3.4.

CONCLUSION:

Based on the above evaluation and the specific combustible configuration beneath the fire rated floor slab in question, the existing automatic fire suppression sprinkler system can be expected to protect the structural steel beams with a wide margin of safety in the event of a postulated fire in this area.

UNIT 2 FIRE RATED FLOOR SLAB
ABOVE FIRE ZONE 2-3B-W

Reference Drawing C-206022, Sheet 1

DESCRIPTION:

The fire rated floor slab in question is 2'-3" thick with the top of slab at elevation 719'-1". This reinforced concrete slab acts compositely with the structural steel beams which support this floor elevation. The primary source of combustibles in this area is cable trays. Portions of one of these cable trays may be wrapped with abandoned-in-place Thermo-Lag (These cable trays are no longer required to be protected for Appendix R Safe Shutdown).

EVALUATION:

The portion of Fire Zone 2-3B-W located beneath the fire rated floor slab in question is protected by an automatic fire suppression sprinkler system which has been installed in accordance with NFPA 13. In the event of a fire in this portion of Fire Zone 2-3B-W, actuation of the automatic sprinkler system would mitigate the heat effect the fire would have on the structural steel beams supporting the fire rated floor slab. The basis for this evaluation is presented in Section 3.4 of the Summary Report for structural steel evaluation. This section of the report provides the justification for the NFPA 13 sprinkler system's heat absorption capability with respect to cable tray fires. Even though portions of the cable trays in the vicinity of the structural steel may be wrapped with Thermo-Lag, the fire hazards analysis documented in Deviation Request No. 42 has determined that the level of combustibles in this fire zone will not be capable of sustaining a large fire. Therefore, the temperatures required to ignite the Thermo-Lag material will not be reached prior to actuation of the automatic suppression system. In conclusion, the combustible configuration beneath this fire rated floor slab is bounded by the analysis in Section 3.4.

CONCLUSION:

Based on the above evaluation and the specific combustible configuration beneath the fire rated floor slab in question, the existing automatic fire suppression sprinkler system can be expected to protect the structural steel beams with a wide margin of safety in the event of a postulated fire in this area.

UNIT 2 FIRE RATED FLOOR SLAB
ABOVE FIRE ZONE 2-3B-W

Reference Drawing C-206022, Sheet 2

DESCRIPTION:

The fire rated floor slab in question is 2'-3" thick with the top of slab at elevation 719'-1". This reinforced concrete slab acts compositely with the structural steel beams which support this floor elevation. The primary source of combustibles in this area is cable trays. Portions of these cable trays may be wrapped with abandoned-in-place Thermo-Lag (These cable trays are no longer required to be protected for Appendix R, Safe Shutdown).

EVALUATION:

The portion of Fire Zone 2-3B-W located beneath the fire rated floor slab in question is protected by an automatic fire suppression sprinkler system which has been installed in accordance with NFPA 13. In the event of a fire in this portion of Fire Zone 2-3B-W, actuation of the automatic sprinkler system would mitigate the heat effect the fire would have on the structural steel beams supporting the fire rated floor slab. The basis for this evaluation is presented in Section 3.4 of the Summary Report for structural steel evaluation. This section of the report provides the justification for the NFPA 13 sprinkler system's heat absorption capability with regards to cable tray fires. Even though portions of the cable trays in the vicinity of the structural steel may be wrapped with Thermo-Lag, the fire hazards analysis documented in Deviation Request No. 42 has determined that the level of combustibles in this fire zone will not be capable of sustaining a large fire. Therefore, the temperatures required to ignite the Thermo-Lag material will not be reached prior to actuation of the automatic suppression system. In conclusion, the combustible configuration beneath this fire rated floor slab is bounded by the analysis in Section 3.4.

CONCLUSION:

Based on the above evaluation and the specific combustible configuration beneath the fire rated floor slab in question, the existing automatic fire suppression sprinkler system can be expected to protect the structural steel beams with a wide margin of safety in the event of a postulated fire in this area.

UNIT 2 FIRE RATED FLOOR SLAB
ABOVE FIRE ZONES 2-4A-S AND 2-4A-W

Reference Drawing C-206013, Sheet 1

DESCRIPTION:

The fire rated floor slab in question is 1'-9" thick and the top of slab is at elevation 749'-1". This reinforced concrete slab acts compositely with the structural steel beams to support this elevation as shown on the reference drawing. The primary source of combustibles in Fire Zone 2-4A-S and 2-4A-W located beneath this fire rated floor slab consist of two horizontal cable trays stacked on top of each other as shown on the reference drawing.

EVALUATION:

The entire section of Fire Zones 2-4A-S and 2-4A-W located beneath the fire rated floor slab in question is protected by an automatic fire suppression sprinkler system which has been installed in accordance with NFPA 13. In the event of a fire in these portions of Fire Zones 2-4A-W and 2-4A-S, actuation of the automatic fire suppression sprinkler system would mitigate the heat effect of the fire on the structural steel beams supporting this fire rated floor slab. The basis for this evaluation is presented in Section 3.4 of the Summary Report for Structural Steel Evaluation. This section of the report provides justification for the NFPA 13 sprinkler system's heat absorption capability with respect to cable tray fires. The combustible configuration beneath this fire rated floor slab is bounded by the analysis in Section 3.4.

CONCLUSION:

Based on the above evaluation and the specific combustible configuration beneath the fire rated floor slab in question, the existing automatic fire suppression sprinkler system can be expected to protect the structural steel beams with a wide margin of safety in the event of a postulated fire in this area.

UNIT 2 FIRE RATED FLOOR SLAB
ABOVE FIRE ZONE 2-4A-W

Reference Drawing C-206013, Sheets 2 & 3

DESCRIPTION:

The fire rated floor slab in question is 1'-9" thick east of column line T and 3'-3" thick west of column line T. The top of slab elevation for the entire slab is at elevation 749'-1". This reinforced concrete slab acts compositely with the structural steel beams to support this elevation as shown on the reference drawing. The primary source of combustibles in Fire Zone 2-4A-W located beneath this fire rated floor slab consist of three horizontal cable trays as depicted on the reference drawing.

EVALUATION:

The entire section of Fire Zone 2-4A-W located beneath the fire rated floor slab in question is protected by an automatic fire suppression sprinkler system which has been installed in accordance with NFPA 13. In the event of a fire in this portion of Fire Zone 2-4A-W, actuation of the automatic fire suppression sprinkler system would mitigate the heat effects on the structural steel beams supporting the fire rated floor slab. The basis for this evaluation is presented in Section 3.4 of the Summary Report for Structural Steel Evaluation. This section of the report provides the justification for the NFPA 13 sprinkler system's heat absorption capability with respect to cable tray fires. The combustible configuration beneath this fire rated floor slab is bounded by the analysis in Section 3.4.

CONCLUSION:

Based on the above evaluation and the specific combustible configuration beneath the fire rated floor slab in question, the existing automatic fire suppression sprinkler system can be expected to protect the structural steel beams with a wide margin of safety in the event of a postulated fire in this area.

UNIT 2 FIRE RATED FLOOR SLAB ABOVE FIRE ZONES 2-4A-W AND 2-4A-S

Reference Drawing C-206013, Sheet 4

DESCRIPTION:

The fire rated floor slab in question is 1'-9", thick and the top of the slab is at elevation 749'-1". This reinforced concrete slab acts compositely with a series of structural steel beams to support this floor elevation as shown on the reference drawing. The primary source of combustibles in this area is two horizontal cable trays. Portions of these cable trays are wrapped with upgraded Thermo-Lag.

EVALUATION:

The portions of Fire Zones 2-4A-W and 2-4A-S located beneath the fire rated floor slab in question is protected by an automatic fire suppression sprinkler system which has been installed in accordance with NFPA 13. In the event of a fire in these portions of Fire Zones 2-4A-W and 2-4A-S, actuation of the automatic sprinkler system would mitigate the heat effect the fire would have on the structural steel beams supporting this fire rated floor slab. The basis for this evaluation is presented in Section 3.4 of the Summary Report for Structural Steel Evaluation. This section of the report provides the justification for the NFPA 13 sprinkler system's heat absorption capability with respect to cable tray fires. Even though portions of the cable trays in the vicinity of the structural steel are wrapped with Thermo-Lag which is considered to be a combustible material, the combustibility effects of the Thermo-Lag are enveloped by the cable tray combustibility analysis. The cables within the protected raceway are protected so they do not contribute to the fire. Since the Thermo-Lag material has combustibility characteristics which are enveloped by the cable jacketing and insulation characteristics, the analysis in the Section 3.4 which is performed for cable jacketing and insulation effects will bound those effects from the Thermo-Lag material. Therefore, the combustible configuration beneath this fire rated floor slab is bounded by the analysis in Section 3.4.

CONCLUSION:

Based on the above evaluation and the specific combustible configuration beneath the fire rated floor slab in question, the existing automatic fire suppression sprinkler system can be expected to protect the structural steel beams with a wide margin of safety in the event of a postulated fire in this area.

UNIT 2 FIRE RATED FLOOR SLAB ABOVE FIRE ZONES 2-4A-W AND 2-4A-N

Reference Drawing C-206013, Sheet 5

DESCRIPTION:

The fire rated floor slab in question is 1'-9" thick and the top of the slab is at elevation 749'-1". This reinforced concrete slab acts compositely with a series of structural steel beams to support this floor elevation as shown on the reference drawing. The primary source of combustibles in this area is cable trays located throughout the fire zones. One cable tray is wrapped with upgraded Thermo-Lag.

EVALUATION:

The portions of Fire Zones 2-4A-W and 2-4A-N located beneath the fire rated floor slab in question is protected by an automatic fire suppression sprinkler system which has been installed in accordance with NFPA 13. In the event of a fire in these portions of Fire Zones 2-4A-W and 2-4A-N, actuation of the automatic sprinkler system would mitigate the heat effect the fire would have on the structural steel beams supporting this fire rated floor slab. The basis for this evaluation is presented in Section 3.4 of the Summary Report for Structural Steel Evaluation. This section of the report provides the justification for the NFPA 13 sprinkler system's heat absorption capability with respect to cable tray fires. Even though a cable tray in the vicinity of the structural steel is wrapped with Thermo-Lag which is considered to be a combustible material, the combustibility effects of the Thermo-Lag are enveloped by the cable tray combustibility analysis. The cables within the protected raceway are protected so they do not contribute to the fire. Since the Thermo-Lag material has combustibility characteristics which are enveloped by the cable jacketing and insulation characteristics, the analysis in the Section 3.4 which is performed for cable jacketing and insulation effects will bound those effects from the Thermo-Lag material. Therefore, the combustible configuration beneath this fire rated floor slab is bounded by the analysis in Section 3.4.

CONCLUSION:

Based on the above evaluation and the specific combustible configuration beneath the fire rated floor slab in question, the existing automatic fire suppression sprinkler system can be expected to protect the structural steel beams with a wide margin of safety in the event of a postulated fire in this area.

UNIT 2 FIRE RATED FLOOR SLAB
ABOVE FIRE ZONE 2-4G

Reference Drawing C-206014, Sheets 1 & 2

DESCRIPTION:

The fire rated floor slab in question is 1'-2-1/2" thick with the top of slab at elevation 761'-10". This reinforced concrete slab acts compositely with the structural steel beams to support this elevation as shown on the reference drawing. The source of combustibles in this fire zone is two cable trays located greater than 16' below the structural steel supporting this elevation.

EVALUATION:

Section 3.3 of the Summary Report for Structural Steel Evaluation provides justification that two horizontally stacked cable trays will not adversely affect the integrity of the structural steel beams. The two cable trays in this fire zone are located approximately 14' below the overhead structural steel beams whereas the cable trays discussed in Section 3.3 of the report are only one foot below the steel beams. This increased distance adds to the margin of safety already contained in the Section 3.3 analysis. Furthermore, an analysis using the Energy Balance Method as developed in Section 3.2 of the Summary Report showed the ratio of the critical energy needed to heat the structural steel to the critical temperature (Ec_t) to the predicted heat release for this combustible configuration (H') to be approximately 6.4 which is much greater than the required minimum value of 1.0. This analysis substantiates the integrity of the structural steel beams above this combustible configuration.

CONCLUSION:

Based on the above evaluation and the specific combustible configuration beneath the fire rated floor slab in question, the structural steel beams supporting elevation 761'-10" above Fire Zone 2-4G will not be adversely affected as the result of a postulated fire in this area.

UNIT 2 FIRE RATED FLOOR SLAB
ABOVE FIRE ZONE 2-5A-N

Reference Drawing C-213469, Sheets 1 & 2

DESCRIPTION:

The fire rated floor slab is 1'-9" thick in the area being rated that is west of column line Q (reference Drawing C-213469, Sheet 1). The top of slab elevation for this portion is 779'-1". East of column line Q (Reference Drawing C-213469, Sheet 2) the slab is 6'-3" thick in the area being rated below the surge tanks vault floor (top of slab elevation is 779'-4") and is 6'-4" thick in the area being rated below the fuel shipping cask storage pool floor (top of slab elevation is 777'-5"). The primary source of combustibles in these areas is cable trays located throughout the fire zone. Some of these cable trays are wrapped with Thermo-Lag which has been determined to be a combustible material.

EVALUATION:

The portions of Fire Zones 2-5A-N located beneath the fire rated floor slab in question is protected by an automatic fire suppression sprinkler system which has been installed in accordance with NFPA 13. In the event of a fire in these portions of Fire Zone 2-5A-N, actuation of the automatic sprinkler system would mitigate the heat effect the fire would have on the structural steel beams supporting this fire rated floor slab. The basis for this evaluation is presented in Section 3.4 of the Summary Report for Structural Steel Evaluation. This section of the report provides the justification for the NFPA 13 sprinkler system's heat absorption capability with respect to cable tray fires. Even though cable trays in the vicinity of the structural steel are wrapped with Thermo-Lag which is considered to be a combustible material, the combustibility effects of the Thermo-Lag are enveloped by the cable tray combustibility analysis. The cables within the protected raceway are protected so they do not contribute to the fire. Since the Thermo-Lag material has combustibility characteristics which are enveloped by the cable jacketing and insulation characteristics, the analysis in the Section 3.4 which is performed for cable jacketing and insulation effects will bound those effects from the Thermo-Lag material. Therefore, the combustible configuration beneath this fire rated floor slab is bounded by the analysis in Section 3.4

CONCLUSION:

Based on the above evaluation and the specific combustible configuration beneath the fire rated floor slab in question, the existing automatic fire suppression sprinkler system can be expected to protect the structural steel beams with a wide margin of safety in the event of a postulated fire in this area.

UNIT 2 FIRE RATED FLOOR SLAB
ABOVE FIRE ZONES 2-5C, 2-5A-S, 2-5B

Reference Drawing C-206015, Sheets 1, 2 & 3

DESCRIPTION:

The fire rated floor slab in question varies in thickness from 1'-9" to 2'-3" as shown on the reference drawing. The top of the entire slab is at elevation 779'-1". This reinforced concrete slab acts compositely with the structural steel beams to support this elevation as shown on the reference drawing. The combustibles in these fire zones located beneath the fire rated floor slab are primarily cable trays of varying elevation and location as shown on the reference drawing. A cable tray in Fire Zone 2-5B is wrapped with upgraded Thermo-Lag.

EVALUATION:

The portion of the fire rated floor slab located north of column line 34.5 has only two horizontal cable trays. Section 3.3 of the Summary Report for Structural Steel Evaluation provides the justification for the adequacy of structural steel for a combustible configuration of two horizontally stacked cable trays. Even though a cable tray is wrapped with Thermo-Lag which is considered to be a combustible material, the combustibility effects of the Thermo-Lag are enveloped by the cable tray combustibility analysis. The cables within the protected raceway are protected so they do not contribute to the fire. The heat release of the Thermo-Lag is bounded by the cable tray heat release analysis in Section 3.3. Therefore, the condition analyzed in the summary report bounds this combustible configuration of two side-by-side horizontal cable trays.

The portion of the fire rated floor slab in question located south of column line 34.5 has been structurally evaluated to determine which steel beams are the minimum required to support this entire floor slab area. The results of this analysis concluded that five structural steel beams are necessary to support the floor slab. These steel beams are noted on Sht. 1 of the reference drawing. The other beams are not required since the 2'-9" thick reinforced concrete slab is capable of spanning between these five required members.

These five required steel beams were then analyzed by the Energy Balance Method as developed in Section 3.2 of the Summary Report for Structural Steel Evaluation. This analysis determined the ratio of the critical energy needed to heat each required structural steel beam to the critical temperature (Ec_t) to the predicted heat release for the combustible configuration surrounding each beam (H'). In all five instances this ratio "(Ec_t/H')" was determined to be greater than the required minimum value of 1.0. Even though a cable tray is wrapped with Thermo-Lag which is considered to be a combustible material, the combustibility effects of the Thermo-Lag are enveloped by the cable tray combustibility analysis. The cables within the protected raceway are protected so they do not contribute to the fire. The heat release of the Thermo-Lag is bounded by the cable tray heat release analysis in Section 3.2. Therefore, this analysis verifies the integrity of the required structural steel beams in the area in the event of a postulated fire.

CONCLUSION:

Based on the above evaluation and the specific combustible configuration beneath the fire rated floor slab in question, a postulated fire in Fire Zones 2-5C, 2-5A-S and 2-5B would not generate sufficient heat to adversely impact the required structural steel beams supporting the fire rated floor slab.

UNIT 2 FIRE RATED FLOOR SLAB
ABOVE FIRE ZONE 2-6A

Reference Drawing C-206016, Sheet 1

DESCRIPTION:

The fire rated floor slab in question is 1'-9" thick and the top of slab is at elevation 779'-1". This reinforced concrete slab acts compositely with the structural steel beams to support this elevation as shown on the reference drawing. The primary source of combustibles in this area is 3 horizontal cable trays stacked on top of each other.

EVALUATION:

The area directly beneath the portion of the floor slab which is fire rated has no cable trays, however, 3 horizontally stacked cable trays are located beneath the W3OX19O structural steel beams which support the area floor slab at elevation 799'-1". These structural steel beams were evaluated by the Energy Balance Method described in Section 3.2 of the Summary Report for Structural Steel Evaluation. This analysis demonstrated that the ratio of the critical energy needed to heat each W3OX19O structural steel beam to the critical temperature (Ec_t) to the predicted heat release for the combustible configuration surrounding each beam (H') to be greater than the required minimum value of 1.0. This analysis verifies the integrity of the required structural steel beams supporting the fire rated floor slab in question.

CONCLUSION:

Based on the above evaluation and the specific combustible configuration beneath this fire rated floor slab as shown on the reference drawing, a postulated fire in Fire Zone 2-6A would not generate sufficient heat to weaken the structural steel beams supporting the fire rated floor slab.

SUSQUEHANNA STEAM ELECTRIC STATION
UNITS 1 & 2

FIRE PROTECTION PROGRAM APPENDIX R DEVIATION REQUEST NO. 6 NON FIREPROOFED STRUCTURAL STEEL

SUMMARY REPORT
FOR
STRUCTURAL STEEL EVALUATION

REVISION 2
10/87

SUMMARY REPORT
FOR
STRUCTURAL STEEL EVALUATION

SUMMARY REPORT
FOR
STRUCTURAL STEEL EVALUATION
UNIT 1 & 2 REACTOR BUILDINGS
APPENDIX R DEVIATION REQUEST NO. 6

1.0 INTRODUCTION

Deviation Request No. 6 was submitted to the NRC in September 1985 (PLA-2529) requesting approval of exposed (non-fireproofed) structural steel which supports fire area barriers in the Unit 1 and 2 Reactor Buildings and the Control Structure.

After reviewing the Deviation Request, the NRC requested additional justification. In response to the NRC request, PP&L submitted the Structural Steel Action Plan to the NRC for their concurrence on February 10, 1986 (PLA-2592).

The initial submittal, outlined in Revision 0 to this report, was submitted to the NRC on May 19, 1986.

Subsequent to the initial submittal, a meeting was held in the NRC Office in Bethesda, MD on July 30, 1986 to discuss the submittal. During this meeting the NRC requested that PP&L revise their submittal and provide the following:

≅ Consideration of the effects of slab openings and the use of a 100% live load criteria.

≅ Specific details of the areas required to be fire rated.

Our summary report has been revised to respond to the NRC requests. Methodology changes different than those proposed in our action plan submitted with PLA-2592, have occurred as a result of NRC comments. These changes are explained in the report.

This report specifically addresses the fire-rated barriers in the Unit 1 and 2 Reactor Buildings and some barriers in the Control Structure. Fire-rated barriers covered by Deviation Request 06 are located in the Unit 1 and 2 Reactor Buildings and in the Control Structure. The write-up within the body of Deviation Request No. 6 is considered to have adequately addressed the combustible configuration so the subject is not specifically addressed in the report.

Finally, in response to concerns expressed verbally by the NRC staff, we have taken the initiative to review all of the structural steel in the Unit 1 and 2 Reactor Buildings regardless of whether or not the structural steel was part of a fire-rated barrier.

2.0 METHODOLOGY

The methodology outlined below, which differs from the methodology outlined in PLA-2592, was used in performing our updated analysis.

All structural steel in both the Unit 1 and Unit 2 Reactor Buildings was reviewed. The structural steel framing plan for each floor elevation on each Reactor Building was reviewed and the minimum set of structural steel framing members required to insure structural integrity was selected. This minimum set of structural steel framing members was selected on the premise that the thick reinforced concrete slabs used in the construction of the Reactor Buildings are able to span significantly longer distances than the normal beam to beam span required by other design basis accident scenarios. Since these other design basis accident scenarios need not be considered in conjunction with a fire, much of the structural steel installed in the Reactor Building is not necessary to maintain structural integrity for the fire scenario. In selecting the minimum set of required structural framing members, the following restrictions were applied:

≅ The reinforced concrete slab must be able to support 100% of the allowable live load shown on the existing structural framing plan drawings. The loss of structural continuity as a result of hatch openings and penetrations must be considered.

≅ The selected structural steel framing beams must be capable of carrying any increased loadings caused by the elimination of adjacent members to the building girders and/or columns. Similarly, the building girders and/or columns must be capable of supporting any increased loading.

Each specific concrete slab section was evaluated to assure that the first criteria outlined above was met. Each required structural steel framing member was reviewed for the effects of any additional load imposed on the member and for the effects of the combustible configuration near each member.

Any required structural steel framing member with a maximum of two horizontal cable trays in its vicinity was evaluated to be acceptable. (See Section 3.3 - Two Horizontal Cable Tray Criteria for an explanation of and justification of this criteria.)

Any required structural steel framing member located in areas protected by an NFPA 13 sprinkler systems was evaluated to be acceptable. (See Section 3.4 – NFPA 13 Sprinkler Criteria, for an explanation of and justification for this criteria.)

All remaining required structural steel framing members were evaluated with respect to fire protection on a case-by-case basis. By reviewing each member and the combustible configuration in the vicinity of the member, the fire protection evaluation determined that structural steel temperatures could not be raised above 1000°F. The case-by-case fire protection evaluation is explained in Section 3.5.

3.0 CRITERIA AND JUSTIFICATION

3.1 General Criteria

In the past it has been common to calculate the average combustible loading by distributing all calculated combustibles uniformly over the entire floor area and comparing the results with the fire rating of the structure. While this method provides a room-to-room comparison, it fails to consider such parameters as combustible concentration, fuel arrangement, and burning rates. These average combustible loadings have traditionally been compared to fire-rated components tested to the Standard Time Temperature Curve (Ref. 2). More recently, this approach has come under attack as being unconservative in certain applications because it fails to address the condition where the majority of the combustibles in an area are concentrated in a small portion of the area.

PP&L based the structural steel evaluation on a comparison of combustible configuration in each area using actual cable tray fire test data. Cable trays are the predominant fire hazard in the Reactor Buildings. The cable tray fire tests referenced take into account the actual fuel arrangement within the cable tray, combustible configuration, and burning rates.

The critical steel failure temperature used in the evaluation criteria was based on the 1000°F average temperature acceptance criteria found in the National Fire Protection Association's standard used for testing fireproofing for structural steel (NFPA-251). Since fireproofing materials are designed to maintain structural steel temperatures below this level, we can conclude that fires which do not heat the structural steel to this critical temperature will not result in loss of structural integrity.

This conclusion is further substantiated by information provided by the American Institute of Steel Construction. The American Institute of Steel Construction Manual (Ref. 8) states that steel maintains approximately 63% of its yield strength at 1000°F and approximately 37% of its yield strength at 1200°F. The normal A.I.S.C. allowable stress in bending is in the range of 60 to 66% of its yield strength. Since it is reasonable to classify the fire condition as an extreme environmental loading combination, it should follow that for this loading combination the allowable stress should be permitted to approach the yield strength of the material. Therefore, by restricting structural steel temperature to 1000°F, we are assuring that approximately 63% of the yield strength of the material is preserved. As a result, when we evaluate the structural members for 100% live and dead load and use the normal A.I.S.C. allowable stresses, we are, in fact, satisfying the conditions which would be imposed by a loading combination consistent with the fire scenario.

In Section 3.2 of this report, the Energy Balance Method outlined in the previous revision has been expanded to include the heat absorption capability of the concrete. In the development of the method it has been assumed that an equilibrium temperature is reached between the structural steel and the first inch of depth of concrete. The assumption of equilibrium concrete heat up to a depth of one inch is considered a reasonable assumption since in actuality the rapid transfer of heat through the air would cause a much larger area than assumed to be heated up. From a structural standpoint heating of the lower 1" of concrete will have a negligible effect on the concrete structural properties since the cover on the reinforcing steel is approximately 4" and in the structural evaluation for slab span capability, the concrete on the underside of the slab is in tension. Tensile concrete is not considered for structural properties.

The following combustibles were generically evaluated, and it was determined that a specific analysis on a case-by-case basis was not required. The remaining combustibles which are represented solely by cable trays are the dominant factor leading to potential high temperatures which would affect structural steel.

3.1.1 Combustible Liquids

Combustible liquids could present fire exposure to structural steel. The most probable location for heat released, however, would be at the floor level and heat would be released very quickly. The analysis of all fire zones containing combustible liquids, except Fire Zones 1-1G and 2-1G, are bounded by the analysis of Fire Zones 1-1C and 2-1C. Fire Zones 1-1C and 2-1C contain the largest quantity of oil (155 gallons of in-situ oil and, up to, 165 gallons of transient oil) in the smallest room (1374 square feet). This oil is associated with the HPCI Turbine.

Assuming the in-situ 155 gallons or a transient allowance of 165 gallons of oil are spilled on the floor and none of the oil is removed by the floor drains, the calculated fire will not cause a failure of the HPCI Room structural steel. The heat generated during the short duration burning period for this quantity of oil is not sufficient to heat the HPCI Room structural steel to the critical temperature of 1000°F.

The HPCI turbines lube oil system has a maximum oil flow of 60 gpm at 110 psi. The potential for a high pressure leak affecting the steel is low. The piping is seismically designed and automatic open head deluge water spray system protect the HPCI Turbine.

Oil sumps located in Fire Zone 1-1G and 2-1G have a 1120 gallon capacity. The construction of these sumps, however, would prevent the ignition and burning of the oil. The sumps are constructed of a steel liner cast into concrete below the Reactor Building Basement. The cover of the sumps is a 1 1/2' thick concrete slab with a 2' x 2 1/2' manhole constructed of a minimum of 3/4" thick steel plate.

3.1.2 Charcoal

The HVAC units which contain charcoal are provided with fixed deluge systems and are contained within steel enclosures. Because of the physical configuration of the charcoal beds a fire will be slow and smoldering with a low heat release rate. Therefore, these units will not effect building structural steel integrity.

3.1.3 Transient Combustibles

Investigations by Sandia Laboratories (Ref. 8, Table 3) indicate that transient combustibles produce low heat release rates resulting in room temperatures below 500°F.

The presence of transient combustibles is administratively controlled throughout the facility. When present transient combustibles are located at floor level. If transient combustibles are considered along with a cable tray, it would be expected, based on the above referenced Sandia data, that the transient would be an ignition source only if the cable tray was close to the transient combustible. Such a combination of heat release caused by cable trays and transient combustibles at floor level would not effect structural steel located at the ceiling. Additionally, since the structural steel justification was based on 1000°F critical temperature, there still remains a 300°F allowance before transient combustibles would produce a local hot spot of 1300°F (1300°F is the allowable local hot spot temperature during a NFPA 251 test).

3.2 Technical Basis

This section of the report provides the technical basis used to address the effects of each unique combustible configuration on the required structural steel members.

The basic methodology developed in this section is referred to as the Energy Balance Method. The Energy Balance Method provides a means to calculate the energy released from a given combustible configuration, to calculate the energy absorption capability of a given structural mass and to determine by comparing these two calculations whether or not the critical temperature can be exceeded.

As discussed below, the Sandia Laboratories' "Fire Retardant Coating Test" (Ref. 1) provides the data necessary to predict the energy release of a cable tray fire. The Sandia Laboratories' "Fire Protection Research Program Corner Effects Tests" Report (Ref. 4) provides additional data to confirm these predictions and predict the heat release effects of the burning cables as a function of the distance of these cable trays from the corner. The heat release data with increasing distance from the corner suggests that the ability of the cables to burn and the resultant energy release is greatly diminished as the reradiation effects typical of the close corner relationship are removed. The energy release figures provided in the corner effects tests are used to baseline the values measured in the "Fire Retardant Coating Tests" and as a conservative prediction of the heat release value to be used in the methodology outlined below.

Energy Balance Method

Energy Absorption

The energy absorption capability of a given structural mass can be calculated as follows:

$Ec_T = Er \times Q$

where:

Ec_T = the critical energy needed to heat all the components in a given area to the critical temperature (BTU)

Er = Energy required to raise a unit amount of a given component from ambient to the critical temperature.

Q = The total quantity of each component in the area.

The typical components in a given area which would be present to absorb heat are structural steel, concrete, ductwork, piping, air, equipment and even the steel cable tray itself. For purposes of our evaluation only structural steel and concrete will be considered as heat absorbing components.

The heat required to raise the temperature of one pound of structural steel to 1000°F can be calculated by the following equation:

$Er_S = CP_S \times (Tc\text{-}To)$ (Eq. 1a)

where:

Er_S = Energy required to raise the temperature of pound of structural steel from ambient to the critical temperature (BTU/lb)

CP_S = Specific heat of steel (Cp = .112 BTU/lb °F for steel)

To = Pre-fire room temperature = 100°F

Tc = Critical temperature = 1000°F

Inserting the given values into equation 1a yields:

$$Er_S = \frac{.112\,BTU}{lb\,^{\circ}F}(1000^{\circ}F - 100^{\circ}F) = 100.8 \text{ BTU/lb}$$

Therefore, approximately 100 BTUs per pound of steel are required to heat the steel to the critical temperature. The critical energy required to heat a given structural member to the critical temperature of 1000°F is expressed as:

$Ec_S = Er_S \times W \times L$ (Eq. 2a)

where:

Ec_S = Critical energy needed to heat a given structural steel member to the critical temperature (BTU)

W = weight of structural steel member per foot (lb/ft)

L = length of structural steel member subject to direct energy effects (ft)

The heat required to raise the temperature of one square foot of concrete 1" deep to 1000EF can be calculated by the following equation:

$Er_C = Cp_c \times (Tc\text{-}To)$ (Eq. 1b)

where:

Er_C = Energy required to raise the temperature of one square foot of concrete 1" deep from ambient to the critical temperature (BTU/lb)

Cp_c = Specific heat of concrete (Cp - .156 BTU/lb °F for concrete)

To = Pre-fire room temperature = 100°F

Tc = Critical temperature = 1000°F

Inserting the given values into equation Ib yields:

$$Er_C = \frac{.156\,BTU}{lb\,^{\circ}F}(145\#/ft3)(1ft/12\,inch)(1000^{\circ}F - 100^{\circ}F) = 1696.5\,BTU/ft^2$$

Therefore, approximately 1700 BTUs per square foot of concrete are required to heat the concrete to the critical temperature. The critical energy required to heat a given concrete area to the critical temperature of 1000°F is expressed as:

Ec_C = Er_C x A_c (Eq. 2b)

where:
Ec_C = Critical energy needed to heat a given concrete area to the critical temperature (BTU)

A_C = the effected concrete area

Energy Release

The energy released from a cable tray can be developed as follows:

The heat released from a two-cable tray fire can be predicted from data developed during Sandia Laboratories Fire Retardant Coating Tests (Ref. 1). During small scale testing, Sandia (Ref. 1, Table A-XI) determined the maximum Heat Release Rate to be 134 KW/M^2 which is equal to 11.8 BTU/ft^2 sec.

Sandia performed a full scale free burn test of two stacked 18-inch wide cable trays filled with IEEE 383 cable (Ref. 1 Test 20). The total heat released from this test can be predicted by conservatively assuming the Sandia small scale maximum heat release rate was constant during the entire fire test burn period. This is expressed as:

Ht = Hr x At x T (Eq. 3)

Ht = Total heat released (BTU)
Hr = Maximum heat release rate (BTU/ft^2 sec)
At = Area of cable tray burned (ft^2)
T = Burn Time (sec)

In this test, the bottom tray was damaged for 24 linear inches and burned 9 minutes. The top tray was damaged for 54 linear inches and burned for 12 minutes. Using this data in equation 3 yields:

$$\text{Heat Release Top Tray} = \frac{11.8\,BTU}{\sec ft^2}\;x\;\frac{18\,inches\;x\;54\,inches}{144\,sq\;inches\,/\,ft^2}\;x\;\frac{12\min}{1\min/\,60\sec} = 57{,}348\,BTU$$

$$\text{Heat Release Top Tray} = \frac{11.8\,BTU}{\sec ft^2}\;x\;\frac{18\,inches\;x\;24\,inches}{144\,sq\;inches\,/\,ft^2}\;x\;\frac{9\min}{1\min/\,60\sec} = 19{,}116\,BTU$$

$$\text{Total Heat Release (Ht)} = 57{,}348 + 19{,}116 = 76{,}464\,BTU$$

The maximum total heat release per area can be expressed as follows:

Hmax = Ht/At (Eq. 4)

where:

Hmax = Maximum total heat release per area (BTU/ft^2)

Substituting our previously developed data into equation 4 yields:

$$H\max = \frac{76{,}464\, BTU}{\frac{18\, inches\left(54\, inches + 24\, inches\right)}{144\, inches^2 / ft^2}} = 7842\, BTU / ft^2$$

This maximum total heat release per area can then be applied to other configurations by the following equation:

H' = Hmax x A' (Eq. 5)

where:

H' = Predicted heat release for a given configuration (BTU)

A' = Area of cable tray burned for that given configuration (ft ^{2})

Sandia Laboratories also conducted separate corner effects tests of cable trays (Ref. 4) where calorimeters recorded heat flux above the cable tray fires. This additional test series can be used to confirm the predicted maximum heat release value of 7842 BTU/ft^2 and also to determine the maximum heat release values for configurations with different corner configurations.

The corner effect test data was obtained during full scale free burn fire tests in a corner configuration. The cable tray type, arrangement, fill and contents were similar to the fire retardant rating tests arrangement. During these corner tests the actual maximum heat flux (heat release rate) was measured by determining the heat release directly above the cable tray with the cable tray located at various distances from the corner (Ref. 5 – Table I and II). The maximum heat flux multiplied by burn time would conservatively indicate the total heat at the upper calorimeter as follows:

Hmax = Hf x T (Eq. 6)

where:

Hf = maximum heat flux (BTU/ft^2 hr)

By substituting the data from the actual corner tests the following data can be generated:

Cable Tray	Max Heat Flux	Burn Time	Max Heat Release

Distance from Corner	(Hf) (BTU/ft^2 x hr)	(T) (min)	/Area Hmax) BTU/ft^2)
5 in x 10.5 in	18,430	20	6140 BTU/ft^2
10.5 in x 18 in	12,300	24	4932 BTU/ft^2
60 in x 120 in	2,370	25	987 BTU/ft^2
* (See Figure 2.0)			

The 6140 BTU/ft^2 is comparable to the 7842 BTU/ft^2 derived from the fire retardant coating test data. This is expected, because at the short corner distance the predicted heat release would nearly equal the measured maximum heat release.

Using this developed data and the results of the Sandia Corner Effects Test (Ref. 4), a determination can be made as to the amount of heat transferred to the structural components in an area due to a fire in a cable tray located some distance below the steel member. It has been determined that 7842 BTU/ft^2 is the maximum heat released at the cable tray or group of cable trays.

Figure 1.0 of this report is a reproduction of Figure 7 from the Sandia corner effects test (Ref. 4). The data in this figure can be used to determine the maximum heat release values as a function of corner configuration.

Acceptance Criteria

The energy required to heat a given structural mass to 1000°F is compared with the energy released by a fire in the vicinity of that mass to determine whether or not the fire threatens structural integrity.

If the following ratio is satisfied, structural integrity will be assured:

$$\frac{Ec}{H^1} t \quad 1.0 \qquad \text{(Eq. 7)}$$

where (as previously defined)

Ec_t = The critical energy needed to heat all the components in a given area to the critical temperature (BTU).

H^1 = Predicated heat release for a given configuration (BTU).

Conservatisms

The following demonstrates that the use of this technical basis at Susquehanna is conservative:

- The maximum heat release rates used in our analysis were based on cable tray test conducted by Sandia (Ref. 4). In these tests cross linked PE (polyethylene) cables is a loose packed configuration were tested.

  EPRI conducted a series of full scale fire tests using the following cable types and packing arrangements:

- Tightly packed ethylene propylene rubber (EPR)/hypalon cables
- Loosely packed ethylene propylene rubber (EPR)/hypalon cables
- Tightly packed PE cables
- Loosely packed PE cables

The results of the EPRI test demonstrated the following relationships.

- The tighter the cable packing, the lower the heat release will be.
- The EPR/hypalon cables have a lower heat release than the PE cables.

Since Susquehanna SES used EPR/hypalon cables in a tight packed arrangement, the quantitative test data indicates that the use of the heat release data from the Sandia test has an inherent factor of safety of approximately 8 when applied to our plant.

- The Sandia observed maximum heat release rate data (Ref. 1, 4) was assumed over the entire burn time. During an actual fire, the heat release rate would gradually increase to the maximum and then decrease.
- All cable trays were assumed to be full.
- Heat transfer to the room air was ignored.
- Steel was assumed to fail if the 1000°F critical temperature was reached. The reduced load capabilities of the structural steel at temperatures above 1000°F were ignored.
- It was assumed that high fire temperatures existed for sufficient time to allow heating of the steel. In many cases the longer heating intervals required for the larger structural steel members will not exist for sufficient time to allow the necessary heat transfer.

3.3 Two Horizontal Cable Tray Criteria

3.3.1 Description

All required structural steel framing members were reviewed. Any member affected by a combustible configuration comprised of no more than two (2) horizontal perpendicular cable trays with no other cable trays within a four (4) foot distance and not less than one foot below the structural steel were determined to be acceptable. (See Figure 3.0.)

3.3.2 Approach

The Energy Balance Method will be used to provide a justification for the criteria by demonstrating that this combustible configuration will not cause temperatures above 1000°F for the lightest member to which the criteria was applied.

3.3.3 Justification

The following justification is provided to quantitatively demonstrate that the combustible effects from two (2) horizontal perpendicular cable trays one foot below the structural steel are insufficient to cause a structural steel member to be heated to 1000°F. (See Figure 3.0.)

Therefore, any structural steel member larger than that member justified is acceptable for the described combustible configuration, because larger quantities of heat are required to heat larger steel members.

The lightest structural steel member to which this criteria was applied is a W21 x 49.

Therefore, a W21 x 49 beam (flange width - 6.52 in, weight - 49 -lb/ft) and two 24-in wide cable trays must be justified.

Energy released at the cable tray:

From Figure 3.0 it can be seen that the cable tray is 33" below the ceiling. Using a value of 9500 BTU/ft_2-HR for a distance from the ceiling of 30" from Figure 1.0 and using 25 minutes, the longest burn time, from the table on page 10, calculate Hmax for this configuration.

Since:

$H_t = H_r \text{ x } A_t \text{ x } t$ (Eq. 8)

And

$Hmax = H_t / A_t$ (Eq. 9)

Therefore:

$$H\max = H_r\ x\, t = 9500\frac{BTU}{ft^2 - Hr}\,x\,25\min.\,x\,\frac{1hr}{60\min.}$$

$$H\max = 3{,}958\frac{BTU}{ft^2}$$

$$H^1 = 3{,}958\frac{BTU}{ft^2}\,x\,\frac{24\,inches}{12\,inches/ft}\,x\,\frac{6.52\,inches}{12\,inches/ft}\,x\,2\,trays$$

$$H^1 = 8{,}602\,BTU \qquad (Eq.10)$$

Energy required to heat beam to 1000°F :

$$\text{Ec} = 49\frac{\text{lbs}}{\text{ft}}\,x\,\frac{24\,inches}{12\,inches/ft}\,x\,\frac{100\,BTU}{lb} = 9{,}800\,BTU \qquad (Eq.11)$$

Ratio (energy required to energy released):

$$\frac{9{,}800\ \text{BTU}}{8{,}602\ \text{BTU}} = 1.14 \quad 1.0 \qquad \text{(Eq. 12)}$$

Therefore, the criteria is justified.

This justification assumes that the maximum heat release rate of the burning cable tray configuration is a function of the distance of the cable tray from the ceiling rather than from the underside of the structural steel member. This is acceptable because all parts of the cable tray are at least 33" from the ceiling except for a short, 6.5", section beneath the structural steel member. It is unrealistic to assume that the corner effects will dramatically increase in this short distance.

This justification also assumes that only the portion of the cable tray directly beneath the structural steel member contributes to raising the temperature of the steel. This is justified because those portions of cable tray not directly under the steel will cause heat-up of the reinforced concrete slab above them. For each additional foot of cable tray considered 7,916 BTU's is released. Assuming a 45° distribution of this heat into the concrete slab, the additional heat absorption afforded by the concrete, using the methodology outlined in Section 3.2, is 12,750 BTU'S. Therefore, more energy absorption capability is added than additional heat released.

3.4 NPFA 13 Sprinkler Criteria

3.4.1 Description

The Unit 1 and Unit 2 Reactor Buildings both have areas with automatic sprinkler protection designed, installed and tested to the requirements of NFPA 13. All required structural steel framing members in areas protected by NFPA 13 sprinkler systems and having combustible configurations less than those justified herein were determined to be acceptable.

3.4.2 Approach

For a given quantity of cable trays, an automatic sprinkler system is capable of preventing structural steel damage by controlling a fire and cooling the steel. Six cable trays have been selected as being a combustible configuration which can be protected by a sprinkler system. Branch Technical Position CMEB 9.5-1 (Rev. 2) lends credence to this criteria in that it requires automatic suppression systems only when an area contains more than six cable trays. Additionally, extensive large scale fire testing of rack storage arrangements, a far more hazardous combustible configuration than cable tray, have demonstrate that ceiling level automatic sprinklers installed in accordance with NFPA 13 are effective in preventing heat damage to unprotected steel beams and columns. The requirements of NFPA Standard 231C, "Standard for Rack Storage of Materials". (Ref. 4) were developed based on the results of these large scale tests. A comparison between the combustible configurations and fire hazards associated with rack storage and cable trays will be used to justify our criteria.

3.4.3 Justification

Our criteria can be justified by comparing the relative fire hazard of a six-cable-tray fire with that of the rack storage fire which meets the NFPA Standard 231C requirements and does not require structural steel protection.

Rack storage of materials, especially most plastic materials, presents a difficult to control fire hazard. The materials and the cardboard packaging holding these materials are easily ignited. Once ignited, the rack storage configuration provides ideal conditions for rapid and intense combustion. In the rack storage configuration the boxes of materials are surrounded on all sides by sufficient oxygen for combustion, and the flue spaces created between adjacent boxes are ideal for reradiation effects which promote fire spread. Also, the pelletized materials (4' x 4') present large areas of blockage from sprinkler protection and allow fire growth to a level which can overpower traditional sprinkler systems. Recognition of these conditions led to extensive large scale fire tests. These tests served as the basis for the National Fire Protection Associations's "Standard for Rack Storage of Materials" (NFPA 231C) (Ref. 4).

The rack storage test program and NFPA standard clearly show that when an adequately designed ceiling sprinkler system is installed, fireproofing is not required for steel columns or ceiling steel. (Ref. 4 Sec. 3-2.1, 3-2.3, B-3-2.1, and B-3-2.3.)

In contrast, the cable trays at Susquehanna contain IEEE 383 qualified cables which require at least 70,000 BTU/hr heat input to ignite the cables. Due to the tight packing of cables in cable trays, there is only limited exposure to air. Cable tray fires are slow developing relative to cardboard packaging materials, and unlike other fuel arrays, cable trays present a fuel arrangement which allows fire propagation in only two directions. Finally, the cable tray itself is constructed of non-combustible steel.

In the Reactor Buildings the predominant fire spread is vertically from tray to tray. Horizontal fire spread from cable tray to cable tray is possible, but the majority of the cable trays in the Reactor Building are arranged with spacing which are not ideal for horizontal fire spread.

The following example shows how to determine the required ceiling sprinkler system parameters for a high hazard rack storage configuration when structural steel fireproofing is not provided on either ceiling beams or columns.

3.4.4 NFPA 231C Sprinkler Design Example

The following example uses NFPA 231C requirements to determine sprinkler system parameters for a given rack storage combustible configuration when structural steel fireproofing is not to be used.

a) Problem Definition - Determine the sprinkler density for a ceiling sprinkler system capable of maintaining the building's structural integrity for the following rack storage configuration.

   1. The stored material is pelletized cardboard cartons containing foamed polystyrene. The pallets and cartons are not encapsulated with plastic.

   2. The aisle spacing is 8 feet. The rack storage height is 15 feet.

3. There are no in-rack sprinklers.

4. Structural steel ceiling beams and columns are not fireproofed.

b) NFPA 231C Requirements

1. The combustible material described above would be classified as a Class IV commodity per NFPA 231C Section 2-1.1.4.

2. By referring to Table 6-11.1 in NFPA 231C and applying the following conditions:

   i) The rack storage height is over 12 feet but less than 20 feet.

   ii) The combustible material is classified as a Class IV commodity.

   iii) The pallets and cartons are not encapsulated with plastic.

   iv) An 8-foot wide aisle is used between rack configurations.

   v) No in-rack sprinklers are provided.

   It can be determined that Figure 6-8.2 can be used to determine the allowable reduction factor to be applied to the sprinkler design density and that Figure 6-11.1d curve E or F is to be used to determine the unfactored sprinkler design density. (Refer to NFPA 231C for figures.)

3. Using NFPA 231C Table 6-8.2, it is determined that a 60% reduction factor may be applied to the required sprinkler design density determined below.

4. NFPA 231C Table 6-11.d curve F will be used because Susquehanna SES uses 212EF rated sprinkler heads. Curve F applies to 165°F rated heads. Curve E applies to 265°F rated heads. Using the curve for the lower rated heads results in a more conservative sprinkler density. Using 2500 square feet, which was used as the design area for sprinkler coverage used in the design of the SSES Reactor Buildings, it can be determined that the required sprinkler design density for this rack storage example is:

   Required Sprinkler Design Density = .54 GPM/ft^2

5. By applying the 60% reduction factor determined in step 3 above, the final sprinkler density is determined to be:

   Sprinkler Density = .54 x .60 = 0.32 GPM/ft^2

6. The requirements of NFPA 231C sections 3-2.1 and 3-2.3 are satisfied by the storage height limitations of 15 feet and the sprinkler design which conforms to Chapters 6.7.8 and 9. Therefore, fireproofing of structural steel beam and columns is not required for this example.

c) Conclusion

A ceiling sprinkler system with a design density of .32 GPM/ft^2 over 2500 square feet is considered sufficient to protect non-fireproofed structural steel (ceiling beams and columns) from damage when subjected to a rack storage hazard with the above parameters.

3.4.5 Comparison of Our Cable Tray Criteria With the Fire Hazard of the Rack Storage Example

a) Cable Trays

Cable trays present an important fire protection challenge to control damage prior to affecting safe shutdown or station availability, but cable tray fires have low heat release rates, spread slowly, and do not pose the danger to structures that the rack storage materials do.

As discussed in Section 3.2 of this report, the Sandia Laboratories Fire Retardant Cable Test (Ref. 1) Table A-XI indicates a maximum of 11.8 BTU/ft^2 sec (134,690 W/M^2) for non-coated electrical cables. Therefore, it can be concluded that the total heat release rate for six cable trays would be 70.8 BTU/ft^2 sec.

b) Rack Storage

Rack storage stores combustible materials in configurative ideal for combustion (i.e., air space around fuel, and distances ideal for radiant heat transfer). Therefore, rack storage presents an extremely difficult fire to control. Rack storage fires have extremely high heat release rates, spread very quickly, and can threaten structural integrity within minutes unless proper sprinkler protection is provided.

Heat release rate data for the rack storage commodity was obtained from Factory Mutual Data (Ref. 10, Table 2, Page 26) which indicates that a pallet of polystyrene in cartons 14 to 15 feet high has an average heat release rate of 300 BTU/ft^2 sec.

c) As a result of the information in a and b above, the following data comparison of critical fire protection parameters can be presented.

DATA COMPARISON

Hazard	Cable Tray Criteria	Rack Storage Example
Heat Release Rate	70.8 BTU/ft^2 sec.	300 BTU/ft^2 sec.
Sprinkler Density	15 GPM/ft^2	.32 GPM/ft^2

*SSES was designed on the basis of a .15 GPM/ft^2 sprinkler density over a 2500 sq. ft. area.

d) Conclusion

The dominant mechanism governing a sprinkler system's ability to extinguish fires and also to protect structural steel from damage is the ability of the sprayed water to absorb the heat released from the fire. This absorption occurs as the heat of the fire is used to change liquid water to steam.

The heat release rates of different materials as they are consumed is an indication of the relative fire hazard of the different fires. As the heat release rate increases, larger and larger quantities of water are necessary to absorb the higher heat levels generated.

Therefore, a comparison of the data presented in Item c above on heat release rates and sprinkler densities can be used in demonstrating the adequacy of the Susquehanna sprinkler design for our cable tray configurations. Since the rack storage example above proved that a .32 GPM/ft^2 density sprinkler system could control a fire with a heat release rate of 300 BTU/ft^2 min, using a strictly linear relationship we can predict a .15 GPM/ft^2 density sprinkler system would control a fire with a heat release rate of 140 BTU/ft^2 sec or 12 cable trays (140 BTU/ft^2 sec divided by 11.8 BTU/ft^2 sec per cable tray).

The assumption of linearity applied above would be viewed as being highly unconservative if the light hazard fire test data was used to predict the sprinkler system requirements to protect a configuration with high fire hazard potential. This is valid because as the level of the combustibles doublest effects such as reradiation can have an exponential effect. In contrast, however, to extrapolate results from the higher density system to the lower density system on a linear basis is clearly a conservative and supportable approach.

While this comparison predicts a wide margin of safety over the six-tray criteria, the criteria was limited to six cable trays to be conservative, to parallel the Branch Technical Position CMEB 9.5-1 (Rev. 2) requirements, and to assure that specific orientations and arrangements exceeding the criteria would be looked at on a case-by-case basis to ensure the adequacy of the sprinkler system.

Therefore, the existing ceiling level automatic sprinkler system in the Susquehanna SES Reactor Building can be expected to protect structural steel with a wide margin of safety in the event of a fire involving six cable trays.

3.5 Case-By-Case Fire Protection Analysis

3.5.1 Description

For all required structural steel framing members not satisfying either of the two criteria outlined above one of the following approaches was used to justify that structural steel fire proofing was not required:

a) For non-sprinklered areas, a case-by-case evaluation using the Energy Balance Method outlined in Section 3.1 of this report was performed. The most severe cable tray exposure was analyzed for each steel member evaluated. In cases where the most severe exposure was not obvious, several exposures were evaluated.

b) For sprinklered areas, a case-by-case evaluation to determine that the existing combustible configuration would be controlled by the sprinkler system was performed.

4.0 RESULTS

All structural steel in the Unit 1 and 2 Reactor Buildings was reviewed in conjunction with the combustible configuration exposing the structural steel to determine if the combustible configuration would cause structural steel temperatures in excess of the critical temperature.

No situations were found where the addition of fireproofing materials was determined to be necessary to keep structure steel temperatures below the critical temperature.

For areas acting as fire area barriers:

a) The structural steel supporting the roof of the Reactor Building switchgear rooms (Fire Zone 1-4C, 1-4D, 1-5F, 1-5G, 2-4C, 2-4D, 2-5F and 2-5G) were confirmed to already be provided with 3-hour fire rated fireproofing (These are not the subject of deviation request No. 6).

b) The specific combustible configurations and justifications for each of the remaining fire rated areas is contained in Deviation Request No. 6, Non-Fireproofed Structural Steel.

5.0 MODIFICATIONS

No modifications are required.

6.0 SCHEDULE

Schedule data for modifications is not applicable. No modifications were identified by this analysis.

7.0 COMPENSATORY MEASURES

Compensator measures are not applicable. No deficiencies were identified by this analysis.

8.0 CONCLUSION

The evaluation of the structural steel in the Susquehanna Steam Electric Station Unit 1 and 2 Reactor Buildings has determined, based on the conservative evaluation criteria outlined in this report, not to require structural steel fire proofing.

With these results, as summarized in Deviation Request No. 6, Non-Fireproofed Structural Steel, all structural steel is justified.

APPENDIX A

FIGURES

APPENDIX B

REFERENCES

1. Sandia Fire Retardant Coating Test
12-7-77 to 1.31-78 Sandi78-0518

2. NFPA Code 251 - Standard Methods of Fire Tests of Building, Construction Materials 1985 Edition

3. NFPA Code 231C - Rack Storage of Materials 1980 Edition

4. Sandia Fire Protection Research Program
Corner Effects Tests - Sand79-0966

5. Categorization of Cable Flammability Intermediate Scale Fire Tests of Cable Tray Installations – EPRI NP-1881, August 1982.

6. NRC's Branch Technical Position CMEP 9.5-1 (Rev. 2).

7. Sandia Investigation of Twenty-Foot Separation Distance as a Fire Protection Method as Specified in 1OCFR5O, Appendix R SAND83-0306.

8. Manual of Steel Construction - 8th edition AISC, Inc.

9. Vendor Drawing M-343 layout drawing and hydraulic calculations.

10. Evaluating Upsprinklered Fire Hazards, Alpert and Ward, Factor Mutual Research (RC84-Bt-9).

11. Fire Protection Review Report (Rev. 2) Susquehanna Steam Electric Station.

12. Chemical Engineers' Handbook - 4th edition, J. H. Perry.

13. Building Code Requirements for Reinforced Concrete, ACI 318-83.

TABLE DR6-2

Fire Zone Beneath Rated Floor Slab	Top Of Slab Elevation	NFPA 13 Sprinkler Protection Provided	Drawing Reference
Control Structure			
0-21A	676'-0"	No	E-205986 Sht. 1
0-22A	686'-0"	No	E-205987 Sht. 1
0-22A (Ceil. Space)	697'-0" No	No	E-205988 Sht. 1
0-24E (See Note 1)	714'-0"	No	E-205989 Sht. 1
0-24I	See Note 2	No	See Note 2
0-24K	See Note 2	No	See Note 2
0-28S	See Note 2	No	See Note 2
0-26A, E-N, P, R (See Note 3)	753'-0 "	Partial	E-205922 Sht. 1
0-28A-I	783'-0"	No	E-205994 Sht. 1
0-28A-II	783'-0"	No	E-205994 Sht. 1
0-28B-1	783'-0"	No	E-205994 Sht. 1
0-28B-II	783'-0"	No	E-205994 Sht. 1
0-28C	783'-0"	No	E-205994 Sht. 1
0-28D	783'-0"	No	E-205994 Sht. 1
0-28E	783'-0"	No	E-205994 Sht. 1
0-28F	783'-0"	No	E-205994 Sht. 1
0-28G	783'-0"	No	E-205994 Sht. 1
0-28H	783'-0"	No	E-205994 Sht. 1
0-28I	783'-0"	No	E-205994 Sht. 1
0-28J	783'-0"	No	E-205994 Sht. 1
0-28K	783'-0"	No	E-205994 Sht. 1
0-28L	783'-0"	No	E-205994 Sht. 1
0-28M	783'-0"	No	E-205994 Sht. 1
0-28N	783'-0"	No	E-205994 Sht. 1
0-28T	783'-0"	No	E-205994 Sht. 1
0-22B	806'-0"	No	E-205995 Sht. 1
0-29B	806'-0"	No	E-205995 Sht. 1

TABLE DR6-2

Fire Zone Beneath Rated Floor Slab	Top Of Slab Elevation	NFPA 13 Sprinkler Protection Provided	Drawing Reference

NOTES:

1. Only the steel above the Fire Zone 0-24E (below Elev. 714'-0") is not fireproofed. The remaining main floor steel below elevation 714'-0" is fireproofed.

2. Steel beams inside HVAC chases do not require fireproofing. See the following for location:

STEEL BELOW ELEVATION	DRAWING REFERENCE
714'-0"	E-205989 Sht. 1
729'-1"	E-205990 Sht. 1
741'-1"	E-205991 Sht. 1
753'-0"	E-205992 Sht. 1
771'-0"	E-205993 Sht. 1

3. Fire Zones 0-26A, 0-26E and part of 0-26H are located under the floor slab at Elevation 741'-0".

TABLE DR6-1

Fire Zone Beneath Rated Floor Slab	Top Of Slab Elevation	NFPA 13 Sprinkler Protection Provided	Drawing Reference
Unit 1 Reactor Building			
1-1F	683'-0"	No	C-206006 Sht. 1
1-1E	683'-0"	No	C-206006 Sht. 2
1-3A	719'-1"	Yes	C-206007 Shts. 1&2
1-3B-W	719'-1"	Yes	C-206021 Sht. 1
1-3B-W	719'-1"	Yes	C-206021 Sht. 2
1-4A-W	749'-1"	Yes	C-206008 Shts. 1&3
1-4A-W 1-4A-N	749'-1"	Yes	C-206008 Sht. 2
1-4A-W 1-4A-S	749'-1"	Yes	C-206008 Sht. 4
1-4A-W 1-4A-N	749'-1"	Yes	C-206008 Sht. 5
1-4G	761'-10"	No	C-206009 Shts. 1&2
1-5A-S	779'-1"	Yes	C-206010 Shts. 1&2
1-5B	779'-1"	No	C-206010 Shts. 3&4
Unit 2 Reactor Building			
2-1A, C & D	670'-0"	No	C-213472 Shts. 1&2
2-1F	683'-0"	No	C-206011 Sht. 1
2-1E	683'-0"	No	C-206011 Sht. 2
2-3B-N	719'-1"	Yes	C-206012 Shts. 1&2
2-3B-W	719'-1"	Yes	C-206022 Sht. 1
2-3B-W	719'-1"	Yes	C-206022 Sht. 2
2-4A-S 2-4A-W	749'-1"	Yes	C-206013 Sht. 1
2-4A-W	749'-1"	Yes	C-206013 Shts. 2&3
2-4A-W 2-4A-S	749'-1"	Yes	C-206013 Sht. 4

TABLE DR6-1			
Fire Zone Beneath Rated Floor Slab	**Top Of Slab Elevation**	**NFPA 13 Sprinkler Protection Provided**	**Drawing Reference**
2-4A-W 2-4A-N	749'-1"	Yes	C-206013 Sht. 5
2-4G	761'-10"	No	C-206014 Shts. 1&2
2-5A-N	779'-1"	Yes	C-213469 Shts. 1&2
2-5C 2-5A-S 2-5B	779'-1	No Partial (see note 1) Yes	C-206015 Shts. 1,2,&3
2-6A	799'-1"	No	C-206016 Sht. 1

Note:

1. NFPA 13 Sprinkler protection provided in the Northwestern area of the zone 2-5A-S identified as the Valve Access Vestibule Area. Sprinklers are installed above and below corridor grating.

APPENDIX R DEVIATION REQUEST NO. 7

FIRE SPREAD LIMITATIONS

DEVIATION REQUEST:

Certain fire zones can be considered to act as a fire area boundary between Fire Areas R-1A and R-1B in the Unit 1 Reactor Building and between Fire Areas R-2A and R-2B in the Unit 2 Reactor Building. The fire zones which act as the fire area boundaries are called "buffer zones."

FIRE AREAS/ZONES AFFECTED:

In the Unit 1 Reactor Building the following fire zones are considered to be buffer zones since they provide a fire area boundary between Fire Areas R-1A and R-1B:

1-6B	1-6F	0-6G
1-6C	1-7A	0-6H
1-6D		0-8A

In the Unit 2 Reactor Building the following fire zones are considered to be buffer zones since they provide a fire area boundary between Fire Areas R-2A and R-2B:

2-6B	2-6E	2-7A
2-6D	2-6F	0-8A

REASON FOR DEVIATION REQUEST:

10CFR50 Appendix R, Section III.G requires separation of cables and equipment required for safe shutdown by a fire barrier having a 3-hour rating. Furthermore, NRC Generic Letter 86-10 states that "the term 'fire area' as used in Appendix R means an area sufficiently bounded to withstand the hazards associated with the fire area and, as necessary, to protect important equipment within the fire area from a fire outside the area." Normally, fire areas are separated by a wall or floor having a fire resistive rating of 3 hours. The walls of the buffer zones do not have a 3-hour rating but possess sufficient integrity of construction and spatial separation to provide a fire area boundary.

JUSTIFICATION:

The buffer zones are fire zones which occupy the upper elevations (i.e., 779', 799' and 818') of each reactor building. Their location is shown on drawings E-205954, E-205955 and E-205956 for Unit 1 and on drawings E-205962, E-205963 and E-205964 for Unit 2. These drawings are contained in Section 8.0. They are zones which are almost entirely devoid of any safe shutdown cables or equipment and the combustible loading in all of these zones is very low.

These zones are considered to provide an equivalent degree of safety as a fire rated wall for the following reasons:

1. In all cases, a minimum of 50 ft. horizontal separation exists between the fire zones in Fire Areas R-1A and R-1B for Unit 1 and in Fire Areas R-2A and R-2B for Unit 2.

2. All buffer zones have fire detection except for the following:

   1-6F Spent Fuel Pool (filled with water)
   2-6F Spent Fuel Pool (filled with water)
   0-6H Cask Storage Pit (filled with water)

3. All buffer zones have very low combustible loadings and there are no specific locations within these zones which have the potential to cause a fire hazard.

4. The walls which bound these zones are not fire rated yet their construction would contain a fire and the products of combustion reasonably well. The walls are of reinforced concrete construction, the doors are of heavy metal construction and the penetrations in the walls are constructed similarly as in a fire rated wall. Therefore, although not fire rated, the boundaries would inhibit the transgression of a fire from one fire area to the next.

5. All buffer zones have manual fire suppression equipment located throughout the area.

6. Typically, the buffer zones are situated such that a fire would have to pass through adjacent buffer zones to spread from one fire area to the next. This is considered extremely improbable based on the specific configuration of the buffer zones with respect to the fire areas they separate.

7. For the purpose of the safe shutdown analysis, the buffer zones were considered to be part of both fire areas which they act to separate. This approach is conservative since it requires protection of all safe shutdown cables or equipment in these zones regardless of safe shutdown path. In all buffer zones, both paths (1 and 3) of safe shutdown equipment are protected where necessary.

In conclusion, it can be stated that the spatial separation, construction techniques and low combustible configurations enable the buffer zones listed in this deviation request to act as a fire area boundary. Therefore, a fire initiated in Fire Area R-1A of the Unit 1 Reactor Building may impact the buffer zones but will not spread into any other fire zone in Fire Area R-1B. Similarly, a fire initiated in Fire Area R-1B may impact the buffer zones but will not spread into any other fire zone in Fire Area R-1A. The same assurance can be stated for Unit 2.

APPENDIX R DEVIATION REQUEST NO. 8

ONE HOUR FIRE BARRIER WRAP WITH LIMITED SUPPRESSION

DEVIATION REQUEST:

The installation of a three hour fire barrier wrap in Fire Zones 0-28B-I, 0-28B-II, 1-2D and 0-28H without automatic suppression in order to comply with 10CFR50 Appendix R, Section III.G.2.a would not significantly enhance the fire protection for those fire zones nor overall plant safety, and therefore a one hour fire barrier is acceptable.

FIRE AREAS/ZONES AFFECTED:

This deviation request applies to Fire Areas CS-17 (Fire Zone 0-28B-I), CS-24 (Fire Zone 0-28B-II), R-1B (Fire Zone 1-2D) and CS-15 (Fire Zone 0-28H).

REASON FOR DEVIATION REQUEST:

10CFR50 Appendix R, Section III.G.2.a requires that redundant safe shutdown equipment/cables be separated by a fire barrier having a 3-hour rating when automatic suppression is not provided.

The redundant safe shutdown equipment/cables are separated by a fire barrier having a 1-hour rating and no automatic suppression is provided. Fire Hazard Analysis EC-013-1846 evaluated the specific deviations from a tested configuration to assure that their capability is in excess of that required by the specific fire hazards in the vicinity of the deviation.

EXISTING ARRANGEMENT:

Fire Zones 0-28B-I and 0-28B-II contain safety related load centers and miscellaneous battery chargers and distribution panels. The 125 VDC distribution panels (1D624 and 1D644) located in Fire Zone 0-28B-II are enclosed with a one-hour protective fire barrier. Two-hour rated barrier walls separate equipment by division and all cabling in these zones is enclosed in conduit or panels. The combustible loading for these fire zones is low. Manual suppression equipment and ionization detectors are provided in these fire zones.

Fire Zone 1-2D consists of one room (approximately 14' X 25') housing various control cables and Unit 1's remote shutdown panel. Approximately 75% of the cabling in the fire zone is contained in conduit. The minority division raceways located on the fire zone consist of control cable for the Emergency Service Water System. The combustible loading for the fire zone is low. Manual suppression equipment and ionization smoke detectors are provided in the fire zone.

Fire Zone 0-28H consists of one room (approximately 20' x 50') housing various cables in conduit and the cold instrument repair facility. The minority division raceways are located above a non-rated false ceiling and are run in conduit. The combustible loading for the fire zone is low. Manual suppression and ionization detectors are provided for the fire zone.

JUSTIFICATION:

When the combustible loading and reasonable transient combustibles are considered, fire detection, manual fire suppression, and one-hour rated cable enclosures without automatic suppression provide adequate protection for safe shutdown cables.

The combustible loading may change over plant life. This Deviation Request will remain valid so long as:

a) The calculated maximum average combustible loading does not exceed 45 minutes.

b) The in-situ combustibles remain evenly dispersed.

DEVIATION REQUEST NO. 9 HAS BEEN WITHDRAWN

DEVIATION REQUEST NO. 10 HAS BEEN WITHDRAWN

APPENDIX R DEVIATION REQUEST NO. 11

HVAC PENETRATIONS REACTOR BUILDING FIRE WALLS

DEVIATION REQUEST:

Fire dampers are not required to be installed in the following ventilation duct penetrations in fire rated wall assemblies between affected Fire Zones.

Penetration	Fire Zone/Fire Zone
X-25-3-37	1-3A/1-3B-N
X-25-5-23	1-5B/1-4G
X-25-5-13	1-5B/1-5A-N
X-25-5-15	1-5B/1-5A-N
X-27-4-16	1-4A-S/1-4G
X-27-4-17	1-4A-S/1-4G
X-27-5-29	1-5B/1-5A-S
X-27-5-30	1-5B/1-5A-S
X-28-5-44	1-5A-W/1-5E
X-29-5-25	1-5A-W/1-5E
X-30-5-4	2-5B/2-5A-N
X-30-5-5	2-5B/2-5A-N
X-30-5-32	2-5B/2-4G
X-30-5-50	2-5B/2-5A-N
X-32-4-3	2-4A-S/2-4G
X-32-4-4	2-4A-S/2-4G
X-32-5-41	2-5B/2-5A-S
X-33-5-26	2-5A-W/2-5E
X-33-5-27	2-5A-W/2-5E

FIRE AREAS/ZONES AFFECTED:

This deviation request concerns Fire Areas in the Unit 1 and Unit 2 Reactor Buildings.

REASON FOR DEVIATION REQUEST:

NRC guidance to 10CFR50, Appendix R, Section III.G.2 requires that fire areas shall have three hour barriers, and such barriers shall have fire rated dampers installed at duct penetrations. Various fire walls within the Unit 1 and Unit 2 Reactor Building have ventilation system (HVAC) duct penetrations without fire dampers thus rendering the rating of the barrier less than three hours.

EXISTING ARRANGEMENT:

A description of the wall assemblies penetrated by ventilation ducts is provided in Table DR11-1.

See attached sheets of Drawing C-205789 for details. Attached Drawing A 205790, Sht. 1, provides the legend for understanding these drawings.

JUSTIFICATION:

The NFPA 90A-1985, Section 3-3.2.1.1 states: "Approved fire dampers shall be provided where ducts or air grills penetrate partitions required to have a fire resistance rating of 2 hours or more." The maximum average combustible loading for any Fire Zone in the Reactor Buildings is limited to 1-1/2 hours. This is based on a conservative estimate of in-situ combustibles and an allowance of 15 minutes for transient combustibles. The specific combustible configurations and potential for transient combustibles were evaluated for each duct penetration. It was concluded that the exposure to these fire barriers due to concentrated combustibles in proximity to the barriers in no case presently exceed one hour. Therefore, the subject duct assemblies do not require fire dampers per Section 3-3.2.1.1 of NFPA 90A.

Attached Drawing C-205789 documents the actual combustible configuration surrounding each HVAC duct assembly and wall penetration in the affected Fire Zones. Cables in cable trays are the primary source of combustible materials contributing to the postulated fire in each Fire Zone.

Transient and specific in-situ combustibles were examined in each affected Fire Zone and are presently calculated to provide average combustible loadings of less than 1-1/2 hours. Additionally, no localized concentration of combustibles was found which exceeded one hour. All of the subject duct assemblies are well above their respective flood elevations. Heat generated from transient combustibles was not found to be of a magnitude which would negatively affect duct assemblies. In-situ combustibles in these areas were found to be either of a low magnitude or located in Fire Zones that have an automatic suppression system which would mitigate the heat generated as a result of a fire.

An analysis was performed by PP&L which examined the effect of the worst case combustible configuration on an HVAC duct assembly. This case is found in Fire Zone 1-3B-N. The analysis postulated that the combustibles concentrated in the vicinity of the duct assembly were consumed and that the area was enclosed to create a localized furnace. With these postulated conditions, the maximum temperature which could be developed in this furnace area was calculated to be 216°F. The analysis continued by examining the heat transfer effect between the 216°F duct assembly and the cooler supply air being transmitted through the duct and discharging into adjacent Fire Zone 1-3A. The maximum air discharge temperature into Fire Zone 1-3A was calculated to be 146°F.

The results of the analysis lead to the following conclusions:

- Since the maximum temperature on the fire side of the fire barrier is 216°F, the non-fire side of the fire barrier will remain below the ambient temperature plus a 250°F temperature rise, which is the fire barrier acceptance test criteria.

- Since the HVAC duct temperatures remain below 160°F, a fire damper operated by a 160°F or higher fusible link would not operate. All dampers at Susquehanna have fusible links with a 160°F actuation temperature or higher.

- Since automatic sprinklers in the Reactor Buildings are rated at 212°F minimum, the increased room temperature resulting from an air inlet temperature of 145°F will not result in sprinkler system activation. (The analysis calculated the final room temperature of Fire Zone 1-3A to be 105°F.)

Since the configuration in Fire Zone 1-3B-N with respect to concentrated combustibles in the vicinity of the duct assembly represents the worst case, it can be concluded that the 216°F calculated furnace temperature represents the worst case situation covered by this deviation request. Automatic sprinkler protection where provided will reduce this maximum temperature. Equipment and cables in the adjacent affected Fire Zone will not be damaged unless, in the event of a fire in an unsprinklered Fire Zone, sufficient heated air can be transferred via the HVAC duct. Air will not be transferred if the HVAC system is not operating, nor is it possible for hot air to be released from a return air duct. Therefore, only cases where a supply duct in an unsprinklered area transferring heated air to an adjacent Fire Zone need to be considered. This limits consideration to only two Fire Zones: 1-3B-N and 2-4A-S.

As discussed previously, the analysis of a fire in Fire Zone 1-3B-N demonstrates that the adjacent zone (1-3A) is not affected. The combustible concentration in Fire Zone 2-4A-S is significantly less than in Fire Zone 1-3B-N and the corresponding adjacent zone (2-4G) is sprinklered. Therefore, based on the analysis for Fire Zone 1-3B-N, it can be concluded that there would be no equipment or cable failures in Fire Zone 2-4G due to a fire in Fire Zone 2-4A-S.

Furthermore, a fact-finding report on air duct penetrations through a one-hour fire resistive wall assembly was conducted by Underwriters Laboratories, Inc. (Ref. 1). This report describes the performance of HVAC duct penetrations through a one-hour rated fire resistive wall assembly when the wall assembly was subjected to a fire test conducted in accordance with the requirements of the Standard for Fire Tests of Building Construction Materials, UL 263 (ASTM E119).

The air duct assemblies which penetrated the wall assembly consisted of two square 10 inch by 10 inch inside dimension galvanized steel ducts and one square 10 inch by 10 inch inside dimension Class I rigid fiberglass duct. All the air duct assemblies had open duct drops on both sides of the wall assembly. None of the air duct assemblies contained fire dampers. The fire resistive wall assembly consisted of 5/8 inch thick gypsum wallboard screw attached to steel studs which were spaced 24 inches on center.

The fire performance included temperatures measured and recorded at various locations within, on the top surface of, to the side of and above the air duct assemblies, the structural integrity of the air duct assemblies, the passage of flames through the air duct assemblies, and the passage of flames through the wall assembly. In the test, the galvanized steel duct assembly was 0.022 inch thick (Susquehanna SES minimum thickness is 0.048 inch), and it was exposed to flames of controlled extent and severity in accordance with the Standard Time-Temperature Curve. In the test, all of the duct assemblies were in the positive pressure area of the furnace which would have aided flame propagation through the ducts to the non-fire side of the wall.

The test results showed that the galvanized steel ducts were intact and remained in place with no degradation of the duct assembly. This test confirms the validity of NFPA 90A, Section 3-3.2.2.1.1. It should be noted that all ducting subject to this deviation request is constructed of galvanized steel. Therefore, this test also gives substance to our deviation request in that the ducts in the test experienced a maximum furnace temperature of approximately 1700°F with no degradation whereas the duct in our analyzed worst case combustible configuration has been calculated to experience a maximum furnace temperature of approximately 216°F.

The NFPA "Fire Protection Handbook" (14th edition, Pages 7-69) states: "In the gauges commonly used, some sheet ducts may protect an opening in a building construction assembly for up to one hour, if properly hung and adequately fire stopped. Therefore, ducts passing through fire barriers having a rating of up to one-hour fire resistance can be assumed to present no extra-ordinary hazard. If the wall, partition, ceiling, or floor is required to have a fire resistance rating of more than one hour, a fire damper is required . . ."

The analysis of the worst case combustible configuration covered by this deviation request shows significantly lower postulated fire temperatures than those associated with the one-hour fire referred to in the NFPA handbook. Also, the minimum 18-gauge (0.048 inch thick) sheet metal ducts used at Susquehanna (Ref: Drawing C-1126) are heavier than the commonly used gauges referred to by the NFPA statement. The ducts are seismically hung (Ref: Drawing C-1129 through C-1136) and adequately fire stopped. (Ref: Respective penetration drawing for each listed duct penetration on Drawing C-205789, all sheets.)

Therefore, it is our position that these ducts adequately mitigate the effects of a fire and do not require fire dampers. Furthermore, this Deviation Request will remain valid for these HVAC duct penetrations as long as the sprinklered areas remain sprinklered and as long as combustible configuration changes in non-sprinklered areas do not cause:

a) Calculated maximum fire barrier exposure temperatures during a fire to exceed 1700°F (the maximum Standard Time-Temperature Curve value for a one-hour fire test), and/or

b) Calculated temperatures in adjacent sprinklered fire areas to reach a level at which automatic sprinkler systems would be activated.

The following descriptions and drawings (C-205789, all sheets, and A-205790, Sht. 1) provide the basis for our position and address each horizontal ventilation duct penetration on an individual case-by-case basis. Through this case-by-case approach, each duct penetration is shown in its actual combustible configuration in the plant. Parameters such as nearby combustibles, direction of duct air flow, location of duct openings, sprinkler protection, HVAC system and general duct and Fire Zone configuration have been examined to clarify and specifically document the rationale used for this deviation request.

REFERENCES:

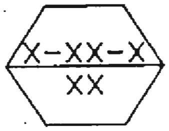
1. "Fact-finding Report on Air Duct Penetrations Through One Hour Fire Resistive Wall Assembly," Underwriters Laboratories, Inc., File NC505-12, Project 84NK29824, April 17, 1985 (Copyright ©1985).

PP&L FORM 3505A (1/84)

(X-XX-X) FIRE ZONE

(XX) BUILDING COLUMN LINE

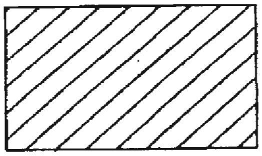
FPD 3 3 HOUR FIRE DAMPER

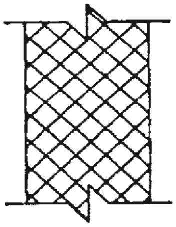


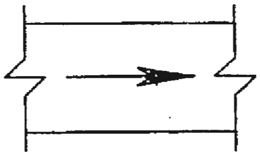
PENETRATION NO.


SUPPLY AIR REGISTER


EXHAUST AIR REGISTER


FIRE RATED FLOOR


FIRE RATED WALL


AIR FLOW DIRECTION

T.O.G. = TOP OF GRATING
B.O.D. = BOTTOM OF DUCT
B.O.R. = BOTTOM OF REGISTER
B.O.T. = BOTTOM OF TRAY

SECTION SHOWN
ON SHEET XX

EXAMPLES:

B.O.D. EL. 772'-9" (16"X24") ← DUCT SIZE

B.O.R. EL. 772'-9" (18"X26") ← REGISTER SIZE

B.O.T. EL. 772'-9" 2MKA (24"X6") ← TRAY SIZE

CABLE TRAY IDENTIFIER → 2MKA

NOTE: SIZE OF DUCTS, REGISTERS & CABLE TRAYS ARE SHOWN IN PLAN AS WIDTH X HEIGHT. EX.: (24"X6"). SHOWN IN ELEVATION VIEW AS HEIGHT X WIDTH. EX.: (6"X24").

SUSQUEHANNA S.E.S.
UNIT 1 & 2
APPENDIX "R"
DEVIATION REQUEST & LEGEND
NO. 11 - SEE DRAWING C-205789
NO. 12 - SEE DRAWING C-205791

NON-QUALITY RELATED

AREA NA	ELEV. NA	SCALE NA

**PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.**

PP&L DRAWING NO.	SHEET NO.	REV.NO.
A-205790	1	1
AE DRAWING NO. C-1695 SH.1		

FRACTIONAL 0 1 2 2 1 0 DECIMAL CV0036

MF
D
/
F C
G B 0 1
G
G LOCATION CODES
G
G

PENETRATION:	X-25-3-37
ADJACENT FIRE ZONES:	1-3A/1-3B-N
DUCT SIZE AT PENETRATION:	8" X 6"
VENTILATION SYSTEM:	REACTOR BUILDING ZONE I SUPPLY

DISCUSSION:

As shown on Shts. 1 and 1A of Drawing C-205789, the duct assembly penetrates the fire barrier wall at Elevation 704'-0". This penetration joins Fire Zone 1-3A with Fire Zone 1-3B-N. A supply air register is located on the face of the fire barrier wall in Fire Zone 1-3A. Fire Zone 1-3A has an automatic fire suppression system.

JUSTIFICATION:

a) Fire initiated in Fire Zone 1-3A with potential to spread to Fire Zone 1-3B-N.

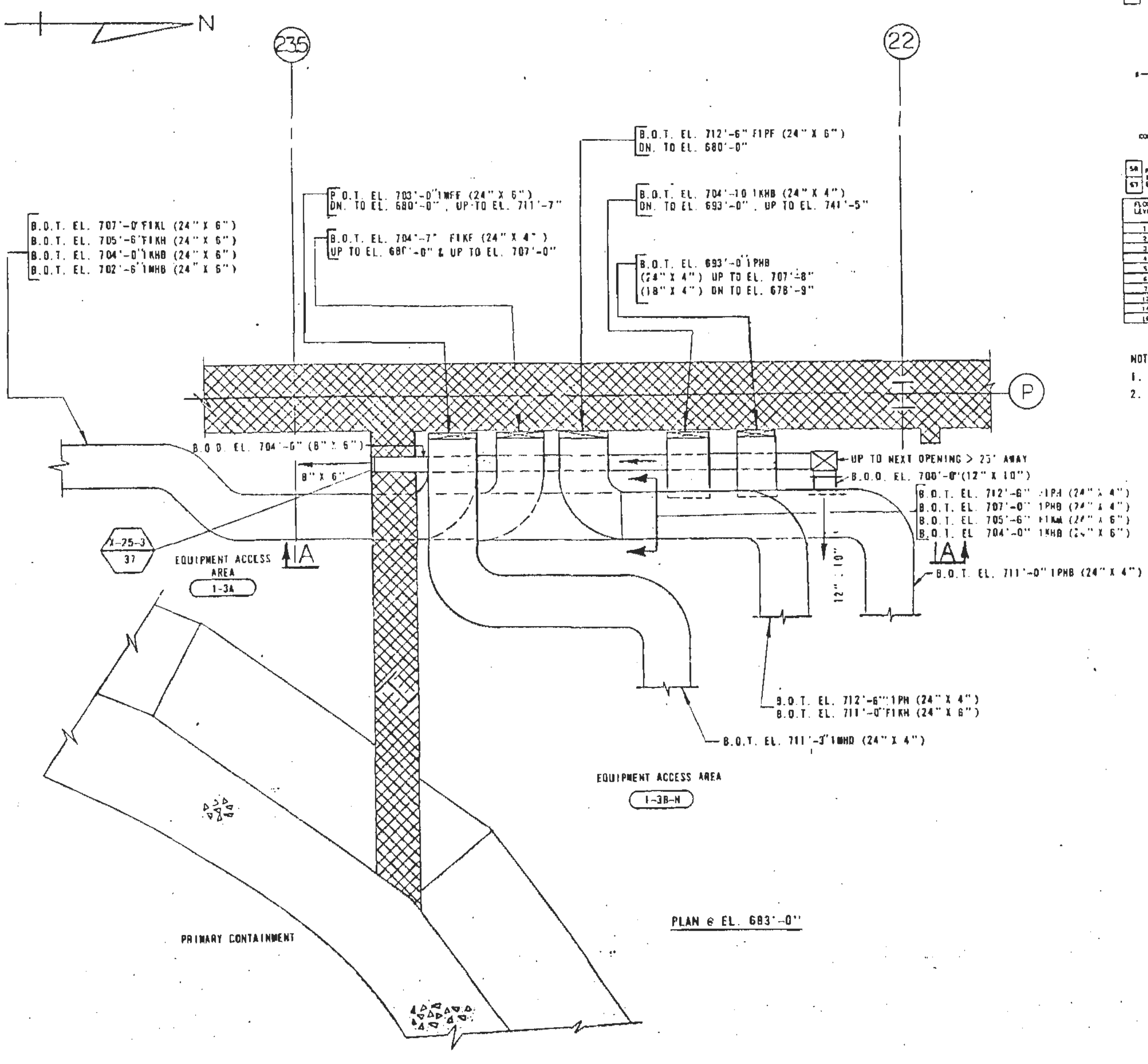
The combustibles in Fire Zone 1-3A consist of five cable trays located 2 feet to the east of the subject penetration. The first opening in the duct assembly in Fire Zone 1-3B-N is located approximately 30 feet from the subject penetration. Based on the UL test results, a fire initiated in Fire Zone 1-3A will not generate enough heat to adversely impact any system in Fire Zone 1-3B-N.

b) Fire initiated in Fire Zone 1-3B-N with potential to spread to Fire Zone 1-3A.

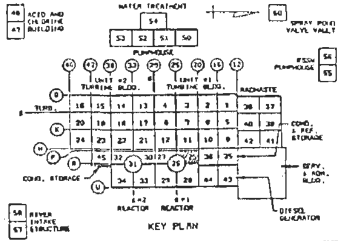
Due to the large concentration of combustibles surrounding the HVAC supply air duct assembly in Fire Zone 1-3B-N, an analysis was performed to determine the increase in room air temperature in adjacent Fire Zone 1-3A. This analysis determined a duct discharge air temperature into Fire Zone 1-3A to be 146°F, consequently heating Fire Zone 1-3A to a temperature of 105°F. This increase in room air temperature would not activate the sprinkler system in Fire Zone 1-3A. Additionally, the previously referenced UL test assures that the duct assembly itself will not degrade as the result of a fire in Fire Zone 1-3B-N. Therefore, a fire initiated in Fire Zone 1-3B-N will not generate enough heat to adversely impact any systems in Fire Zone 1-3A.

CONCLUSION:

Based on the above discussion, NFPA 90A, Section 3-3.2.1.1, the physical layout of the adjacent Fire Zones and the combustible configuration within the Fire Zones, a fire damper is not required in penetration X-25-3-37.



PLAN @ EL. 683'-0"



KEY PLAN

FLOOR LEVEL	TURBINE BLDG. EL.	REACTOR BLDG. EL.	RADWASTE BLDG. EL.	DIESEL GENERATOR EL.	DRYWELL REACTOR BLDG. EL.	CONTROL BLDG. EL.
1	656'0"	645'0"	646'0"	660'0"		
2	676'0"	670'0"	660'0"	677'0"	704'0"	679'0"
3	699'0"	683'0"	676'0"	710'0"	713'1"	699'0"
4	729'0"	719'1"	691'6"		738'11½"	714'0"
5	752'0"	749'1"			752'2½"	729'0"
6	771'0"	779'1"			779'1"	741'0"
7		818'1"				754'0"
12					761'1"	771'0"
14					806'0"	783'0"
16		799'1"				806'0"

NOTE:

1. FOR LEGEND SEE DWG. A-205790, SHT. 1
2. WORK THIS DWG. WITH C-205789 SHT. 1A

SUSQUEHANNA S.E.S.
UNIT I
APPENDIX "R"
DEVIATION REQUEST NO. 11
PENETRATION X-25-3-37

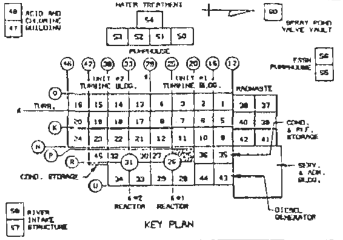
AREA 25	ELEV 683'-0"	SCALE NA

PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PP&L DRAWING NO.	SHEET NO.	REV. NO.
C-205789	1	1
BK DRAWING NO. C-1693 SH.1		

FRACTIONAL DECIMAL LOCATION CODES G 1 B 0 1 SORTS C F

PP&L FORM 3505C (1/81)

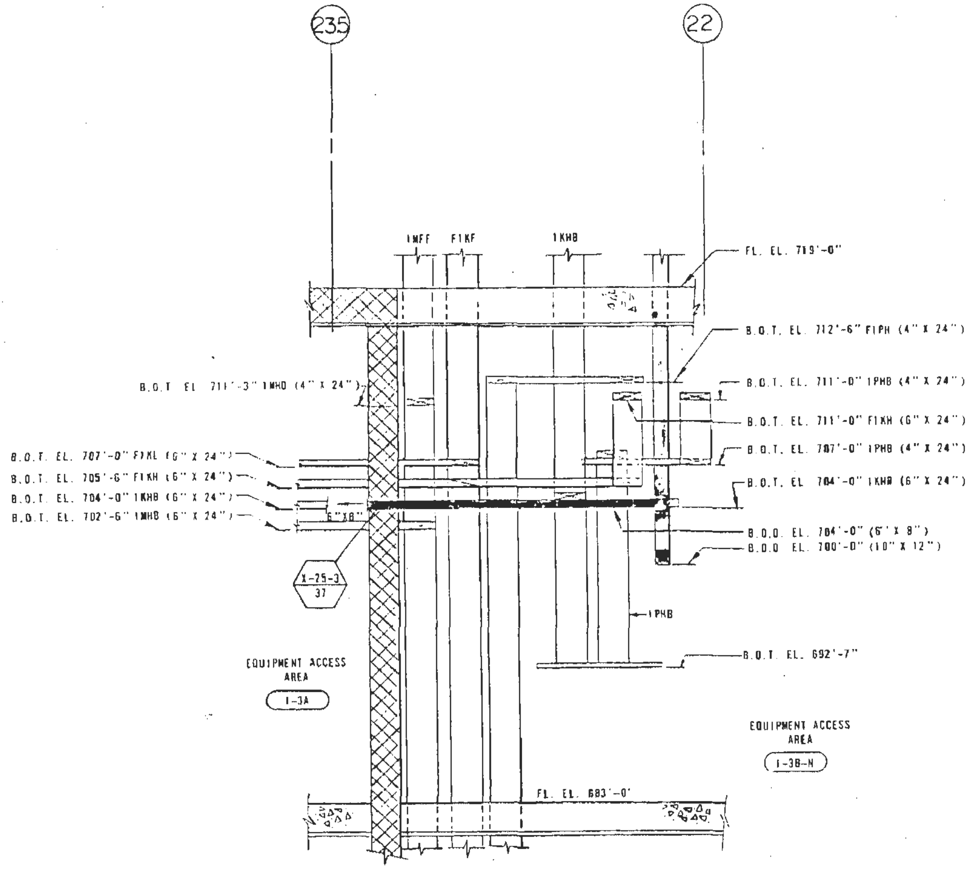


KEY PLAN

FLOOR LEVEL	TURBINE BLDG. EL.	REACTOR BLDG. EL.	RADWASTE BLDG. EL.	DIESEL GENERATOR EL.	DRYWELL REACTOR BLDG. EL.	CONTROL BLDG. EL.
1	656'0"	645'0"	646'0"	660'0"		
2	676'0"	670'0"	660'0"	677'0"	704'0"	676'0"
3	699'0"	683'0"	676'0"	710'0"	719'1"	699'0"
4	729'0"	719'1"	691'6"		738'11½"	714'0"
5	762'0"	749'1"			752'2½"	729'0"
6	714'0"	779'1"			779'1"	741'0"
7		818'1"				754'0"
12					761'1"	771'0"
14					806'0"	783'0"
16		798'1"				806'0"

NOTE:

1. FOR LEGEND SEE DWG. A-205790 SHT. 1
2. WORK THIS DWG. WITH C-205789 SH. 1



SECTION 1A-1A

SUSQUEHANNA S.E.S.
UNIT 1
APPENDIX "R"
DEVIATION REQUEST NO. 11
PENETRATION X-25-3-37

AREA 25	ELEV 683'-0"	SCALE NA

PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PP&L DRAWING NO.	SHEET NO.	REV. NO.
C-205789	1A	1
AE DRAWING NO. C-1693 SH. 1A		

PENETRATION:	X-25-5-23
ADJACENT FIRE ZONES:	1-5B/1-4G
DUCT SIZE AT PENETRATION:	24" X 18"
VENTILATION SYSTEM:	REACTOR BUILDING ZONE I EQUIPMENT COMPARTMENT (FILTERED) EXHAUST

DISCUSSION:

As shown on Shts. 2 and 2A of Drawing C-205789, this duct assembly penetrates the P-line wall at Elevation 770'-1". This penetration joins Fire Zone 1-4G with Fire Zone 1-5B. An exhaust air register is located flush with the wall in Fire Zone 1-4G and another exhaust air register is located in Fire Zone 1-5B, approximately 18 feet away from the subject penetration. Neither Fire Zone has sprinkler protection.

JUSTIFICATION:

a) Fire initiated in Fire Zone 1-4G with potential to spread to Fire Zone 1-5B.

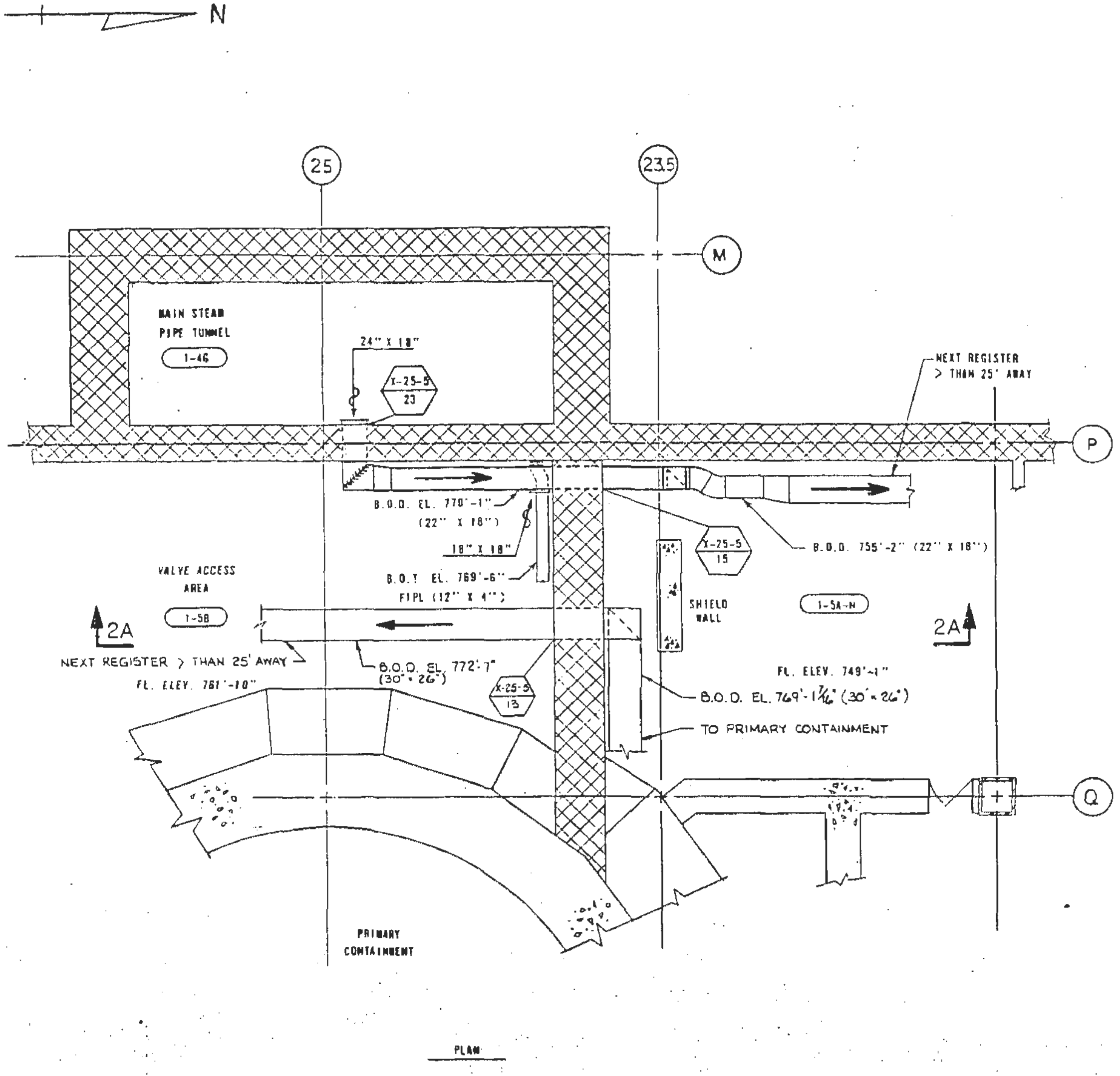
Fire Zone 1-4G has minimal combustibles with no combustibles located within 10 feet of the register in that room. Therefore, a fire initiated in Fire Zone 1-4G would not generate enough heat to pass through penetration X-25-5-23 and adversely impact any system in Fire Zone 1-5B. In addition, there would not be enough heat generated in Fire Zone 1-4G to impact any room through which this duct system passes.

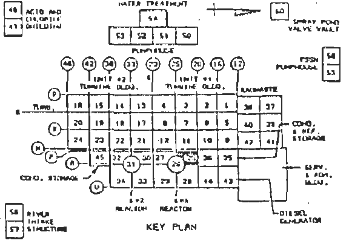
b) Fire initiated in Fire Zone 1-5B with potential to spread to Fire Zone 1-4G.

Fire Zone 1-5B has minimal combustibles. As noted in the referenced sketch, a 12 inch x 4 inch cable tray is situated directly under the exhaust air register in Fire Zone 1-5B. However, this cable tray would not generate enough heat to affect the duct assembly and furthermore there are no combustibles in the vicinity of the exhaust air register in Fire Zone 1-4G. Therefore, a fire initiated in Fire Zone 1-5B would not generate enough heat to adversely impact any systems in Fire Zone 1-4G.

CONCLUSION:

Based on the above discussion, NFPA 90A, Section 3-3.2.1.1, the physical layout of the adjacent Fire Zones and the combustible configuration within the Fire Zones, a fire damper is not required in penetration X-25-5-23.





FLOOR LEVEL	TURBINE BLDG. EL.	REACTOR BLDG. EL.	RADWASTE BLDG. EL.	DIESEL GENERATOR EL.	DRYWELL REACTOR BLDG. EL.	CONTROL BLDG. EL.
1	656'0"	645'0"	646'0"	660'0"		
2	676'0"	670'0"	662'0"	677'0"	704'0"	676'0"
3	699'0"	683'0"	676'0"	710'0"	719'1"	698'0"
4	729'0"	719'1"	691'6"		[illegible]	714'0"
5	762'0"	749'1"			[illegible]	729'0"
6	786'0"	779'1"			779'1"	741'0"
7		818'1"				754'0"
12					751'1"	771'0"
14					806'0"	783'0"
16		799'1"				806'0"

NOTES:

1. FOR LEGEND SEE DRAWING A-205790, SHEET 1.
2. WORK THIS DRAWING WITH C-205789, SHEET 2A.

SUSQUEHANNA S.E.S.
UNIT 1
APPENDIX "R"
DEVIATION REQUEST NO. 11
PENETRATIONS X-25-5-13,
X-25-5-15 & X-25-5-23

AREA 25 | ELEV. 7[illegible]'-1" | SCALE NA

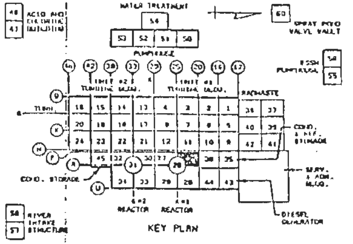
PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PP&L DRAWING NO. C-205789 | SHEET NO. 2 | REV. NO. 2

AE DRAWING NO. C-1693 SH. 2

FRACTIONAL | DECIMAL | LOCATION CODES G1B01 | SORTS C F

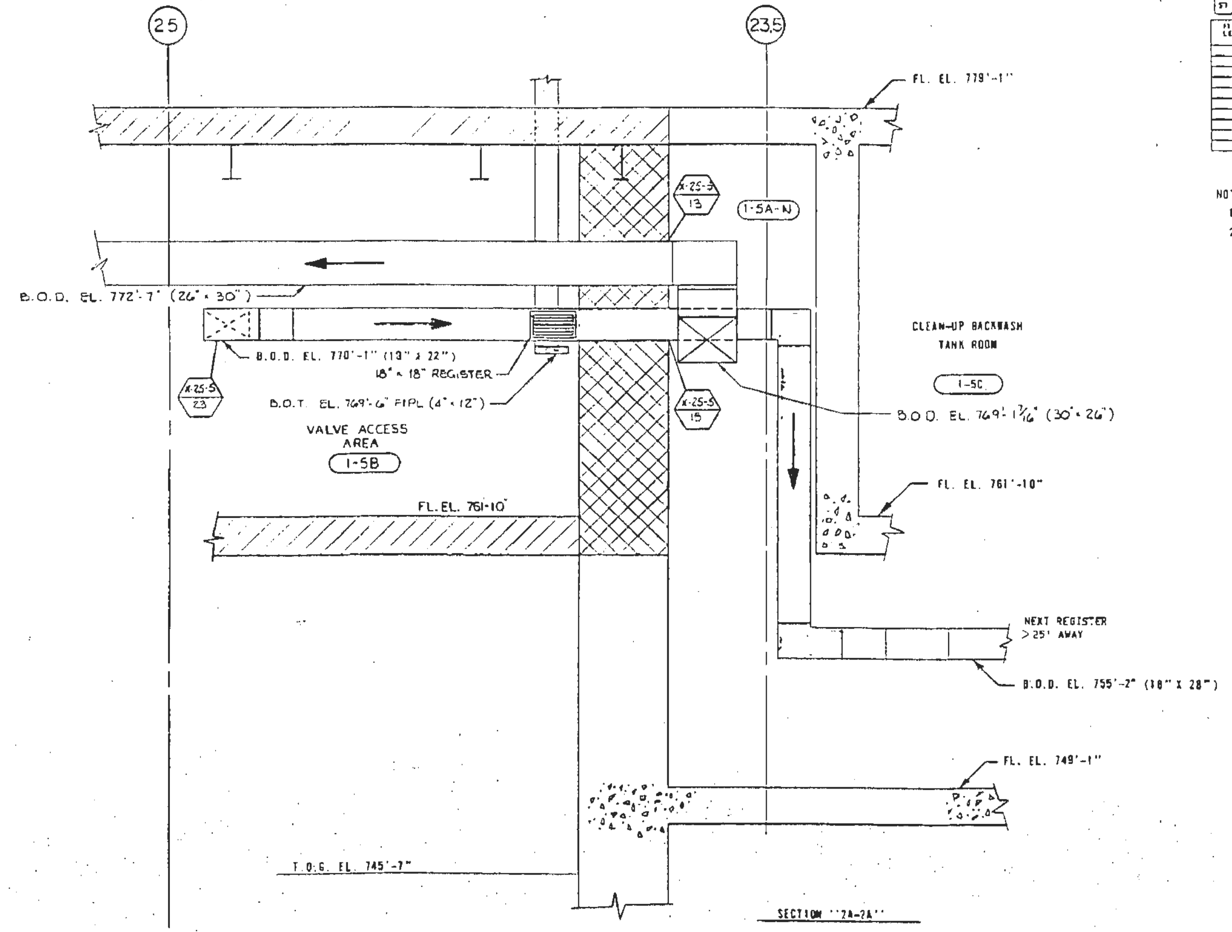
PP&L FORM 3502 (1/81)



FLOOR LEVEL	TURBINE BLDG. EL.	REACTOR BLDG. EL.	RADWASTE BLDG. EL.	DIESEL GENERATOR EL.	[illegible] REACTOR BLDG. EL.	CONTROL BLDG. EL.
1	656'0"	645'0"	648'0"	660'0"		
2	676'0"	670'0"	660'0"	677'0"	704'0"	679'0"
3	699'0"	683'0"	676'0"	710'0"	719'1"	699'0"
4	729'0"	719'1"	691'6"		738'11½"	714'0"
5	762'0"	749'1"			752'2½"	729'0"
6	784'0"	779'1"			779'1"	741'0"
7		818'1"				754'0"
12					791'1"	771'0"
13					806'0"	783'0"
18		799'1"				806'0"

NOTES:

1. FOR LEGEND SEE DRAWING A-205790, SHEET 1.
2. WORK THIS DRAWING WITH C-205789, SHEET 2.



SECTION "2A-2A"

SUSQUEHANNA S.E.S.
UNIT I
APPENDIX "R"
DEVIATION REQUEST NO. 11
PENETRATIONS X-25-5-13,
X-25-5-15 & X-25-5-23

AREA 25	ELEV. 749'-1"	SCALE NA

PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PP&L DRAWING NO. C-205789
SHEET NO. 2A
REV. NO. 2
BE DRAWING NO. C-1693 SH.2A

FRACTIONAL DECIMAL LOCATION CODES G1B01 SORTS C F

PENETRATION:	X-25-5-13
ADJACENT FIRE ZONES:	1-5B/1-5A-N
DUCT SIZE AT PENETRATION:	30" X 26"
VENTILATION SYSTEM:	UNIT 1 PRIMARY CONTAINMENT DRYWELL PURGE EXHAUST TO STANDBY GAS TREATMENT

DISCUSSION:

As shown on Shts. 2 and 2A of Drawing C-205789, this duct system penetrates the fire barrier wall at Elevation 772'-7". This penetration joins Fire Zone 1-5A-N with Fire Zone 1-5B. There are no openings in the duct assembly in Fire Zone 1-5A-N or Fire Zone 1-5B. Neither Fire Zone has sprinkler protection.

JUSTIFICATION:

a) Fire initiated in Fire Zone 1-5A-N with potential to spread to Fire Zone 1-5B.

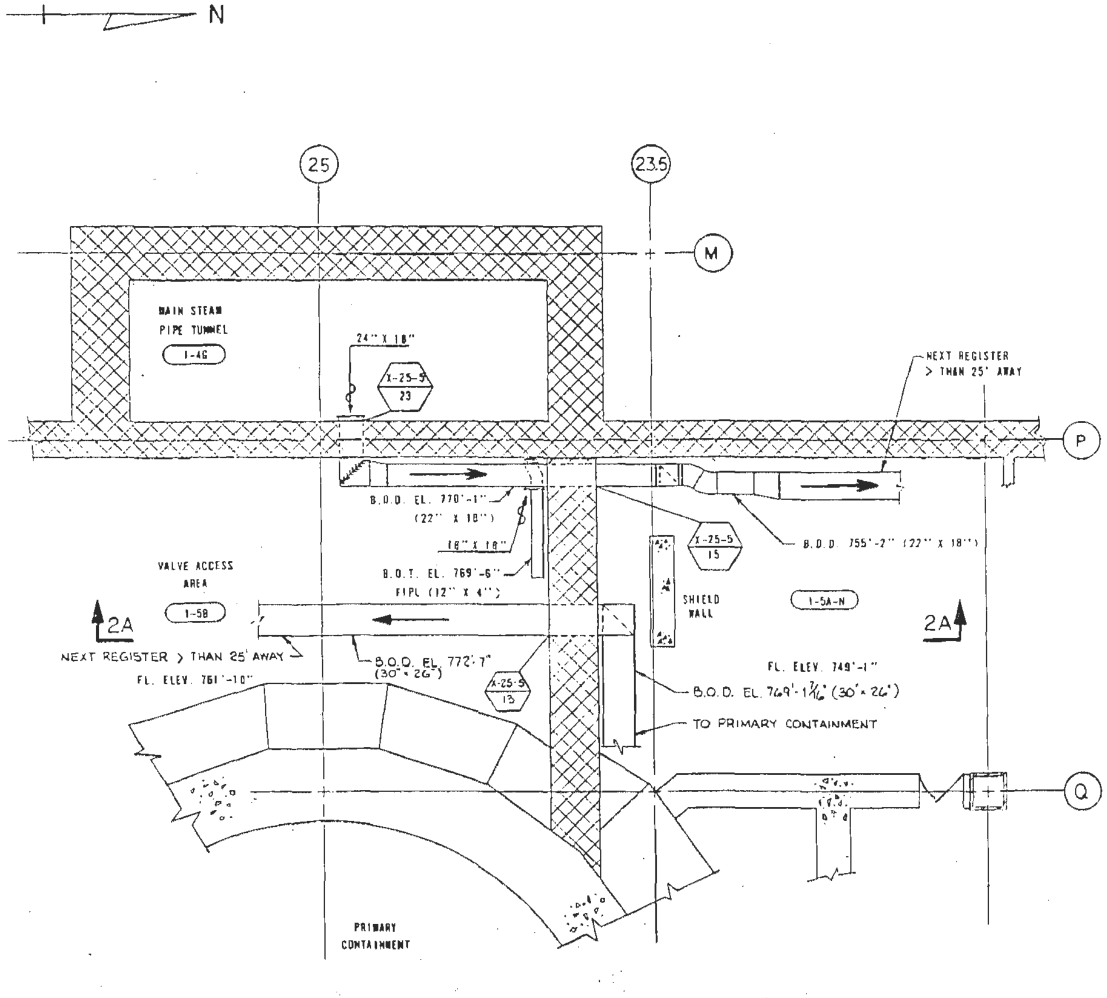
Since this duct system performs a primary containment purge function, there are no openings in the duct system throughout its entire length. Therefore, a fire initiated in Fire Zone 1-5A-N would not generate enough heat to breach the duct system and transfer heat into Fire Zone 1-5B or into any other Fire Zone through which this duct passes.

b) Fire initiated in Fire Zone 1-5B with potential to spread to Fire Zone 1-5A-N.

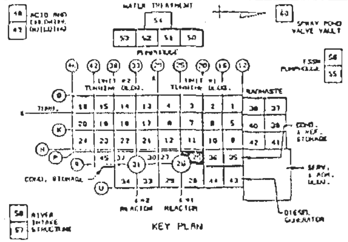
Since this duct system performs a primary containment purge function, there are no openings in the duct system throughout its entire length. Therefore, a fire initiated in Fire Zone 1-5B would not generate enough heat to breach the duct system and transfer heat into Fire Zone 1-5A-N or into any other Fire Zone through which this duct passes.

CONCLUSION:

Based on the above discussion, NFPA 90A, Section 3-3.2.1.1, the physical layout of the adjacent Fire Zones and the combustible configuration within the Fire Zones, a fire damper is not required in penetration X-25-5-13.



PLAN



KEY PLAN

FLOOR LEVEL	TURBINE BLDG. EL.	REACTOR BLDG. EL.	RADWASTE BLDG. EL.	DIESEL GENERATOR EL.	DRYWELL REACTOR BLDG. EL.	CONTROL BLDG. EL.
1	656'0"	645'0"	646'0"	660'0"		
2	676'0"	670'0"	660'0"	677'0"	704'0"	676'0"
3	699'0"	683'0"	676'0"	710'0"	719'1"	699'0"
4	729'0"	719'1"	691'6"		[illegible]	714'0"
5	762'0"	749'1"			[illegible]	729'0"
6	714'0"	779'1"			779'1"	741'0"
7		818'1"				754'0"
12					786'1"	771'0"
14					806'0"	783'0"
16		799'1"				806'0"

NOTES:

1. FOR LEGEND SEE DRAWING A-205790, SHEET 1.
2. WORK THIS DRAWING WITH C-205789, SHEET 2A.

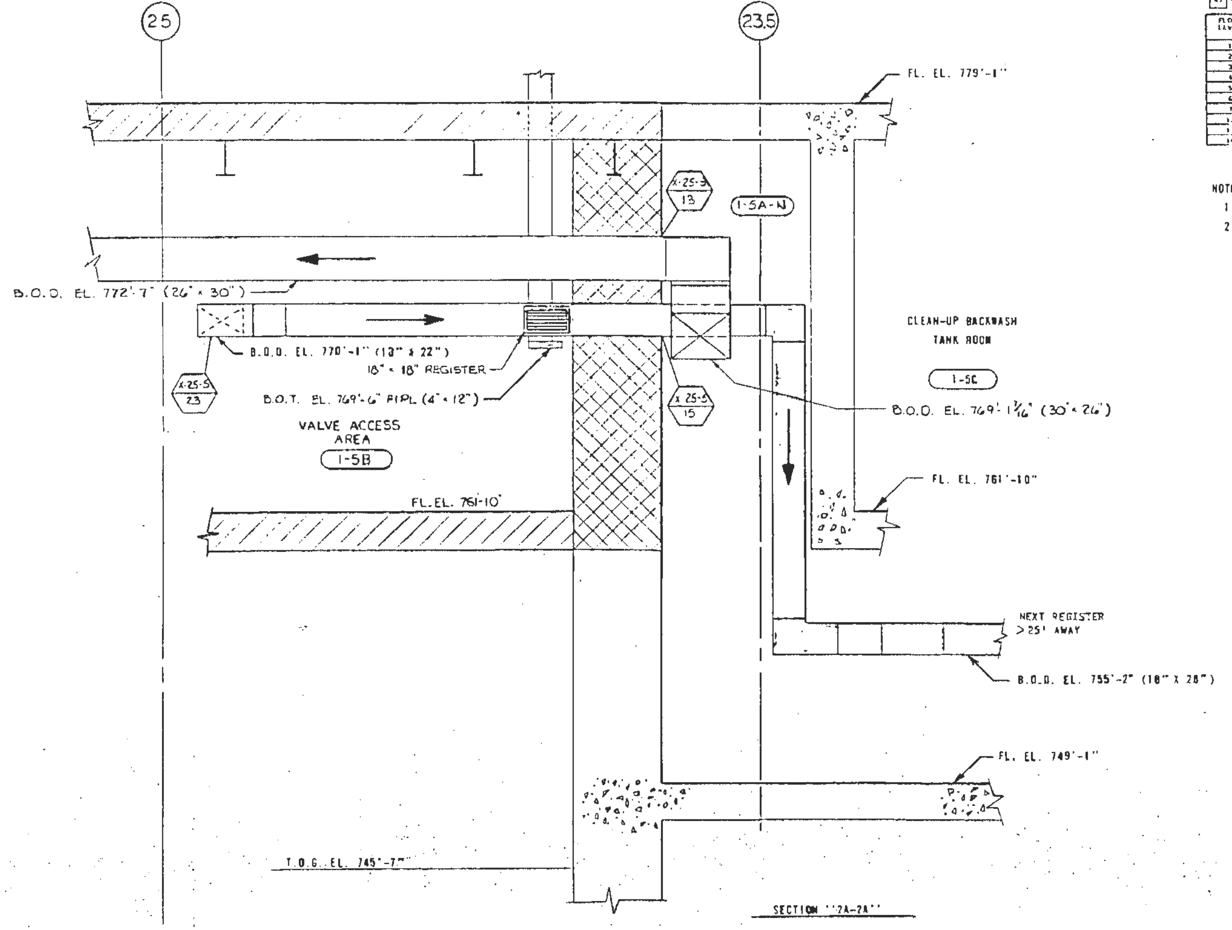
SUSQUEHANNA S.E.S.
UNIT 1
APPENDIX "R"
DEVIATION REQUEST NO. 11
PENETRATIONS X-25-5-13,
X-25-5-15 & X-25-5-23

AREA 25 | ELEV. 7[illegible]'-1" | SCALE NA

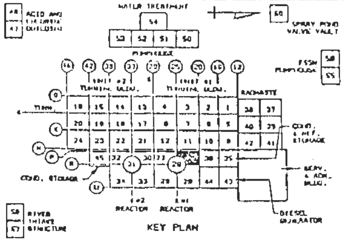
PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PP&L DRAWING NO. C-205789 | SHEET NO. 2 | REV. NO. 2

AE DRAWING NO. C-1693 SH. 2



SECTION "2A-2A"



KEY PLAN

FLOOR LEVEL	TURBINE BLDG. EL.	REACTOR BLDG. EL.	RADWASTE BLDG. EL.	DIESEL GENERATOR EL.	DRYWELL REACTOR BLDG. EL.	CONTROL BLDG. EL.
1	656'0"	645'0"	646'0"	660'0"		
2	676'0"	670'0"	660'0"	677'0"	704'0"	676'0"
3	699'0"	683'0"	676'0"	710'0"	719'1"	699'0"
4	729'0"	719'1"	691'6"		738'11½"	714'0"
5	762'0"	749'1"			752'2½"	729'0"
6	814'0"	779'1"			775'1"	741'0"
7		818'1"				754'0"
12					791'1"	771'0"
13					808'0"	783'0"
14		799'1"				806'0"

NOTES:

1. FOR LEGEND SEE DRAWING A-205790, SHEET 1.
2. WORK THIS DRAWING WITH C-205789, SHEET 2.

SUSQUEHANNA S.E.S.
UNIT 1
APPENDIX "R"
DEVIATION REQUEST NO. 11
PENETRATIONS X-25-5-13,
X-25-5-15 & X-25-5-23

AREA 25.	ELEV. 749'-1"	SCALE NA

PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PP&L DRAWING NO. C-205789
SHEET NO. 2A
REV. NO. 2
AE DRAWING NO. C-1693 SH.2A

FRACTIONAL
DECIMAL
LOCATION CODES
SORTS

PENETRATION:	X-25-5-15
ADJACENT FIRE ZONES:	1-5B/1-5A-N
DUCT SIZE AT PENETRATION:	22" X 18"
VENTILATION SYSTEM:	REACTOR BUILDING ZONE I EQUIPMENT COMPARTMENT (FILTERED) EXHAUST

DISCUSSION:

As shown on Shts. 2 and 2A of Drawing C-205789, the duct assembly penetrates the fire barrier wall through penetration X-25-5-15 at Elevation 770'-1". This penetration joins Fire Zone 1-5A-N with Fire Zone 1-5B. An exhaust air register is located in the duct in Fire Zone 1 5B. Neither Fire Zone has sprinkler protection.

JUSTIFICATION:

a) Fire initiated in Fire Zone 1-5A-N with potential to spread to Fire Zone 1-5B.

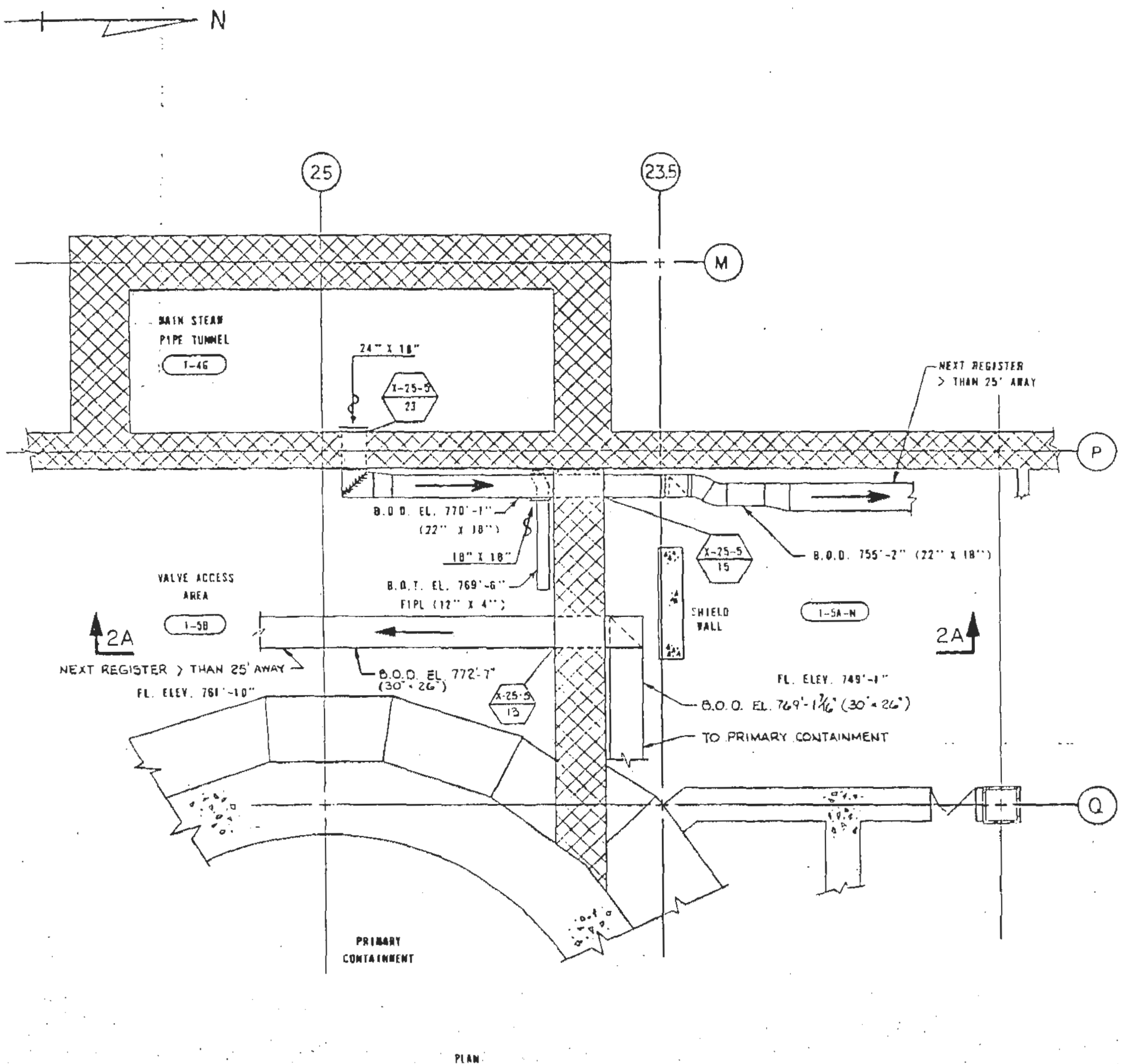
There are no openings in the duct assembly in Fire Zone 1-5A-N within at least 50 feet of the subject penetration. If a fire were initiated in Fire Zone 1-5A-N, the heat generated as a result of that fire would have to travel through at least 50 feet of ductwork before reaching into Fire Zone 1-5B. As the heat would escape from the exhaust air register in Fire Zone 1-5B, it would migrate upwards away from cable tray F1PL and not have sufficient heat content to adversely affect this cable tray or any other system in Fire Zone 1-5B.

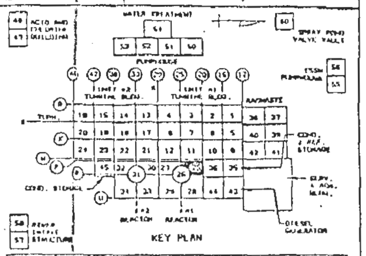
b) Fire initiated in Fire Zone 1-5B with potential to spread to Fire Zone 1-5A-N.

Fire Zone 1-5B has minimal combustibles. As noted on the referenced drawing, a 12 inch x 4 inch cable tray is situated directly under the exhaust air register in Fire Zone 1-5B. However, this cable tray would not generate sufficient heat to affect the duct assembly in Fire Zone 1-5A-N, and since there are no openings in the duct assembly in Fire Zone 1-5A-N within at least 50 feet of the subject duct penetration, sufficient heat would not be generated by a fire in Fire Zone 1-5B to adversely affect any system in Fire Zone 1-5-N.

CONCLUSION:

Based on the above discussion, NFPA 90A, Section 3-3.2.1.1, the physical layout of the adjacent Fire Zones and the combustible configuration within the Fire Zones, a fire damper is not required in penetration X-25-5-15.





FLOOR LEVEL	TURBINE BLDG. EL.	REACTOR BLDG. EL.	RADWASTE BLDG. EL.	DIESEL GENERATOR EL.	DRYWELL REACTOR BLDG. EL.	CONTROL BLDG. EL.
1	[illegible]	645'0"	646'0"	660'0"		
2	676'0"	670'0"	660'0"	677'0"	704'0"	676'0"
3	699'0"	683'0"	676'0"	710'0"	719'1"	699'0"
4	729'0"	719'1"	691'8"		[illegible]	714'0"
5	752'0"	749'1"			[illegible]	729'0"
6	771'0"	779'1"			771'1"	741'0"
7		818'1"				754'0"
12					[illegible]	771'0"
14					[illegible]	783'0"
15		799'1"				806'0"

NOTES:

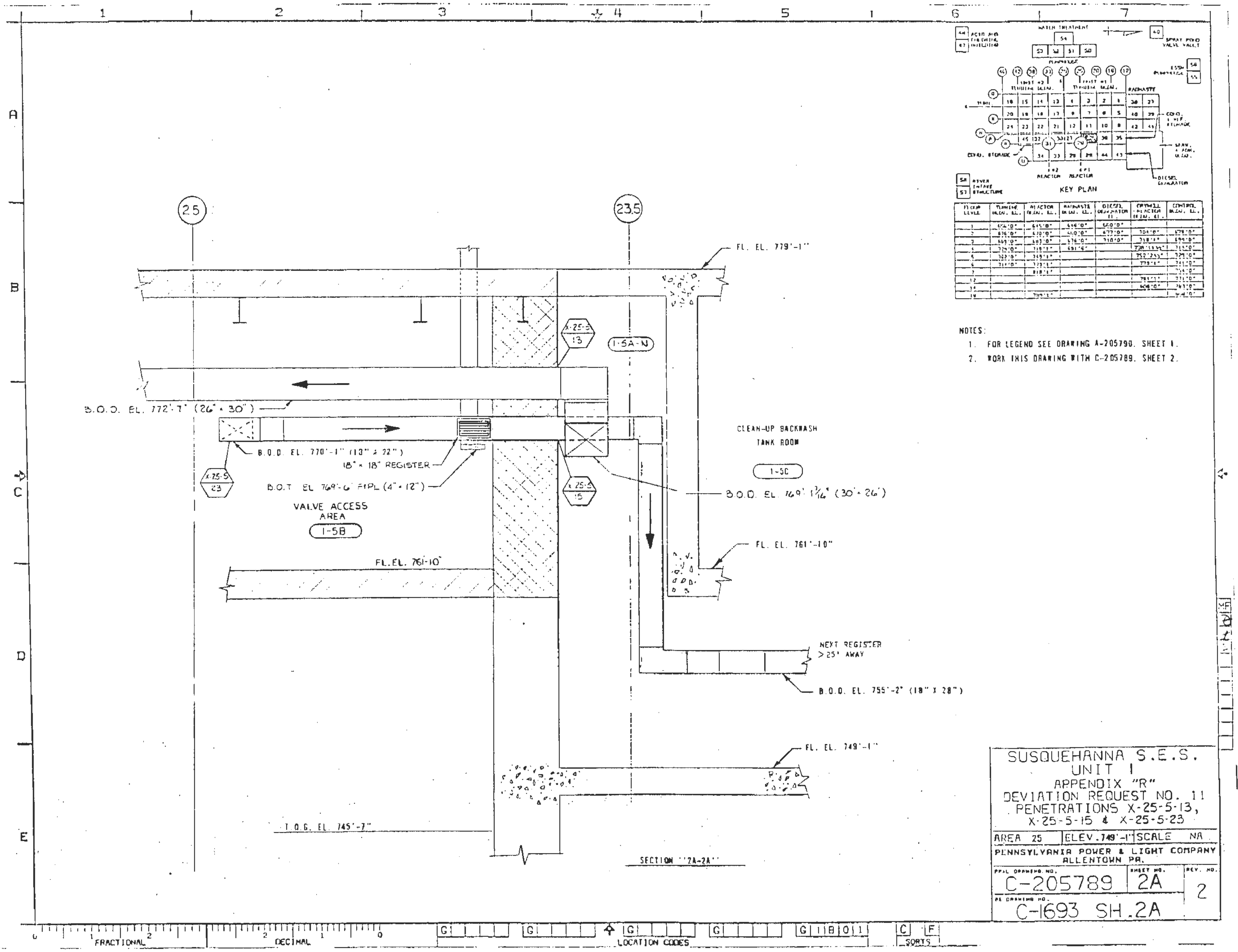
1. FOR LEGEND SEE DRAWING A-205790, SHEET 1.
2. WORK THIS DRAWING WITH C-205789, SHEET 2A.

SUSQUEHANNA S.E.S.
UNIT I
APPENDIX "R"
DEVIATION REQUEST NO. 11
PENETRATIONS X-25-5-13,
X-25-5-15 & X-25-5-23

AREA 25	ELEV. 7[illegible]'-1"	SCALE NA

PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN, PA.

PP&L DRAWING NO.	SHEET NO.	REV. NO.
C-205789	2	2
AE DRAWING NO. C-1693 SH. 2		



FLOOR LEVEL	TURBINE BLDG. EL.	REACTOR BLDG. EL.	RADWASTE BLDG. EL.	DIESEL GENERATOR EL.	DRYWELL - REACTOR BLDG. EL.	CONTROL BLDG. EL.
1	656'0"	645'0"	646'0"	660'0"		
2	676'0"	670'0"	660'0"	677'0"	704'0"	679'0"
3	699'0"	683'0"	676'0"	710'0"	718'1"	699'0"
4	729'0"	719'1"	691'6"		738'11½"	715'0"
5	762'0"	749'1"			752'2½"	729'0"
6	711'0"	779'1"			779'1"	741'0"
7		818'1"				754'0"
12					791'1"	771'0"
14					806'0"	783'0"
19		799'1"				806'0"

NOTES:

1. FOR LEGEND SEE DRAWING A-205790, SHEET 1.
2. WORK THIS DRAWING WITH C-205789, SHEET 2.

SUSQUEHANNA S.E.S.
UNIT 1
APPENDIX "R"
DEVIATION REQUEST NO. 11
PENETRATIONS X-25-5-13,
X-25-5-15 & X-25-5-23

AREA 25	ELEV. 749'-1"	SCALE NA

PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PP&L DRAWING NO.	SHEET NO.	REV. NO.
C-205789	2A	2
BE DRAWING NO. C-1693 SH.2A		

PENETRATION:	X-27-4-16
ADJACENT FIRE ZONES:	1-4A-S/1-4G
DUCT SIZE AT PENETRATION:	30" X 18
VENTILATION SYSTEM:	REACTOR BUILDING ZONE I SUPPLY

DISCUSSION:

As shown on Shts. 3 and 3A of Drawing C-205789, the duct assembly penetrates the fire barrier at Elevation 743'-3". This penetration joins Fire Zone 1-4A-S with Fire Zone 1-4G. A supply air register is located in Fire Zone 1-4G near the face of the fire barrier wall. Fire Zone 1-4A-S is a fully sprinklered area.

JUSTIFICATION:

a) Fire initiated in Fire Zone 1-4G with potential to spread to Fire Zone 1-4A-S.

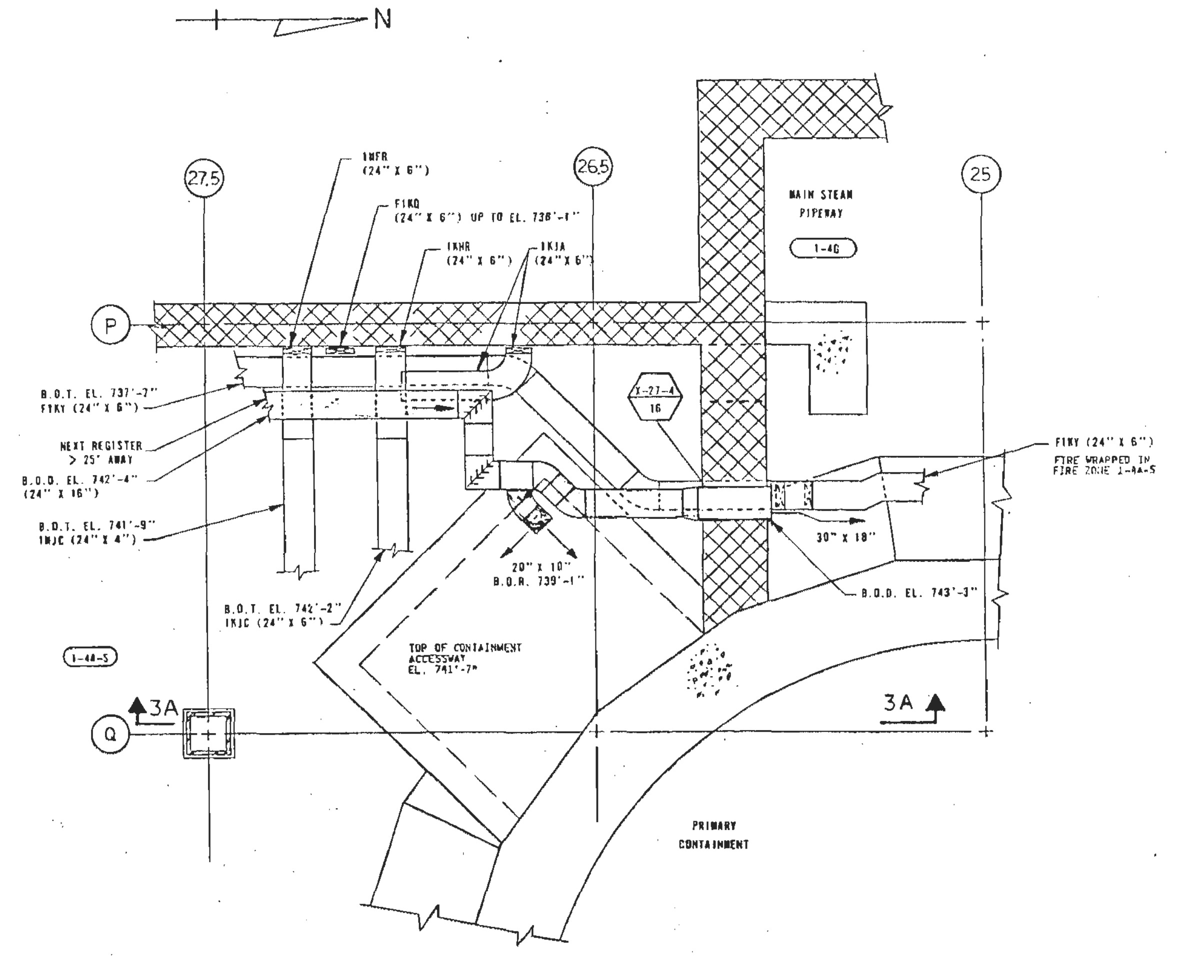
Fire Zone 1-4G has minimal combustibles with the only combustible near penetration X-27-4-16 being cable tray F1KY. Based on the previously referenced analysis, the consequences of a fire in Fire Zone 1-4G would not adversely impact any systems in Fire Zone 1-4A-S. Therefore, a fire generated in Fire Zones 1-4G would not generate enough heat to adversely impact any systems in Fire Zone 1-4A-S.

b) Fire initiated in Fire Zone 1-4A-S with potential to spread to Fire Zone 1-4G.

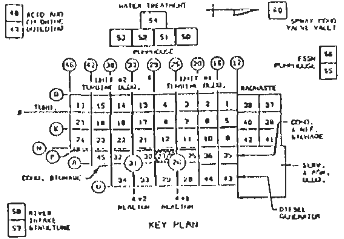
Fire Zone 1-4A-S is protected by an automatic fire suppression system which would mitigate the consequences of any heat generated in Fire Zone 1-4A-S as a result of a fire in Fire Zone 1-4A-S. Therefore, a fire initiated in Fire Zone 1-4A-S would not generate enough heat to adversely impact any systems in Fire Zone 1-4G.

CONCLUSION:

Based on the above discussion, NFPA 90A, Section 3-3.2.1.1, the physical layout of the adjacent Fire Zones and the combustible configuration within the Fire Zones, a fire damper is not required in penetration X-27-4-16.



PLAN @ EL. 719'-1"



FLOOR LEVEL	TURBINE BLDG. EL.	REACTOR BLDG. EL.	RADWASTE BLDG. EL.	DIESEL GENERATOR EL.	DRYWELL REACTOR BLDG. EL.	CONTROL BLDG. EL.
1	656'0"	645'0"	646'0"	660'0"		
2	676'0"	670'0"	660'0"	672'0"	704'0"	678'0"
3	[illegible]	[illegible]	676'0"	710'0"	719'1"	[illegible]
4	[illegible]	719'1"	[illegible]		[illegible]	[illegible]
5	762'0"	[illegible]			[illegible]	[illegible]
6	[illegible]	[illegible]			[illegible]	[illegible]
7		[illegible]				[illegible]
12					[illegible]	[illegible]
14					[illegible]	[illegible]
16		[illegible]				[illegible]

NOTE:

1. FOR LEGEND SEE DWG. A-205790, SHT. 1.
2. WORK THIS DWG. WITH C-205789, SHT. 3A.

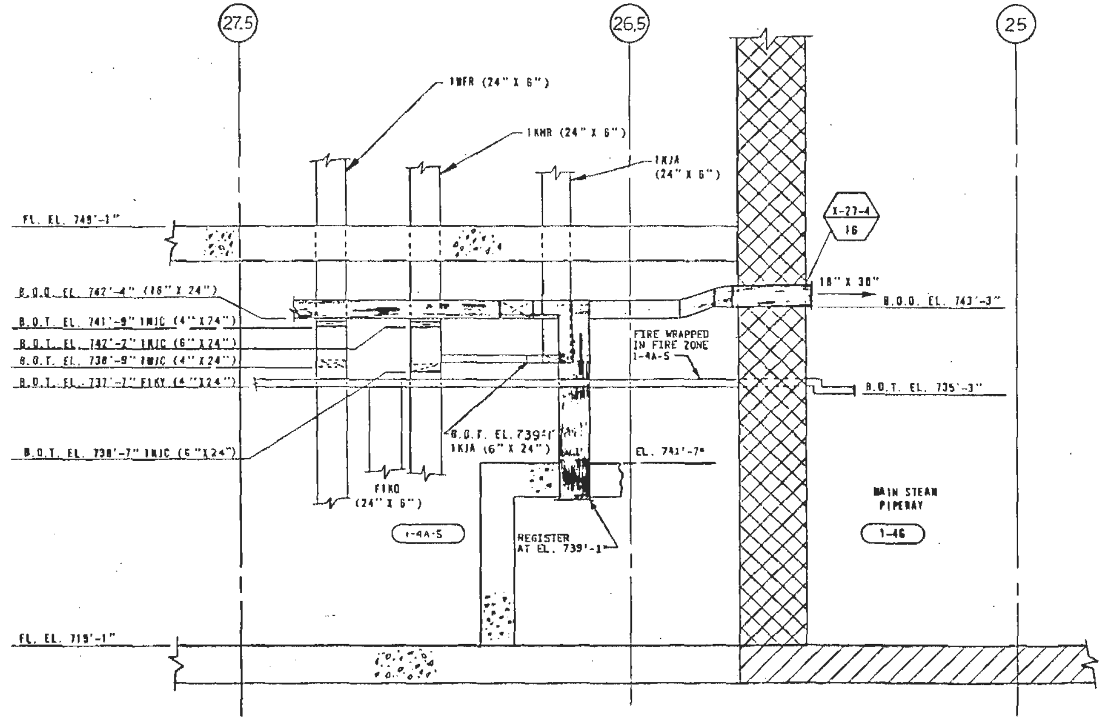
SUSQUEHANNA S.E.S.
UNIT I
APPENDIX "R"
DEVIATION REQUEST NO. 11
PENETRATION X-27-4-16

AREA 27 | ELEV. 719'-1" | SCALE NA

PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

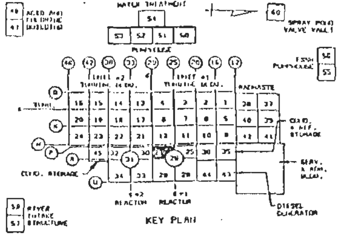
PP&L DRAWING NO. C-205789
SHEET NO. 3
REV. NO. 1
AE DRAWING NO. C-1693 SH. 3

FRACTIONAL DECIMAL LOCATION CODES G1B01 SORTS C F



SECTION "3A-3A"

NOTE CONTAINMENT ACCESSWAY SHOWN PARTIALLY FOR CLARITY.



FLOOR LEVEL	TURBINE BLDG. EL.	REACTOR BLDG. EL.	RADWASTE BLDG. EL.	DIESEL GENERATOR EL.	DRYWELL REACTOR BLDG. EL.	CONTROL BLDG. EL.
1	656'0"	645'0"	646'0"	650'0"		
2	676'0"	670'0"	660'0"	677'0"	704'0"	676'0"
3	699'0"	683'0"	676'0"	710'0"	718'1"	699'0"
4	729'0"	719'1"	691'6"		721'11½"	714'0"
5	762'0"	749'1"			757'2½"	729'0"
6	714'0"	779'1"			779'1"	741'0"
7		818'1"				754'0"
12					791'11"	771'0"
14					806'0"	783'0"
18		799'1"				806'0"

NOTE:

1. FOR LEGEND SEE DWG. A-205790, SHT. 1.
2. WORK THIS DWG. WITH C-205789, SHT. 3.

SUSQUEHANNA S.E.S.
UNIT 1
APPENDIX "R"
DEVIATION REQUEST NO. 11
PENETRATION X-27-4-16

AREA 27 | ELEV. 719'-1" | SCALE NA

PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PP&L DRAWING NO. C-205789 | SHEET NO. 3A | REV. NO. 1

AE DRAWING NO. C-1693 SH. 3A

PP&L FORM 3505C (1/86)

PENETRATION:	X-27-4-17
ADJACENT FIRE ZONES:	1-4A-S/1-4G
DUCT SIZE AT PENETRATION:	12" X 12"
VENTILATION SYSTEM:	TRANSFER DUCT

DISCUSSION:

As shown on Shts. 4 and 4A of Drawing C-205789, this duct assembly penetrates the fire barrier at Elevation 743'-0". This penetration joins Fire Zone 1-4A-S with Fire Zone 1-4G. A supply air register is located in Fire Zone 1-4G near the face of the fire barrier wall. This duct system is a transfer duct which supplies air from Zone 1-4A-S to Fire Zone 1-4G at a rate of 500 cfm. Fire Zone 1-4A-S is a fully sprinklered area.

JUSTIFICATION:

a) Fire initiated in Fire Zone 1-4G with potential to spread to Fire Zone 1-4A-S.

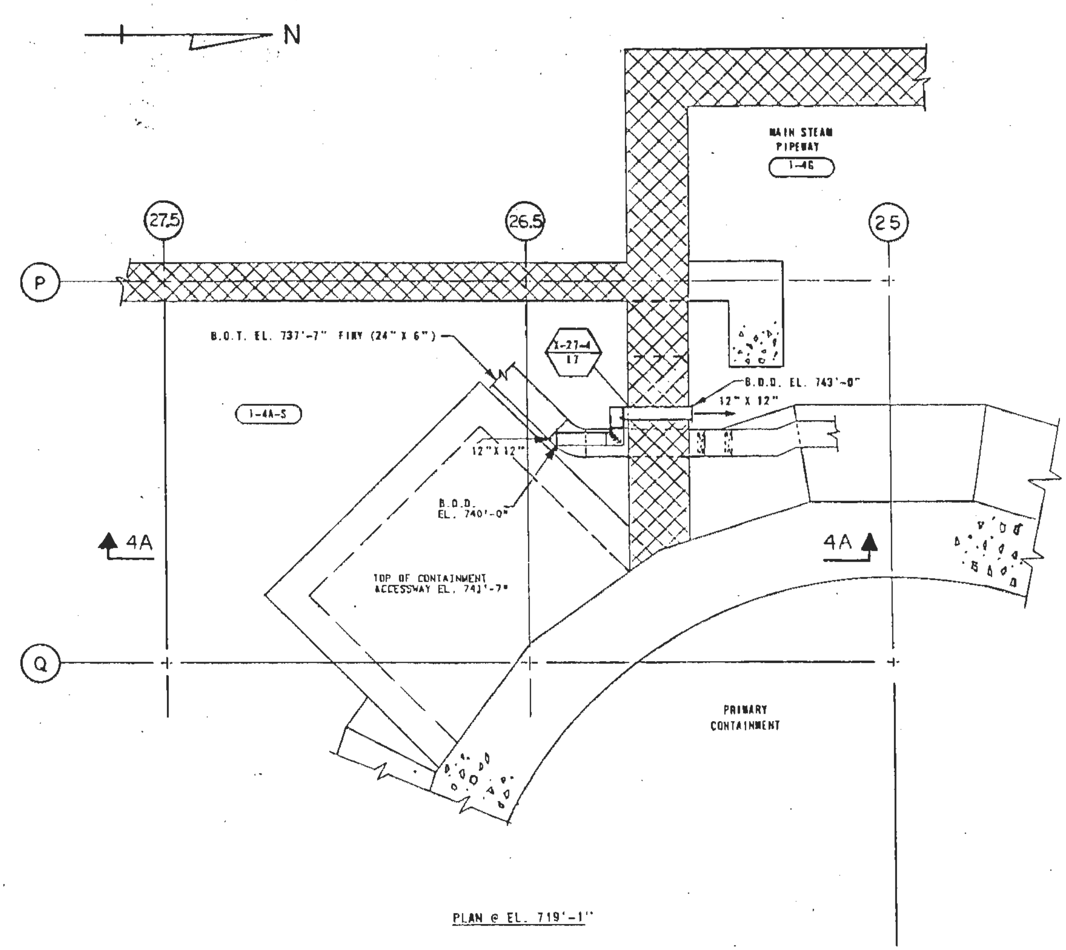
Fire Zone 1-4G has minimal combustibles with the nearest combustible (cable tray F1KY) located approximately 5'-2" beneath the duct supply air register. Cable tray F1KY is fire wrapped in Fire Zone 1-4A-S. After cable tray F1KY enters Fire Zone 1-4G, it drops to a distance of approximately 7'-3" beneath the duct supply air register. Based on the low combustible loading of Fire Zone 1-4G and the distance between the supply air register and the nearest cable tray, a fire in Fire Zone 1-4G will not generate enough heat to adversely impact any system in Fire Zone 1-4A-S.

b) Fire initiated in Fire Zone 1-4A-S with potential to spread to Fire Zone 1-4G.

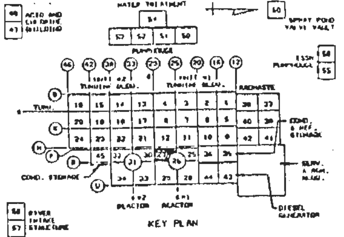
Fire Zone 1-4A-S is protected by an automatic fire suppression system which would mitigate the consequences of any heat generated by a fire in Fire Zone 1-4A-S. The one cable tray (F1KY) located near the duct opening is fire wrapped. Therefore, a fire initiated in Fire Zone 1-4A-S would not generate enough heat to adversely impact any system in Fire Zone 1-4G.

CONCLUSION:

Based on the above discussion, NFPA 90A, Section 3-3.2.1.1, the physical layout of the adjacent Fire Zones and the combustible configuration within the Fire Zones, a fire damper is not required in penetration X-27-4-17.



PLAN @ EL. 719'-1"



KEY PLAN

FLOOR LEVEL	TURBINE BLDG. EL.	REACTOR BLDG. EL.	RADWASTE BLDG. EL.	DIESEL GENERATOR EL.	DRYWELL REACTOR BLDG. EL.	CONTROL BLDG. EL.
1	656'0"	645'0"	645'0"	660'0"		
2	676'0"	670'0"	660'0"	677'0"	704'0"	676'0"
3	699'0"	683'0"	676'0"	710'0"	719'1"	699'0"
4	729'0"	719'1"	691'6"		738'11½"	714'0"
5	762'0"	749'1"			752'3½"	729'0"
6	774'0"	779'1"			773'1"	741'0"
7		818'1"				754'0"
12					761'1"	771'0"
14					806'0"	783'0"
16		799'1"				806'0"

NOTE:

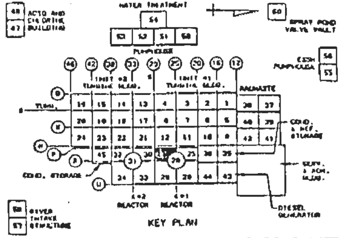
1. FOR LEGEND SEE DWG. A-205790, SHT. 1.
2. WORK THIS DRAWING WITH C-205789, SHT. 4A.

SUSQUEHANNA S.E.S.
UNIT 1
APPENDIX "R"
DEVIATION REQUEST NO. 11
PENETRATION X-27-4-17

AREA 27 | ELEV. 719'-0" | SCALE NA

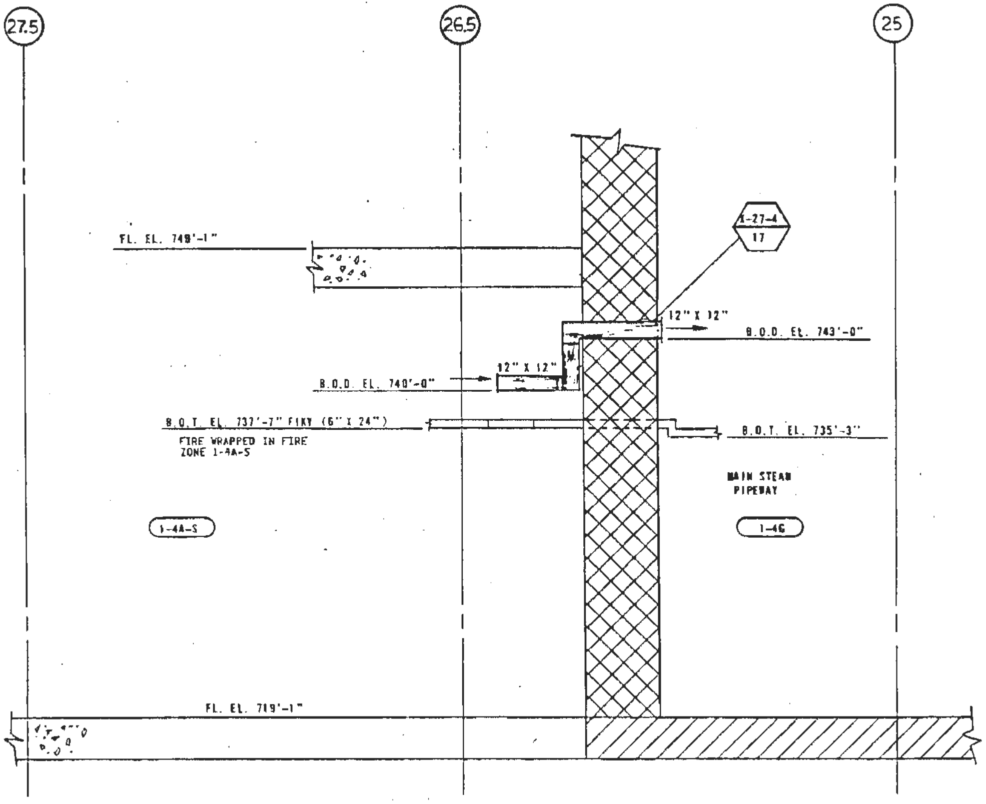
PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PP&L DRAWING NO. C-205789
SHEET NO. 4
REV. NO. 1
AE DRAWING NO. C-1693 SH. 4



FLOOR LEVEL	TURBINE BLDG. EL.	REACTOR BLDG. EL.	RADWASTE BLDG. EL.	DIESEL GENERATOR EL.	DRYWELL REACTOR BLDG. EL.	CONTROL BLDG. EL.
1	656'3"	645'0"	646'0"	660'0"		
2	676'3"	670'0"	660'0"	677'0"	704'0"	676'0"
3	699'0"	683'0"	676'0"	710'0"	719'1"	699'0"
4	729'0"	719'1"	691'0"		738'11½"	714'0"
5	762'0"	749'1"			753'2½"	729'0"
6	714'0"	779'1"			779'1"	741'0"
7		818'1"				754'0"
12					791'1"	771'0"
14					808'0"	783'0"
16		799'1"				806'0"

NOTE:
1. FOR LEGEND SEE DWG. A-205790, SHT. 1.
2. WORK THIS DRAWING WITH C-205789, SHT. 4.



SECTION "4A-4A"

NOTE: CONTAINMENT ACCESSWAY WALL OMITTED FOR CLARITY

SUSQUEHANNA S.E.S.
UNIT I
APPENDIX "R"
DEVIATION REQUEST NO. 11
PENETRATION X-27-4-17

AREA 27 | ELEV. 719'-1" | SCALE NA

PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PP&L DRAWING NO. C-205789 | SHEET NO. 4A | REV. NO. 1

BE DRAWING NO. C-1693 SH. 4A

G 1 8 0 1 LOCATION CODES

C F SORTS

PP&L FORM 3505Z (3/81)

PENETRATION:	X-27-5-29
ADJACENT FIRE ZONES:	1-5B/1-5A-S
DUCT SIZE AT PENETRATION:	18" X 18"
VENTILATION SYSTEM:	REACTOR BUILDING ZONE I SUPPLY

DISCUSSION:

As shown on Sht. 5 of Drawing C-205789, the duct assembly penetrates the fire barrier wall at Elevation 771'-6". This penetration joins Fire Zone 1-5A-S with Fire Zone 1-5B. A supply air register is located against the face of the fire barrier wall in Fire Zone 1-5B. Fire Zone 1-5A-S is a fully sprinklered area.

JUSTIFICATION:

a) Fire initiated in Fire Zone 1-5A-S with potential to spread to Fire Zone 1-5B.

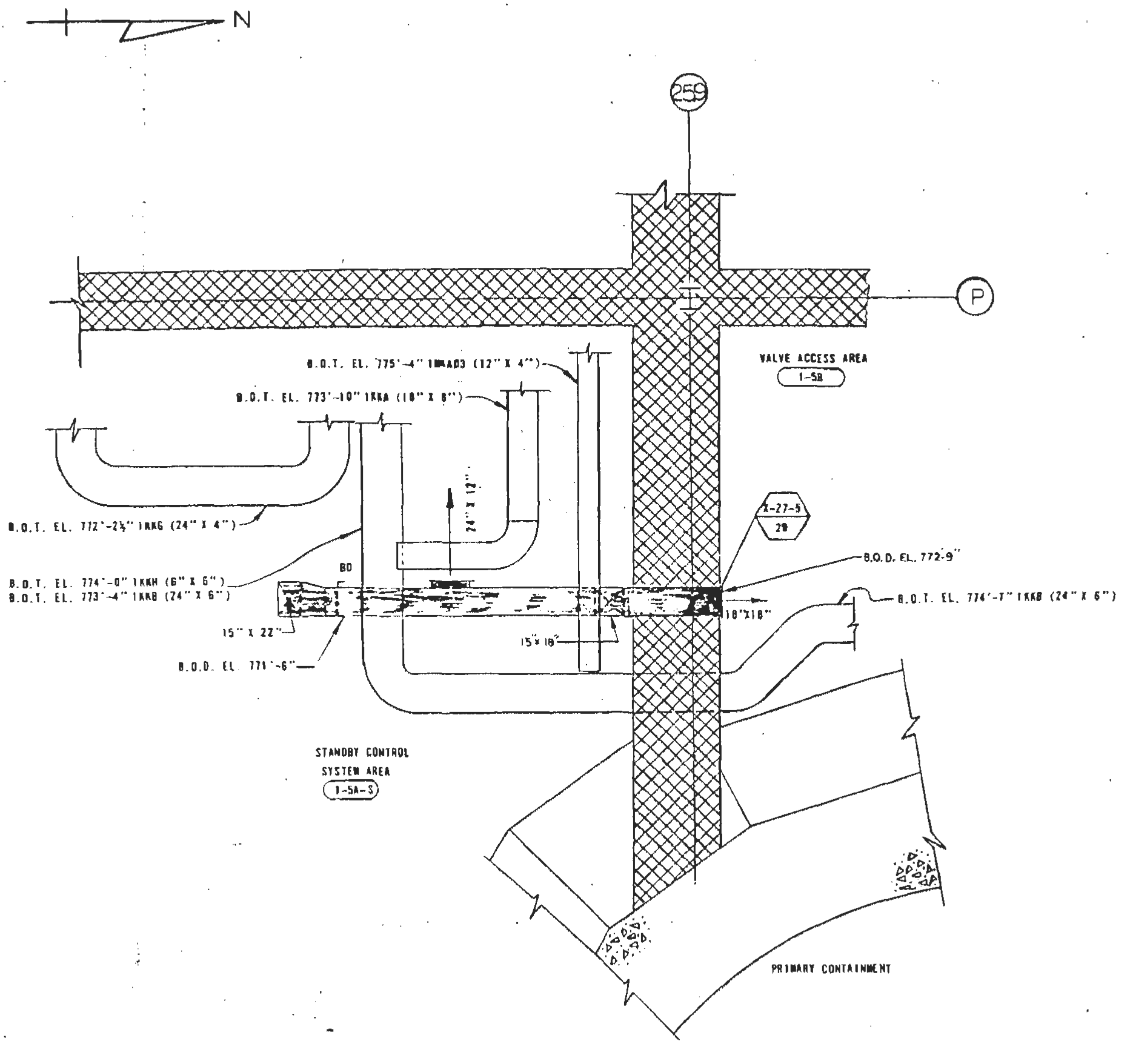
Fire Zone 1-5A-S is protected by an automatic fire suppression system which would mitigate the consequences of any heat generated in Fire Zone 1-5A-S as a result of a fire in Fire Zone 1-5A-S. Therefore, a fire initiated in Fire Zone 1-5A-S would not generate enough heat to adversely impact any system in Fire Zone 1-5B.

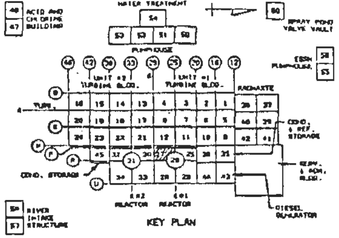
b) Fire initiated in Fire Zone 1-5B with potential to spread to Fire Zone 1-5A-S.

Fire Zone 1-5B has minimal combustibles and the only combustible near the duct opening is located above the top of the duct. Therefore, a fire initiated in Fire Zone 1-5B would not generate enough heat to adversely impact any system in Fire Zone 1-5A-S.

CONCLUSION:

Based on the above discussion, NFPA 90A, Section 3-3.2.1.1, the physical layout of the adjacent Fire Zones and the combustible configuration within the Fire Zones, a fire damper is not required in penetration X-27-5-29.





KEY PLAN

FLOOR LEVEL	TURBINE BLDG. EL.	REACTOR BLDG. EL.	RADWASTE BLDG. EL.	DIESEL GENERATOR EL.	DRYWELL REACTOR BLDG. EL.	CONTROL BLDG. EL.
1	656'0"	645'0"	646'0"	660'0"		
2	676'0"	670'0"	660'0"	677'0"	704'0"	676'0"
3	699'0"	683'0"	676'0"	710'0"	718'1"	699'0"
4	729'0"	719'1"	691'6"		738'10½"	714'0"
5	762'0"	749'1"			752'2½"	729'0"
6	716'0"	779'1"			779'1"	741'0"
7		818'1"				754'0"
12					791'1"	771'0"
14					806'0"	783'0"
19		799'1"				806'0"

NOTE:

1. FOR LEGEND SEE DWG. A-205780 SH. 1

SUSQUEHANNA S.E.S.
UNIT I
APPENDIX "R"
DEVIATION REQUEST NO. 11
PENETRATION X-27-5-29

AREA 27 | ELEV. 740'-1" | SCALE NA

PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PP&L DRAWING NO. C-205789 | SHEET NO. 5 | REV. NO. 1

AE DRAWING NO. C-1693 SH.5

FRACTIONAL DECIMAL

G | G | G | G | G | B | 0 | 1

LOCATION CODES

C F

SORTS

PENETRATION:	X-27-5-30
ADJACENT FIRE ZONES:	1-5B/1-5A-S
DUCT SIZE AT PENETRATION:	30" X 26"
VENTILATION SYSTEM:	UNIT 1 PRIMARY CONTAINMENT DRYWELL PURGE EXHAUST TO STANDBY GAS TREATMENT

DISCUSSION:

As shown on Sht. 6 Drawing C-205789, the duct assembly penetrates the fire barrier wall at Elevation 772'-7". This penetration joins Fire Zone 1-5A-S with Fire Zone 1-5B. Fire Zone 1-5A-S is a fully sprinklered area.

JUSTIFICATION:

a) Fire initiated in Fire Zone 1-5A-S with potential to spread to Fire Zone 1-5B.

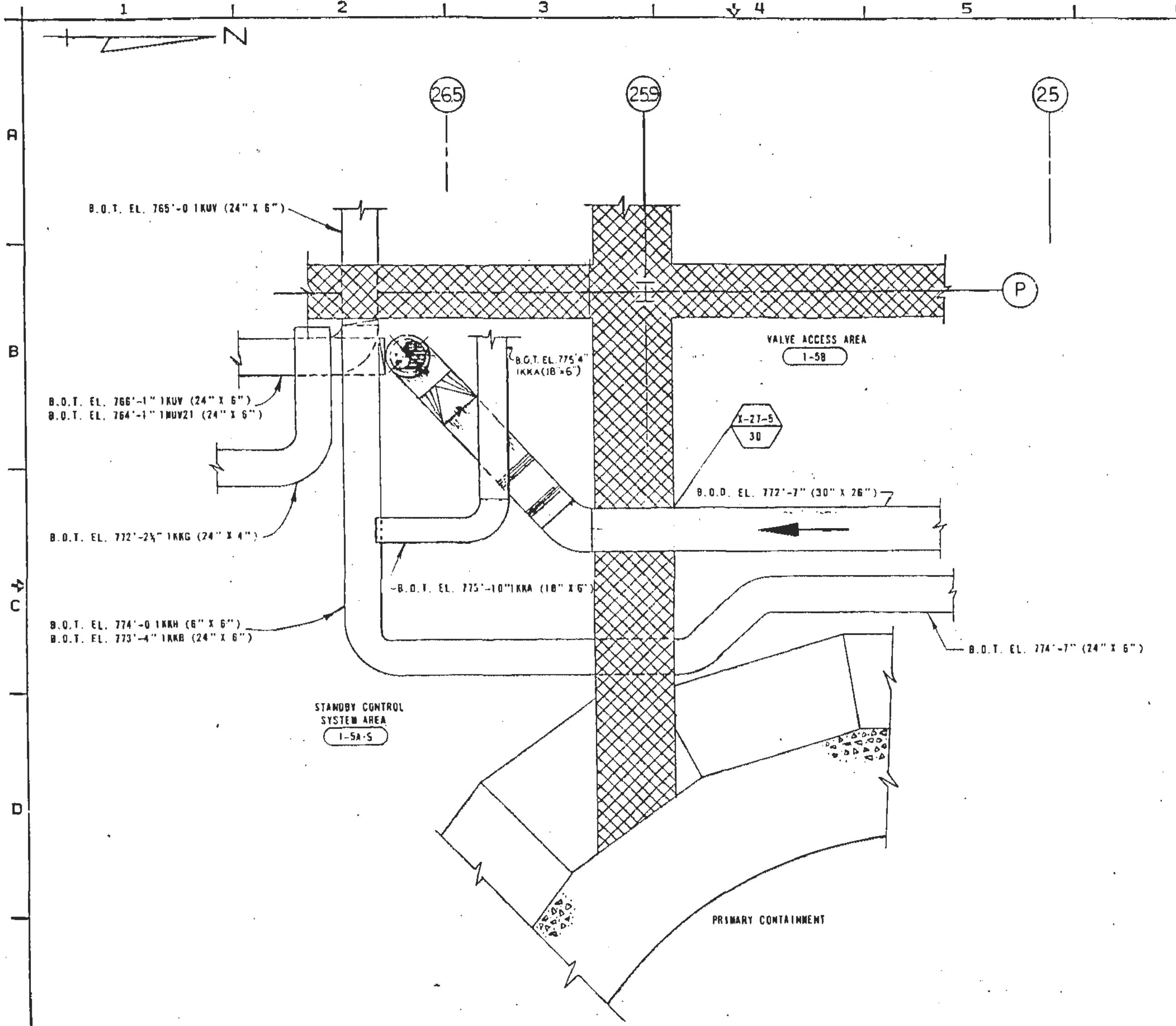
Fire Zone 1-5A-S is protected by an automatic fire suppression system which would mitigate the consequences of any heat generated in Fire Zone 1-5A-S as a result of a fire in Fire Zone 1-5-S. Also, there are no openings in the duct assembly in either Fire Zone. Therefore, a fire generated in Fire Zone 1-5A-S would not generate enough heat to adversely impact any system in Fire Zone 1-5B.

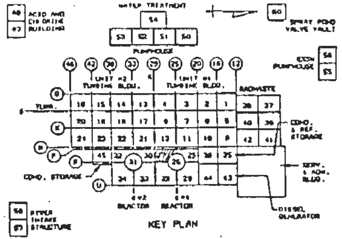
b) Fire initiated in Fire Zone 1-5B with potential to spread to Fire Zone 1-5A-S.

Fire Zone 1-5B has minimal combustibles and there are no openings in the duct assembly in either Fire Zone 1-5B nor Fire Zone 1-5A-S. Therefore, a fire in Fire Zone 1-5B would not generate enough heat to adversely impact any system in Fire Zone 1-5A-S.

CONCLUSION:

Based on the above discussion, NFPA 90A, Section 3-3.2.1.1, the physical layout of the adjacent Fire Zones and the combustible configuration within the Fire Zones, a fire damper is not required in penetration X-27-5-30.





FLOOR LEVEL	TURBINE BLDG. EL.	REACTOR BLDG. EL.	RADWASTE BLDG. EL.	DIESEL GENERATOR EL.	DRYWELL REACTOR BLDG. EL.	CONTROL BLDG. EL.
1	656'-3"	645'-0"	646'-0"	660'-0"		
2	676'-3"	670'-0"	660'-0"	677'-0"	704'-0"	676'-0"
3	699'-3"	683'-0"	676'-0"	710'-0"	719'-1"	698'-0"
4	729'-0"	719'-1"	691'-6"		738'-11½"	714'-0"
5	762'-3"	749'-1"			752'-2½"	729'-0"
6	719'-0"	779'-1"			779'-1"	741'-0"
7		818'-1"				754'-0"
12					761'-1"	771'-0"
14					806'-0"	783'-0"
16		799'-1"				806'-0"

NOTE:

1. FOR LEGEND SEE DWG. A-205790, SH. 1

SUSQUEHANNA S.E.S.
UNIT 1
APPENDIX "R"
DEVIATION REQUEST NO. 11
PENETRATION X-27-5-30

AREA 27 | ELEV 749'-1" | SCALE NA

PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PP&L DRAWING NO. C-205789 | SHEET NO. 6 | REV. NO. 1

AE DRAWING NO. C-1693 SH. 6

FRACTIONAL DECIMAL

LOCATION CODES G G G G G 1 B 0 1

SORTS C F

PP&L FORM 3505C (1/81)

PENETRATION:	X-28-5-44
ADJACENT FIRE ZONES:	1-5A-W/1-5E
DUCT SIZE AT PENETRATION:	18" X 12"
VENTILATION SYSTEM:	REACTOR BUILDING ZONE I EQUIPMENT COMPARTMENT (FILTERED) EXHAUST

DISCUSSION:

As shown on Shts. 7 and 7A of Drawing C-205789, the duct assembly penetrates the fire barrier wall at Elevation 771'-3". This penetration joins Fire Zone 1-5E with Fire Zone 1-5A-W. An exhaust air register is located against the face of the wall in Fire Zone 1-5E.

JUSTIFICATION:

a) Fire initiated in Fire Zone 1-5E with potential to spread to Fire Zone 1-5A-W.

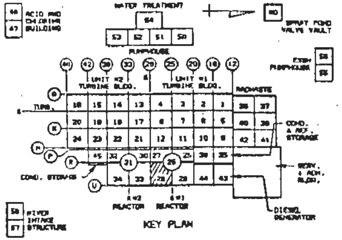
Fire Zone 1-5E has minimal combustibles with no combustibles located near the subject penetration. Also, there are no duct openings located within 50 feet of the penetration in Fire Zone 1-5A-W. Therefore, a fire generated in Fire Zone 1-5E would not generate enough heat to adversely impact any system in Fire Zone 1-5A-W.

b) Fire initiated in Fire Zone 1-5A-W with potential to spread to Fire Zone 1-5E. Fire Zone 1-5A-W is protected by an automatic fire suppression system which would mitigate the consequences of any heat generated in Fire Zone 1-5A-W as a result of a fire in Fire Zone 1-5A-W. Therefore, a fire initiated in Fire Zone 1-5A-W would not generate enough heat to adversely impact any system in Fire Zone 1-5E.

CONCLUSION:

Based on the above discussion, NFPA 90A, Section 3-3.2.1.1, the physical layout of the adjacent Fire Zones and the combustible configuration within the Fire Zones, a fire damper is not required in penetration X-28-5-44.

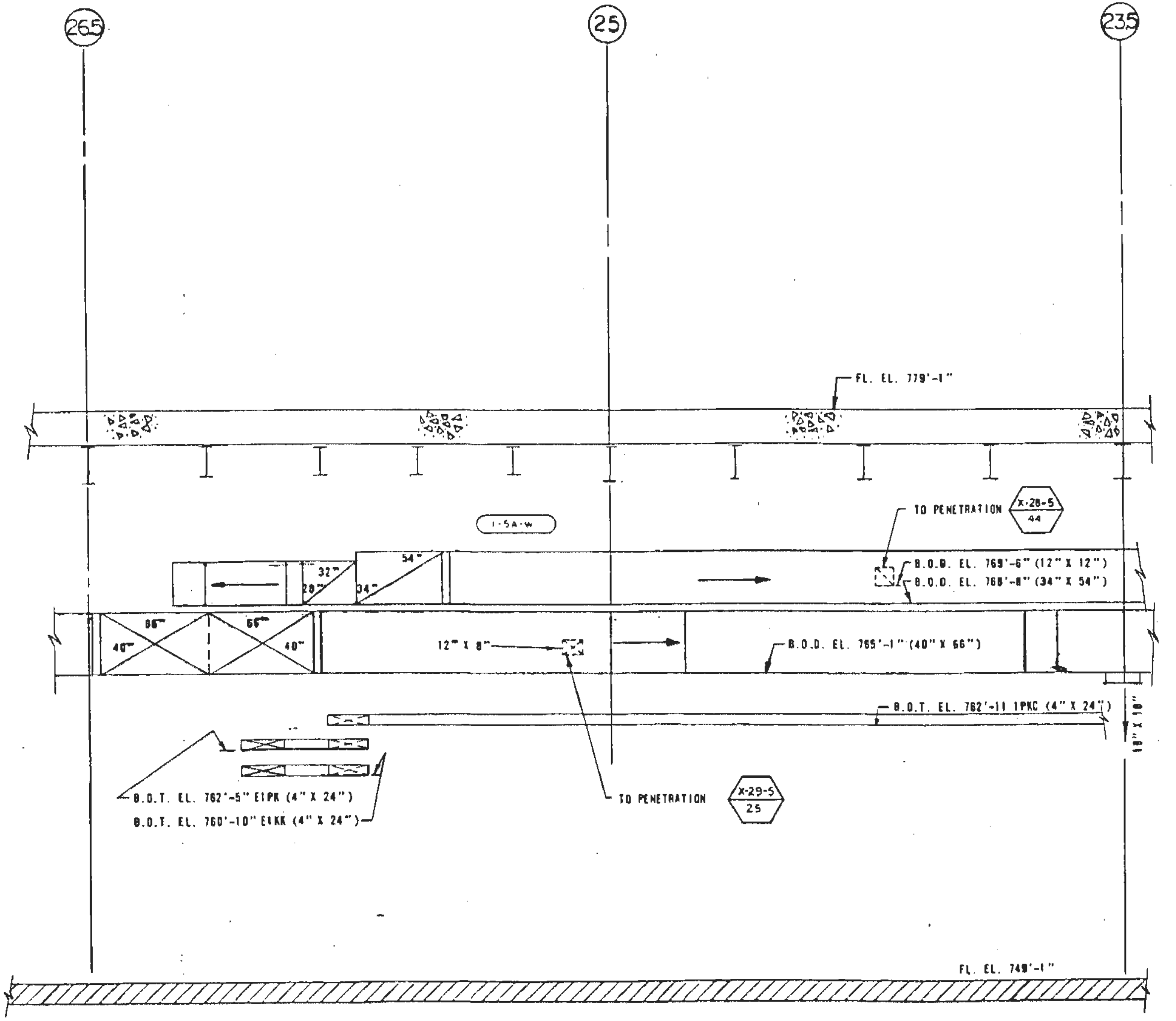
Security-Related Information
Figure Withheld Under 10 CFR 2.390



KEY PLAN

FLOOR LEVEL	TURBINE BLDG. EL.	REACTOR BLDG. EL.	RADWASTE BLDG. EL.	DIESEL GENERATOR EL.	DRYWELL REACTOR BLDG. EL.	CONTROL BLDG. EL.
1	656'0"	645'0"	646'0"	660'0"		
2	676'0"	670'0"	660'0"	677'0"	704'0"	676'0"
3	699'0"	683'0"	676'0"	710'0"	719'1"	698'0"
4	729'0"	719'1"	691'0"		724'11½"	714'0"
5	762'0"	749'1"			752'2½"	729'0"
6	714'0"	779'1"			779'1"	741'0"
7		818'1"				754'0"
12					791'1"	771'0"
14					806'0"	783'0"
19		799'1"				806'0"

NOTE:
1. FOR LEGEND SEE DWG. A-205780 SHT. 1
2. WORK THIS DWG. WITH C-205789 SHT. 7 & 8



SECTION 7A-7A

SUSQUEHANNA S.E.S.
UNIT 1
APPENDIX "R"
DEVIATION REQUEST NO. 11
PENETRATION X-28-5-44
AND X-29-5-25

AREA 29	ELEV 749'-1"	SCALE NA

PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PP&L DRAWING NO.	SHEET NO.	REV. NO.
C-205789	7A	1
AE DRAWING NO. C-1693 SH.7A		

FRACTIONAL DECIMAL LOCATION CODES G G G G G1801 SORTS C F

PENETRATION:	X-29-5-25
ADJACENT FIRE ZONES:	1-5A-W/1-5E
DUCT SIZE AT PENETRATION:	12" X 8"
VENTILATION SYSTEM:	REACTOR BUILDING ZONE I SUPPLY

DISCUSSION:

As shown on Shts. 8 and 7A of Drawing C-205789, the duct assembly penetrates the fire barrier wall at Elevation 766'-9". This penetration joins Fire Zone 1-5E with Fire Zone 1-5A-W. A supply air register is located on the face of the fire barrier wall in Fire Zone 1-5E.

JUSTIFICATION:

a) Fire initiated in Fire Zone 1-5E with potential to spread to Fire Zone 1-5A-W.

Fire Zone 1-5E has minimal combustibles with the nearest combustible approximately 10 feet from the supply air register. Also, there are no openings in the duct assembly in Fire Zone 1-5A-W located within 30 feet of penetration X-29-5-25. Therefore, a fire initiated in Zone 1-5E would not generate enough heat to adversely impact any system in Fire Zone 1-5A-W.

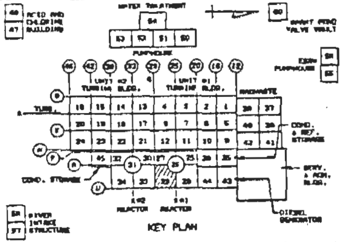
b) Fire initiated in Fire Zone 1-5A-W with potential to spread to Fire Zone 1-5E.

Fire Zone 1-5A-W is protected by an automatic fire suppression system which would mitigate the consequences of any heat generated in Fire Zone 1-5A-W as a result of a fire in Fire Zone 1-5A-W. Therefore, a fire initiated in Fire Zone 1-5A-W would not generate enough heat to adversely impact any system in Fire Zone 1-5E.

CONCLUSION:

Based on the above discussion, NFPA 90A, Section 3-3.2.1.1, the physical layout of the adjacent Fire Zones and the combustible configuration within the Fire Zones, a fire damper is not required in penetration X-29-5-25.

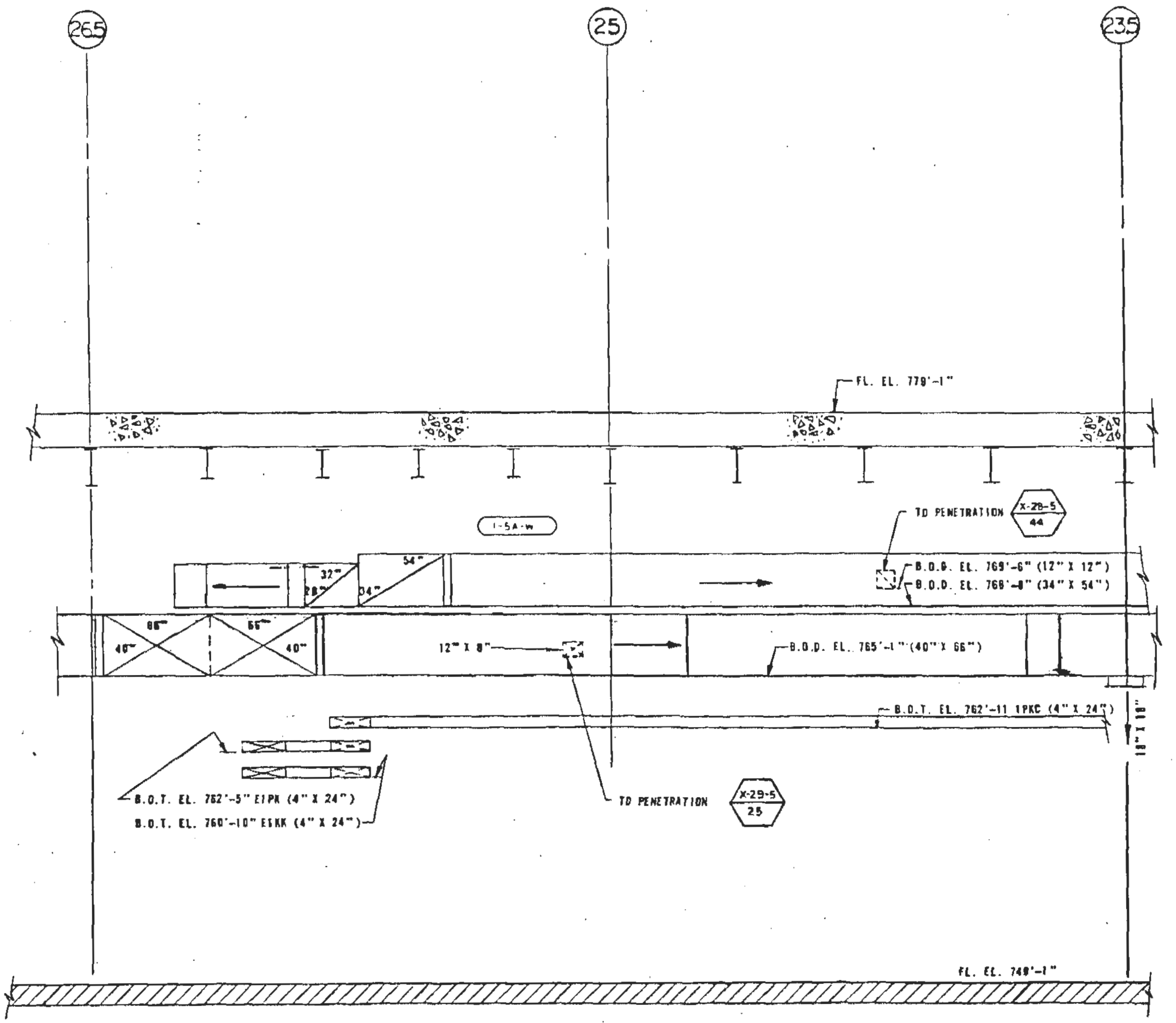
Security-Related Information
Figure Withheld Under 10 CFR 2.390



FLOOR LEVEL	TURBINE BLDG. EL.	REACTOR BLDG. EL.	RADWASTE BLDG. EL.	DIESEL GENERATOR EL.	DRYWELL REACTOR BLDG. EL.	CONTROL BLDG. EL.
1	656'0"	645'0"	646'0"	660'0"		
2	676'0"	670'0"	660'0"	677'0"	704'0"	676'0"
3	699'0"	683'0"	675'0"	710'0"	719'1"	698'0"
4	729'0"	719'1"	691'6"		738'11½"	714'0"
5	752'0"	749'1"			757'2½"	729'0"
6	714'0"	779'1"			779'1"	741'0"
7		818'1"				754'0"
12					791'1"	771'0"
14					806'0"	783'0"
19		799'1"				806'0"

NOTE:

1. FOR LEGEND SEE DWG. A-205790 SHT. 1
2. WORK THIS DWG. WITH C-205789 SHT. 7 & 8



SECTION 7A-7A

SUSQUEHANNA S.E.S.
UNIT 1
APPENDIX "R"
DEVIATION REQUEST NO. 11
PENETRATION X-28-5-44
AND X-29-5-25

AREA 29 | ELEV 749'-1" | SCALE NA

PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PP&L DRAWING NO. C-205789
SHEET NO. 7A
REV. NO. 1
AE DRAWING NO. C-1693 SH.7A

FRACTIONAL DECIMAL LOCATION CODES G G G G G 1 8 0 1 SORTS C F

PENETRATION:	X-30-5-4
ADJACENT FIRE ZONES:	2-5B/2-5A-N
DUCT SIZE AT PENETRATION:	18" X 18"
VENTILATION SYSTEM:	REACTOR BUILDING ZONE II SUPPLY

DISCUSSION:

As shown on Sht. 9 of Drawing C-205789, this duct assembly penetrates the fire barrier wall at Elevation 770'-9". This penetration joins Fire Zone 2-5B with Fire Zone 2-5A-N. A supply air register is located in Fire Zone 2-5B at the face of the fire barrier wall. Fire Zone 2-5A-N is a fully sprinklered area.

JUSTIFICATION:

a) Fire initiated in Fire Zone 2-5B with potential to spread to Fire Zone 2-5A-N.

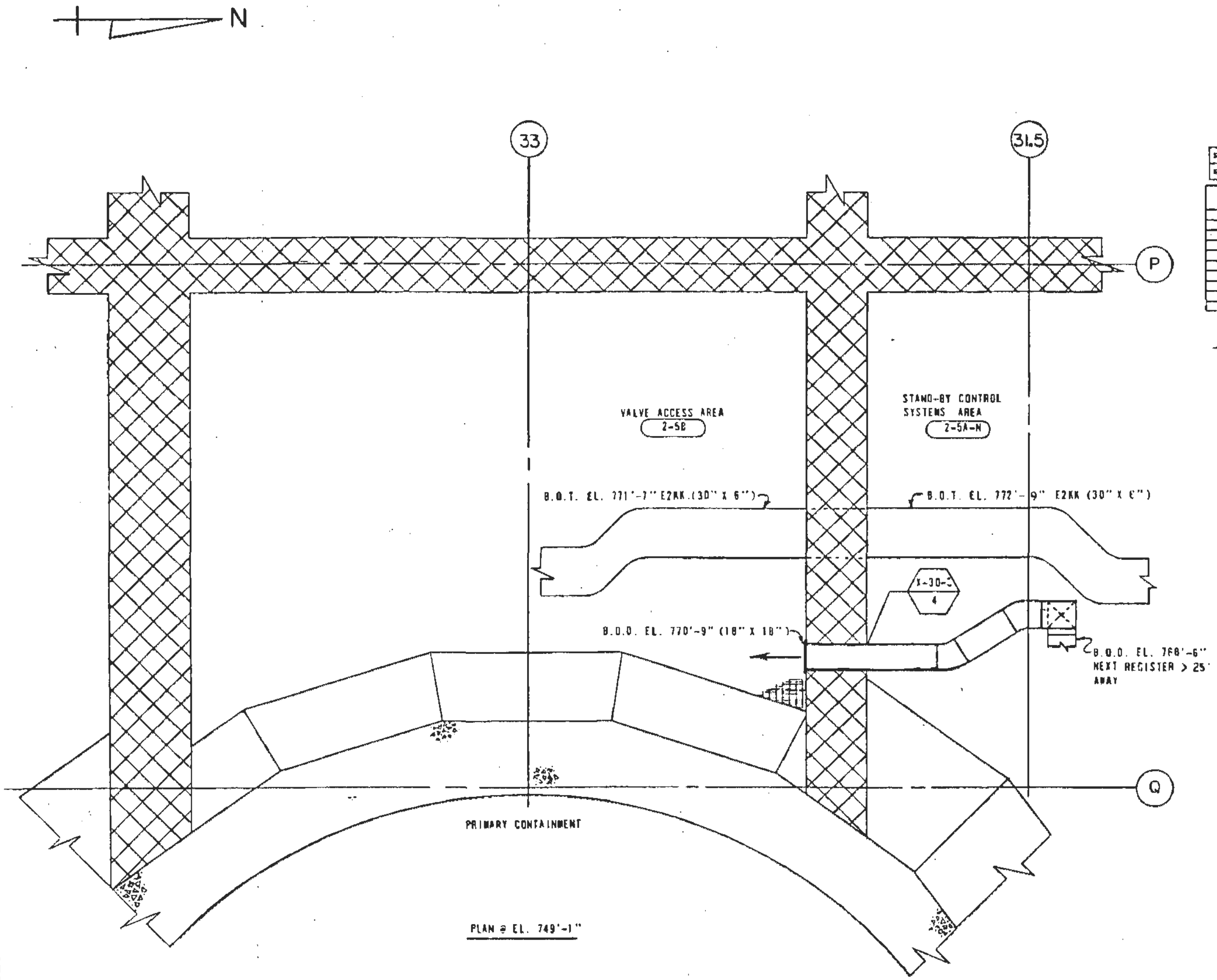
Fire Zone 2-5B has minimal combustibles and the nearest combustible to the duct supply air register is cable tray E2KK which is offset horizontally from the duct by approximately 6 feet. Based on the minimal combustibles in Fire Zone 2-5B and the nearest opening in the duct assembly in Fire Zone 2-5A-N being greater than 35' from penetration X-30-5-4, a fire initiated in Fire Zone 2-5B would not generate enough heat to adversely impact any system in Fire Zone 2-5A-N.

b) Fire initiated in Fire Zone 2-5A-N with potential to spread to Fire Zone 2-5B.

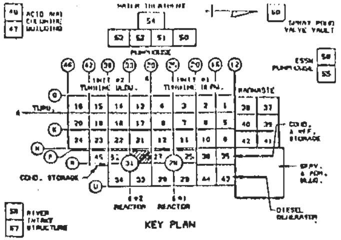
Fire Zone 2-5A-N is protected by an automatic fire suppression system which would mitigate the consequences of the heat generated in Fire Zone 2-5A-N as a result of a fire in Fire Zone 2-5A-N. Therefore, a fire initiated in Fire Zone 2-5A-N would not generate enough heat to adversely impact any system in Fire Zone 2-5B.

CONCLUSION:

Based on the above discussion, NFPA 90A, Section 3-3.2.1.1, the physical layout of the adjacent Fire Zones and the combustible configuration within the Fire Zones, a fire damper is not required in penetration X-30-5-4.



PLAN @ EL. 749'-1"



KEY PLAN

FLOOR LEVEL	TURBINE BLDG. EL.	REACTOR BLDG. EL.	RADWASTE BLDG. EL.	DIESEL GENERATOR EL.	DRYWELL REACTOR BLDG. EL.	CONTROL BLDG. EL.
1	656'0"	645'0"	646'0"	660'0"		
2	676'0"	670'0"	660'0"	677'0"	704'0"	676'0"
3	699'0"	683'0"	676'0"	710'0"	719'1"	698'0"
4	729'0"	719'1"	691'6"		739'11½"	714'0"
5	762'0"	749'1"			752'2½"	729'0"
6	786'0"	779'1"			779'1"	741'0"
7		818'1"				754'0"
12					791'1"	771'0"
14					806'0"	783'0"
18		799'1"				806'0"

NOTE:

1. FOR LEGEND SEE DWG. A-205790, SHT. 1

SUSQUEHANNA S.E.S.
UNIT2
APPENDIX "R"
DEVIATION REQUEST NO. 11
PENETRATION X-30-5-4

AREA 30 | ELEV. 749'-1" | SCALE NA

PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PP&L DRAWING NO. C-205789
SHEET NO. 9
REV. NO. 1
AE DRAWING NO. C-1693 SH.9

FRACTIONAL DECIMAL LOCATION CODES G 2 B 0 1 C F SORTS

PP&L FORM 3525C (1/84)

PENETRATION:	X-30-5-5
ADJACENT FIRE ZONES:	2-5B/2-5A-N
DUCT SIZE AT PENETRATION:	22" X 22"
VENTILATION SYSTEM:	REACTOR BUILDING ZONE II EQUIPMENT COMPARTMENT (FILTERED) EXHAUST

DISCUSSION:

As shown on Sht. 10 of attached Drawing C-205789, the duct assembly penetrates the fire barrier wall at Elevation 773'-3". This penetration joins Fire Zone 2-5B with Fire Zone 2-5A-N. Fire Zone 2-5A-N is a fully sprinklered area.

JUSTIFICATION:

a) Fire initiated in Fire Zone 2-5B with potential to spread to Fire Zone 2-5A-N.

Fire Zone 2-5B has minimal combustibles and there is an exhaust air register in the duct assembly in Fire Zone 2-5B. However, the first opening in the duct assembly in Fire Zone 2-5A-N is greater than 30 feet from penetration X-30-5-5. Therefore, a fire initiated in Fire Zone 2-5B would not generate enough heat to adversely impact any system in Fire Zone 2-5A-N.

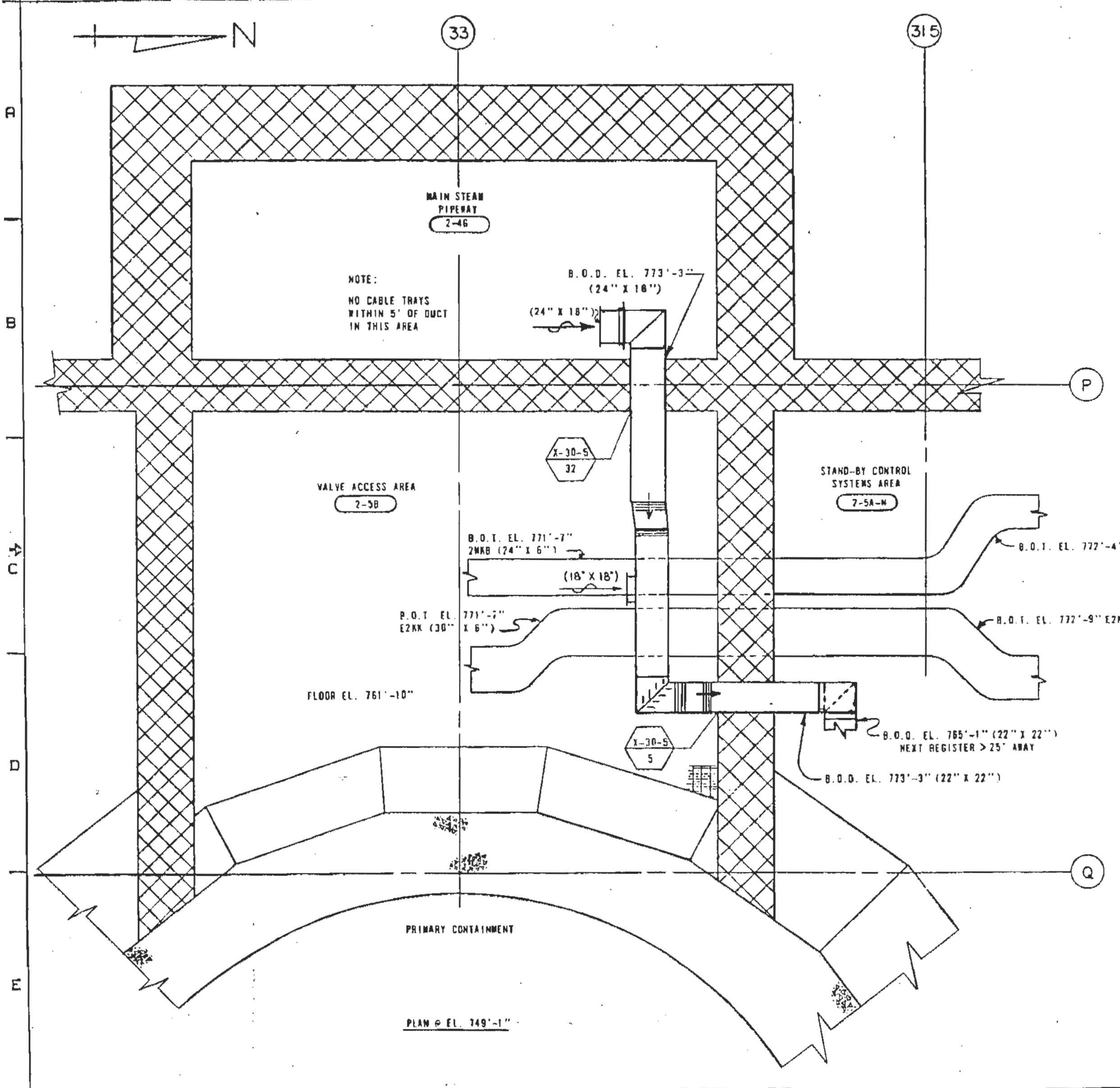
b) Fire initiated in Fire Zone 2-5A-N with potential to spread into Fire Zone 2-5B.

Fire Zone 2-5A-N is protected by an automatic fire suppression system which would mitigate the consequences of any heat generated in Fire Zone 2-5A-N as a result of a fire in Fire Zone 2-5A-N. Therefore, a fire initiated in Fire Zone 2-5A-N would not generate enough heat to adversely impact any system in Fire Zone 2-5B. This automatic suppression system would also mitigate the effects of heat being further transmitted through the duct assembly into Fire Zone 2-4G.

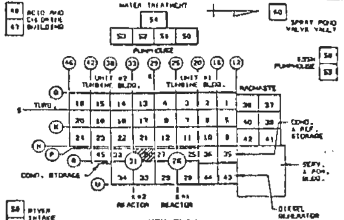
As this duct assembly continues, it enters Fire Zone 2-4G, which also must be separated from Fire Zone 2-5A-N. However, using the same reasoning as in the above paragraph, a fire in Fire Zone 2-5A-N would not have a path capable of spreading fire to Fire Zone 2-4G.

CONCLUSION:

Based on the above discussion, NFPA 90A, Section 3-3.2.1.1, the physical layout of the adjacent Fire Zones and the combustible configuration within the Fire Zones, a fire damper is not required in penetration X-30-5-5.



PLAN @ EL. 749'-1"



KEY PLAN

FLOOR LEVEL	TURBINE BLDG. EL.	REACTOR BLDG. EL.	RADWASTE BLDG. EL.	DIESEL GENERATOR EL.	DRYWELL REACTOR BLDG. EL.	CONTROL BLDG. EL.
1	656'0"	645'0"	646'0"	660'0"		
2	676'0"	670'0"	660'0"	677'0"	704'0"	676'0"
3	699'0"	683'0"	676'0"	710'0"	719'1"	699'0"
4	729'0"	719'1"	691'6"		738'11½"	714'0"
5	762'0"	749'1"			752'2½"	729'0"
6	714'0"	779'1"			778'1"	741'0"
7		818'1"				754'0"
12					751'1"	771'0"
13					806'0"	783'0"
14		799'1"				806'0"

NOTE:

1. FOR LEGEND SEE DWG. A-205790, SHT. 1

SUSQUEHANNA S.E.S.
UNIT 2
APPENDIX "R"
DEVIATION REQUEST NO. 11
PENETRATION X-30-5-5 &
X-30-5-32

AREA 30	ELEV. 749'-1"	SCALE NA

PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PP&L DRAWING NO.	SHEET NO.	REV. NO.
C-205789	10	2
AE DRAWING NO. C-1693 SH. 10		

FRACTIONAL DECIMAL LOCATION CODES SORTS

PENETRATION:	X-30-5-32
ADJACENT FIRE ZONES:	2-5B/2-4G
DUCT SIZE AT PENETRATION:	24" X 18"
VENTILATION SYSTEM:	REACTOR BUILDING ZONE II EQUIPMENT COMPARTMENT (FILTERED) EXHAUST

DISCUSSION:

As shown on Sht. 10 of Drawing C-205789, the duct assembly penetrates the fire barrier wall at Elevation 773'-3". This penetration joins Fire Zone 2-5B with Fire Zone 2-4G. An exhaust air register is located within Fire Zone 2-4G and Fire Zone 2-5B.

JUSTIFICATION:

a) Fire initiated in Fire Zone 2-4G with potential to spread to Fire Zone 2-5B.

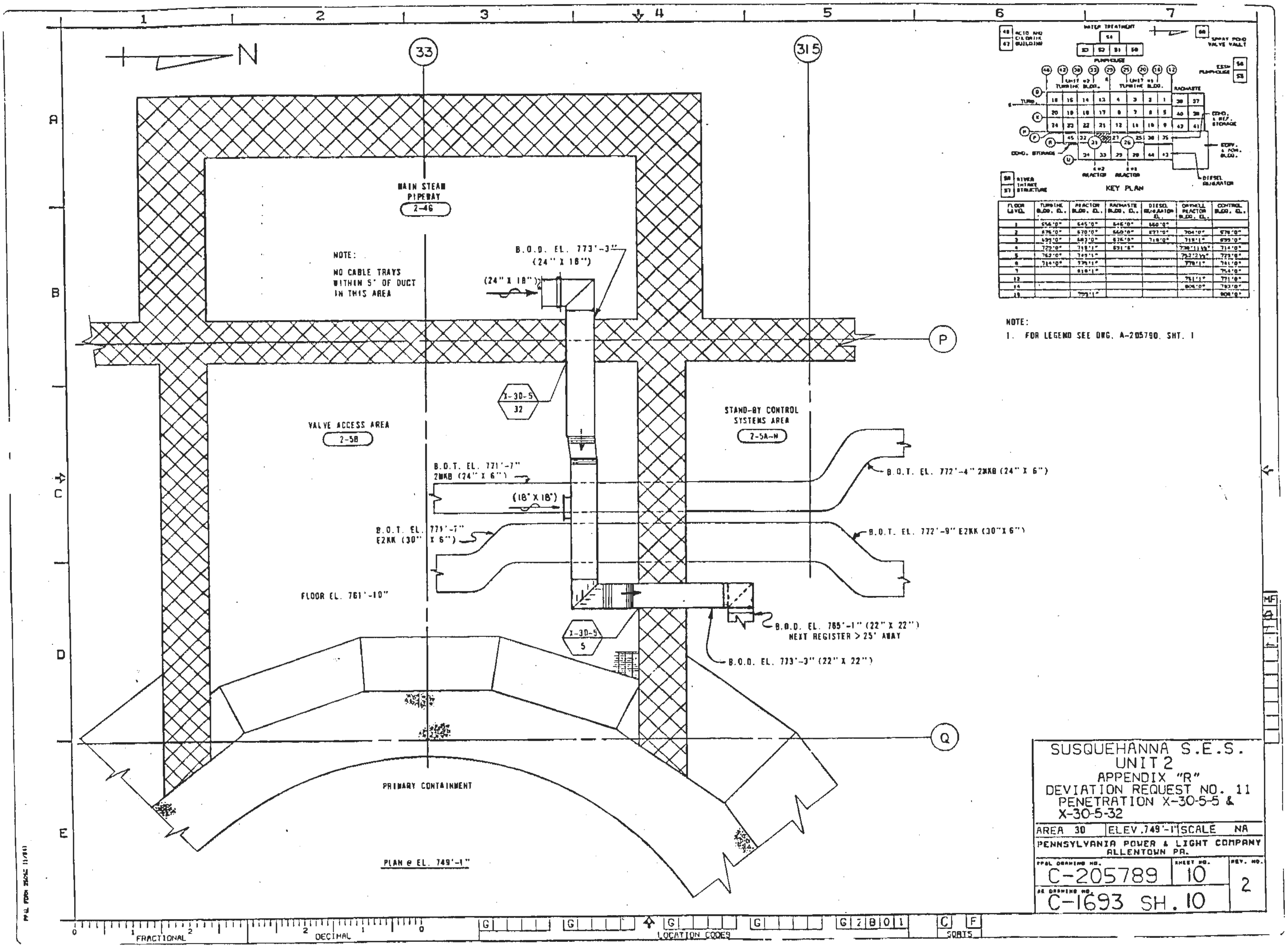
Fire Zone 2-4G has minimal combustibles and there are no combustibles located near the exhaust air register in Fire Zone 2-4G. There is an exhaust air register in the duct assembly in Fire Zone 2-5B. Therefore, a fire initiated in Fire Zone 2-4G would not generate enough heat to adversely impact any system in Fire Zone 2-5B. Additionally, the lack of combustibles in Fire Zone 2-4G inhibits the effect of a fire in Fire Zone 2-4G from adversely impacting any system in Fire Zone 2-5A-N.

b) Fire initiated in Fire Zone 2-5B with potential to spread into Fire Zone 2-4G.

Fire Zone 2-5B has minimal combustibles and there is an exhaust air register in the duct assembly in Fire Zone 2-5B. Additionally, there are no combustibles located near the exhaust air register in Fire Zone 2-4G. Therefore, a fire initiated in Fire Zone 2-5B would not generate enough heat to adversely impact any system in Fire Zone 2-4G.

CONCLUSION:

Based on the above discussion, NFPA 90A, Section 3-3.2.1.1, the physical layout of the adjacent Fire Zones and the combustible configuration within the Fire Zones, a fire damper is not required in penetration X-30-5-32.



FLOOR LEVEL	TURBINE BLDG. EL.	REACTOR BLDG. EL.	RADWASTE BLDG. EL.	DIESEL GENERATOR EL.	DRYWELL REACTOR BLDG. EL.	CONTROL BLDG. EL.
1	656'0"	645'0"	646'0"	660'0"		
2	676'0"	670'0"	660'0"	677'0"	704'0"	676'0"
3	699'0"	683'0"	676'0"	710'0"	719'1"	699'0"
4	729'0"	719'1"	691'6"		738'11½"	714'0"
5	762'0"	749'1"			752'2½"	729'0"
6	714'0"	779'1"			779'1"	741'0"
7		818'1"				754'0"
12					751'1"	771'0"
14					806'0"	783'0"
19		799'1"				806'0"

NOTE:

1. FOR LEGEND SEE DWG. A-205790, SHT. 1

SUSQUEHANNA S.E.S.
UNIT 2
APPENDIX "R"
DEVIATION REQUEST NO. 11
PENETRATION X-30-5-5 &
X-30-5-32

AREA 30 | ELEV. 749'-1" | SCALE NA

PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PP&L DRAWING NO. C-205789 SHEET NO. 10 REV. NO. 2
AE DRAWING NO. C-1693 SH. 10

PENETRATION:	X-30-5-50
ADJACENT FIRE ZONES:	2-5B/2-5A-N
DUCT SIZE AT PENETRATION:	30" X 26"
VENTILATION SYSTEM:	UNIT 2 PRIMARY CONTAINMENT DRYWELL PURGE EXHAUST TO STANDBY GAS TREATMENT

DISCUSSION:

As shown on Shts. 11 and 11A of Drawing C-205789, this duct assembly penetrates the fire barrier wall at Elevation 770'-9". This penetration joins Fire Zone 2-5B with Fire Zone 2-5A-N. There are no duct openings in either Fire Zone. Fire Zone 2-5A-N is a fully sprinklered area.

JUSTIFICATION:

a) Fire initiated in Fire Zone 2-5B with potential to spread to Fire Zone 2-5A-N.

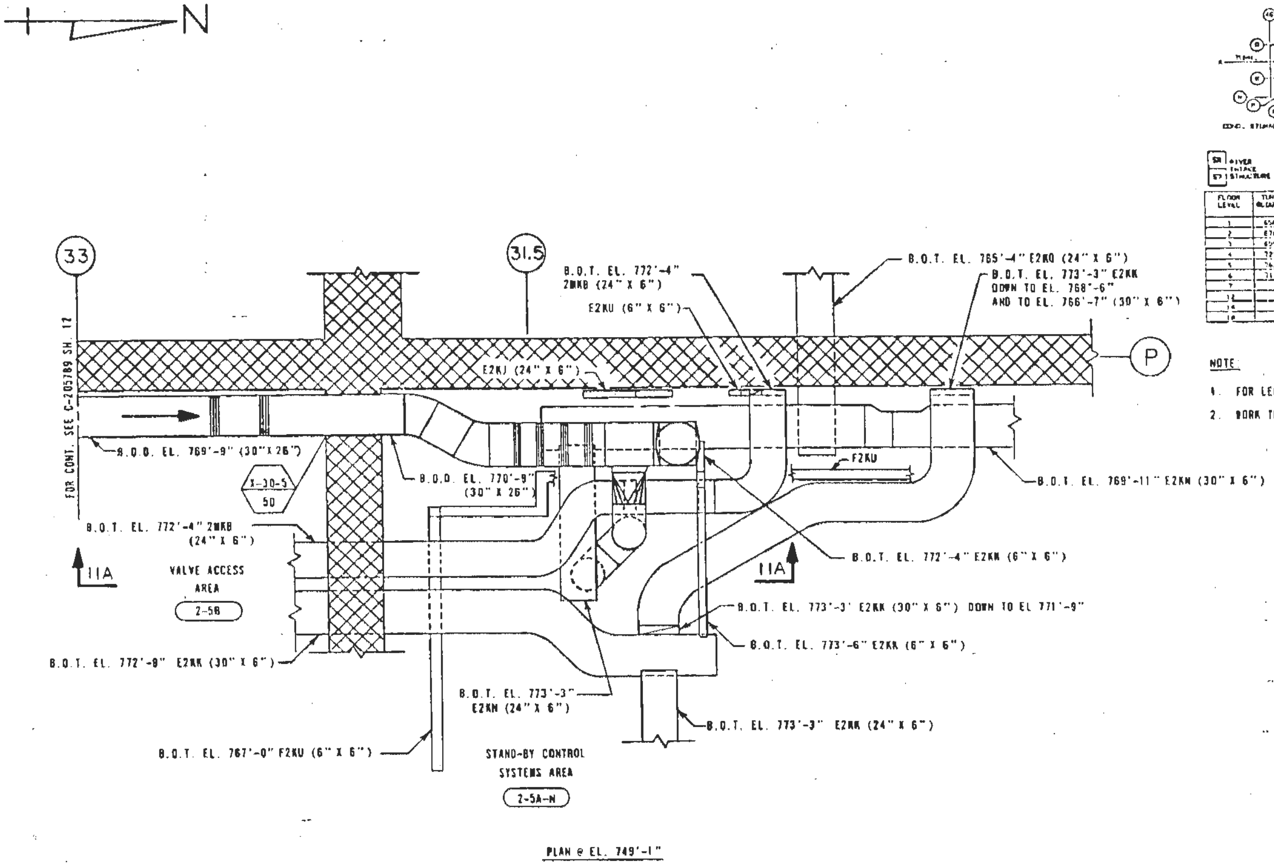
Fire Zone 2-5B has minimal combustibles and the nearest combustible is approximately 5 feet from the duct assembly. Also, there are no openings in the duct assembly in this zone. Therefore a fire initiated in Fire Zone 2-5B would not generate enough heat to adversely impact any system in Fire Zone 2-5A-N.

b) Fire initiated in Fire Zone 2-5A-N with potential to spread to Fire Zone 2-5B.

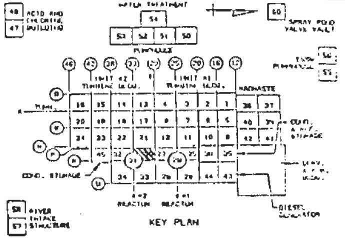
Fire Zone 2-5A-N is protected by an automatic fire suppression system and there are no openings in the duct assembly in this zone. The automatic suppression system would mitigate the consequences of any heat generated in Fire Zone 2-5A-N as a result of a fire in Fire Zone 2-5A-N and, therefore, a fire initiated in Fire Zone 2-5A-N would not generate enough heat to adversely impact any system in Fire Zone 2-5B.

CONCLUSION:

Based on the above discussion, NFPA 90A, Section 3-3.2.1.1, the physical layout of the adjacent Fire Zones and the combustible configuration within the Fire Zones, a fire damper is not required in penetration X-30-5-50.



PLAN @ EL. 749'-1"



KEY PLAN

FLOOR LEVEL	TURBINE BLDG. EL.	REACTOR BLDG. EL.	RADWASTE BLDG. EL.	DIESEL GENERATOR EL.	DRYWELL REACTOR BLDG. EL.	CONTROL BLDG. EL.
1	656'0"	645'0"	646'0"	660'0"		
2	676'0"	670'0"	660'0"	677'0"	704'0"	676'0"
3	699'0"	683'0"	676'0"	710'0"	719'1"	[illegible]
4	729'0"	719'1"	691'6"		[illegible]	[illegible]
5	762'0"	749'1"			[illegible]	[illegible]
6	714'0"	779'1"			779'1"	[illegible]
7		818'1"				[illegible]
12					[illegible]	[illegible]
14					[illegible]	[illegible]
18		799'1"				[illegible]

NOTE

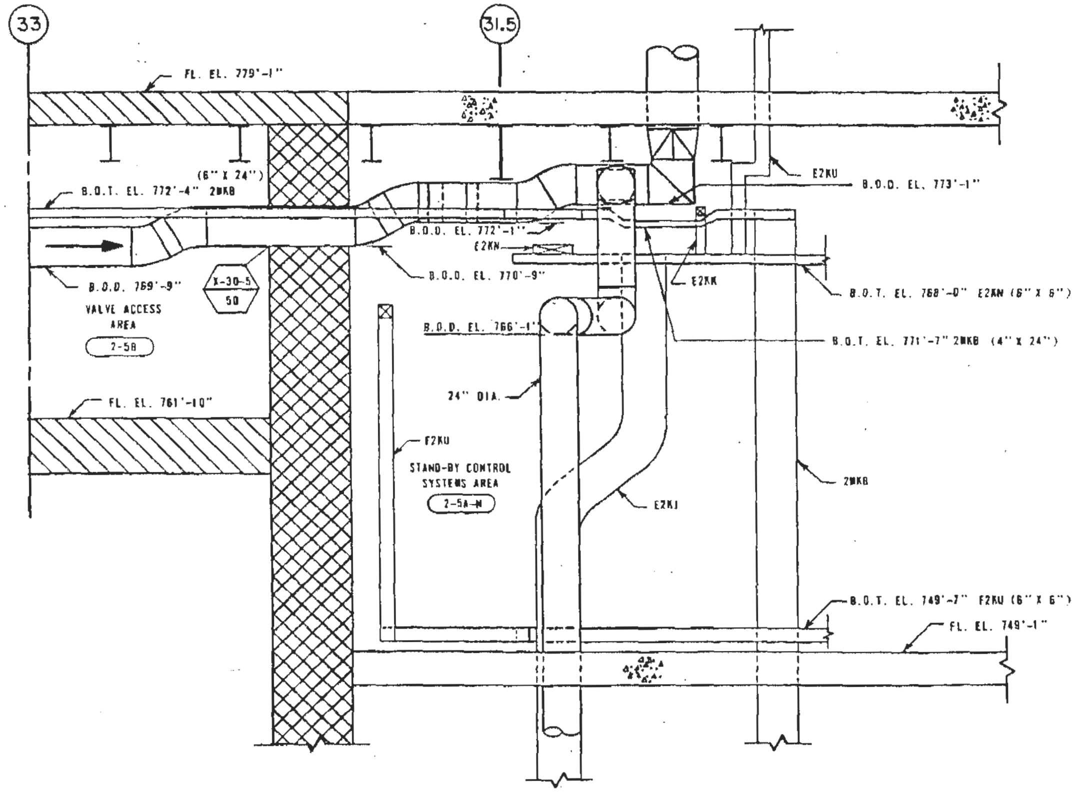
1. FOR LEGEND SEE DWG. A-205790, SHT. 1
2. WORK THIS DWG. WITH C-205789, SHT. 11A

SUSQUEHANNA S.E.S.
UNIT 2
APPENDIX "R"
DEVIATION REQUEST NO. 11
PENETRATION X-30-5-50

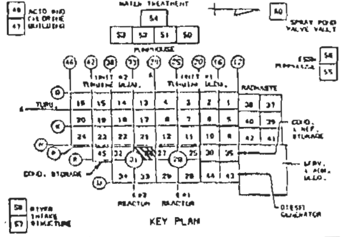
AREA 30 | ELEV 749'-1" | SCALE NA

PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PP&L DRAWING NO. C-205789
SHEET NO. 11
REV. NO. 1
BE DRAWING NO. C-1693 SH. 11



SECTION "11A-11A"



KEY PLAN

FLOOR LEVEL	TURBINE BLDG. EL.	REACTOR BLDG. EL.	RADWASTE BLDG. EL.	DIESEL GENERATOR EL.	DRYWELL REACTOR BLDG. EL.	CONTROL BLDG. EL.
1	656'0"	645'0"	646'0"	660'0"		
2	676'0"	670'0"	660'0"	677'0"	704'0"	676'0"
3	699'0"	683'0"	676'0"	710'0"	719'1"	697'0"
4	729'0"	719'1"	691'6"		[illegible]	714'0"
5	762'0"	749'1"			[illegible]	729'0"
6	714'0"	779'1"			779'1"	741'0"
7		818'1"				754'0"
12					781'1"	771'0"
14					806'0"	783'0"
10		799'1"				806'0"

NOTE:

1. FOR LEGEND SEE DWG. A-205790, SHT. 1
2. WORK THIS DWG. WITH C-205789, SHT. 11

SUSQUEHANNA S.E.S.
UNIT 2
APPENDIX "R"
DEVIATION REQUEST NO. 11
PENETRATION X-30-5-50

AREA 30	ELEV. 749'-1"	SCALE NA

PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PP&L DRAWING NO. C-205789
SHEET NO. 11A
REV. NO. 1
AE DRAWING NO. C-1693 SH. 11A

PP&L FORM 3505C (1/84)

FRACTIONAL DECIMAL LOCATION CODES G G G G G2B01 C F SORTS

PENETRATION:	X-32-4-3
ADJACENT FIRE ZONES:	2-4A-S/2-4G
DUCT SIZE AT PENETRATION:	30" X 18"
VENTILATION SYSTEM:	REACTOR BUILDING ZONE II SUPPLY

DISCUSSION:

As shown on Shts. 15 and 15A of Drawing C-205789, this duct assembly penetrates the fire barrier wall at Elevation 741'-11". This penetration joins Fire Zone 2-4A-S with Fire Zone 2-4G. A supply air register is located in Fire Zone 2-4G near the face of the fire barrier wall. Fire Zone 2-4A-S does not have sprinkler protection in the area of concern and Fire Zone 2-4G has no sprinkler protection.

JUSTIFICATION:

a) Fire initiated in Fire Zone 2-4G with potential to spread to Fire Zone 2-4A-S.

Fire Zone 2-4G has minimal combustibles with the only combustibles near penetration X-32-4-3 being two E2KJ cable trays. Based on the previously referenced analysis in this deviation request, the consequences of a fire in Fire Zone 2-4G would not adversely impact any systems in Fire Zone 2-4A-S. Therefore, a fire generated in Fire Zone 2-4G would not generate enough heat to adversely impact any systems in Fire Zone 2-4A-S.

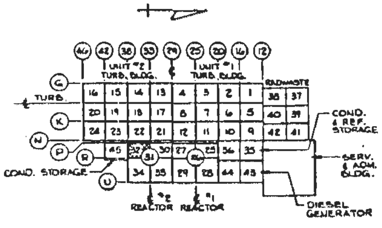
b) Fire initiated in Fire Zone 2-4A-S with potential to spread to Fire Zone 2-4G.

As discussed within the justification for this deviation request, the combustible configuration and fire hazards of this portion of Fire Zone 2-4A-S are bounded by the analyzed condition in Fire Zone 1-3B-N. The first opening in the duct assembly in Fire Zone 2-4A-S is greater than 25 feet from the subject penetration. Therefore, the combustible configuration in this portion of Fire Zone 2-4A-S would not generate enough heat to adversely impact any system in Fire Zone 2-4G.

CONCLUSION:

Based on the above discussion, NFPA 90A, Section 3-3.2.1.1, the physical layout of the adjacent Fire Zones and the combustible configuration within the Fire Zones, a fire damper is not required in penetration X-32-4-3.

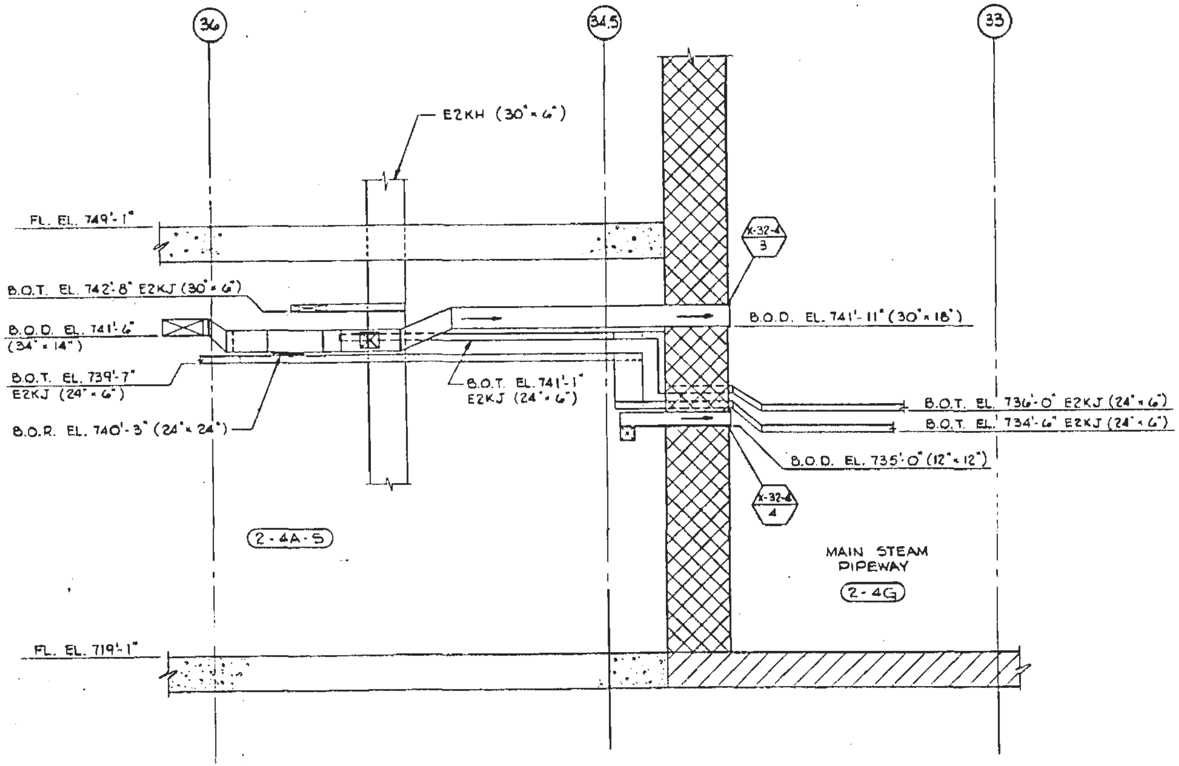
Security-Related Information
Figure Withheld Under 10 CFR 2.390



KEY PLAN

NOTES :

1. FOR LEGEND SEE DWG. A-205790, SH. 1.
2. WORK THIS DWG. WITH C-205789, SH. 15.



SECTION '15A - 15A'

SUSQUEHANNA S.E.S.
UNIT 2
APPENDIX 'R'
DEVIATION REQUEST NO. 11
PENETRATIONS X-32-4-3
& X-32-4-4

AREA 32	ELEV. 719'-1"	SCALE NA

PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PP&L DRAWING NO.	SHEET NO.	REV. NO.
C-205789	15A	0
AE DRAWING NO. C-1693 SH. 15A		

PENETRATION:	X-32-4-4
ADJACENT FIRE ZONES:	2-4A-S/2-4G
DUCT SIZE AT PENETRATION:	12" X 12"
VENTILATION SYSTEM:	TRANSFER DUCT

DISCUSSION:

As shown on Shts. 15 and 15A of Drawing C-205789, the duct assembly penetrates the fire barrier wall at Elevation 735'-0". This penetration joins Fire Zone 2-4A-S with Fire Zone 2-4G. An air register is located in Fire Zone 2-4G near the face of the fire barrier wall. This duct system is a transfer duct which supplies air from Fire Zone 2-4A-S to Fire Zone 2-4G at a rate of 500 cfm. Fire Zone 2-4A-S does not have sprinkler protection in the area of concern and Fire Zone 2-4G has no sprinkler protection.

JUSTIFICATION:

a) Fire initiated in Fire Zone 2-4G with potential to spread to Fire Zone 2-4A-S.

Fire Zone 2-4G has minimal combustibles with the nearest combustibles being two E2KJ cable trays. These trays are located at approximately the same elevation as the air register of the duct system. Any heat generated by these two cable trays would have a minimal effect on this transfer duct. Therefore, a fire initiated in Fire Zone 2-4G would not adversely impact any systems in Fire Zone 2-4-A-S.

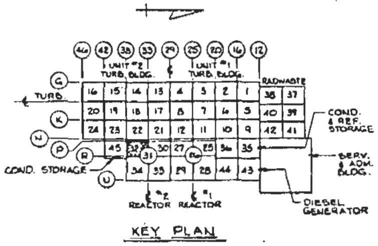
b) Fire initiated in Fire Zone 2-4A-S with potential to spread to Fire Zone 2-4G.

There are no significant combustibles in area beneath the transfer duct grill in Fire Zone 2-4A-S. Any heat generated by the combustibles in Fire Zone 2-4A-S would migrate upwards and not be significant enough to impact the transfer duct. Therefore, a fire generated in Fire Zone 2-4A-S would not generate enough heat to adversely impact any systems in Fire Zone 2-4G.

CONCLUSION:

Based on the above discussion, NFPA 90A, Section 3-3.2.1.1, the physical layout of the adjacent Fire Zones and the combustible configuration within the Fire Zones, a fire damper is not required in penetration X-32-4.4.

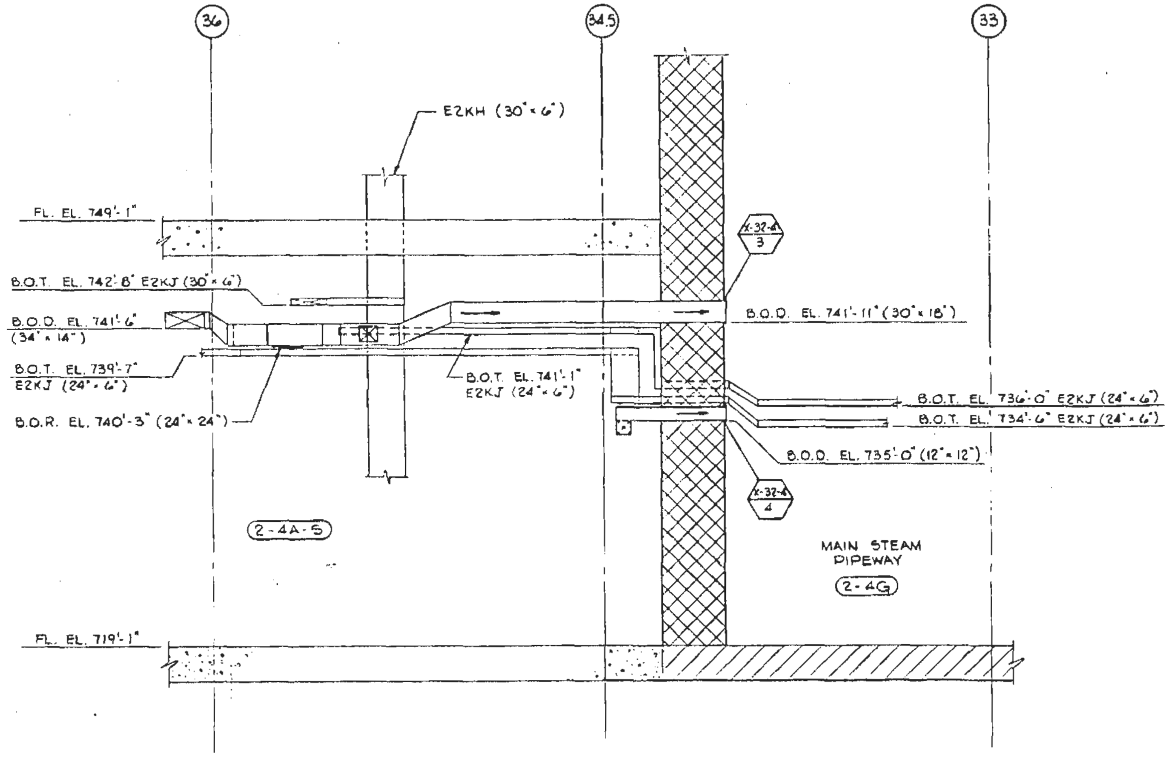
Security-Related Information
Figure Withheld Under 10 CFR 2.390



KEY PLAN

NOTES:

1. FOR LEGEND SEE DWG. A-205790, SH. 1.
2. WORK THIS DWG. WITH C-205789, SH. 15.



SECTION "15A-15A"

SUSQUEHANNA S.E.S.
UNIT 2
APPENDIX 'R'
DEVIATION REQUEST NO. 11
PENETRATIONS X-32-4-3
& X-32-4-4

AREA 32	ELEV. 719'-1"	SCALE NA

PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PP&L DRAWING NO.	SHEET NO.	REV. NO.
C-205789	15A	0
AE DRAWING NO. C-1693 SH. 15A		

PENETRATION:	X-32-5-41
ADJACENT FIRE ZONES:	2-5A-S/2-5B
DUCT SIZE AT PENETRATION:	30" X 26"
VENTILATION SYSTEM:	UNIT 2 PRIMARY CONTAINMENT DRYWELL PURGE EXHAUST TO STANDBY GAS TREATMENT

DISCUSSION:

As shown on Shts. 12 and 12A of Drawing C-205789, the duct assembly penetrates the fire barrier at Elevation 769'-9". This penetration joins Fire Zone 2-5A-S with Fire Zone 2-5B. There are no duct openings in either Fire Zone.

JUSTIFICATION:

a) Fire initiated in Fire Zone 2-5A-S with potential to spread to Fire Zone 2-5B.

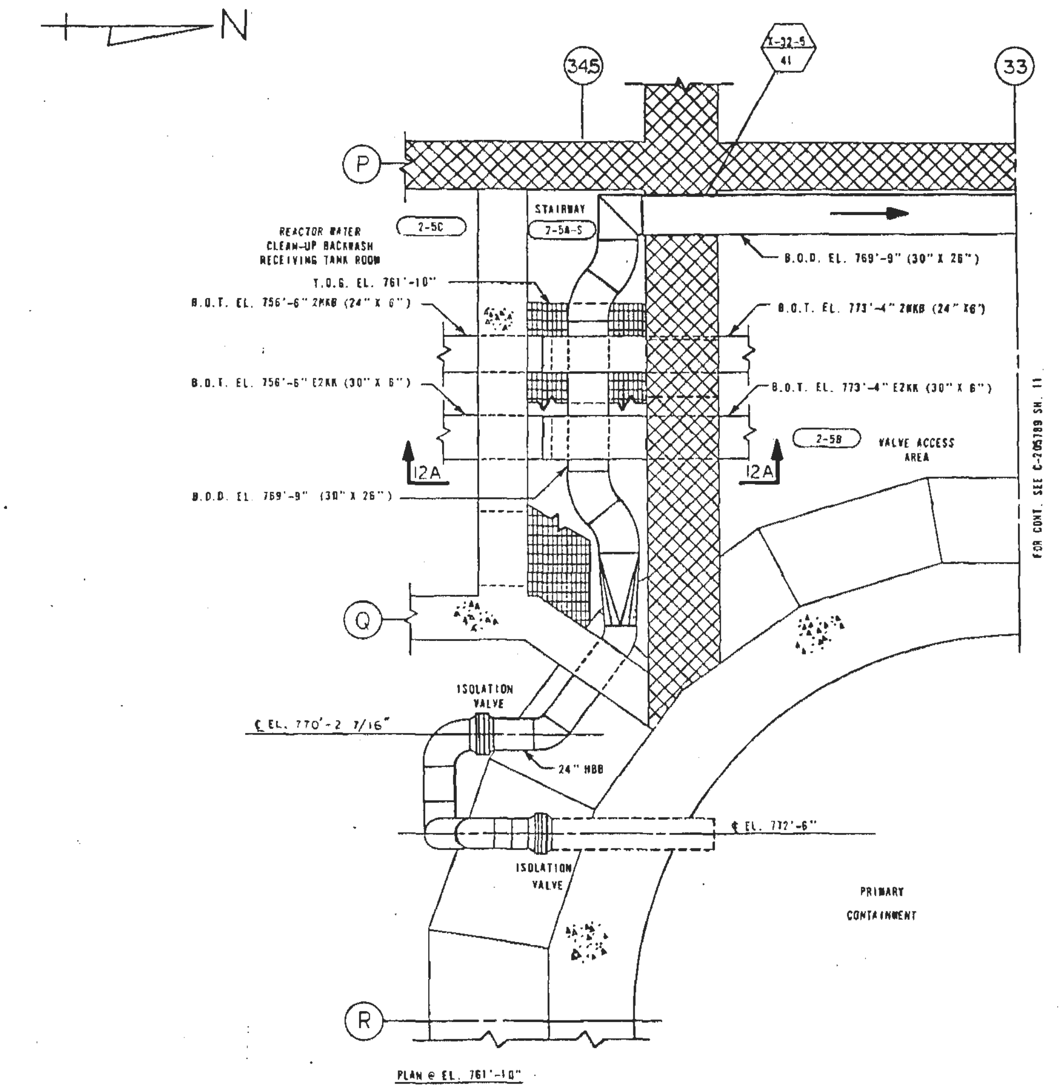
There are no openings in the duct assembly in Fire Zone 2-5A-S or Fire Zone 2-5B and the only combustibles near the duct assembly in Fire Zone 2-5A-S are on the side of and above the duct. Therefore, a fire initiated in Fire Zone 2-5A-S would not generate enough heat to adversely impact any system in Fire Zone 2-5B.

b) Fire initiated in Fire Zone 2-5B with potential to spread to Fire Zone 2-5A-S.

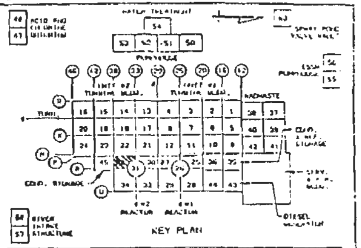
The duct assembly in Fire Zone 2-5B has no openings and the combustible loading in this zone is minimal with no combustibles within 5' of the duct. Therefore, a fire initiated in Fire Zone 2-5B would not generate enough heat to adversely impact any system in Fire Zone 2-5A-S.

CONCLUSION:

Based on the above discussion, NFPA 90A, Section 3-3.2.1.1, the physical layout of the adjacent Fire Zones and the combustible configuration within the Fire Zones, a fire damper is not required in penetration X-32-5-41.



PLAN @ EL. 761'-10"



KEY PLAN

FLOOR LEVEL	TURBINE BLDG. EL.	REACTOR BLDG. EL.	RADWASTE BLDG. EL.	DIESEL GENERATOR EL.	DRYWELL REACTOR BLDG. EL.	CONTROL BLDG. EL.
1	656'0"	645'0"	646'0"	660'0"		
2	676'0"	670'0"	[illegible]	677'0"	704'0"	[illegible]
3	699'0"	683'0"	676'0"	710'0"	719'1"	[illegible]
4	729'0"	719'1"	691'6"		[illegible]	[illegible]
5	762'0"	749'1"			[illegible]	[illegible]
6	714'0"	779'1"			770'1"	[illegible]
7		818'1"				[illegible]
12					[illegible]	[illegible]
14					[illegible]	[illegible]
16		[illegible]				[illegible]

NOTE:

1. FOR LEGEND SEE DWG. A-205790, SHT. 1.
2. WORK THIS DWG. WITH C-205789, SHT. 12A.

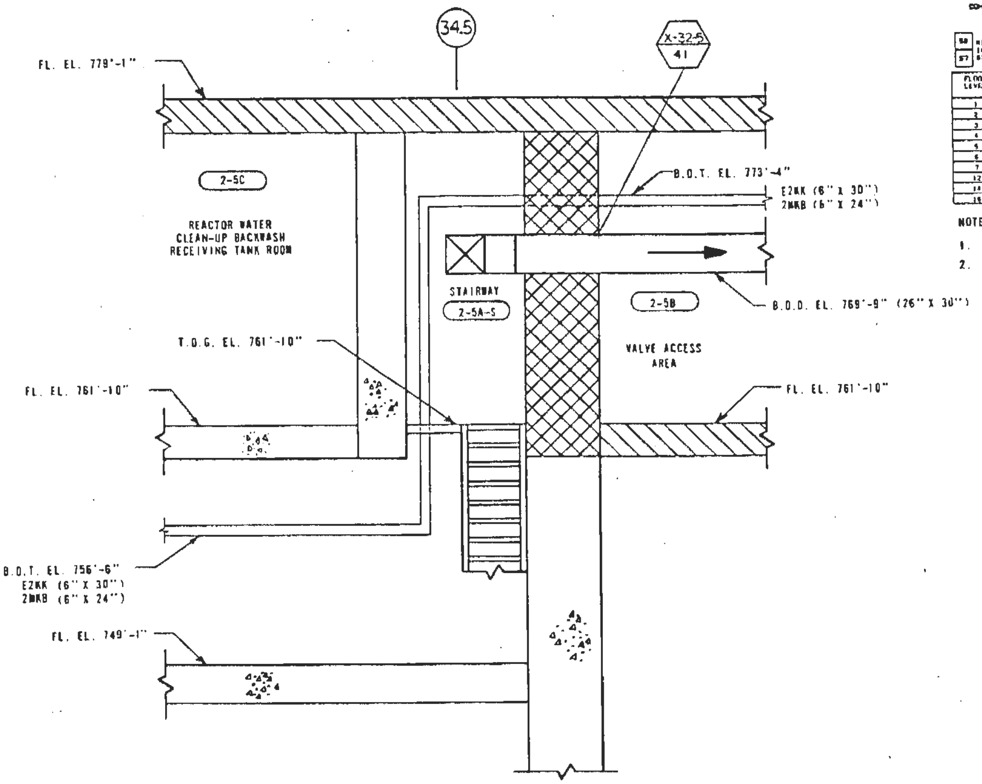
SUSQUEHANNA S.E.S.
UNIT 2
APPENDIX "R"
DEVIATION REQUEST NO. 11
PENETRATION X-32-5-41

AREA 32 | ELEV 749'-1" | SCALE NF

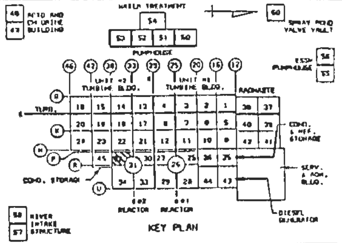
PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PPAL DRAWING NO. C-205789 | SHEET NO. 12 | REV. NO. 1

AE DRAWING NO. C-1693 SH.12



SECTION "12A-12A"



KEY PLAN

FLOOR LEVEL	TURBINE BLDG. EL.	REACTOR BLDG. EL.	RADWASTE BLDG. EL.	DIESEL GENERATOR EL.	DRYWELL REACTOR BLDG. EL.	CONTROL BLDG. EL.
1	656'0"	645'0"	646'0"	660'0"		
2	676'0"	670'0"	660'0"	677'0"	704'0"	676'0"
3	699'0"	683'0"	676'0"	710'0"	719'1"	699'0"
4	729'0"	719'1"	691'6"		738'11½"	714'0"
5	762'0"	749'1"			752'2½"	729'0"
6	714'0"	779'1"			778'1"	741'0"
7		818'1"				754'0"
12					751'1"	771'0"
18					806'0"	783'0"
19		737'1"				806'0"

NOTE:

1. FOR LEGEND SEE DWG. A-205790, SHT. 1.
2. WORK THIS DWG. WITH C-205789, SHT. 12.

SUSQUEHANNA S.E.S.
UNIT 2
APPENDIX "R"
DEVIATION REQUEST NO. 11
PENETRATION X-32-5-41

AREA 32	ELEV. 749'-1"	SCALE NA

PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PP&L DRAWING NO.	SHEET NO.	REV. NO.
C-205789	12A	1
AE DRAWING NO. C-1693 SH.12A		

FRACTIONAL DECIMAL LOCATION CODES G G G G G 2 B 0 1 C F SORTS

PENETRATION:	X-33-5-26
ADJACENT FIRE ZONES:	2-5A-W/2-5E
DUCT SIZE AT PENETRATION:	12" X 8"
VENTILATION SYSTEM:	REACTOR BUILDING ZONE II SUPPLY

DISCUSSION:

As shown on Shts. 13 and 14A of Drawing C-205789, this duct assembly penetrates the fire barrier wall at Elevation 767'-1". This penetration joins Fire Zone 2-5A-W with Fire Zone 2-5E. A supply air register is located in Fire Zone 2-5E near the face of the fire barrier wall. Fire Zone 2-5A-W is a fully sprinklered area.

JUSTIFICATION:

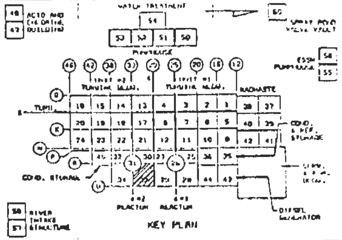
a) Fire initiated in Fire Zone 2-5E with potential to spread to Fire Zone 2-5A-W.

Fire Zone 2-5E has minimal combustibles. The first opening in adjacent Fire Zone 2-5A-W is approximately 18 feet from the supply air register in Fire Zone 2-5E. Therefore, a fire initiated in Fire Zone 2-5E would not generate enough heat to adversely impact any system in Fire Zone 2-5A-W.

b) Fire Zone 2-5A-W is protected by an automatic fire suppression system which would mitigate the consequences of any heat generated in Fire Zone 2-5A-W as a result of a fire in Fire Zone 2-5A-W. Therefore, a fire initiated in Fire Zone 2-5A-W would not generate enough heat to adversely impact any system in Fire Zone 2-5E.

CONCLUSION:

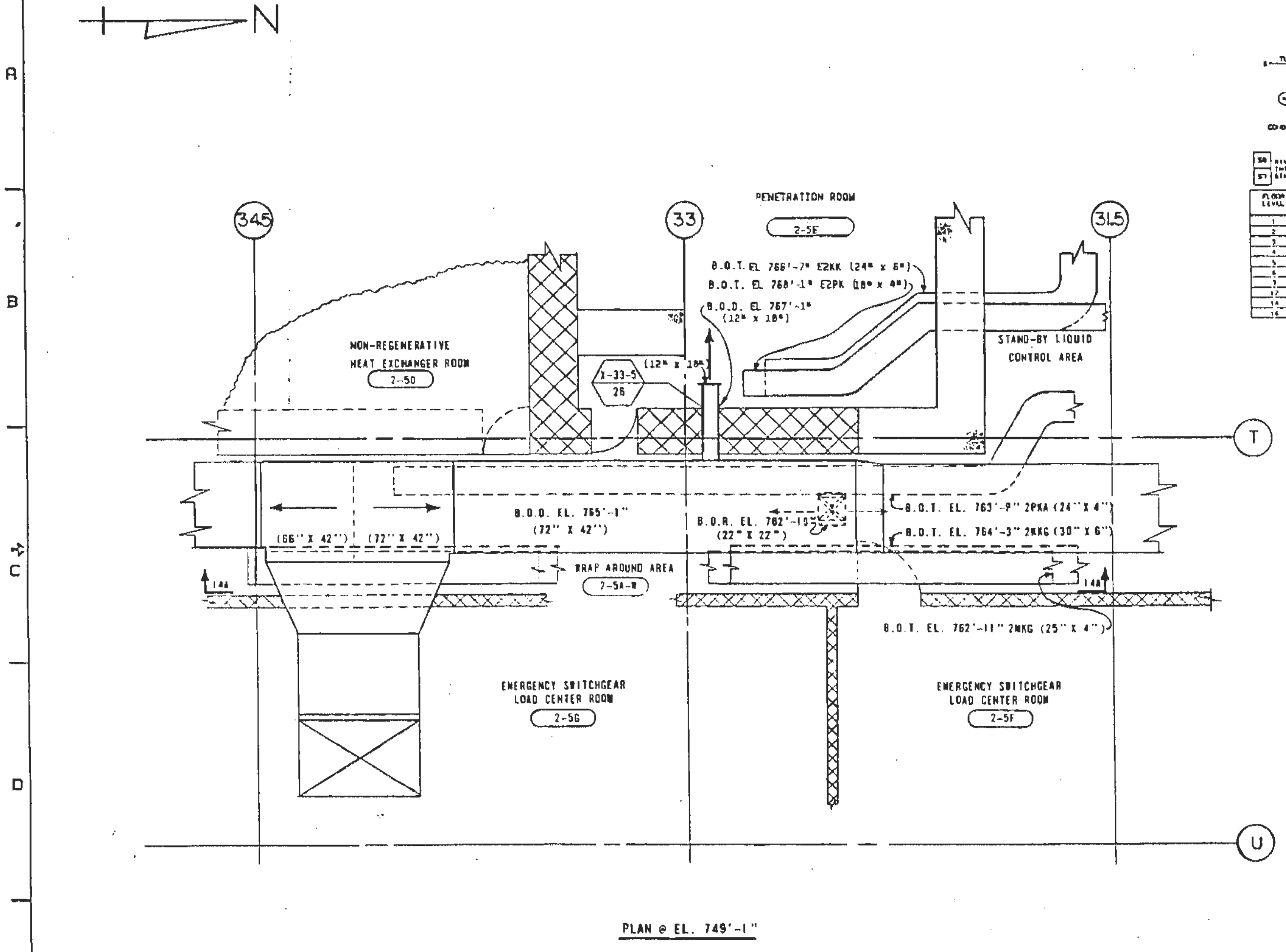
Based on the above discussion, NFPA 90A, Section 3-3.2.1.1, the physical layout of the adjacent Fire Zones and the combustible configuration within the Fire Zones, a fire damper is not required in penetration X-33-5-26.



FLOOR LEVEL	TURBINE BLDG. EL.	REACTOR BLDG. EL.	RADWASTE BLDG. EL.	DIESEL GENERATOR EL.	DRYWELL REACTOR BLDG. EL.	CONTROL BLDG. EL.
1	656'0"	645'0"	646'0"	660'0"		
2	676'0"	670'0"	660'0"	677'0"	704'0"	675'0"
3	699'0"	[illegible]	676'0"	710'0"	[illegible]	[illegible]
4	729'0"	719'1"	[illegible]		[illegible]	714'0"
5	752'0"	749'1"			[illegible]	[illegible]
6	[illegible]	[illegible]			[illegible]	741'0"
7		818'1"				[illegible]
12					[illegible]	[illegible]
14					[illegible]	[illegible]
16		[illegible]				[illegible]

NOTES:

1. FOR LEGEND SEE DRAWING A-205790, SHEET 1.
2. WORK THIS DRAWING WITH C-205789, SHEET 14A.



PLAN @ EL. 749'-1"

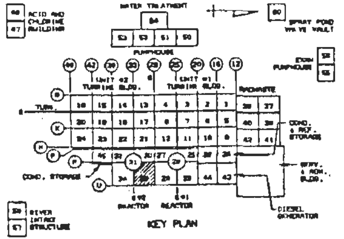
SUSQUEHANNA S.E.S.
UNIT 2
APPENDIX "R"
DEVIATION REQUEST NO. 11
PENETRATION X-33-5-26

AREA 33	ELEV. 749'-1"	SCALE NA

PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PP&L DRAWING NO.	SHEET NO.	REV. NO.
C-205789	13	1

BE DRAWING NO. C-1693 SH. 13

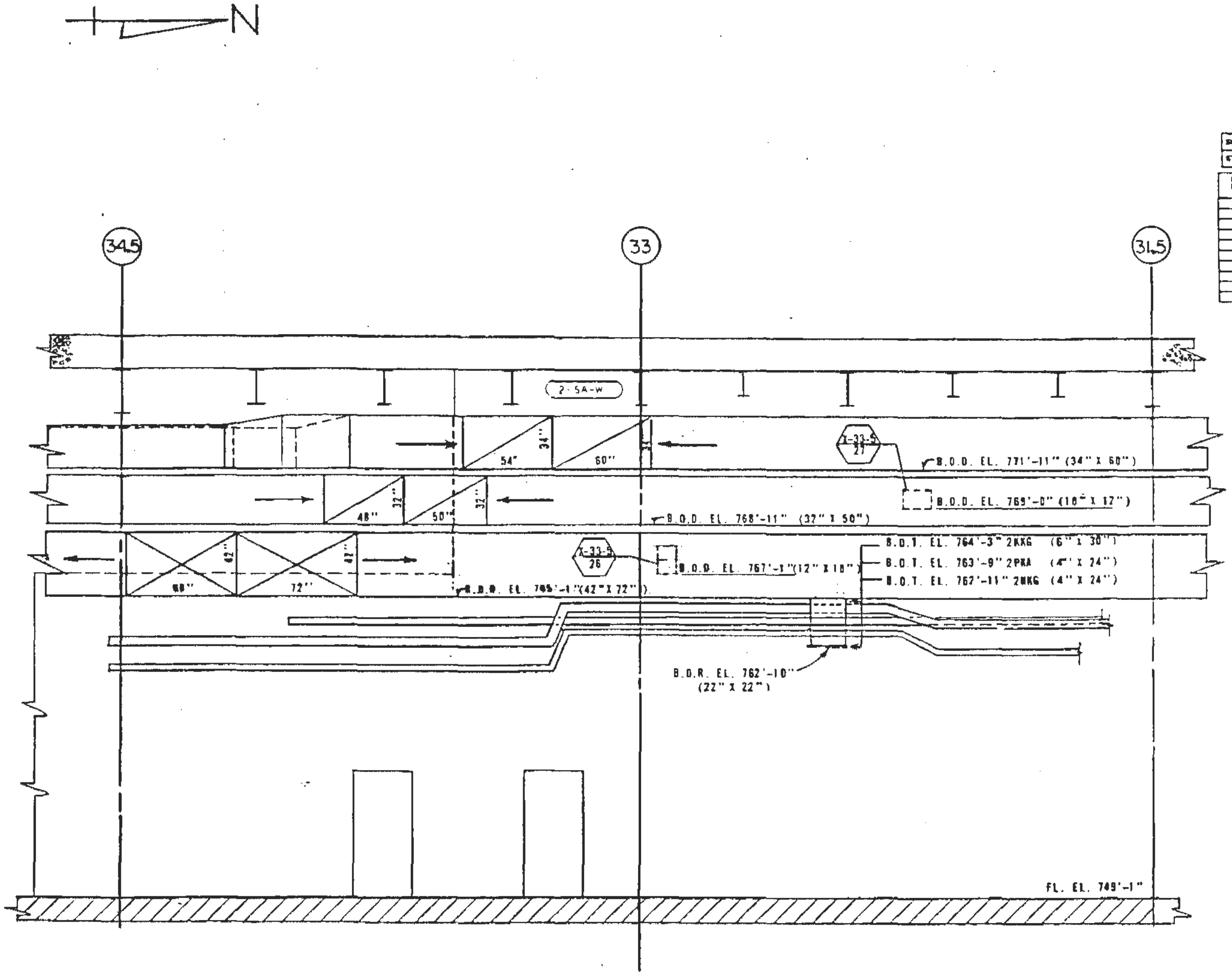


KEY PLAN

FLOOR LEVEL	TURBINE BLDG. EL.	REACTOR BLDG. EL.	RADWASTE BLDG. EL.	DIESEL GENERATOR EL.	DRYWELL REACTOR BLDG. EL.	CONTROL BLDG. EL.
1	[illegible]	645'0"	646'0"	660'0"		
2	676'0"	670'0"	660'0"	677'0"	704'0"	676'0"
3	[illegible]	683'0"	676'0"	710'0"	719'1"	[illegible]
4	729'0"	719'1"	691'6"		738'11½"	714'0"
5	752'0"	749'1"			752'2½"	729'0"
6	714'0"	779'1"			779'1"	741'0"
7		818'1"				754'0"
12					791'1"	771'0"
14					806'0"	783'0"
19		799'1"				806'0"

NOTES:

1. FOR LEGEND SEE DRAWING A-205790, SHEET 1.
2. WORK THIS DRAWING WITH C-205789, SHEETS 13 & 14.



SECTION 14A-14A

SUSQUEHANNA S.E.S.
UNIT 2
APPENDIX "R"
DEVIATION REQUEST NO. 11
PENETRATION X-33-5-26
AND X-33-5-27

AREA 33 | ELEV. 749'-1" | SCALE NA

PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PP&L DRAWING NO. C-205789 | SHEET NO. 14A | REV. NO. 1

AE DRAWING NO. C 1693 SH. 14A

FRACTIONAL DECIMAL LOCATION CODES G 2 B 0 1 C F SORTS

PP&L FORM 3595C (1-81)

PENETRATION:	X-33-5-27
ADJACENT FIRE ZONES:	2-5A-W/2-5E
DUCT SIZE AT PENETRATION:	18" X 12"
VENTILATION SYSTEM:	REACTOR BUILDING ZONE II EQUIPMENT COMPARTMENT (FILTERED) EXHAUST

DISCUSSION:

As shown on Shts. 14 and 14A of Drawing C-205789, the duct assembly penetrates the fire barrier wall at Elevation 769'-0". This penetration joins Fire Zone 2-5A-W with Fire Zone 2-5E. An exhaust air register is located at the face of the wall in Fire Zone 2-5E. Fire Zone 2-5A-W is a fully sprinklered area.

JUSTIFICATION:

a) Fire initiated in Fire Zone 2-5E with potential to spread to Fire Zone 2-5A-W.

Fire Zone 2-5E has minimal combustibles and there are no openings in the duct assembly in adjacent Fire Zone 2-5A-W. Therefore, a fire initiated in Fire Zone 2-5E would not generate enough heat to adversely impact any system in Fire Zone 2-5A-W.

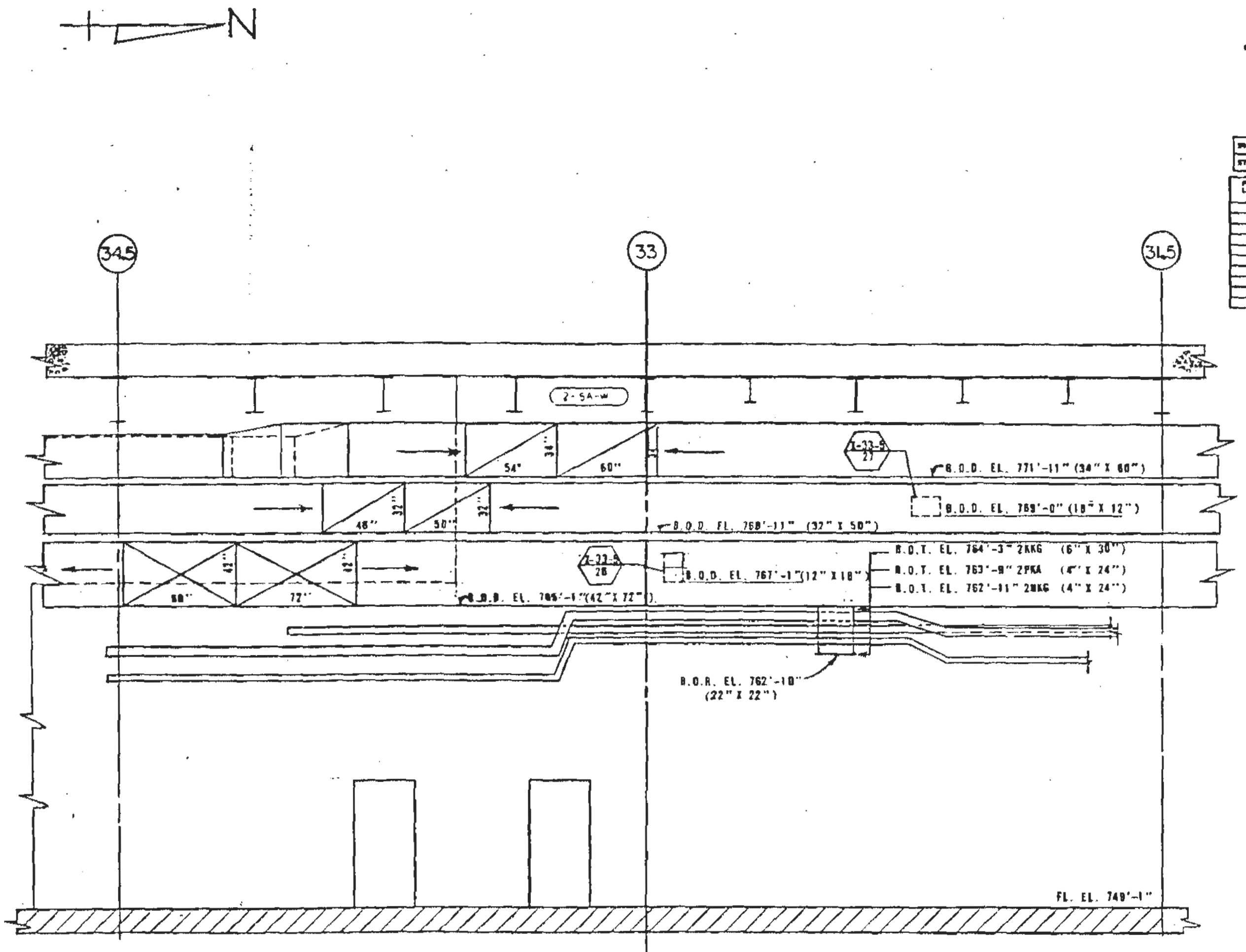
b) Fire initiated in Fire Zone 2-5A-W with potential to spread to Fire Zone 2-5E.

Fire Zone 2-5A-W is protected by an automatic fire suppression system which would mitigate the consequences of any heat generated as a result of a fire in Fire Zone 2-5A-W. Therefore, a fire initiated in Fire Zone 2-5A-W would not generate enough heat to adversely impact any system in Fire Zone 2-5E.

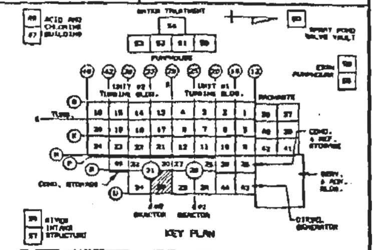
CONCLUSION:

Based on the above discussion, NFPA 90A, Section 3-3.2.1.1, the physical layout of the adjacent Fire Zones and the combustible configuration within the Fire Zones, a fire damper is not required in penetration X-33-5-27.

Security-Related Information
Figure Withheld Under 10 CFR 2.390



SECTION 14A-14A



KEY PLAN

FLOOR LEVEL	TURBINE BLDG. EL.	REACTOR BLDG. EL.	RADWASTE BLDG. EL.	DIESEL GENERATOR EL.	DRYWELL REACTOR BLDG. EL.	CONTROL BLDG. EL.
1	[illegible]	645'-0"	646'-0"	660'-0"		
2	676'-0"	670'-0"	660'-0"	677'-0"	704'-0"	676'-0"
3	699'-0"	683'-0"	676'-0"	710'-0"	719'-1"	698'-0"
4	729'-0"	719'-1"	691'-0"		738'-11½"	714'-0"
5	752'-0"	749'-1"			752'-2¼"	728'-0"
6	714'-0"	779'-1"			779'-1"	741'-0"
7		818'-1"				754'-0"
12					791'-1"	771'-0"
15					806'-0"	783'-0"
18		799'-1"				806'-0"

NOTES:

1. FOR LEGEND SEE DRAWING A-205790, SHEET 1.
2. WORK THIS DRAWING WITH C-205789, SHEETS 13 & 14.

SUSQUEHANNA S.E.S.
UNIT 2
APPENDIX "R"
DEVIATION REQUEST NO. 11
PENETRATION X-33-5-26
AND X-33-5-27

AREA 33	ELEV. 749'-1"	SCALE NA

PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PP&L DRAWING NO.	SHEET NO.	REV. NO.
C-205789	14A	1
AE DRAWING NO. C 1693 SH. 14A		

FRACTIONAL DECIMAL LOCATION CODES G G G G G 2 B 0 1 C F SORTS

ATTACHMENT 1
to
DEVIATION REQUEST NO. 11, HAS BEEN DELETED

TABLE DR11-1

Fire Zone/ Fire Area	Penetration	Duct Size	Zone Sprinklered	Zone Without Duct Opening	Drawing C-205789 Reference
UNIT 1					
1-3A/1-3B-N	X-25-3-37	8" X 6"	1-3A	Neither	Shts. 1&1A
1-5B/1-4G	X-25-5-23	24" X 18"	Neither	Neither	Shts. 2&2A
1-5B/1-5A-N	X-25-5-13	30" X 26"	Neither	Both	Shts. 2&2A
1-5B/1-5A-N	X-25-5-15	22" X 18"	Neither	Neither	Shts. 2&2A
1-4A-S/1-4G	X-27-4-16	30" X 18"	1-4A-S	Neither	Shts. 3&3A
1-4A-S/1-4G	X-27-4-17	12" X 12"	1-4A-S	Neither	Shts. 4&4A
1-5B/1-5A-S	X-27-5-29	18" X 18"	1-5A-S	Neither	Sht. 5
1-5B/1-5A-S	X-27-5-30	30" X 26"	1-5A-S	Both	Sht. 6
1-5A-W/1-5E	X-28-5-44	18" X 12"	1-5A-W	Neither	Shts. 7&7A
1-5A-W/1-5E	X-29-5-25	12" X 8"	1-5A-W	Neither	Shts. 8&7A
UNIT 2					
2-5B/2-5A-N	X-30-5-4	18" X 18"	Both	Neither	Sht. 9
2-5B/2-5A-N	X-30-5-5	22" X 22"	Both	2-5A-N	Sht. 10
2-5B/2-4G	X-30-5-32	24" X 18"	2-5B	Neither	Sht. 10
2-5B/2-5A-N	X-30-5-50	30" X 26"	Both	Both	Shts. 11&11A
2-4A-S/2-4G	X-32-4-3	30" X 18"	Neither	Neither	Shts. 15&15A
2-4A-S/2-4G	X-32-4-4	12" X 12"	Neither	Neither	Shts. 15&15A
2-5B/2-5A-S	X-32-5-41	30" X 26"	2-5B 2-5A-S (Part)	Both	Shts. 12&12A
2-5A-W/2-5E	X-33-5-26	12" X 8"	2-5A-W	Neither	Shts. 13&14A
2-5A-W/2-5E	X-33-5-27	18" X 12"	2-5A-W	2-5A-W	Shts. 14&14A

APPENDIX R DEVIATION REQUEST NO. 12

FIRE BARRIER WITHOUT FIRE DAMPERS IN VERTICAL VENTILATION DUCT PENETRATIONS

DEVIATION REQUEST:

Fire dampers are not required to be installed in the following ventilation duct penetrations in fire rated floor/ceiling assemblies between affected fire zones.

Penetration	Fire Zone/Fire Zone
X-27-6-17	1-5A-S/1-6A
X-27-6-18	1-5A-S/1-6A
X-27-6-50	1-5A-S/1-6A
X-27-6-51	1-5A-S/1-6A
X-27-6-83	1-5A-S/1-6A
X-28-5-66	1-4A-W/1-5A-W
X-29-5-34	1-4A-W/1-5A-S
X-29-5-54	1-4A-W/1-5A-S
X-34-5-4	2-4A-S/2-5A-W

FIRE AREAS/ZONES AFFECTED:

This deviation request concerns Fire Areas R-1A, R-1B, R-2A and R-2B.

REASON FOR DEVIATION REQUEST:

NRC guidance to 10CFR50, Appendix R, Section III.G requires fire rated barriers between Fire Areas. The guidance documents provided by the NRC indicate these barriers shall be rated for 3-hours fire resistance and ventilation ducts that penetrate such barriers shall have fire dampers installed. The floor/ceiling assemblies identified to be upgraded in PP&L's September 4, 1985 response (PLA-2529) contain ventilation duct penetrations which do not contain fire dampers.

EXISTING ARRANGEMENT:

A description of the floor/ceiling assemblies penetrated by ventilation ducts is provided in Table DR12-1.

See attached sheets of Drawing C-205791 for details. Attached Drawing A-205790, Sht. 1 provides the legend for understanding these drawings.

JUSTIFICATION:

NFPA 90A-1985, Section 3-3.2.1.1 states that "Approved fire dampers shall be provided where ducts or air grills penetrate partitions required to have a fire resistance rating of 2 hours or more." The maximum average combustible loading for any fire zone in the Reactor Building is limited to 1-1/2 hours. This is based on a conservative estimate of in-situ combustibles and an allowance of 15 minutes for transient combustibles. The specific combustible configurations and potential for transient combustibles were evaluated for each duct penetration. It was concluded that the local combustible loading exposure to these fire barriers is less than 1 hour. Therefore, the subject duct assemblies do not require fire dampers per Section 3-3.2.1.1 of NFPA 90A.

Furthermore, all of the fire zones located beneath the penetrations in question are protected by an automatic fire suppression system. In the event of a fire in one of the fire zones beneath these penetrations, the automatic suppression system would mitigate the heat generated in those zones and prevent the fire from impacting the fire zone located above the rated floor. Conversely, the fire zones located above the penetrations in question do not contain sufficient combustibles to generate enough heat to adversely impact the fire zones located beneath the penetrations. This statement is substantiated by the analysis prepared for Deviation Request No. 11. This analysis conservatively concluded that with the worst case combustible configuration in Deviation Request No. 11, the maximum air temperature in the duct assembly would be 146°F. Although this analysis was conducted for a horizontal duct assembly, the combustible configuration would not raise the air temperature in the vertical duct above unacceptable limits. The results of the analysis demonstrates the following:

- Since the maximum temperature on the fire side of the fire barrier is 216°F, the non-fire side of the fire barrier will remain below the ambient temperature plus a 250°F temperature rise, which is the fire damper acceptance test criteria.
- Since the HVAC duct temperature remain below 165°F, a fire damper operated by a 165°F or higher fusible link would not operate.
- Since automatic sprinklers in the Reactor Buildings are rated at 212°F minimum, the increased room temperature resulting from an air inlet temperature of 145°F will not result in sprinkler system activation. (The analysis calculated the final room temperature of Fire Zone 1-3A to 105°F.)

A fire in Fire Zone 1-3B-N with a resultant 216°F room temperature represents the worst case covered by this deviation request, because Fire Zone 1-3B-N contains a more severe combustible loading than any case covered by this deviation request. Automatic sprinkler protection where provided will reduce this maximum temperature. Equipment and cables in the adjacent affected fire zones will not be damaged, in the event of a fire in an unsprinklered fire zone, sufficient heat air can be transferred via the HVAC duct. Air will not be transferred if the HVAC system is not operating, nor is it possible for hot air to be released from a return air duct. Therefore, only cases where a supply duct in an unsprinklered area could transfer air to the adjacent fire zone needs to be considered.

Air flow temperatures which could actuate sprinklers in adjacent fire zones are not a problem in the ducts with vertical penetrations because either:

- The duct has no openings in either fire zone or on either side of the fire barrier.

  - OR -

- The supply duct to a sprinklered fire zone has no openings in that fire zone.

  - OR -

- The fire zone is sprinklered and in the event of a fire in that fire zone, the fire would be controlled before it could heat the HVAC duct supplying air to the adjacent fire zone on the opposite side of the fire barrier.

The NFPA "Fire Protection Handbook" (14th edition, Pages 7-69) states: "In the gauges commonly used, some sheet metal ducts may protect an opening in a building construction assembly for up to 1-hour, if properly hung and adequately fire stopped. Therefore, ducts passing through fire barriers having a rating of up to 1-hour fire resistance can be assumed to present no extraordinary hazard. If the wall, partition, ceiling or floor is required to have a fire resistance rating of more than 1-hour, a fire damper is required . . . "

The minimum 18 gauges (0.048 inch thick) sheet metal ducts used at Susquehanna (Ref: Drawing C-1126) are heavier than the commonly used gauges referred to by the NFPA statement. The ducts are seismically hung (Ref: Drawings C-1129 through C-1136) and adequately fire stopped (Ref: Respective penetration drawing for each listed duct penetration on Drawing C-205791, all sheets).

A 3-hour fire resistance rating can be achieved by a fire damper constructed of 24 gauge steel. It is therefore reasonable to conclude that HVAC ducts without openings in the fire zone and constructed of a minimum of 18 gauge steel will not be breached by a fire.

Therefore, it is our position that these ducts adequately mitigate the effects of a fire and do not require fire dampers.

Furthermore, this Deviation Request will remain valid for these HVAC duct penetrations as long as the sprinklered areas remain sprinklered and as long as combustible configuration changes in sprinkler areas do not cause:

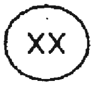
a) Calculated maximum fire barrier exposure temperatures during a fire to exceed 1700°F (the maximum standard) time-temperature curve value for a 1-hour fire test) and/or

b) Calculated temperatures in adjacent sprinklered fire areas to reach a level at which automatic sprinkler systems would be activated.

The following descriptions and drawings (C-205791, all sheets) provide the basis for our position and address each ventilation duct penetration on an individual case-by-case basis. Through this case-by-case approach, each duct penetration is shown in its actual combustible configuration in the plant. Parameters such as nearby combustibles, direction of duct air flow, location zone configuration have been examined to clarify and document the justification for this deviation request.

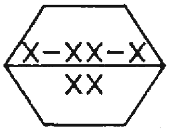
PP&L FORM 3605A (1/84)

FIRE ZONE



BUILDING COLUMN LINE

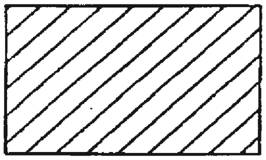
FPD 3 3 HOUR FIRE DAMPER

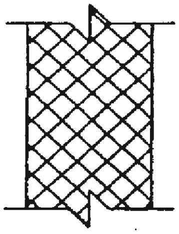


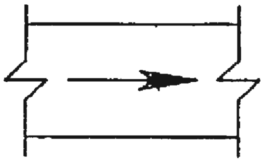
PENETRATION NO.


SUPPLY AIR REGISTER

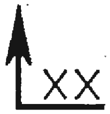

EXHAUST AIR REGISTER


FIRE RATED FLOOR


FIRE RATED WALL


AIR FLOW DIRECTION

T.O.G. = TOP OF GRATING
B.O.D. = BOTTOM OF DUCT
B.O.R. = BOTTOM OF REGISTER
B.O.T. = BOTTOM OF TRAY



SECTION SHOWN ON SHEET XX

EXAMPLES:

B.O.D. EL. 772'-9" (16"X24") ← DUCT SIZE

B.O.R. EL. 772'-9" (18"X26") ← REGISTER SIZE

B.O.T. EL. 772'-9" 2MKA (24"X6") ← TRAY SIZE

CABLE TRAY IDENTIFIER → 2MKA

NOTE: SIZE OF DUCTS, REGISTERS & CABLE TRAYS ARE SHOWN IN PLAN AS WIDTH X HEIGHT. EX.: (24"X6"). SHOWN IN ELEVATION VIEW AS HEIGHT X WIDTH. EX.: (6"X24").

SUSQUEHANNA S.E.S.
UNIT 1 & 2
APPENDIX "R"
DEVIATION REQUEST & LEGEND
NO. 11 - SEE DRAWING C-205789
NO. 12 - SEE DRAWING C-205791

NON-QUALITY RELATED
AREA NA | ELEV. NA | SCALE NA

**PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.**

PP&L DRAWING NO. A-205790
SHEET NO. 1
REV.NO. 1
AE DRAWING NO. C-1695 SH.1

LOCATION CODES

SORTS

FRACTIONAL 0 1 2 2 1 0 DECIMAL CV0036

PENETRATION:	X-27-6-17
ADJACENT FIRE ZONES:	1-5A-S/1-6A
DUCT SIZE AT PENETRATION:	26" DIAMETER
VENTILATION SYSTEM:	REACTOR BUILDING STANDBY GAS TREATMENT SYSTEM SUCTION FROM RECIRCULATION SYSTEM

DISCUSSION:

As shown on Shts. 1, 1A and 1B of Drawing C-205791, the duct assembly penetrates the fire barrier floor at Elevation 779'-1". This penetration joins Fire Zone 1-5A-S with Fire Zone 1-6A. Fire Zone 1-5A-S is a fully sprinklered area.

JUSTIFICATION:

a) Fire initiated in Fire Zone 1-5A-S with potential to spread to Fire Zone 1-6A.

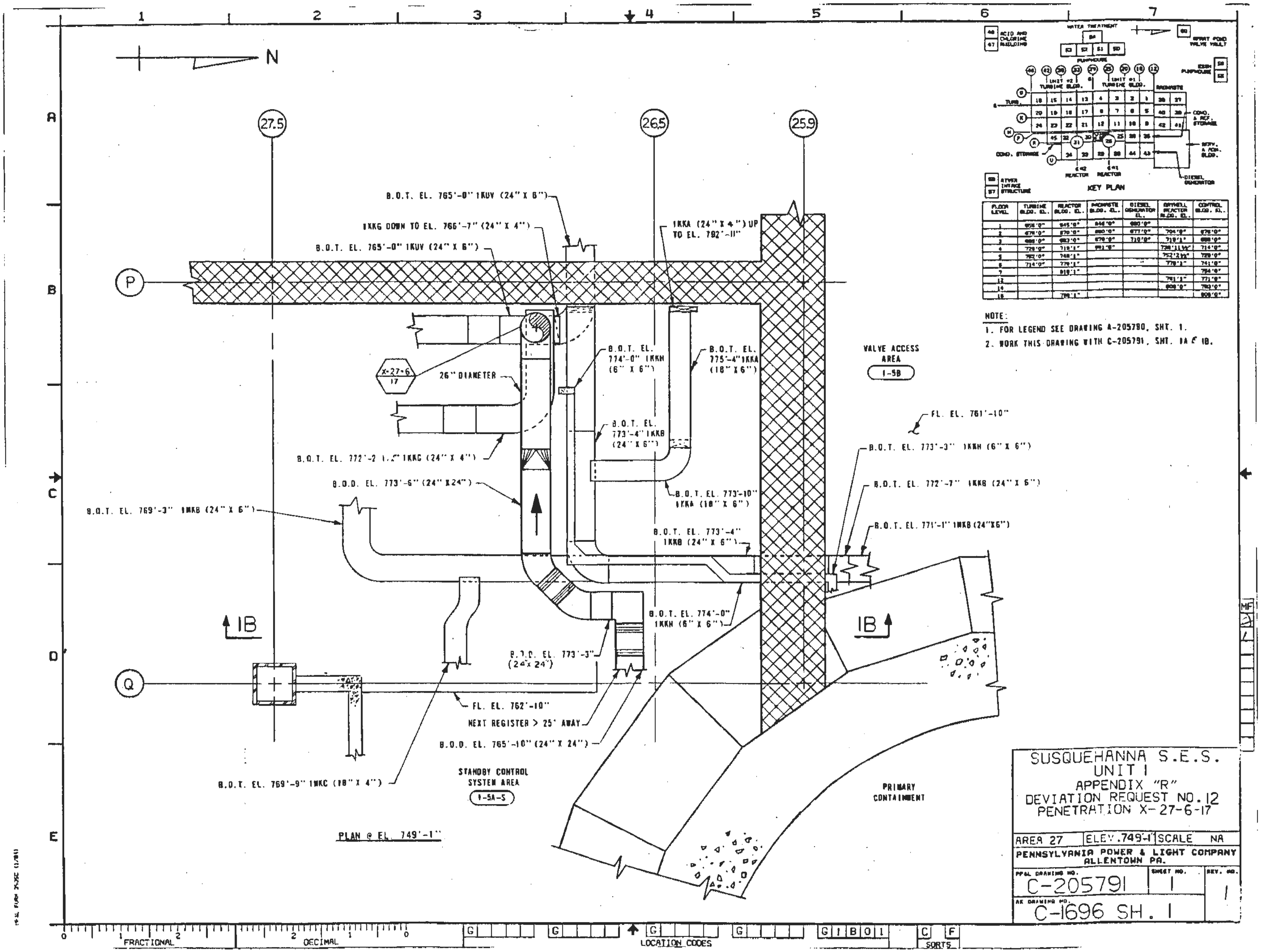
Fire Zone 1-5A-S is protected by an automatic suppression system which would mitigate the consequences of any heat generated in Fire Zone 1-5A-S as the result of a fire in Fire Zone 1-5A-S. Therefore, a fire initiated in Fire Zone 1-5A-S would not generate enough heat to adversely impact any systems in Fire Zone 1-6A.

b) Fire initiated in Fire Zone 1-6A with potential to spread to Fire Zone 1-5A-S.

Fire Zone 1-6A has minimal combustibles, and there are no openings in the duct assembly in this fire zone. Therefore, a fire generated in Fire Zone 1-6A would not generate enough heat to adversely impact any system in Fire Zone 1-5A-S.

CONCLUSION:

Based on the above discussion, NFPA 90A, Section 3-3.2.1.1, the physical layout of the adjacent fire zones and the combustible configuration within the fire zones, a fire damper is not required in penetration X-27-6-17.



FLOOR LEVEL	TURBINE BLDG. EL.	REACTOR BLDG. EL.	RADWASTE BLDG. EL.	DIESEL GENERATOR EL.	DRYWELL REACTOR BLDG. EL.	CONTROL BLDG. EL.
1	656'0"	645'0"	646'0"	660'0"		
2	676'0"	670'0"	660'0"	677'0"	704'0"	676'0"
3	699'0"	683'0"	676'0"	710'0"	719'1"	698'0"
4	729'0"	719'1"	691'6"		738'11½"	714'0"
5	752'0"	749'1"			752'2½"	729'0"
6	714'0"	779'1"			778'1"	741'0"
7		818'1"				754'0"
12					791'1"	771'0"
14					806'0"	783'0"
18		799'1"				806'0"

NOTE:

1. FOR LEGEND SEE DRAWING A-205790, SHT. 1.
2. WORK THIS DRAWING WITH C-205791, SHT. 1A & 1B.

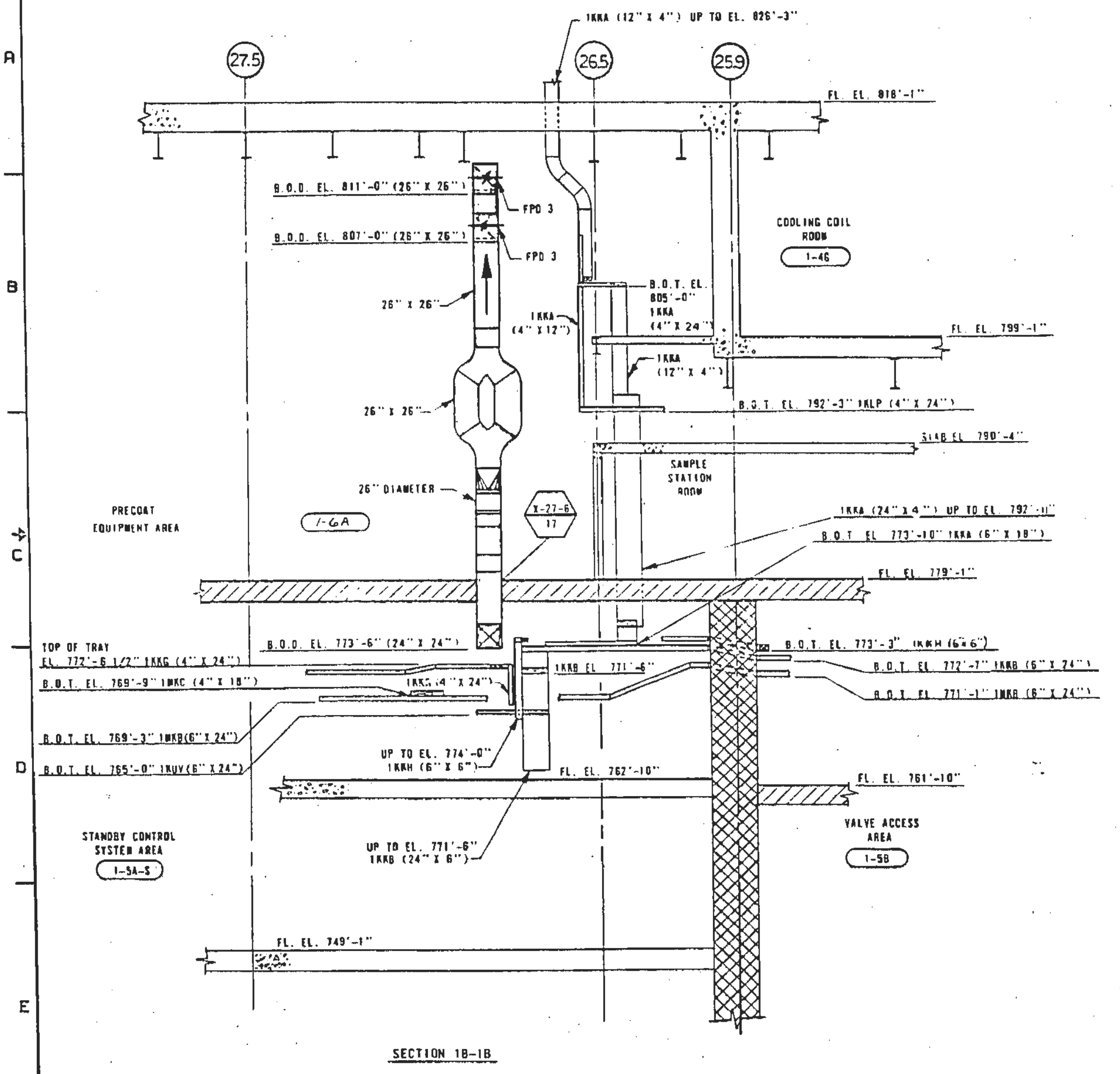
SUSQUEHANNA S.E.S.
UNIT I
APPENDIX "R"
DEVIATION REQUEST NO. 12
PENETRATION X-27-6-17

AREA 27	ELEV. 749'-1"	SCALE NA

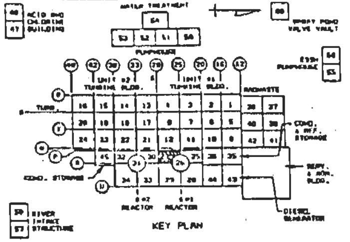
PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PP&L DRAWING NO. C-205791	SHEET NO. 1	REV. NO. 1
AE DRAWING NO. C-1696 SH. 1		

Security-Related Information
Figure Withheld Under 10 CFR 2.390



SECTION 1B-1B



FLOOR LEVEL	TURBINE BLDG. EL.	REACTOR BLDG. EL.	RADWASTE BLDG. EL.	DIESEL GENERATOR EL.	DRYWELL REACTOR BLDG. EL.	CONTROL BLDG. EL.
1	656'0"	645'0"	646'0"	660'0"		
2	676'0"	670'0"	660'0"	677'0"	704'0"	676'0"
3	699'0"	683'0"	676'0"	710'0"	719'1"	699'0"
4	729'0"	719'1"	691'6"		738'11½"	714'0"
5	762'0"	749'1"			752'2½"	729'0"
6	714'0"	779'1"			778'1"	741'0"
7		818'1"				754'0"
12					751'1"	771'0"
14					806'0"	783'0"
16		783'1"				806'0"

NOTE:

1. FOR LEGEND SEE DWG. A-205790, SHT. 1.
2. WORK THIS DWG. WITH C-205791, SHT. 1 & 1A.

SUSQUEHANNA S.E.S.
UNIT I
APPENDIX "R"
DEVIATION REQUEST NO. 12
PENETRATION X-27-6-17

AREA 27	ELEV. 749'-1"	SCALE NA

PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PP&L DRAWING NO.	SHEET NO.	REV. NO.
C-205791	1B	1

AE DRAWING NO.
C-1696 SH.1B

PENETRATION:	X-27-6-18
ADJACENT FIRE ZONES:	1-5A-S/1-6A
DUCT SIZE AT PENETRATION:	32" DIAMETER
VENTILATION SYSTEM:	UNIT 1 PRIMARY CONTAINMENT DRYWELL AND SUPPRESSION POOL PURGE EXHAUST TO STANDBY GAS TREATMENT

DISCUSSION:

As shown on Shts. 2, 2A and 2B of Drawing C-205791, the duct assembly penetrates the fire barrier floor/ceiling at Elevation 779'-1". This penetration joins Fire Zone 1-5A-S with Fire Zone 1-6A. There are no openings in the duct assembly in Fire Zone 1-5A-S or Fire Zone 1-6A. Fire Zone 1-5A-S is fully protected by an automatic suppression system.

JUSTIFICATION:

a) Fire initiated in Fire Zone 1-5A-S with potential to spread to Fire Zone 1-6A.

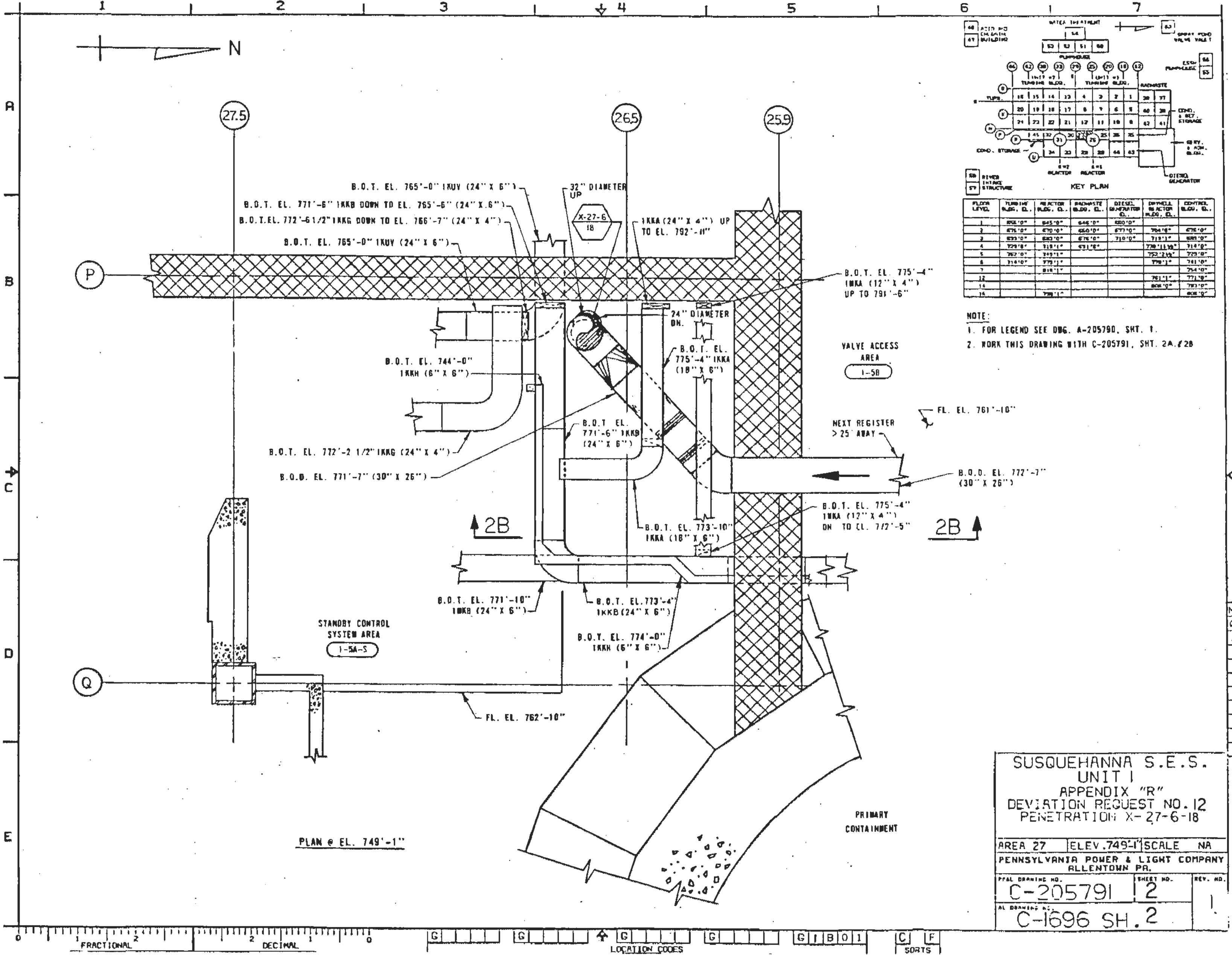
Fire Zone 1-5A-S is protected by an automatic suppression system which would mitigate the consequences of any heat generated in Fire Zone 1-5A-S as a result of a fire in Fire Zone 1-5A-S. Therefore, a fire initiated in Fire Zone 1-5A-S would not generate enough heat to adversely impact any system in Fire Zone 1-6A.

b) Fire initiated in Fire Zone 1-6A with potential to spread to Fire Zone 1-5A-S.

Fire Zone 1-6A has minimal combustibles and there are no openings in the duct assembly in this fire zone. Therefore, a fire generated in Fire Zone 1-6A would not generate enough heat to adversely impact any system in Fire Zone 1-5A-S.

CONCLUSION:

Based on the above discussion, NFPA 90A, Section 3-3.2.1.1, the physical layout of the adjacent fire zones and the combustible configuration within the fire zones, a fire damper is not required in penetration X-27-6-18.



FLOOR LEVEL	TURBINE BLDG. EL.	REACTOR BLDG. EL.	RADWASTE BLDG. EL.	DIESEL GENERATOR EL.	DRYWELL REACTOR BLDG. EL.	CONTROL BLDG. EL.
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4	729'0"	719'1"	691'6"		738'11½"	714'0"
5	762'0"	749'1"			752'2½"	729'0"
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7		818'1"				754'0"
12					761'1"	771'0"
14					806'0"	783'0"
16		799'1"				806'0"

NOTE:

1. FOR LEGEND SEE DWG. A-205790, SHT. 1.
2. WORK THIS DRAWING WITH C-205791, SHT. 2A & 2B

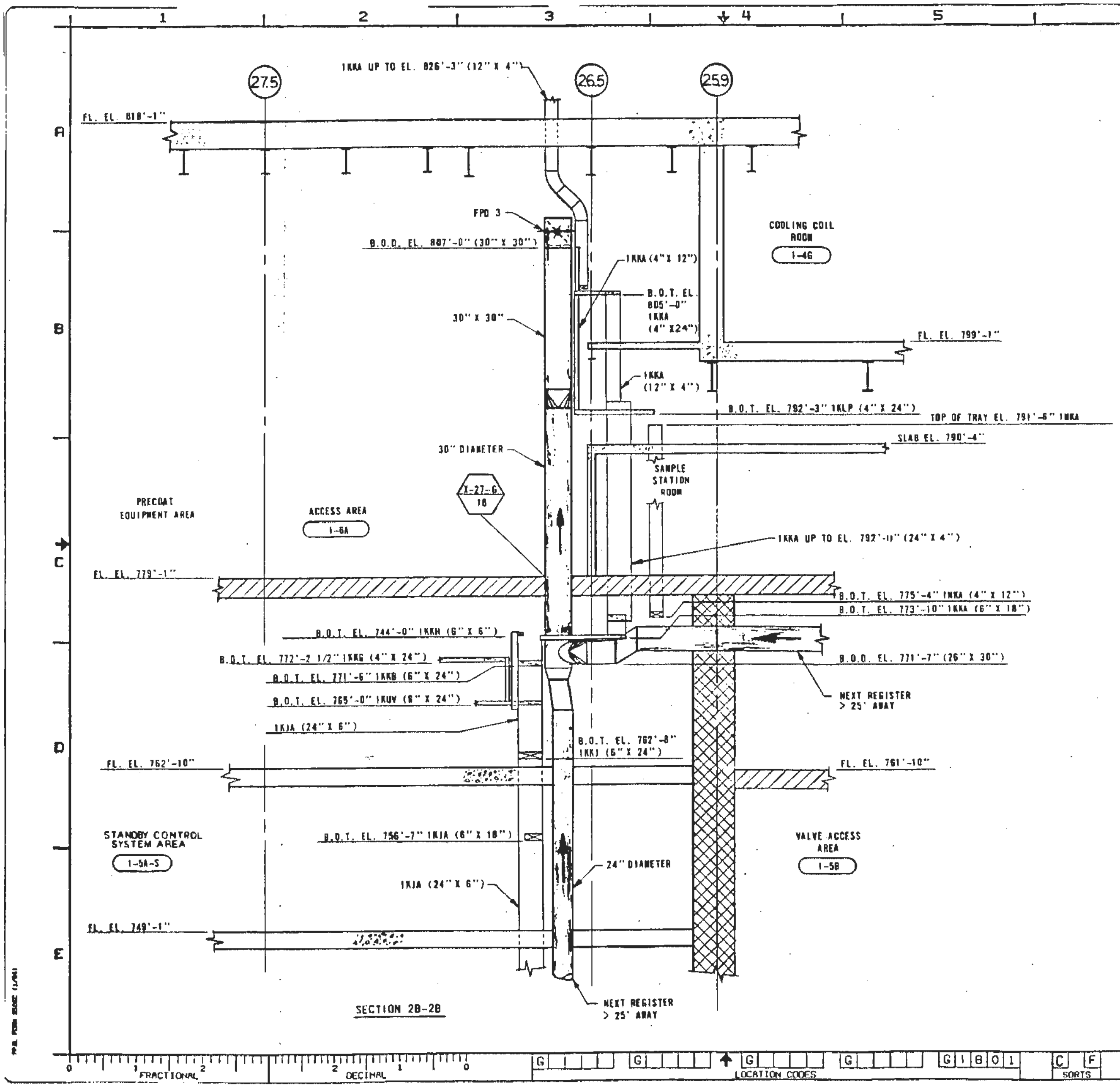
SUSQUEHANNA S.E.S.
UNIT I
APPENDIX "R"
DEVIATION REQUEST NO. 12
PENETRATION X-27-6-18

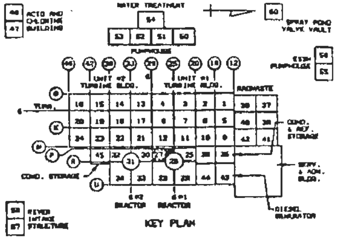
AREA 27 | ELEV. 749'-1" | SCALE NA

PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PP&L DRAWING NO. C-205791
SHEET NO. 2
REV. NO. 1
AL DRAWING NO. C-1696 SH. 2

Security-Related Information
Figure Withheld Under 10 CFR 2.390





FLOOR LEVEL	TURBINE BLDG. EL.	REACTOR BLDG. EL.	RADWASTE BLDG. EL.	DIESEL GENERATOR EL.	DRYWELL REACTOR BLDG. EL.	CONTROL BLDG. EL.
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5	752'0"	749'1"			752'3½"	728'0"
6	710'0"	779'1"			779'1"	741'0"
7		818'1"				754'0"
12					791'1"	771'0"
14					806'0"	783'0"
16		799'1"				806'0"

NOTE:

1. FOR LEGEND SEE DWG. A-205790, SHT. 1
2. WORK THIS DWG. WITH C-205791, SHT. 2 & 2A.

SUSQUEHANNA S.E.S.
UNIT I
APPENDIX "R"
DEVIATION REQUEST NO. 12
PENETRATION X-27-6-18

AREA 27	ELEV. 749'-1"	SCALE NA

PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PP&L DRAWING NO.	SHEET NO.	REV. NO.
C-205791	2B	1
BE DRAWING NO. C-1696 SH. 2B		

PENETRATION:	X-27-6-50
ADJACENT FIRE ZONES:	1-5A-S/1-6A
DUCT SIZE AT PENETRATION:	30" X 20"
VENTILATION SYSTEM:	REACTOR BUILDING ZONE III UNFILTERED EXHAUST

DISCUSSION:

As shown on Shts. 3, 3A and 3B of Drawing C-205791, the duct assembly penetrates the fire barrier floor/ceiling at Elevation 779'-1". This penetration joins Fire Zone 1-5A-S with Fire Zone 1-6A. Fire Zone 1-5A-S has full sprinkler protection.

JUSTIFICATION:

a) Fire initiated in Fire Zone 1-5A-S with potential to spread to Fire Zone 1-6A.

Fire Zone 1-5A-S is protected by an automatic suppression system which would mitigate the consequences of any heat generated in Fire Zone 1-5A-S as a result of a fire in Fire Zone 1-5A-S. Therefore, a fire initiated in Fire Zone 1-5A-S would not generate enough heat to adversely impact any systems in Fire Zone 1-6A.

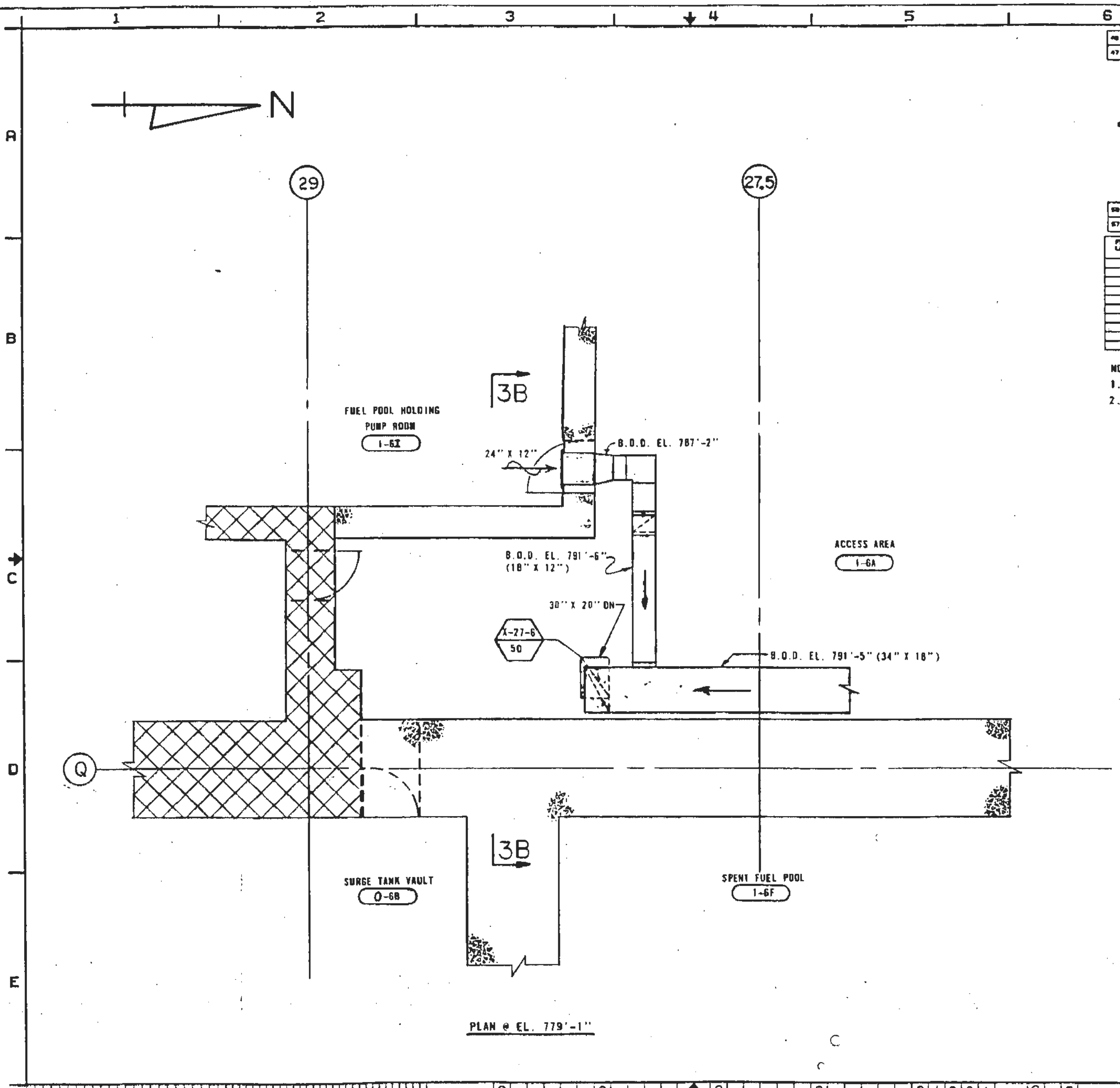
b) Fire initiated in Fire Zone 1-6A with potential to spread to Fire Zone 1-5A-S.

Fire Zone 1-6A has minimal combustibles and there are no combustibles in the immediate area of the duct assembly. There are no openings in the duct in Fire Zone 1-6A; however, there is an exhaust air register in adjacent Fire Zone 1-6I. There are no combustibles located near this exhaust air register. Sufficient combustibles do not exist in Fire Zones 1-6A and 1-6I to generate enough heat to adversely impact any systems in Fire Zone 1-5A-S.

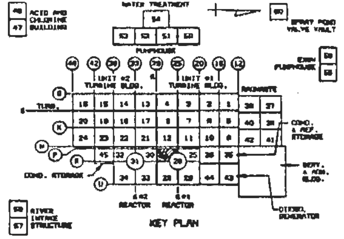
CONCLUSION:

Based on the above discussion, NFPA 90A, Section 3-3.2.1.1, the physical layout of the adjacent fire zones and the combustible configuration within these zones, a fire damper is not required in penetration X-27-6-50.

Security-Related Information
Figure Withheld Under 10 CFR 2.390



PLAN @ EL. 779'-1"



KEY PLAN

FLOOR LEVEL	TURBINE BLDG. EL.	REACTOR BLDG. EL.	RADWASTE BLDG. EL.	DIESEL GENERATOR EL.	DRYWELL REACTOR BLDG. EL.	CONTROL BLDG. EL.
1	656'0"	645'0"	646'0"	660'0"		
2	676'0"	670'0"	660'0"	677'0"	704'0"	676'0"
3	699'0"	683'0"	676'0"	710'0"	719'1"	699'0"
4	729'0"	719'1"	691'0"		738'11½"	714'0"
5	752'0"	749'1"			752'3½"	729'0"
6	714'0"	779'1"			779'1"	741'0"
7		818'1"				754'0"
12					791'1"	771'0"
14					806'0"	783'0"
19		799'1"				806'0"

NOTES:

1. FOR LEGEND SEE DRAWING A-205790, SHEET 1.
2. WORK THIS DRAWING WITH C-205791, SHEETS 3 & 3B.

SUSQUEHANNA S.E.S.
UNIT I
APPENDIX "R"
DEVIATION REQUEST NO. 12
PENETRATION X-27-6-50

AREA 27
ELEV. 779'-1"
SCALE NA

PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PP&L DRAWING NO. C-205791
SHEET NO. 3A
REV. NO. 1
AE DRAWING NO. C-1696 SH. 3A

PP&L FORM 3505C (1/81)

Security-Related Information
Figure Withheld Under 10 CFR 2.390

PENETRATION:	X-27-6-51
ADJACENT FIRE ZONES:	1-5A-S/1-6A
DUCT SIZE AT PENETRATION:	30" X 20"
VENTILATION SYSTEM:	REACTOR BUILDING ZONE III SUPPLY

DISCUSSION:

As shown on Shts. 4, 4A and 4B of Drawing C-205791, the duct assembly penetrates the fire barrier floor/ceiling at Elevation 779'-1". This penetration joins Fire Zone 1-5A-S with Fire Zone 1-6A. Fire Zone 1-5A-S has full sprinkler protection.

JUSTIFICATION:

a) Fire initiated in Fire Zone 1-5A-S with potential to spread to Fire Zone 1-6A.

Fire Zone 1-5A-S is protected by an automatic suppression system which would mitigate the consequences of any heat generated in Fire Zone 1-5A-S as a result of a fire in Fire Zone 1-5A-S. Therefore, a fire initiated in Fire Zone 1-5A-S would not generate enough heat to adversely impact any system in Fire Zone 1-6A.

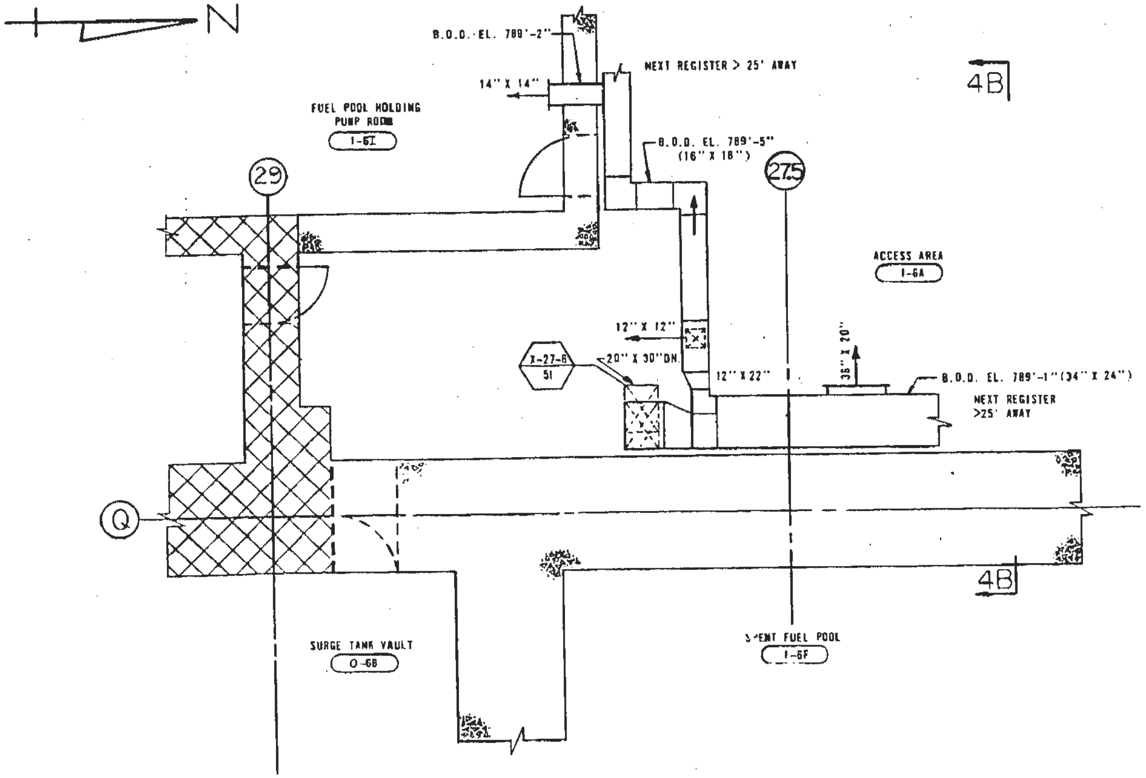
b) Fire initiated in Fire Zone 1-6A with potential to spread to Fire Zone 1-5A-S.

Fire Zone 1-6A has minimal combustibles and there are no combustibles in the vicinity of the duct assembly. This duct assembly also goes through Fire Zone 1-6I; however, that zone also has minimal combustibles with no combustibles in the vicinity of the duct assembly. There are no openings in the duct assembly in Fire Zone 1-5A-S. Therefore, sufficient combustibles do not exist in Fire Zones 1-6A or 1-6I to generate enough heat to adversely impact any systems in Fire Zone 1-5A-S.

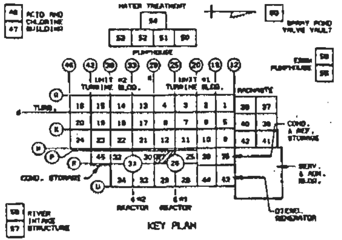
CONCLUSION:

Based on the above discussion, NFPA 90A, Section 3-3.2.1.1, the physical layout of the adjacent fire zones and the combustible configuration within the fire zones, a fire damper is not required in penetration X-27-6-51.

Security-Related Information
Figure Withheld Under 10 CFR 2.390



PLAN @ EL. 779'-1"



FLOOR LEVEL	TURBINE BLDG. EL.	REACTOR BLDG. EL.	RADWASTE BLDG. EL.	DIESEL GENERATOR EL.	DRYWELL REACTOR BLDG. EL.	CONTROL BLDG. EL.
1	656'0"	645'0"	646'0"	660'0"		
2	676'0"	670'0"	660'0"	677'0"	704'0"	676'0"
3	699'0"	683'0"	676'0"	710'0"	719'1"	698'0"
4	729'0"	719'1"	691'6"		738'11½"	714'0"
5	752'0"	749'1"			752'2½"	729'0"
6	714'0"	779'1"			778'1"	741'0"
7		818'1"				754'0"
12					791'1"	771'0"
14					806'0"	783'0"
18		799'1"				806'0"

NOTES:

1. FOR LEGEND SEE DRAWING A-205790, SHEET 1.
2. WORK THIS DRAWING WITH C-205791, SHEETS 4 & 4B.

SUSQUEHANNA S.E.S.
UNIT 1
APPENDIX "R"
DEVIATION REQUEST NO. 12
PENETRATION X-27-6-51

AREA 27	ELEV. 779'-1"	SCALE NA

PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PP&L DRAWING NO.	SHEET NO.	REV. NO.
C-205791	4A	1

AE DRAWING NO. C-1696 SH. 4A

FRACTIONAL DECIMAL LOCATION CODES G I B 0 1 SORTS C F

PP&L FORM 3505C (1/81)

Security-Related Information
Figure Withheld Under 10 CFR 2.390

PENETRATION:	X-27-6-83
ADJACENT FIRE ZONES:	1-5A-S/1-6A
DUCT SIZE AT PENETRATION:	20" X 8"
VENTILATION SYSTEM:	REACTOR BUILDING HVAC ZONE I EQUIPMENT COMPARTMENT (FILTERED) EXHAUST SYSTEM Note: This duct section has been blanked off and abandoned in place.

DISCUSSION:

As shown on Shts. 5, 5A and 5B of Drawing C-205791, the duct assembly penetrates the fire barrier floor/ceiling at Elevation 779'-1". This penetration joins Fire Zone 1-5A-S with Fire Zone 1-6A. Fire Zone 1-5A-S has full sprinkler protection. It should be noted that this duct section has been blanked off at Elevation 780'-1" and has been abandoned in place.

JUSTIFICATION:

a) Fire initiated in Fire Zone 1-5A-S with potential to spread to Fire Zone 1-6A.

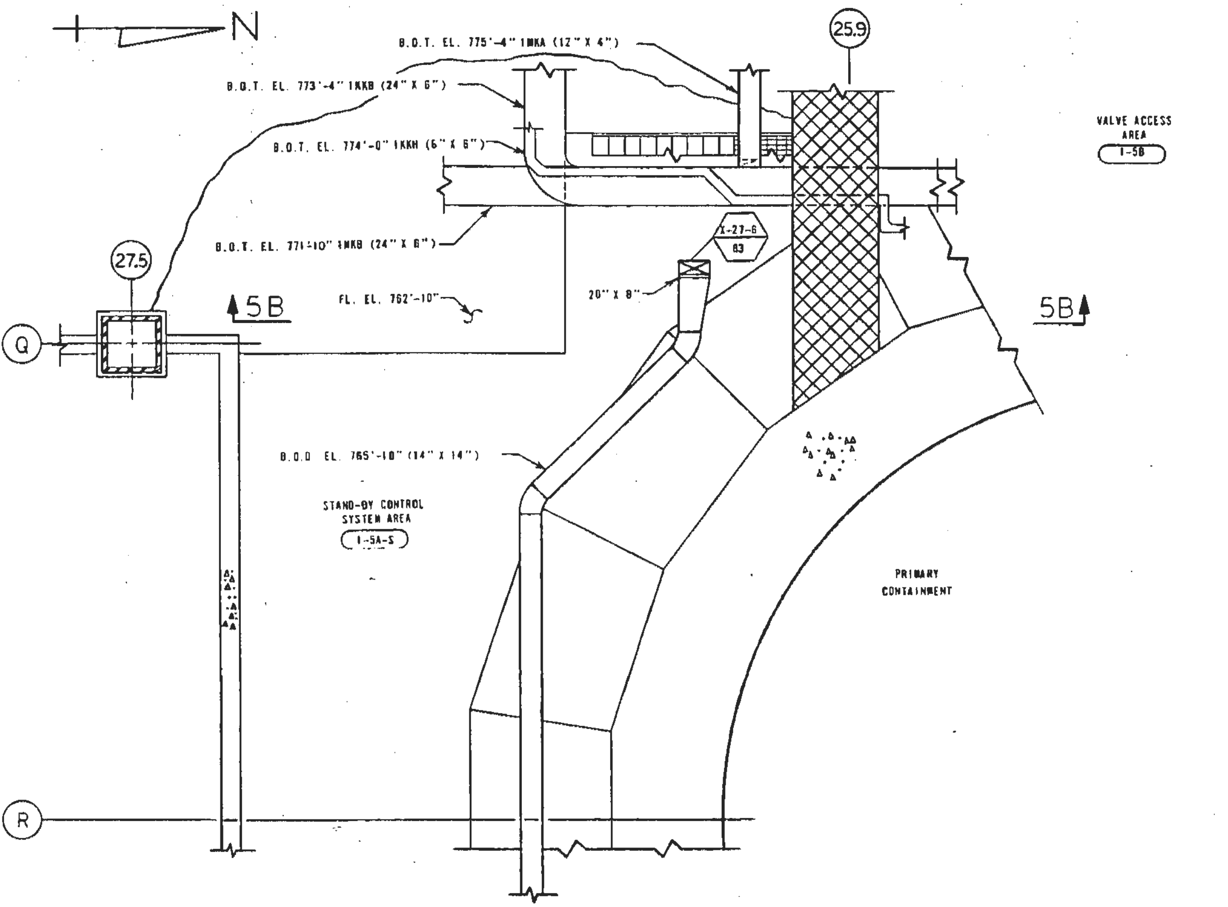
There are no openings in the duct assembly in Fire Zone 1-5A-S and heat generated by a fire in Fire Zone 1-5A-S would be mitigated by the automatic suppression system in Fire Zone 1-5A-S. Therefore, a fire initiated in Fire Zone 1-5A-S would not generate enough heat to adversely impact any system in Fire Zone 1-6A.

b) Fire initiated in Fire Zone 1-6A with potential to spread to Fire Zone 1-5A-S.

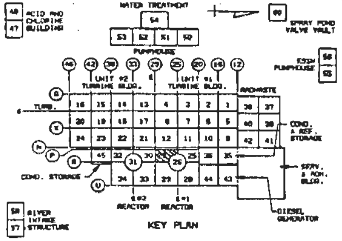
The duct assembly is capped one foot above its floor penetration in Fire Zone 1-6A and there are no combustibles in the vicinity of this one foot length of duct. Therefore, a fire initiated in Fire Zone 1-6A would not generate enough heat to adversely impact any system in Fire Zone 1-5A-S.

CONCLUSION:

Based on the above discussion, NFPA 90A, Section 3-3.2.1.1, the physical layout of the adjacent fire zones and the combustible configuration within the fire zones, a fire damper is not required in penetration X-27-6-83.



PLAN @ EL. 749'-1"



KEY PLAN

FLOOR LEVEL	TURBINE BLDG. EL.	REACTOR BLDG. EL.	RADWASTE BLDG. EL.	DIESEL GENERATOR EL.	DRYWELL REACTOR BLDG. EL.	CONTROL BLDG. EL.
1	656'0"	645'0"	646'0"	660'0"		
2	676'0"	670'0"	660'0"	677'0"	704'0"	676'0"
3	699'0"	683'0"	676'0"	710'0"	719'1"	698'0"
4	729'0"	719'1"	691'6"		738'11½"	714'0"
5	762'0"	749'1"			752'2½"	729'0"
6	714'0"	779'1"			778'1"	741'0"
7		818'1"				754'0"
12					791'1"	771'0"
14					806'0"	783'0"
16		799'1"				806'0"

NOTE:

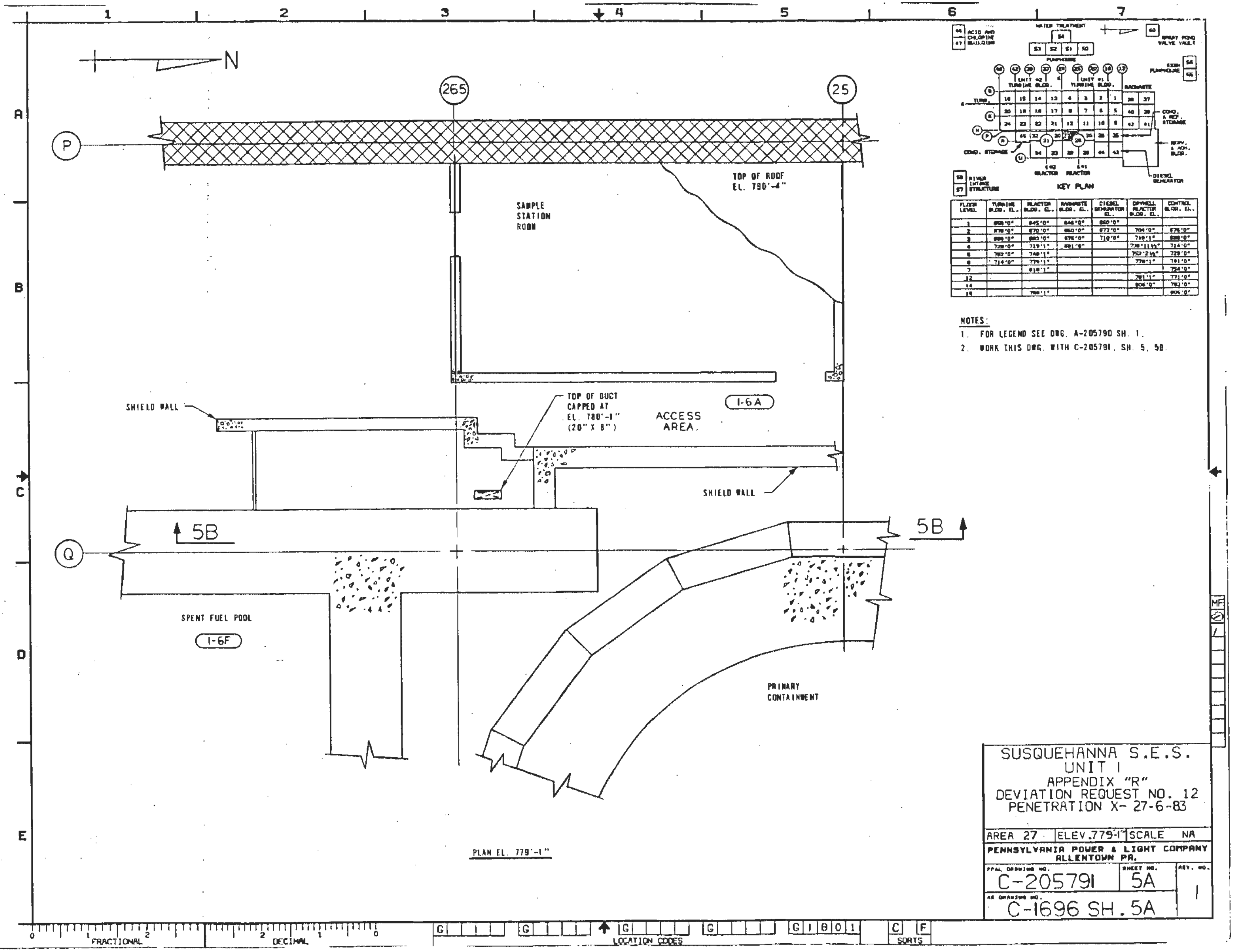
1. FOR LEGEND SEE DWG. A-205790, SHT. 1.
2. WORK THIS DWG. WITH C-205791, SHTS. 5A AND 5B.

SUSQUEHANNA S.E.S.
UNIT 1
APPENDIX "R"
DEVIATION REQUEST NO. 12
PENETRATION X-27-6-83

AREA 27 | ELEV. 749'-1" | SCALE NA

PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PP&L DRAWING NO. C-205791
SHEET NO. 5
REV. NO. 1
AE DRAWING NO. C-1696 SH. 5



FLOOR LEVEL	TURBINE BLDG. EL.	REACTOR BLDG. EL.	RADWASTE BLDG. EL.	DIESEL GENERATOR EL.	DRYWELL REACTOR BLDG. EL.	CONTROL BLDG. EL.
1	656'0"	645'0"	646'0"	660'0"		
2	676'0"	670'0"	660'0"	677'0"	704'0"	676'0"
3	699'0"	683'0"	676'0"	710'0"	719'1"	698'0"
4	729'0"	719'1"	691'6"		738'11½"	714'0"
5	752'0"	749'1"			752'2½"	729'0"
6	714'0"	779'1"			778'1"	741'0"
7		818'1"				754'0"
12					791'1"	771'0"
14					806'0"	783'0"
19		799'1"				806'0"

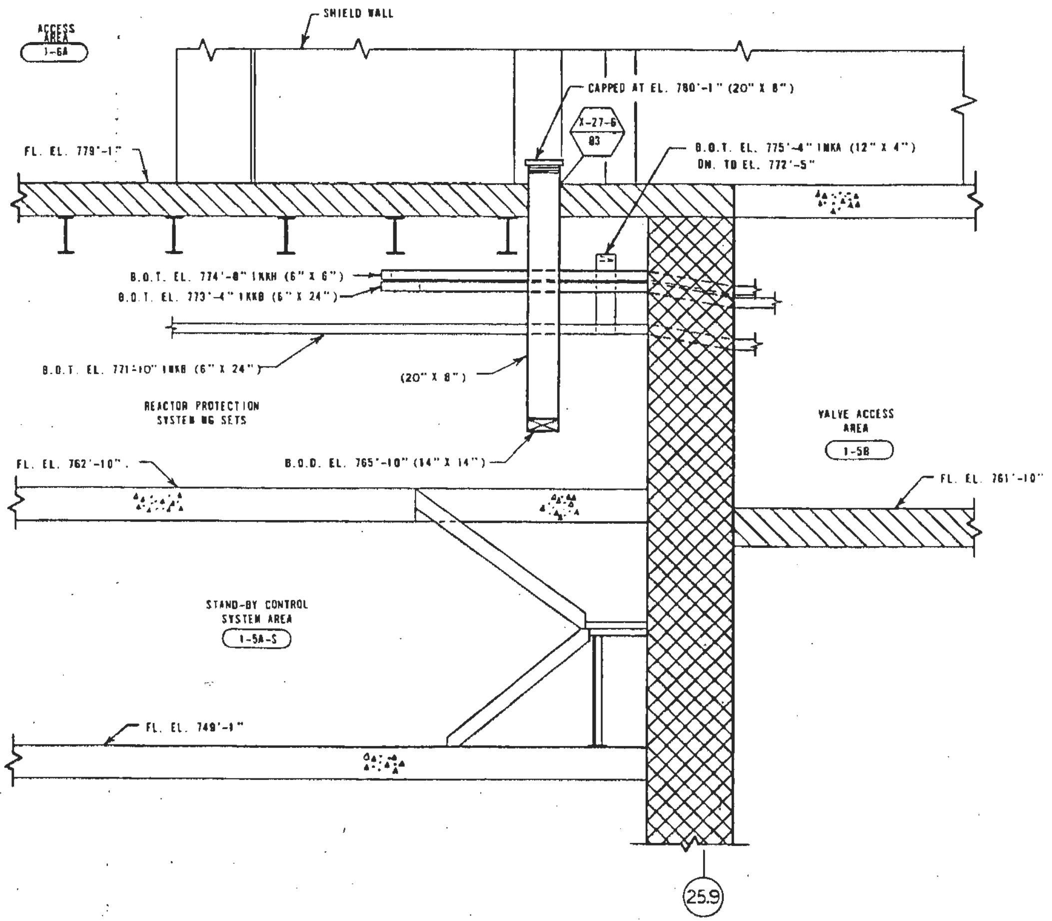
NOTES:
1. FOR LEGEND SEE DWG. A-205790 SH. 1.
2. WORK THIS DWG. WITH C-205791. SH. 5, 5B.

SUSQUEHANNA S.E.S.
UNIT I
APPENDIX "R"
DEVIATION REQUEST NO. 12
PENETRATION X- 27-6-83

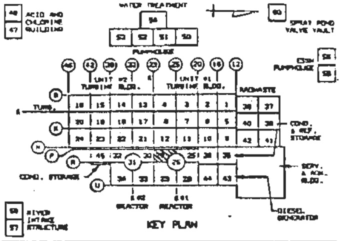
AREA 27	ELEV. 779'-1"	SCALE NA

PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PP&L DRAWING NO.	SHEET NO.	REV. NO.
C-205791	5A	1
AE DRAWING NO. C-1696 SH. 5A		



SECTION "5B-5B"



FLOOR LEVEL	TURBINE BLDG. EL.	REACTOR BLDG. EL.	RADWASTE BLDG. EL.	DIESEL GENERATOR EL.	OFFWELL REACTOR BLDG. EL.	CONTROL BLDG. EL.
1	656'0"	645'0"	646'0"	660'0"		
2	676'0"	670'0"	660'0"	677'0"	704'0"	676'0"
3	699'0"	683'0"	676'0"	710'0"	719'1"	698'0"
4	729'0"	719'1"	691'6"		738'11½"	714'0"
5	762'0"	749'1"			752'2½"	729'0"
6	714'0"	779'1"			779'1"	741'0"
7		818'1"				754'0"
12					791'1"	771'0"
14					806'0"	783'0"
19		799'1"				806'0"

NOTE:

1. FOR LEGEND SEE DWG. A-205790, SHT. 1.
2. WORK THIS DWG. WITH C-205791, SHTS. 5 AND 5A.

SUSQUEHANNA S.E.S.
UNIT 1
APPENDIX "R"
DEVIATION REQUEST NO. 12
PENETRATION X-27-6-83

AREA 27 | ELEV. 749'-1" | SCALE NA

PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PP&L DRAWING NO. C-205791 | SHEET NO. 5B | REV. NO. 1

BE DRAWING NO. C-1696 SH. 5B

PP&L FORM 3505C (1/81)

FRACTIONAL DECIMAL LOCATION CODES SORTS

PENETRATION:	X-28-5-66
ADJACENT FIRE ZONES:	1-4A-W/1-5A-W
DUCT SIZE AT PENETRATION:	22" X 22"
VENTILATION SYSTEM:	REACTOR BUILDING EMERGENCY SWITCHGEAR ROOMS COOLING UNITS SUPPLY

DISCUSSION:

As shown on Shts. 6, 6A and 6B of Drawing C-205791, this duct assembly penetrates the fire barrier floor at Elevation 749'-1". This penetration joins Fire Zone 1-4A-W with Fire Zone 1-5A-W. Fire Zone 1-4A-W has full sprinkler protection.

JUSTIFICATION:

a) Fire initiated in Fire Zone 1-4A-W with potential to spread to Fire Zone 1-5A-W.

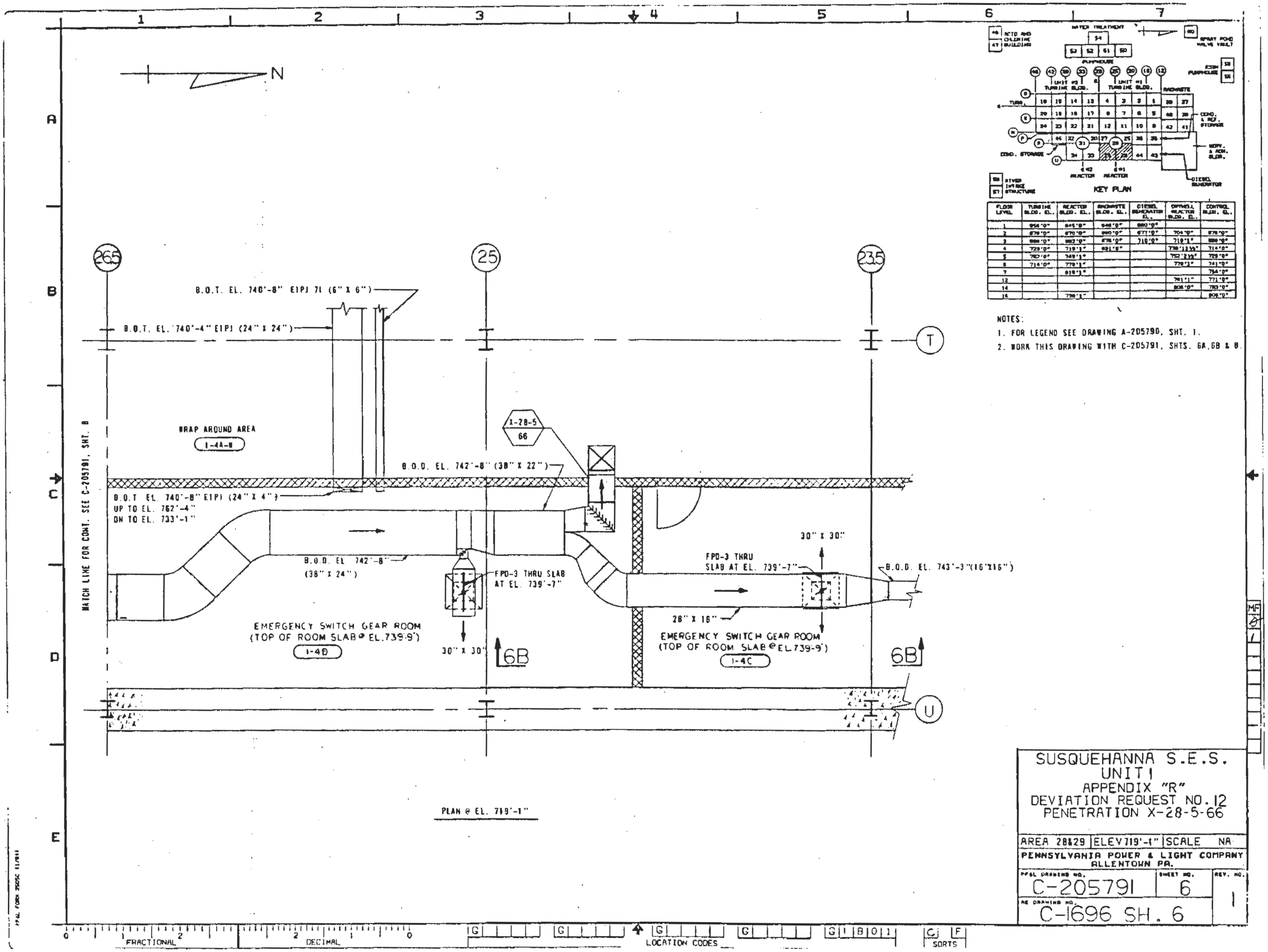
Fire Zone 1-4A-W is protected by an automatic fire suppression system which would mitigate the consequences of any heat generated in Fire Zone 1-4A-W as a result of a fire in Fire Zone 1-4A-W. Therefore, a fire initiated in Fire Zone 1-4A-W would not generate enough heat to adversely impact any system in Fire Zone 1-5A-W.

b) Fire initiated in Fire Zone 1-5A-W with potential to spread to Fire Zone 1-4A-W.

Fire Zone 1-5A-W is protected by an automatic fire suppression system which would mitigate the consequences of any heat generated in Fire Zone 1-5A-W as a result of a fire in Fire Zone 1-5A-W. Therefore, a fire initiated in Fire Zone 1-5A-W would not generate enough heat to adversely impact any system in Fire Zone 1-4A-W.

CONCLUSION:

Based on the above discussion, NFPA 90A, Section 3-3.2.1.1, the physical layout of the adjacent fire zones and the combustible configuration within the fire zones, a fire damper is not required in penetration X-28-5-66.



FLOOR LEVEL	TURBINE BLDG. EL.	REACTOR BLDG. EL.	RADWASTE BLDG. EL.	DIESEL GENERATOR EL.	DRYWELL REACTOR BLDG. EL.	CONTROL BLDG. EL.
1	656'-0"	645'-0"	646'-0"	660'-0"		
2	676'-0"	670'-0"	660'-0"	677'-0"	704'-0"	676'-0"
3	699'-0"	683'-0"	676'-0"	710'-0"	719'-1"	698'-0"
4	729'-0"	719'-1"	691'-6"		738'-11½"	714'-0"
5	762'-0"	749'-1"			752'-2½"	729'-0"
6	714'-0"	779'-1"			778'-1"	741'-0"
7		818'-1"				754'-0"
12					791'-1"	771'-0"
14					808'-0"	783'-0"
15		739'-1"				806'-0"

NOTES:

1. FOR LEGEND SEE DRAWING A-205790, SHT. 1.
2. WORK THIS DRAWING WITH C-205791, SHTS. 6A, 6B & 8.

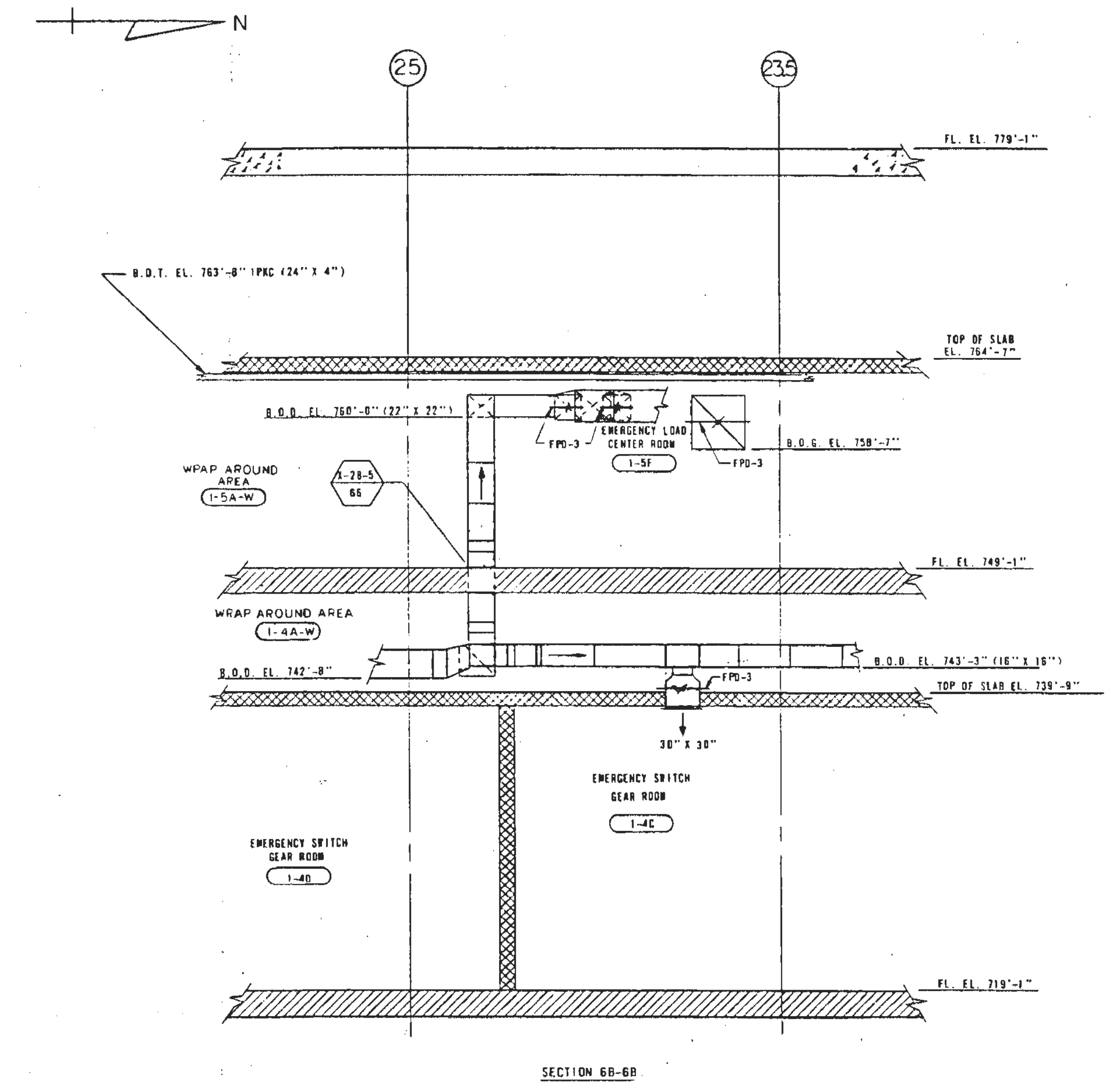
SUSQUEHANNA S.E.S.
UNIT 1
APPENDIX "R"
DEVIATION REQUEST NO. 12
PENETRATION X-28-5-66

AREA 28&29	ELEV 719'-1"	SCALE NA

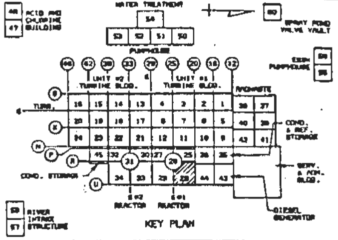
PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PP&L DRAWING NO.	SHEET NO.	REV. NO.
C-205791	6	1
AE DRAWING NO. C-1696 SH. 6		

Security-Related Information
Figure Withheld Under 10 CFR 2.390



SECTION 6B-6B



KEY PLAN

FLOOR LEVEL	TURBINE BLDG. EL.	REACTOR BLDG. EL.	RADWASTE BLDG. EL.	DIESEL GENERATOR EL.	DRYWELL REACTOR BLDG. EL.	CONTROL BLDG. EL.
1	656'0"	645'0"	646'0"	660'0"		
2	676'0"	670'0"	660'0"	677'0"	704'0"	676'0"
3	699'0"	683'0"	676'0"	710'0"	718'1"	698'0"
4	729'0"	719'1"	691'0"		738'11½"	714'0"
5	762'0"	749'1"			752'2½"	729'0"
6	714'0"	779'1"			778'1"	741'0"
7		818'1"				754'0"
12					791'1"	771'0"
14					806'0"	783'0"
15		799'1"				806'0"

NOTES:

1. FOR LEGEND SEE DRAWING A-205790, SHT. 1.
2. WORK THIS DRAWING WITH C-205791, SHTS. 8 & 6A.

SUSQUEHANNA S.E.S.
UNIT 1
APPENDIX "R"
DEVIATION REQUEST NO. 12
PENETRATION X-28-5-66

AREA 28 | ELEV. | SCALE NA

PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PP&L DRAWING NO. C-205791 | SHEET NO. 6B | REV. NO. 1

AE DRAWING NO. C-1696 SH. 6B

PP&L FORM 3505C (1/84)

PENETRATION:	X-29-5-34
ADJACENT FIRE ZONES:	1-4A-W/1-5A-S
DUCT SIZE AT PENETRATION:	36"
VENTILATION SYSTEM:	REACTOR BUILDING ZONE I SUPPLY TO UNIT 1 PRIMARY CONTAINMENT DRYWELL AND SUPPRESSION POOL PURGE SUPPLY

DISCUSSION:

As shown on Shts. 7, 7A, 7B and 7C of Drawing C-205791, the duct assembly penetrates the fire barrier floor at Elevation 749'-1". This penetration joins Fire Zone 1-4A-W with Fire Zone 1-5A-S. Both Fire Zone 1-4A-W and Fire Zone 1-5A-S have full sprinkler protection. Additionally, there are no openings in this duct run with both ends having normally closed dampers.

JUSTIFICATION:

a) Fire initiated in Fire Zone 1-4A-W with potential to spread to Fire Zone 1-4A-S.

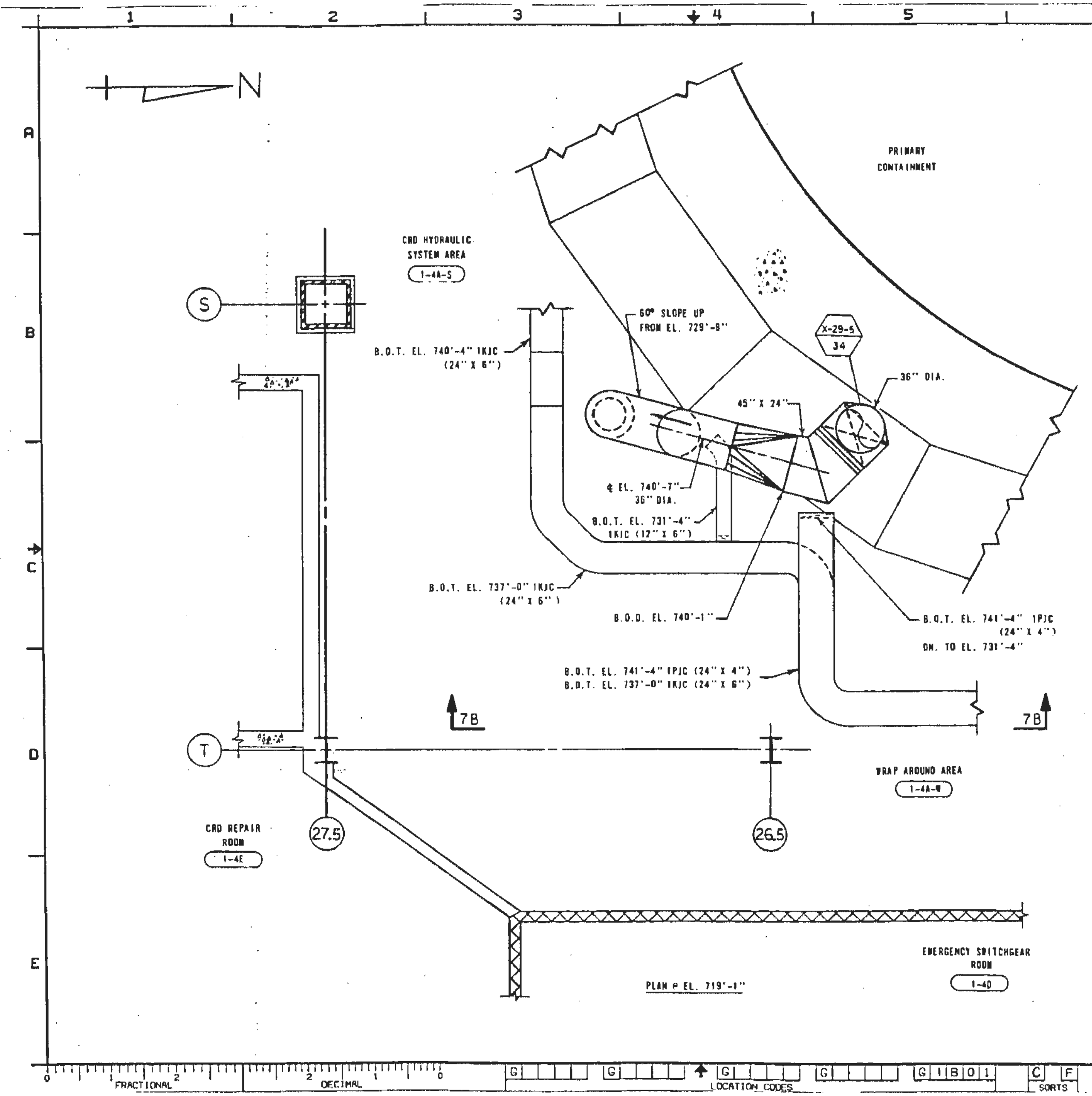
There are no openings in the duct assembly in either fire zone and heat generated by a fire in Fire Zone 1-4A-W would be mitigated by the automatic suppression system in Fire Zone 1-4A-W. Therefore, a fire initiated in Fire Zone 1-4A-W would not generate enough heat to adversely impact any system in Fire Zone 1-5A-S.

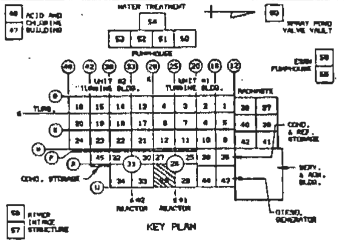
b) Fire initiated in Fire Zone 1-5A-S with potential to spread to Fire Zone 1-4A-W.

There are no openings in the duct assembly in either fire zone and heat generated by a fire in Fire Zone 1-5A-S would be mitigated by the automatic suppression system in Fire Zone 1-5A-S. Therefore, a fire initiated by Fire Zone 1-5A-S would not generate enough heat to adversely impact any system in Fire Zone 1-4A-W.

CONCLUSION:

Based on the above discussion, NFPA 90A, Section 3-3.2.1.1, the physical layout of the adjacent fire zones and the combustible configuration within the fire zones, a fire damper is not required in penetration X-2-5-34.





FLOOR LEVEL	TURBINE BLDG. FL.	REACTOR BLDG. EL.	RADWASTE BLDG. EL.	DIESEL GENERATOR EL.	DRYWELL REACTOR BLDG. EL.	CONTROL BLDG. EL.
1	656'0"	645'0"	646'0"	660'0"		
2	676'6"	670'0"	660'0"	677'0"	704'0"	679'0"
3	699'0"	683'0"	676'0"	719'0"	719'1"	699'0"
4	729'0"	719'1"	691'6"		738'11½"	714'0"
5	752'0"	749'1"			752'2½"	729'0"
6	774'0"	779'1"			779'1"	741'0"
7		818'1"				754'0"
12					791'1"	771'0"
14					806'0"	783'0"
16		799'1"				806'0"

NOTE:

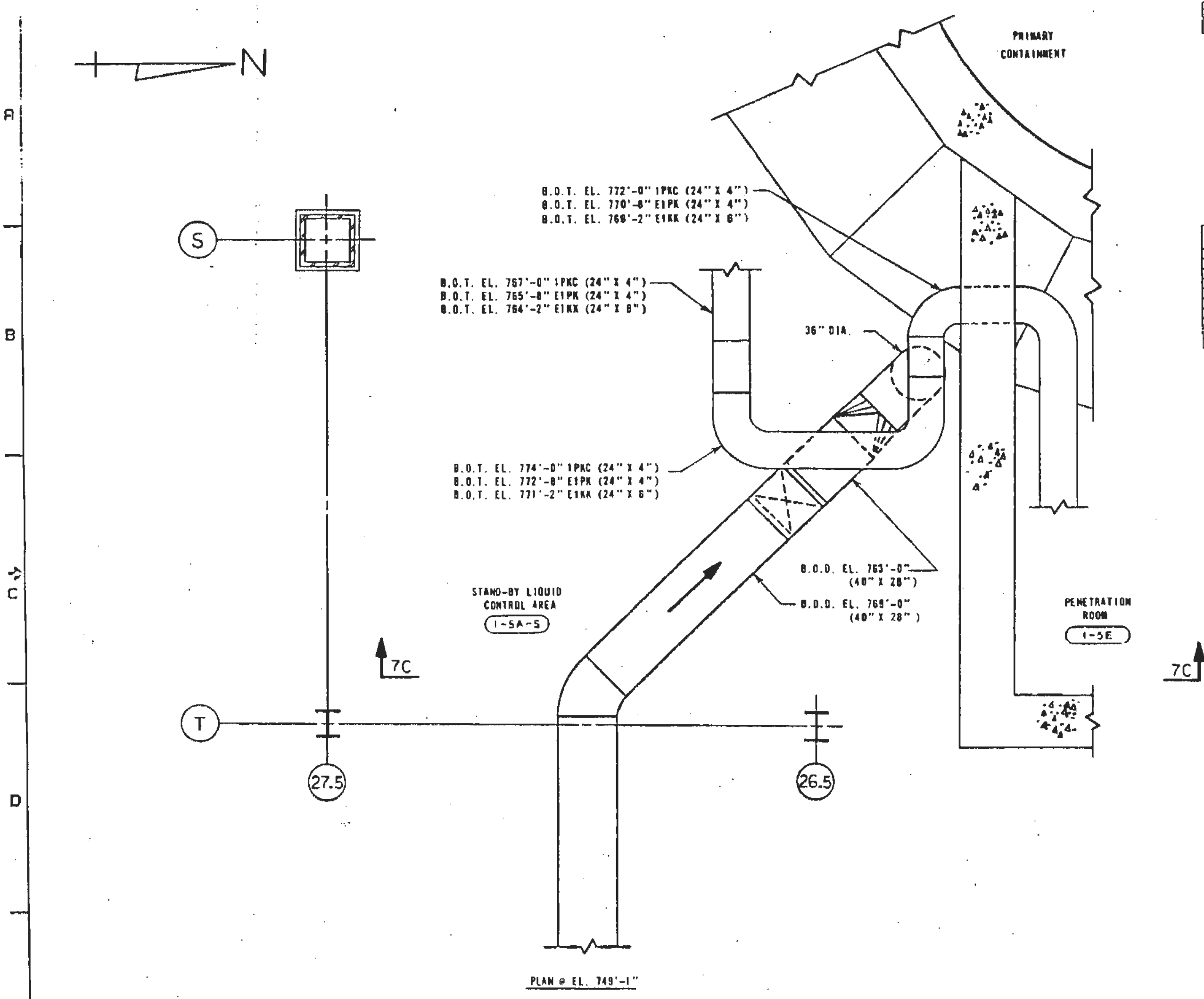
1. FOR LEGEND SEE DWG. A-205790, SHT. 1.
2. WORK THIS DWG. WITH C-205791, SHTS. 7A, 7B & 7C.

SUSQUEHANNA S.E.S.
UNIT 1
APPENDIX "R"
DEVIATION REQUEST NO. 12
PENETRATION X-29-5-34

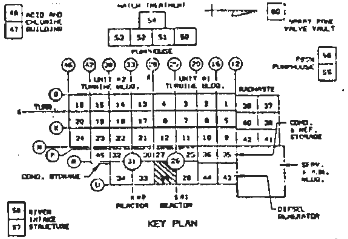
AREA 29 | ELEV. 719'-1" | SCALE NA

PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PP&L DRAWING NO. C-205791
SHEET NO. 7
REV. NO. 1
AE DRAWING NO. C-1696 SH. 7



PLAN @ EL. 749'-1"



KEY PLAN

FLOOR LEVEL	TURBINE BLDG. EL.	REACTOR BLDG. EL.	RADWASTE BLDG. EL.	DIESEL GENERATOR EL.	DRYWELL REACTOR BLDG. EL.	CONTROL BLDG. EL.
1	656'0"	645'0"	646'0"	660'0"		
2	676'0"	670'0"	660'0"	677'0"	704'0"	676'0"
3	699'0"	683'0"	676'0"	710'0"	719'1"	699'0"
4	729'0"	719'1"	691'6"		738'11½"	714'0"
5	762'0"	749'1"			752'2½"	729'0"
6	714'0"	779'1"			779'1"	741'0"
7		818'1"				754'0"
12					781'1"	771'0"
14					806'0"	783'0"
18		799'1"				806'0"

NOTE:

1. FOR LEGEND SEE DWG. A-205790, SHT. 1.
2. WORK THIS DWG. WITH C-205791, SHTS. 7, 7B & 7C.

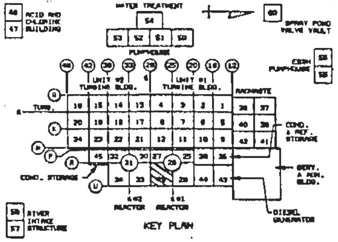
SUSQUEHANNA S.E.S.
UNIT I
APPENDIX "R"
DEVIATION REQUEST NO. 12
PENETRATION X-29-5-34

AREA 29	ELEV. 749'-1"	SCALE NA

PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PP&L DRAWING NO.	SHEET NO.	REV. NO.
C-205791	7A	1
AE DRAWING NO. C-1696 SH. 7A		

PP&L FORM 3676C (1/81)

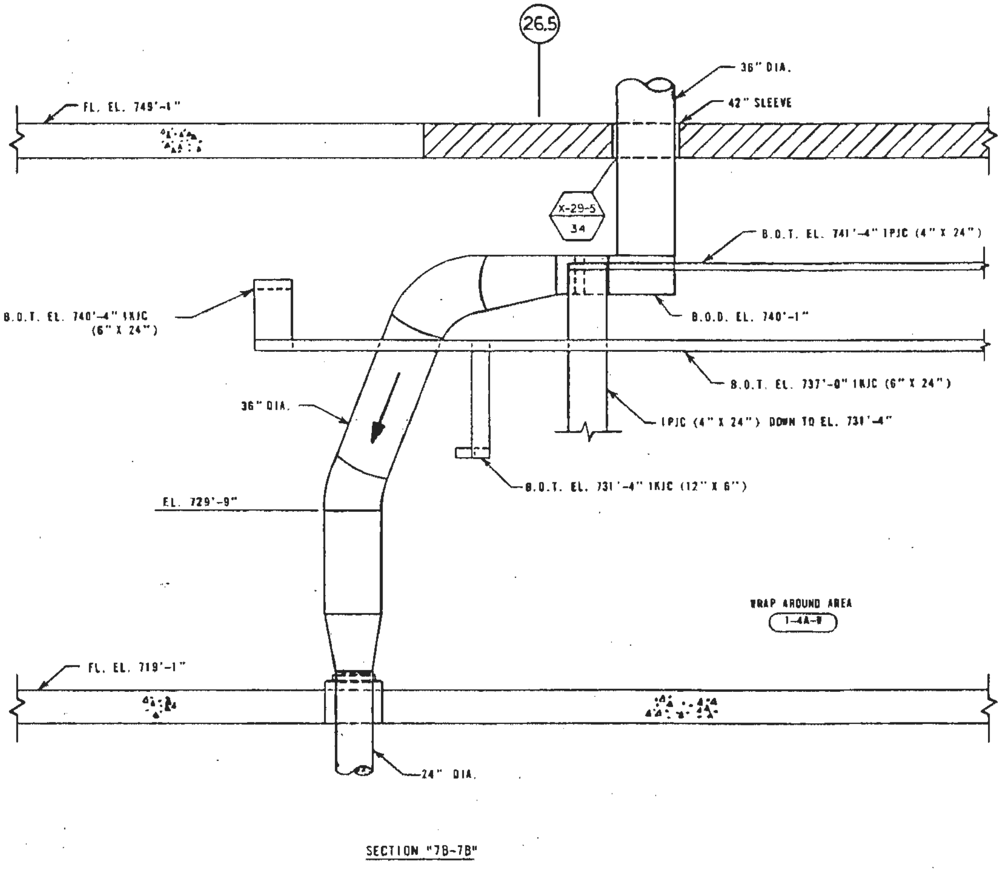


KEY PLAN

FLOOR LEVEL	TURBINE BLDG. EL.	REACTOR BLDG. EL.	RADWASTE BLDG. EL.	DIESEL GENERATOR EL.	DRYWELL REACTOR BLDG. EL.	CONTROL BLDG. EL.
1	656'0"	645'0"	646'0"	660'0"		
2	676'0"	670'0"	660'0"	677'0"	704'0"	676'0"
3	699'0"	683'0"	676'0"	710'0"	719'1"	698'0"
4	729'0"	719'1"	691'6"		739'11½"	714'0"
5	762'0"	749'1"			752'2½"	729'0"
6	774'0"	779'1"			779'1"	741'0"
7		818'1"				754'0"
12					761'1"	771'0"
14					806'0"	783'0"
18		799'1"				806'0"

NOTE:

1. FOR LEGEND SEE DWG. A-205790, SHT. 1
2. WORK THIS DWG. WITH C-205791, SHTS. 7, 7A & 7C.



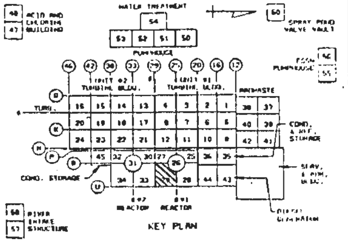
SECTION "7B-7B"

SUSQUEHANNA S.E.S.
UNIT 1
APPENDIX "R"
DEVIATION REQUEST NO. 12
PENETRATION X-29-5-34

AREA 29	ELEV. 719'-1"	SCALE NA

PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

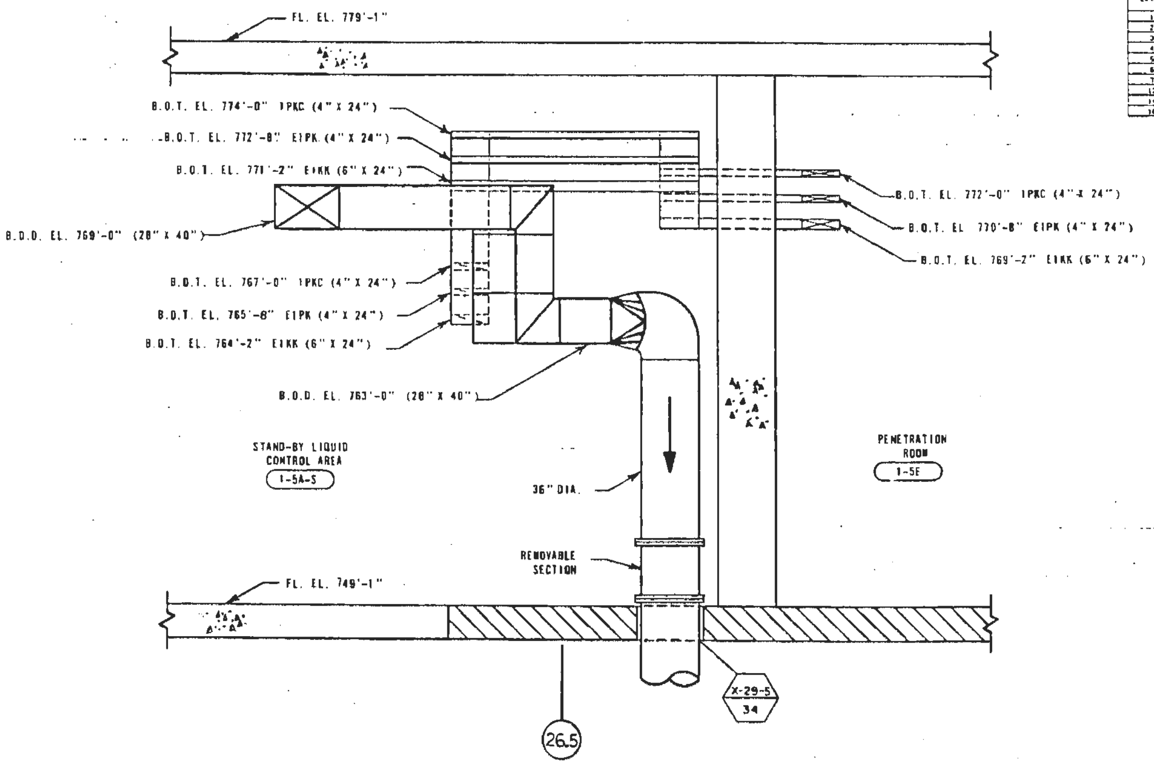
PP&L DRAWING NO.	SHEET NO.	REV. NO.
C-205791	7B	1
AE DRAWING NO. C-1696 SH. 7B		



FLOOR LEVEL	TURBINE BLDG. EL.	REACTOR BLDG. EL.	RADWASTE BLDG. EL.	DIESEL GENERATOR EL.	[illegible]	[illegible]
1	656'0"	645'0"	646'0"	660'0"		
2	676'0"	670'0"	660'0"	677'0"	704'0"	[illegible]
3	699'0"	683'0"	676'0"	710'0"	719'1"	[illegible]
4	729'0"	719'1"	691'6"		[illegible]	714'0"
5	762'0"	749'1"			[illegible]	[illegible]
6	719'0"	779'1"			779'1"	741'0"
7		818'1"				754'0"
12					751'1"	776'0"
14					806'0"	783'0"
16		799'1"				806'0"

NOTE:

1. FOR LEGEND SEE DWG. A-205790, SHT. 1.
2. WORK THIS DWG. WITH C-205791, SHTS. 7, 7A & 7B.



SECTION "7C-7C"

SUSQUEHANNA S.E.S.
UNIT 1
APPENDIX "R"
DEVIATION REQUEST NO. 12
PENETRATION X-29-5-34

AREA 29 | ELEV 749'-1" | SCALE NA

PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PP&L DRAWING NO. C-205791
SHEET NO. 7C
REV. NO. 1
AE DRAWING NO. C-1696 SH. 7C

PENETRATION:	X-29-5-54
ADJACENT FIRE ZONES:	1-4A-W/1-5A-S
DUCT SIZE AT PENETRATION:	22" X 22"
VENTILATION SYSTEM:	REACTOR BUILDING EMERGENCY SWITCHGEAR ROOMS COOLING UNIT SUPPLY

DISCUSSION:

As shown on Shts. 8, 8A and 8B of Drawing C-205791, the duct assembly penetrates the fire barrier floor at Elevation 749'-1". This penetration joins Fire Zone 1-4A-W with Fire Zone 1-5A-S. Both Fire Zone 1-4A-W and Fire Zone 1-5A-S have full sprinkler protection.

JUSTIFICATION:

a) Fire initiated in Fire Zone 1-4A-W with potential to spread to Fire Zone 1-5A-S.

There are no openings in the duct assembly in either Fire Zone 1-4A-W or Fire Zone 1-5A-S. A fire in Fire Zone 1-4A-W would be mitigated by the automatic suppression system in Fire Zone 1-4A-W and therefore, a fire initiated in Fire Zone 1-4A-W would not generate enough heat to adversely impact any system in Fire Zone 1-5A-S.

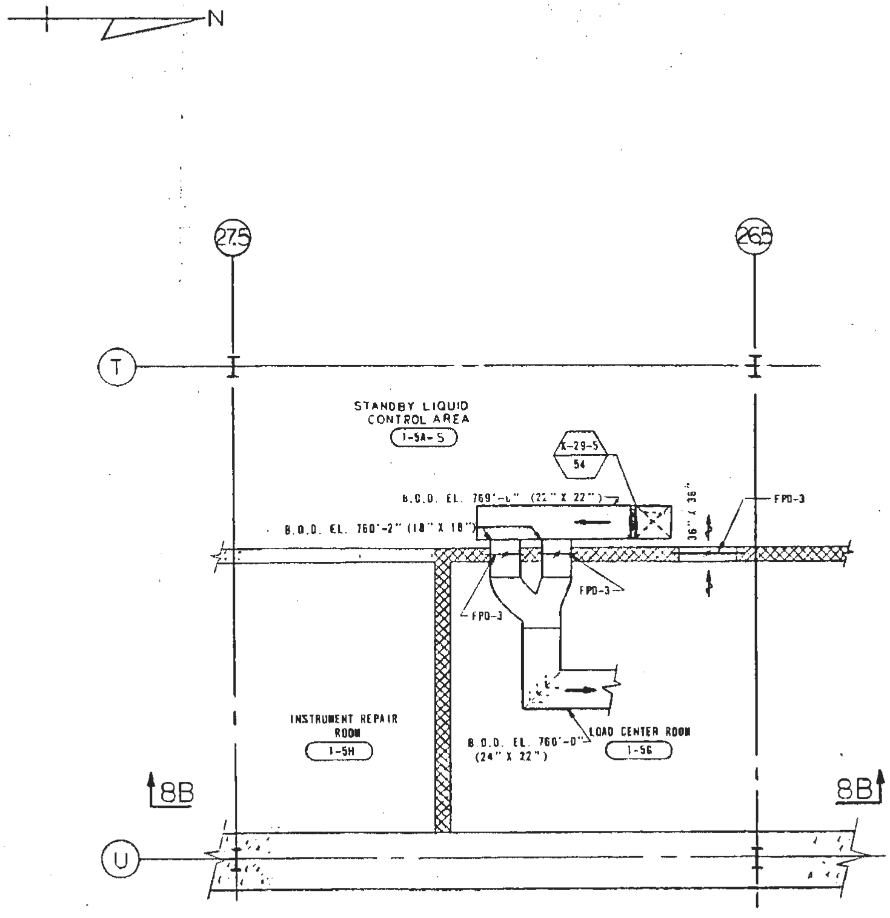
b) Fire initiated in Fire Zone 1-5A-S with potential to spread to Fire Zone 1-4A-W.

There are no openings in the duct assembly in either Fire Zone 1-5A-S or Fire Zone 1-4A-W. A fire in Fire Zone 1-5A-S would be mitigated by the automatic suppression system in Fire Zone 1-5A-S and therefore, a fire initiated in Fire Zone 1-5A-S would not generate enough heat to adversely impact any system in Fire Zone 1-4A-W.

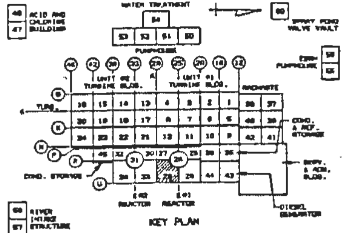
CONCLUSION:

Based on the above discussion, NFPA 90A, Section 3-3.2.1.1, the physical layout of the adjacent fire zones and the combustible configuration within the fire zones, a fire damper is not required in penetration X-29-5-54.

Security-Related Information
Figure Withheld Under 10 CFR 2.390



PLAN @ EL. 749'-1"



KEY PLAN

FLOOR LEVEL	TURBINE BLDG. EL.	REACTOR BLDG. EL.	RADWASTE BLDG. EL.	DIESEL GENERATOR EL.	DRYWELL REACTOR BLDG. EL.	CONTROL BLDG. EL.
1	656'-0"	645'-0"	646'-0"	660'-0"		
2	676'-0"	670'-0"	660'-0"	677'-0"	704'-0"	676'-0"
3	699'-0"	683'-0"	676'-0"	710'-0"	719'-1"	698'-0"
4	729'-0"	719'-1"	691'-0"		738'-11½"	714'-0"
5	752'-0"	749'-1"			752'-8½"	729'-0"
6	774'-0"	779'-1"			778'-1"	741'-0"
7		818'-1"				754'-0"
12					791'-1"	771'-0"
14					806'-0"	783'-0"
18		799'-1"				806'-0"

NOTES:

1. FOR LEGEND SEE DRAWING A-205790, SHEET 1.
2. WORK THIS DRAWING WITH C-205791, SHEETS 8 & 8B.

SUSQUEHANNA S.E.S.
UNIT I
APPENDIX "R"
DEVIATION REQUEST NO. 12
PENETRATION X-29-5-54

AREA 29 | ELEV 749'-1" | SCALE NA

PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PP&L DRAWING NO. C-205791 | SHEET NO. 8A | REV. NO. 1

AE DRAWING NO. C-1696 SH. 8A

FRACTIONAL DECIMAL

G | G | G | G 1 B 0 1

LOCATION CODES

C F

SORTS

Security-Related Information
Figure Withheld Under 10 CFR 2.390

PENETRATION:	X-34-5-4
ADJACENT FIRE ZONES:	2-4A-S/2-5A-W
DUCT SIZE AT PENETRATION:	40" X 28"
VENTILATION SYSTEM:	REACTOR BUILDING HVAC ZONE II SUPPLY TO UNIT II PRIMARY CONTAINMENT DRYWELL AND SUPPRESSION POOL PURGE SUPPLY

DISCUSSION:

As shown on Shts. 9, 9A and 9B of Drawing C-205791, the duct assembly penetrates the fire barrier floor/ceiling at Elevation 749'-1". This penetration joins Fire Zone 2-4A-S with Fire Zone 2-5A-W. Both Fire Zone 2-4A-S and Fire Zone 2-5A-W have automatic suppression system protection in the vicinity of the subject penetration. Additionally, there are no openings in this duct run with both ends having normally closed dampers.

JUSTIFICATION:

a) Fire initiated in Fire Zone 2-4A-S with potential to spread to Fire Zone 2-5A-W.

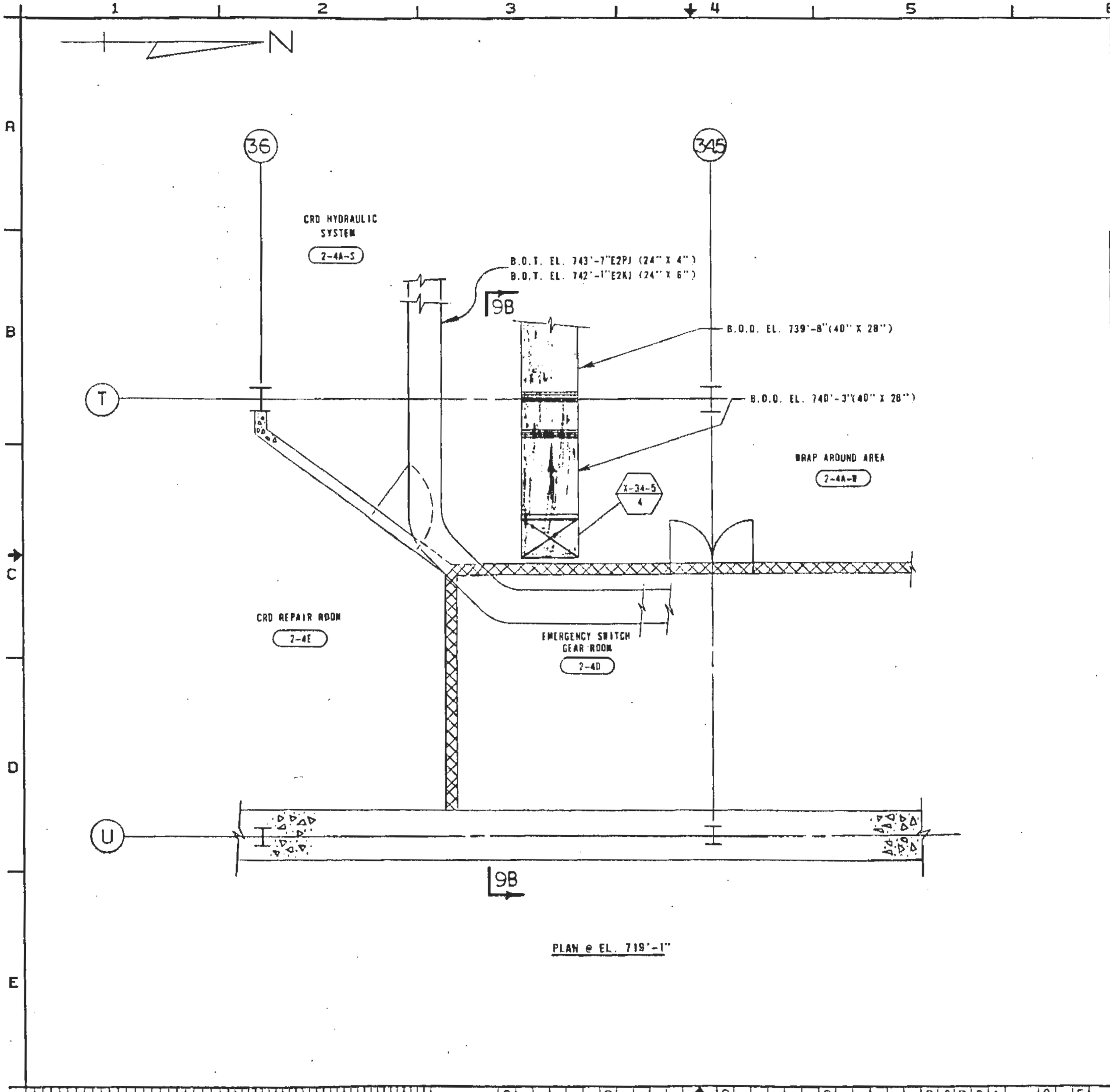
The combustibles located near the duct assembly in Fire Zone 2-4A-S are two cable trays. A fire in Fire Zone 2-4A-S would be mitigated by the automatic suppression system in Fire Zone 2-4A-S. Therefore, a fire initiated in Fire Zone 2-4A-S would not generate enough heat to adversely impact any system in Fire Zone 2-5A-W.

b) Fire initiated in Fire Zone 2-5A-W with potential to spread to Fire Zone 2-4A-S.

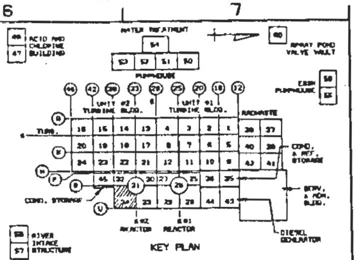
Fire Zone 2-5A-W is protected by an automatic fire suppression system which would mitigate the consequences of any heat generated in Fire Zone 2-5A-W as a result of a fire in Fire Zone 2-5A-W. Therefore, a fire initiated in Fire Zone 2-5A-W would not generate enough heat to adversely impact any system in Fire Zone 2-4A-S.

CONCLUSION:

Based on the above discussion, NFPA 90A, Section 3-3.2.1.1, the physical layout of the adjacent fire zones and the combustible configuration within the fire zones, a fire damper is not required in penetration X-34-5-4.



PLAN @ EL. 719'-1"



KEY PLAN

FLOOR LEVEL	TURBINE BLDG. EL.	REACTOR BLDG. EL.	RADWASTE BLDG. EL.	DIESEL GENERATOR EL.	DRYWELL REACTOR BLDG. EL.	CONTROL BLDG. EL.
1	656'0"	645'0"	646'0"	660'0"		
2	676'0"	670'0"	660'0"	677'0"	704'0"	678'0"
3	699'0"	683'0"	676'0"	710'0"	719'1"	699'0"
4	729'0"	719'1"	691'0"		738'11½"	714'0"
5	762'0"	749'1"			752'2½"	729'0"
6	714'0"	779'1"			779'1"	741'0"
7		818'1"				754'0"
12					791'1"	771'0"
14					808'0"	783'0"
19		799'1"				806'0"

NOTES:

1. FOR LEGEND SEE DWG. A-205790, SHT. 1.
2. WORK THIS DWG. WITH C-205791, SHTS. 9A & 9B.

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SUSQUEHANNA S.E.S.
UNIT 2
APPENDIX "R"
DEVIATION REQUEST NO. 12
PENETRATION X-34-5-4

AREA 34	ELEV. 719'-0"	SCALE NA

PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PP&L DRAWING NO.	SHEET NO.	REV. NO.
C-205791	9	1
BE DRAWING NO. C-1696 SH. 9		

0 1 2 FRACTIONAL 2 1 0 DECIMAL

G G G G 2 B 0 1 LOCATION CODES C F SORTS

PP&L FORM 2505C (1/81)

Security-Related Information
Figure Withheld Under 10 CFR 2.390

Security-Related Information
Figure Withheld Under 10 CFR 2.390

TABLE DR12-1

Fire Zone/ Fire Area	Penetration	Duct Size	Zone Sprinklered	Zone Without Duct Opening	Drawing C-205791 Reference
R-1A to R-1B:					
1-5A-S/1-6A	X-27-6-17	27" Dia.	1-5A-S	Both	Shts. 1, 1A & 1B
1-5A-S/1-6A	X-27-6-18	32" Dia.	1-5A-S	Both	Shts. 2, 2A & 2B
1-5A-S/1-6A	X-27-6-50	30" X 20"	1-5A-S	1-5A-S	Shts. 3, 3A & 3B
1-5A-S/1-6A	X-27-6-51	30" X 20"	1-5A-S	1-5A-S	Shts. 4, 4A & 4B
1-5A-S/1-6A	X-26-6-83	20" X 8"	1-5A-S	Both	Shts. 5, 5A & 5B
1-4A-W/1-5A-W	X-28-5-66	22" X 22"	Both	Both	Shts. 6, 6A & 6B
1-4A-W/1-5A-S	X-29-5-34	36" Dia.	Both	Both	Shts. 7, 7A & 7B & 7C
1-4A-W/1-5A-S	X-29-5-34	22" X 22"	Both	Both	Shts. 8, 8A & 8B
R-2A to R-2B:					
2-4A-S/2-5A-W	X-34-5-4	40" X 28"	Both	Both	Shts. 9, 9A & 9B

APPENDIX R DEVIATION REQUEST NO. 13

ESSENTIAL REDUNDANT RACEWAY PROTECTION

DEVIATION REQUEST:

a) Protection of redundant safe shutdown cables in a fire zone may be accomplished through the use of one or a combination of methods identified in 10CFR50, Appendix R, Section III.G.2a, b, and c.

b) The safe shutdown cables required to ensure availability of a safe shutdown path in a particular fire zone need only be protected within that fire zone. The criteria for fire spread is documented in Deviation Request Nos. 4 and 7).

c) All raceways are protected by the use of a 1-hour fire rated barrier where automatic suppression/detection exists or by the use of a 3-hour fire rated barrier where automatic suppression/detection does not exist (See attached Drawing B-213424).

FIRE AREAS/ZONES AFFECTED:

This deviation request applies to all fire areas in the Unit 1 and Unit 2 Reactor Buildings.

REASON FOR DEVIATION REQUEST:

10CFR50 Appendix R Section III.G.2 requires that where cables or equipment of redundant trains of systems necessary to achieve safe shutdown are located within the same fire area, one of 3 means (III.G.2.a,b,c) of ensuring that one of the redundant trains is free of fire damage shall be provided. When using the methods of Sections III.G.2.b or c for raceway protection, it is required that the fire detection and an automatic fire suppression system be installed in (throughout) the fire area. Although we have fire detection, where appropriate, throughout the fire areas, we do not have an automatic fire suppression system installed completely throughout the fire areas. Based on the fire spread limitation criteria outlined in Deviation Request No. 7 and the wraparound area concept in Deviation Request No. 4, protection of the essential redundant train throughout an entire fire area is not warranted. In addition, certain fire zones have only partial automatic suppression coverage within the fire zone.

EXISTING CONDITIONS:

The 3-hour fire barrier method (III.G.2.a) and the 1-hour fire barrier with automatic fire suppression/detection method (III.G.2.c) are used to protect essential redundant raceways at Susquehanna SES. The choice of methods depends on the availability of automatic fire suppression/detection.

There are two specific types of exceptions to this general criteria. In one case, Fire Hazards Analyses have been used to justify the use of 1-hour rated fire barriers to protect redundant safe shutdown raceway even though there are no sprinklers installed in the area. For these cases, a 10 CFR 50.59 Safety Evaluation has been used to demonstrate that the condition does not adversely affect the ability to achieve and maintain safe shutdown. This satisfies the SSES Licensing Condition for changes to the approved Fire Protection Program. The areas listed below are the Fire Zones where this approach has been used.

Fire Zone	FHA Reference	Safety Evaluation No.
1-5B	EC-013-1834	98-3014C
1-6I	EC-013-1081	98-3014D
2-5A-N	EC-013-1823	98-3013C
2-5C	EC-013-1082	98-3013C
2-6A	EC-013-1824	98-3013C

In the other case, specific deviation requests have been submitted to and approved by the NRC allowing the use of 1-hour fire rated barriers on redundant safe shutdown raceway. Deviation Request Nos. 8 and 15 fall into this category.

The wraparound areas at Susquehanna SES contain both divisions of redundant safe shutdown raceways and both divisions of these raceways are protected within the wraparound areas (see Deviation Request No. 4). The wraparound area provides a spatial separation between fire areas and the protection of both redundant safe shutdown raceway divisions within the wraparound area assures the availability of a safe shutdown path based on the limitation of fire spread across the wraparound area.

The fire spread limitation criteria (see Deviation Request No. 7) states that a fire will only propagate to the next adjacent fire zone. Therefore, different safe shutdown paths could be protected in fire zones remote from each other.

JUSTIFICATION:

The purpose of Appendix R, Section III.G.2, is to assure that one train of safe shutdown raceway and its associated circuits are free of fire damage so that they remain available for safe shutdown of the plant. The method of protection for these essential redundant raceways outlined in this deviation request is different than that required by Appendix R, Section III.G.2, but accomplishes the same purpose and intent of Section III.G.2.

Due to the large configurations of some of the Reactor Building fire areas and the fire spread limitation criteria presented in Deviation Request No. 7, the installation of an automatic suppression system throughout the fire areas would not significantly enhance the safety of the plant. Moreover, where an automatic suppression system does not exist, essential redundant raceway are protected by a 3-hour fire rated barrier. The exceptions to this itemized above have been justified on an individual basis separately.

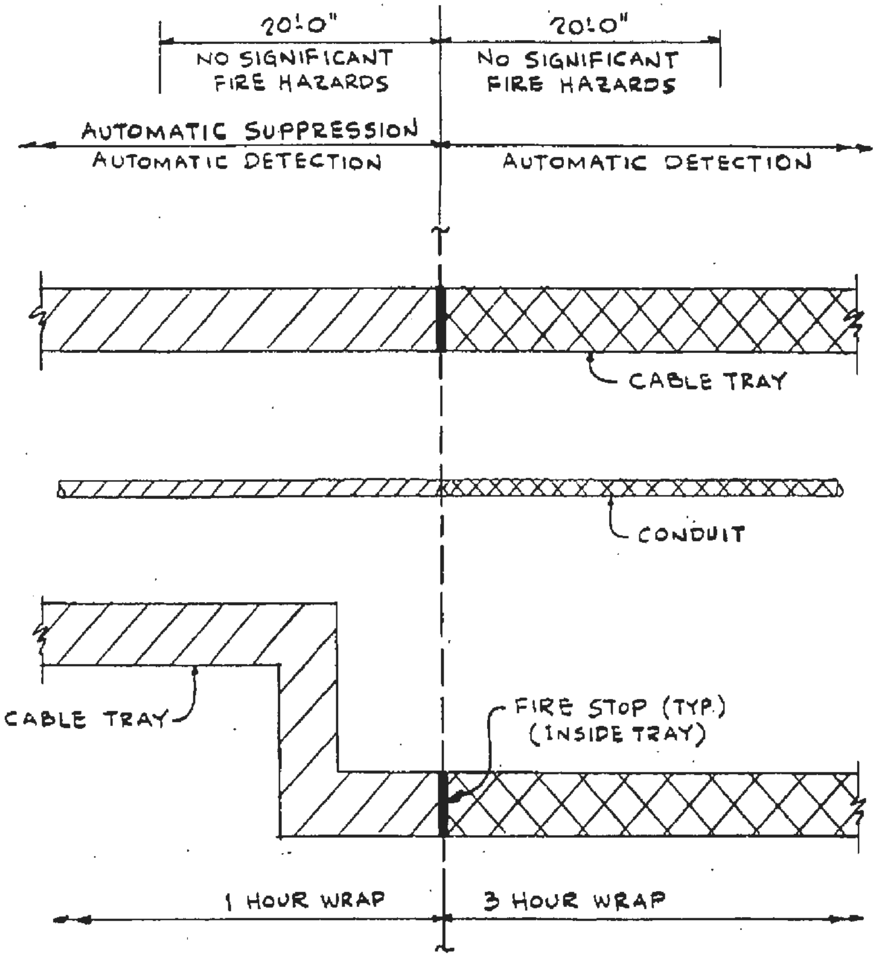
In fire zones where automatic suppression is not complete throughout the entire fire zone, both one-hour and three-hour raceway protection (wrapping) is used. There are four fire zones at Susquehanna which have partial automatic suppression coverage within the fire zone. These four zones are listed below along with the conservatively developed in-situ combustible loading as determined from the Combustible Loading Analysis.

Fire Zone	In-situ Combustible Loading
1-3B-N	40.4 minutes
1-4A-N	22.9 minutes
2-3B-N	55.5 minutes
2-4A-S	25.9 minutes

Actual in-situ combustible loading durations are provided to document existing arrangement and justify the deviation request. These values are based on the initial combustible loading analysis. Modifications subsequent to this analysis have revised these values with the possibility of future modifications revising them again. The governing criteria for the combustible loading analysis is that the fire area resistance rating exceed the combustible loading duration. The combustible loading durations specified in the deviation request will not be updated in the future since program commitments require that all modifications be evaluated to assure that additional combustibles are controlled to remain below the fire area fire resistance rating.

In all cases, the conservative maximum combustible loading for each of these fire zones is less than 60 minutes. This is the tested acceptance level for the 1-hour wrapping used at Susquehanna. Additionally, wherever the 1-hour wrapping is being used, automatic suppression protection exists to mitigate the heat effect that a postulated fire would have on the wrapped raceway. Inspection of the boundary areas for each of these partially protected fire zones reveals that there are no significant fire hazards on either side of this boundary for a minimum distance of approximately 20 ft. (See attached Drawing B-213424). Therefore, we are assured that adequate protection exists for the given combustible configuration in each of these boundary areas.

Based on the criteria and justifications presented in this deviation request and in Deviation Requests No. 4 and No. 7, we are assured that one of the redundant trains of a required safe shutdown system is free from fire damage.



LEGEND

▨ — 1 HR. WRAP

▦ — 3 HR. WRAP

PLAN VIEW

ESSENTIAL REDUNDANT RACEWAY PROTECTION

FIRE ZONE WITH PARTIAL SPRINKLER PROTECTION.

SUSQUEHANNA S.E.S.
UNIT #1 & 2
APP. R-DEVIATION REQ. #13
ESSENTIAL REDUNDANT
RACEWAY PROTECTION

AREA —	ELEV. —	SCALE —

PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PP&L DRAWING NO.	SHEET NO.	REV. NO.
B213424	1	
AE DRAWING NO. C-1836		0

APPENDIX R DEVIATION REQUEST NO. 14

REACTOR BUILDING FIRE ZONES WITHOUT FIRE DETECTION

DEVIATION REQUEST:

Fire detection need not be provided in fire zones which do not contain safe shutdown raceway or do not represent an exposure hazard to safe shutdown equipment even if a fire zone within the same area contains redundant safe shutdown raceway. The provision of automatic sprinkler protection in lieu of fire detection is acceptable in Fire Zones 1-2C and 2-2C.

FIRE AREA/ZONES AFFECTED:

This deviation applies to Unit 1 and Unit 2 Reactor Buildings, Fire Area: R-1A, R-1B, R-2A and R-2B.

REASON FOR DEVIATION REQUEST:

10CFR50, Appendix R, Section III.G.2 require fire detection. The NRC guidance indicates fire detection should be provided throughout a fire area. Fire detection has not been provided in the Reactor Building fire zones listed below under Existing Arrangement.

EXISTING ARRANGEMENT:

The following fire zones do not have fire detection:

Fire Area	Fire Zones	Reason
R-1A	1-2C	Railroad Airlock/Access Shaft – No detection – Automatic sprinklers provided
	1-4E	CRD Rebuild Room – No required safe shutdown cables – very low combustible loading
	0-6H	Cask Storage Pit – Filled with water.
	1-7B	Recirculation Fan Room – No required safe shutdown cables – very low combustible loading
	1-6F	Spent Fuel Pool – Filled with water.
R-1B	1-1J	Stairwell-no safe shutdown raceway or combustibles
	1-6F	Spent Fuel Pool – Filled with water.
	1-5C	Reactor Backwash Receiving Tank Room – No required safe shutdown cables – Very low combustible loading
	0-6H	Cask Storage Pit – Filled with water.
R-2A	2-2C	Same as 1-2C
	2-4E	Same as 1-4E
	2-6F	Same as 1-6F
R-2B	2-1J	Same as 1-1J
	2-6F	Same as 1-6F

JUSTIFICATION:

Fire Zones 1-2C and 2-2C have been provided with automatic sprinkler protection. Detection of a fire is provided via the sprinkler flow alarm when heat activates a sprinkler head. The remainder of the fire zones listed above do not contain required safe shutdown cables or equipment. None of the zones listed above represent a fire hazard which impacts on adjacent fire zones.

The NRC requested additional detection for Fire Zones 1-7B and 1-6F in FSAR Question 281.17. Our response to the staff and our Fire Protection Review Report both indicated that additional smoke detection would be provided in zones which contain or present a fire exposure hazard to safe shutdown equipment. The fire zones delineated in this request do not present an exposure fire hazard to safe shutdown equipment.

APPENDIX R DEVIATION REQUEST NO. 15

FIRE AREAS CONTROL STRUCTURE WITHOUT FIRE SUPPRESSION

DEVIATION REQUEST:

Automatic fire suppression is not required for the protection of 1-hour wrapped redundant safe shutdown raceway in Fire Areas CS-11 and CS-20.

FIRE AREAS/ZONES AFFECTED:

This deviation applies to Fire Areas CS-11 (Fire Zone 0-28A-I) and CS-20 (Fire Zone 0-28A-II).

REASON FOR DEVIATION REQUEST:

The requirements of 10CFR50, Appendix R, Section III G.2.C require fire suppression if a one-hour fire rated barrier for cables and equipment is provided. Fire Areas CS-11 and CS-20 are not provided with automatic fire suppression. Fire Hazard Analysis EC-013-1846 evaluated the specific deviations from tested configurations to assure that their capability is in excess of that required by the specific fire hazards in the vicinity of the deviation.

EXISTING CONDITIONS:

Fire Areas CS-11 and CS-20 contain safe shutdown cables enclosed in conduits which are protected by a one-hour fire barrier. In addition, Fire Area CS-20 contains two 125V DC distribution panels (2D624 and 2D644) which are enclosed with a one-hour protective fire barrier. The combustible loading for these fire zones is low. Manual suppression equipment and ionization detectors are provided in these fire zones. All cables are in conduits or panels. No cable trays which could add to the combustible loading are located in either fire area.

Actual in-situ combustible loading durations are provided to document existing arrangement and justify the deviation request. These values are based on the initial combustible loading analysis. Modifications subsequent to this analysis have revised these values with the possibility of future modifications revising them again. The governing criteria for the combustible loading analysis is that the fire area fire resistance rated exceed the combustible loading duration. The combustible loading durations specified in the deviation request will not be updated in the future since program commitments require that all modifications be evaluated to assure that additional combustibles are controlled to remain below the fire area fire resistance rating.

JUSTIFICATION:

Fire Areas CS-11 and CS-20 are identical in function and hazard to Fire Zones 0-28B-I and 0-28B-II which were the subject of a request for variance (See Deviation Request No. 8).

The combustible loadings may change over plant life. This Deviation Request will remain valid so long as:

a) The calculated maximum average combustible loading does not exceed 45 minutes.

b) The in-situ combustibles remain evenly dispersed.

DEVIATION REQUEST NO. 16 HAS BEEN WITHDRAWN

DEVIATION REQUEST NO. 17 HAS BEEN WITHDRAWN

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APPENDIX R DEVIATION REQUEST NO. 19

INCOMPLETE AUTOMATIC SUPPRESSION IN DIESEL GENERATOR FIRE AREA D-1

DEVIATION REQUEST:

Existing fire protection in Fire Area D-1, consisting of automatic suppression and detection in the basement (Elevation 660'-0") and ground floor (Elevation 677'-0") and fire detection only on the top floor (Elevation 710'-9"), is adequate to protect 1-hour fire barriers installed on required safe shutdown raceway located within the fire area. Specifically, no automatic suppression is required for the top floor (Elevation 710'-9").

FIRE AREAS/ZONES AFFECTED:

This deviation covers Diesel Generator Fire Area D-1 (Fire Zone 0-41A). This is the A Diesel Generator Building and is the only Diesel Generator Fire Area that has required safe shutdown raceway protected with a 1-hour fire barrier.

REASONS FOR DEVIATION REQUEST:

10CFR50, Appendix R, Sections III.G.2.c requires that fire detection and automatic suppression be installed in the fire area when required safe shutdown raceway are protected with a 1-hour fire barrier within the fire area. NRC guidance indicates fire detection and automatic suppression should be provided throughout the fire area. Contrary to this, the Diesel Generator A Building does not satisfy this requirement. The Diesel Generator A Building, Fire Area D-1, does not have automatic suppression on Elevation 710'-9".

EXISTING ARRANGEMENT:

Fire Area D-1 contains redundant safe shutdown raceway protected with a 1-hour fire barrier on Elevation 660'.0". Automatic suppression and fire detection is provided for the basement (Elevation 660'-0") and the ground floor (Elevation 677'-0") of this fire area. The top floor of this fire area (Elevation 710'-9") is provided with fire detection (alarm only) but is not provided with automatic suppression.

JUSTIFICATION:

The top floor (Elevation 710'-9") of this fire area contains fan equipment, safety related electrical panels for substituting Diesel Generator E for Diesel Generator A and a safety related HVAC panel. The SSES Appendix R Safe Shutdown Analysis demonstrates that the loss of this equipment, due to a fire in this fire area, will not affect the ability to achieve and maintain safe shutdown. Additionally, Elevation 710'-9" of the Diesel Generator A Building has minimal combustibles and has installed fire detection. This installed fire detection will assure identification of a fire and insure timely response by the plant fire brigade.

Due to the limited amount of in-situ combustibles on Elevation 710'-9", the manual fire fighting effort will more then compensate for the lack of automatic suppression on this elevation. Consequently, the lack of automatic suppression on this elevation does not present a hazard to required safe shutdown raceway protected with a 1-hour fire barrier located on elevation 660'-0" of the A Diesel Generator Building where fire detection and automatic suppression is installed.

CONCLUSION

The existing fire protection features provided on Elevation 710'-9" of the A Diesel Generator Building, Fire Area D-1, provide a level of fire protection equivalent to that required by 10CFR50 Appendix R Section III.G.2.c. This conclusion is based on the lack of effect on post fire safe shutdown capabilities, minimal combustibles, and existing fire detection as described above.

APPENDIX R DEVIATION REQUEST NO. 20

PENETRATION SEALS - CONDUITS

DEVIATION REQUEST:

It is acceptable to seal new and existing conduits at Susquehanna SES which penetrate fire rated barriers by installing a non-combustible seal internal to the conduit in order to contain the products of combustion within the fire area of fire origin.

FIRE AREAS/ZONES AFFECTED:

The requirements for sealing penetrations through fire rated barriers are contained in a specification and are applied throughout the facility. Therefore, this deviation request applies to all fire area boundaries.

REASON FOR DEVIATION REQUEST:

The requirements of 10CFR50, Appendix R, Section III.G.2 require fire areas to have rated fire boundaries. In NRC Generic Letter 86-10, Section 8.8, the NRC indicated guidelines for sealing conduits as they passed through fire rated boundaries. The conduits passing through fire rated barriers at Susquehanna SES are protected in an equivalent manner. The purpose of this deviation request is to document that equivalency.

EXISTING ARRANGEMENT:

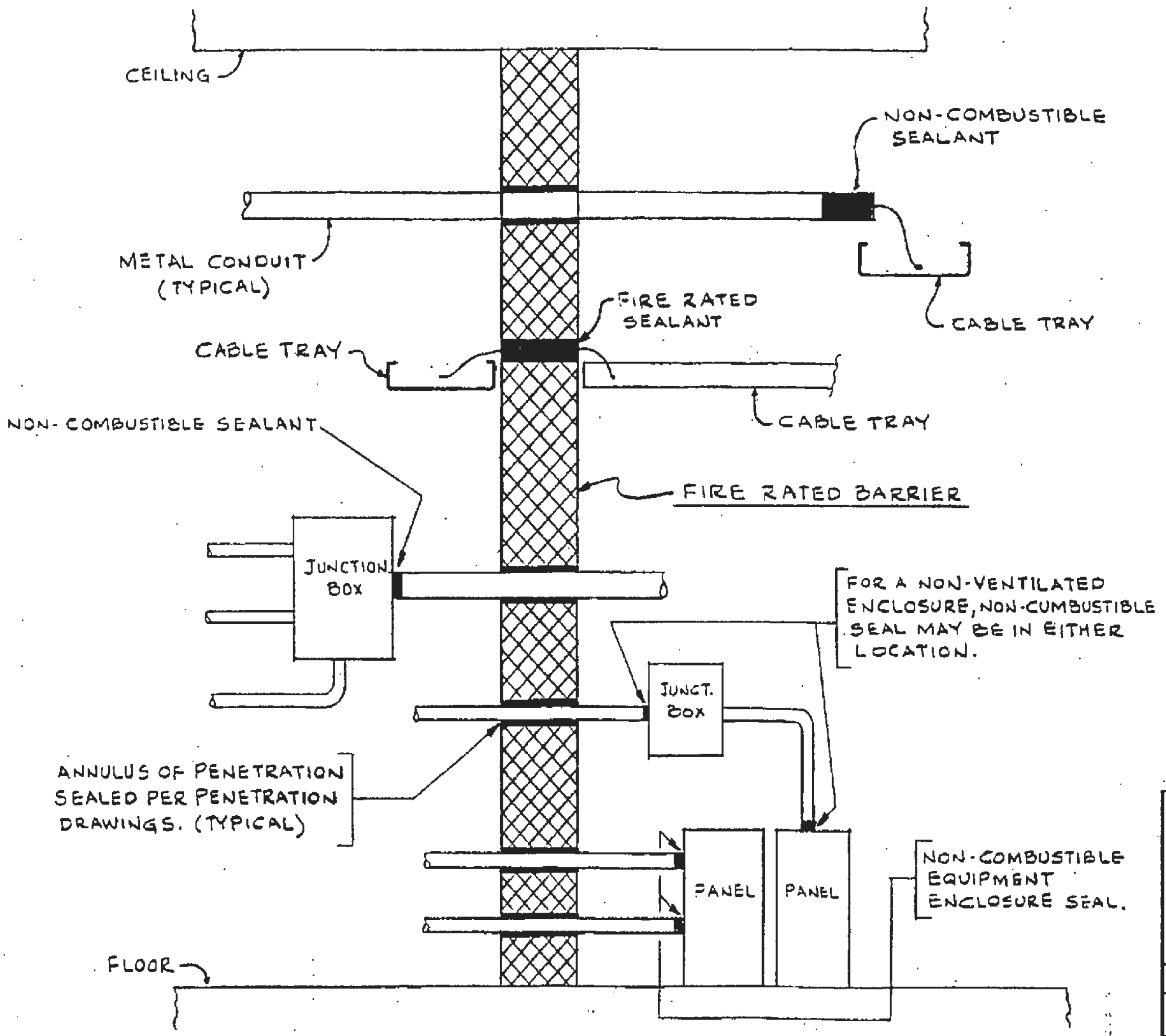
The specification criteria along with an in-plant inspection of all conduits which penetrate fire rated barriers assures that the conduits are sealed internally with a non-combustible material to contain the products of combustion within the fire area of fire origin and maintain the integrity of the fire area boundary.

JUSTIFICATION:

In accordance with NRC Generic Letter 86-10, the term fire area as used in Appendix R means an area sufficiently bounded to withstand the hazards associated with the fire area and, as necessary, to protect important equipment within the fire area from a fire outside the area.

The installation of a non-combustible seal internal to conduits penetrating fire area boundaries accomplishes the above purpose. Typically, these seals consist of a ceramic fiber damming material topped with either silicone foam or a fire retardant putty installed at the first available access point on one side of the fire barrier.

See attached drawing B-213419 for examples of some typical installations.



TYPICAL CONDUIT SEALING DETAILS

SUSQUEHANNA S.E.S.
UNIT # 1 & 2
APPENDIX R-DEVIATION
REQUEST # 20
CONDUIT SEALING DETAILS

AREA — ELEV. — SCALE —

PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PP&L DRAWING NO. B 213419
SHEET NO. 1
REV. NO. 1
AE DRAWING NO. C-1833

APPENDIX R DEVIATION REQUEST NO. 21

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APPENDIX R DEVIATION REQUEST NO. 23

CONTROL STRUCTURE
FIRE AREA CS-9
PARTIAL FIRE SUPPRESSION

DEVIATION REQUEST:

Fire protection provided in Fire Area CS-9 is adequate to protect the identified hazard. Specifically, the fire area is constantly manned by operations personnel who would detect and react to a fire, the area is provided with partial suppression, manual suppression is available, and the capability to achieve safe shutdown through alternative equipment is provided by the remote shutdown panel located outside the fire area.

FIRE AREAS/ZONES AFFECTED:

This deviation applies to Fire Area CS-9.

REASON FOR THE DEVIATION REQUEST:

Dedicated shutdown capability in accordance with Appendix R, Section III.G.3 has been provided for use in the event of a fire in the control room. The above was provided since separation of redundant trains of safe shutdown equipment within the control room does not satisfy the requirements of 10CFR50, Appendix R, Section III.G.2. Complete Fire suppression has not been provided throughout Fire Area CS-9.

EXISTING CONDITIONS:

The following conditions exist in Fire Area CS-9:

Zone	Protection	Safe Shutdown Equipment
0-26A	None	None
0-26E	None	None
0-26F	Manual Spurt CO_2 under floor (Fixed Piping)	Yes
0-26G	Manual Spurt CO_2 under floor (Fixed Piping)	Yes
0-26H	Manual Spurt CO_2 under floor (Fixed Piping)	Yes
0-26I	Manual Spurt CO_2 under floor (Fixed Piping)	Yes
0-26J	Manual Spurt CO_2 under floor (Fixed Piping)	Yes
0-26K	Automatic Sprinkler Protection	Yes
0-26L	Automatic Sprinkler Protection	Yes
0-26M	Manual Spurt CO_2 (Fixed Piping)	Yes
0-26N	Manual Spurt CO_2 (Fixed Piping)	Yes
0-26P	Manual Spurt CO_2 (Fixed Piping)	Yes
0-26R	Manual Spurt CO_2 (Fixed Piping)	Yes

The release of CO_2 is controlled manually to minimize the effects of a CO_2 discharge on plant operation. Manual control stations are provided both inside and outside the fire area. Fire Zones with constant occupancy (0-26G, 0-26H, and 0-26I) are provided with under floor protection only.

Complete automatic sprinkler protection has been provided for Fire Zone 0-26K and 0-26L.

Fire Zones 0-26F and 0-26J are vestibules and contain safety related cables below the raised floor. These cables are protected by manual spurt CO_2.

Portable extinguishers are available for use in the fire area. A hose station is available within the control structure for use in the fire area.

JUSTIFICATION:

It has been demonstrated during the performance of startup and test program that full shutdown is achievable without reliance on the Control Room. The existing protection provided in Fire Area CS-9 is adequate to protect the identified cable hazards. It is expected that since the control room is constantly manned by operations personnel, any fire would be detected and extinguished prior to activation of a suppression system. The addition of more suppression capability would not enhance, to a significant degree, the protection of safe shutdown functions.

APPENDIX R DEVIATION REQUEST NO. 24

AUTOMATIC FIRE SUPPRESSION IN FIRE ZONE 2-5D

DEVIATION REQUEST:

The installation of an automatic fire suppression system in Fire Zone 2-5D in order to comply with Appendix R, Section III.G.2.b would not significantly enhance the fire protection for that zone nor overall plant safety, and therefore is not required.

FIRE ZONE AFFECTED:

This deviation request applies only to Fire Zone 2-5D, which is in Fire Area R-2A.

REASON FOR DEVIATION:

10CFR50, Appendix R, Section III.G.2.b requires the existence of an automatic fire suppression system, in addition to fire detectors, in those fire areas where separation of redundant safe shutdown cables and equipment is greater than 20 feet with no intervening combustibles. Fire Zone 2-5D contains cables for HV-E21-2F005A (Div. I) and power cables from 2D613 and 2D653A (Div. I) as well as Valve HV-G33-2F004 (Div. II).

Redundant safe shutdown equipment/cables in Fire Zone 2-5D are separated by a horizontal spatial distance of approximately 50 feet with negligible intervening combustibles. No automatic fire suppression system exists in the fire zone. Fire Zone 2-5D is a fire zone in which relief from the automatic fire suppression system requirement of Appendix R, Section III.G.2.b is sought.

EXISTING ARRANGEMENT:

RWCU Outboard Isolation Valve HV-G33-2F004 is normally open during power operation and is required closed to isolate reactor coolant letdown to the RWCU System when performing plant shutdown for an Appendix R scenario. In the event valve HV-G33-2F004 is unavailable, the RWCU Inboard Isolation Valve HV-G33-2F001 may be called upon to close to isolate reactor coolant letdown. Valve HV-G33-2F001 is located inside containment (Fire Zone 2-4F) and HV-G33-2F004 is located in Fire Zone 2-5D.

For a fire in Fire Zone 2-5D (physical location of valve HV-G33-2F004), HV-G33-2F004 (Div. II) and its cables may be disabled. The valve and its cables are located in the North-West corner of the fire zone (refer to Drawing C-1824). The cables travel West to Fire Zone 2-5C. No cables for Inboard Isolation Valve HV-G33-2F001 (Div. I) are located in Fire Zone 2-5D. Cables for Valve HV-G33-2F001 and its power supply wrapped in adjacent (i.e., communicating) Fire Zones (2-4A-W and 2-5A-W) except for 2-4A-S for which 3-hour barrier upgrades are provided between zones. Refer to Figures C-1732, sh. 1, R1, and C-1731, sh. 1, R1, for applicable fire zone layouts.

The total in-situ combustible loading in Fire Zone 2-5D is less than 10 minutes assuming all combustibles are fully consumed. The combustibles consist of a total of five (5) gallons of lube oil (five separate one gallon locations) and cable in cable trays.

Actual in-situ combustible loading durations are provided to document existing arrangement and justify the deviation request. These values are based on the initial combustible loading analysis. Modifications subsequent to this analysis have revised these values with the possibility of future modifications revising them again. The governing criteria for the combustible loading analysis is that the fire area fire resistance rating exceed the combustible loading duration. The combustible loading durations specified in the deviation request will not be updated in the future since program commitments require that all modifications be evaluated to assure that additional combustibles are controlled to remain below the fire area fire resistance rating.

Division I cable trays E2PK, E2KK, 2PKB, and 2KKB are located at the east end of Fire Zone 2-5D and are separated from Valve HV-G33-2F004 (Div. II) by a horizontal distance of about 49 feet at the closest point. The effect of combustible oil in the fire zone was evaluated with respect to Div. I cable trays. The five gallons total of lube oil in the fire zone is composed from 1 gallon in each of the Cleanup System Recirculation Pumps (2P221A and B) and 1 gallon in each of three valves (HV-G33-2F042, HV-G33-2F044, and HV-G33-2F104--each are non-safe shutdown valves). The pumps are located in individual cubicles each equipped with a floor drain which contains any spilled lube oil within the pump cubicles. The spatial separation between HV-G33-2F004 and the closest pump lube oil is approximately 17 feet and is separated by a pump cubicle wall. The pump cubicles are totally enclosed by concrete and/or masonry walls and communicate only with the valve HV-G33-2F004 area via a few penetrations in the labyrinth wall arrangement. The three valves and hence the three gallons of lube oil, are separated from valve HV-G33-2F004 by approximately 35 feet of horizontal spatial separation. Within the 35 feet between the valves exists two floor drains which would preclude a lube oil fire from affecting valve HV-G33-2F004. The lube oil is the only intervening combustible between HV-G33-2F004 and the redundant safe shutdown equipment cables (refer to C-1824).

The above-mentioned cable trays constitute the only other combustibles in Fire Zone 2-5D. However, the large horizontal spatial separation of the cable trays from HV-G33-2F004 and the intervening labyrinth wall arrangement make these combustibles inconsequential.

Fire Zone 2-5D is equipped with fire detection.

JUSTIFICATION:

A study performed, which included analyzing the combustible loading configuration of Fire Zone 2-5D, determined that a fire occurring in Fire Zone 2-5D is highly improbable based on the negligible level of in-situ combustible loading. However, assuming a fire did start in Fire Zone 2-5D, approximately 50 feet horizontal spatial separation exists between redundant safe shutdown equipment/cables. Currently, the only intervening combustibles are five gallons of lube oil which are protected for spillage by pump cubicles and floor drains such that any spilled lube oil will not contribute to the propagation of a fire. Additionally, the closest lube oil to Valve HV-G33-2F004 is approximately 17 feet separated by an intervening concrete/masonry wall, which provides substantial assurance that a fire will not disable redundant safe shutdown equipment/cables that are approximately 50 feet apart.

Based on the low probability of a fire in Fire Zone 2-5D, and the insignificant consequences of a fire (due to the configuration of the room) if one were to start, the only possible concerns, therefore, are: 1) a fire may start due to the presence of transient combustibles, and 2) a fire may spread from an adjacent fire zone to Fire Zone 2-5D with the existence of transient combustibles as the fire propagation medium. Both of these concerns are alleviated by controlling the level of transient combustibles in Fire Zone 2-5D and by zone barrier upgrades to prevent such communication between zones where different shutdown paths are specified.

The introduction of transient combustibles into Fire Zone 2-5D would be limited due to infrequent access to the room since the fire zone is a high radiation area during normal operation. Additionally, NRC Generic Letter 86-10, Section 3.6.2 stipulates that transient combustibles need not be considered intervening combustibles. The second concern is further addressed in the communicating fire zone discussions below.

Fire Zone 2-5D has five adjacent fire zones as follows: 2-4A-S, 2-4A-W, 2-5A-S, 2-5A-W and 2-5C. Only Fire Zones 2-4A-S, 2-4A-W and 2-5A-W contain cables for redundant isolation valve HV-G33-2F001 or its power supply (2A203). A study conducted concluded that a fire involving the worst case spatial separation would have to start in Fire Zone 2-4A-S (a fire zone with low in-situ combustibles) damaging cables for valve 2F001 or power source 2A203, traverse into Fire Zone 2-5D through the small penetration (3 inch diameter, X-34-5-71), propagate 50 feet horizontally via negligible in-situ combustibles in Fire Zone 2-5D, and damage cables for valve 2F004 or the valve itself. This scenario is highly improbable based on the large spatial separation and low amounts of combustible loading in both fire zones. Hence, operability of RWCU Inboard Isolation Valve HV-G33-2F001 is assured for a fire in Fire Zone 2-5D. For a fire in Fire Zone 2-4A-S, HV-G33-2F004 is assured operable.

Therefore, based on the existence of: 1) large spatial separation between redundant safe shutdown equipment, 2) fire detection, 3) minimal in-situ combustibles and 4) negligible intervening combustible loading in Fire Zone 2-5D, the current configuration provides an equivalent degree of safety as that required by Section III.G.2 of Appendix R.

The installation of an automatic fire suppression system in Fire Zone 2-5D to meet the requirements of 10CFR50 Appendix R, Section III.G.2 would not significantly augment the level of fire protection for that fire zone.

Future Appendix R compliance is assured by: 1) Wrapping safe shutdown raceways that are needed for a fire in Fire Zone 2-5D, 2) installing three-hour fire rated penetration seals for any future penetrations in the barrier separating Fire Zones 2-5D and 2-4A-S and 3) by controlling the level of transient combustibles in Fire Zone 2-5D.

Security-Related Information
Figure Withheld Under 10 CFR 2.390

Security-Related Information
Figure Withheld Under 10 CFR 2.390

Security-Related Information
Figure Withheld Under 10 CFR 2.390

APPENDIX R DEVIATION REQUEST NO. 25

SEPARATION OF REDUNDANT SAFE SHUTDOWN CAPABILITY IN FIRE ZONE 1-3A

DEVIATION REQUEST:

The current location of the Core Spray flow instruments and the automatic suppression and combustible loading configuration in Fire Zone 1-3A provides an equivalent degree of safety as that required by Appendix R, Section III.G.2.b. The affected components for CS include FIS-E21-1N006A, FT-E21-1N003A, FIS-E21-1N006B, FT-E21-1N003B and circuits for these components.

FIRE ZONE AFFECTED:

This deviation request applies only to Fire Zone 1-3A (Unit 1 Reactor Building Elevation 683'), which is in Fire Area R-1A.

REASON FOR DEVIATION:

10 CFR 50, Appendix R, Section III.G.2.b requires the existence of an automatic fire suppression system, in addition to fire detectors, in those fire areas where separation of redundant safe shutdown cables and equipment is greater than 20 feet with no intervening combustibles.

The redundant Core Spray flow instruments in Fire Zone 1-3A (in Fire Area R-1A) are separated by greater than 20 feet (approximately 45 feet) with automatic fire suppression and full detection in Fire Zone 1-3A. Fire Area R-1A, however, does not have automatic fire suppression throughout. In addition, there are a few intervening combustibles (e.g. raceway with Thermo-Lag fire barriers and cable trays) located between the redundant Core Spray flow instruments.

EXISTING ARRANGEMENT:

In Fire Zone 1-3A, Division II of safe shutdown equipment is assured available for plant shutdown. Core Spray (CS) System flow instruments FIS-E21-1N006B and FT-E21-1N003B are located in Fire Zone 1-3A and are required to function in support of the Division II CS System. The Division II CS flow instruments are separated by approximately 45 feet from Division I CS flow instruments FIS-E21-1N006A and FT-E21-1N003A, including instrument tubing for the respective instruments. There are additional Division II circuits in this same area that also rely upon spatial separation equivalent to that required by Appendix R Section III.G.2.b. Refer to Calculation EC-013-1837 for information on circuits in Cable Tray Sections F1KH15 and F1KL15 in this portion of Fire Zone 1-3A that also rely on spatial separation as a part of their qualification basis.

Automatic fire suppression exists in all of Fire Zone 1-3A. The 45 feet separating the redundant CS flow instruments is also fully covered by detection (refer to attached Drawing C-1834 Sheets 1 and 2).

Several cable trays with sheet metal covers (top and bottom) and some raceway with Thermo-Lag fire barriers traverse North-South in Fire Zone 1-3A between the redundant CS flow instruments. The cables in the cable trays and the Thermo-Lag are the only source of combustibles located between the redundant CS flow instruments. The unwrapped cable trays are entirely enclosed with sheet metal covers top and bottom north of Column Line 26.5. This constitutes greater than 20 horizontal feet in which the enclosed raceways are protected by automatic fire suppression and detection systems. Additionally, the lowest cable tray has a vertical spatial separation of approximately 13 feet from the CS flow instruments located below (refer to C-1834 Sheet 2).

JUSTIFICATION:

To meet the requirements of 10 CFR 50, Appendix R, Section III.G.2.b, the following features must exist to ensure that a fire is limited so that only one division of redundant components important to safe shutdown is affected:

a. fire detection,
b. automatic fire suppression,
c. greater than 20 feet horizontal separation between redundant safe shutdown equipment/cables, and
d. no intervening combustibles.

Fire Detection:

In the local area where Section III.G.2.b separation is sought, ionizing detectors 1I-240, 1I-255, 1I-256, 1I-309 and 1I-310 provide the necessary fire detection to alert operators of the onset of a fire in the CS flow instrument location. Hence, the level of fire detection in Fire Zone 1-3A meets the requirements of Section III.G.2.b (refer to the attached Drawing C-1834 Sheet 1 for approximate fire detector locations).

Automatic Fire Suppression:

The automatic fire suppression system in Fire Zone 1-3A (Fire Area R-1A) provides suppression capability to suppress a fire. Fire Zone 1-3A has full automatic fire suppression, i.e. PA-131. Although Appendix R Section III.G.2.b requires automatic fire suppression throughout the fire area, the installation of an area-wide automatic fire suppression system in Fire Area R-1A to meet the requirements of 10 CFR 50 Appendix R Section III.G.2 would not significantly augment the level of fire protection for the redundant CS flow instruments.

Spatial Separation:

The spatial separation between redundant CS flow instruments (including their respective instrument tubing) in Fire Zone 1-3A is more than twice that required by Section III.G.2.b. The 45 feet separating the redundant CS flow instruments provides a high degree of margin for safety, in the event of a fire, to ensure both divisions of CS flow instruments will not be disabled. Hence, the spatial separation between redundant CS flow instruments more than meets the requirements of Section III.G.2.b. In addition, the 13 feet vertical spatial separation between the CS flow instruments and the cable trays further reduces the possibility of a fire in the cable trays affecting the CS flow instruments. There areThermo-Lag wrapped conduits within this 13 feet separation. Thermo-Lag 330-1 is combustible with an ignition temperature of 1000°F. The automatic suppression system in this fire zone will prevent temperatures from reaching this level. Therefore, there will be no effect from the Thermal-Lag on the CS flow instruments. There are additional Division II circuits in this same area that also rely upon spatial separation equivalent to that required by Appendix R Section III.G.2.b. Refer to Calculation EC-013-1837 for information on circuits in Cable Tray Sections F1KH15 and F1KL15 in this portion of Fire Zone 1-3A that also rely on spatial separation as a part of their qualification basis.

Intervening Combustibles:

Appendix R compliance requires that no intervening combustibles be located between the redundant CS flow instruments. The only combustibles located in this local area consist of cables in cable trays and raceway protected with Thermo-Lag fire barriers (note that cables routed in conduits, terminal boxes and junction boxes do not constitute intervening combustibles). However, each of the cable trays located in the local area of concern in Fire Zone 1-3A is fully enclosed by sheet metal (top, bottom, and sides). NRC Generic Letter 86-10, Enclosure 2, Section 3.6.2 states that "cables in cable trays having solid sheet metal bottom, sides and top, if protected by automatic fire detection and suppression systems and if the design is supported by a fire hazards analysis, have been found acceptable under the exemption process." Based on the above discussion, the cables trays routed between the redundant CS flow instruments can be considered to not constitute intervening combustibles. However, the Thermo-Lag fire barriers on the raceway must be considered as intervening combustibles and this deviation request constitutes the documentation of the fire hazards analysis that supports the adequacy of the existing fire protection features in the local area of concern.

In the area located between the redundant CS flow instruments, Thermo-Lag fire barriers on raceway are the only intervening combustibles. Thermo-Lag 330-1 has an ignition temperature of approximately 1000° F. Due to the presence of automatic suppression and detection in this fire zone, temperatures in this range will never be reached and a fire will neither initiate nor propagate along the Thermo-Lag on the raceway to either redundant CS component.

Also note that the introduction of transient combustibles is highly unlikely due to the narrow passageway (approximately three feet wide) in the location under review. Moreover, NRC Generic Letter 86-10 specifically states that transient materials are not considered intervening combustibles.

Conclusion:

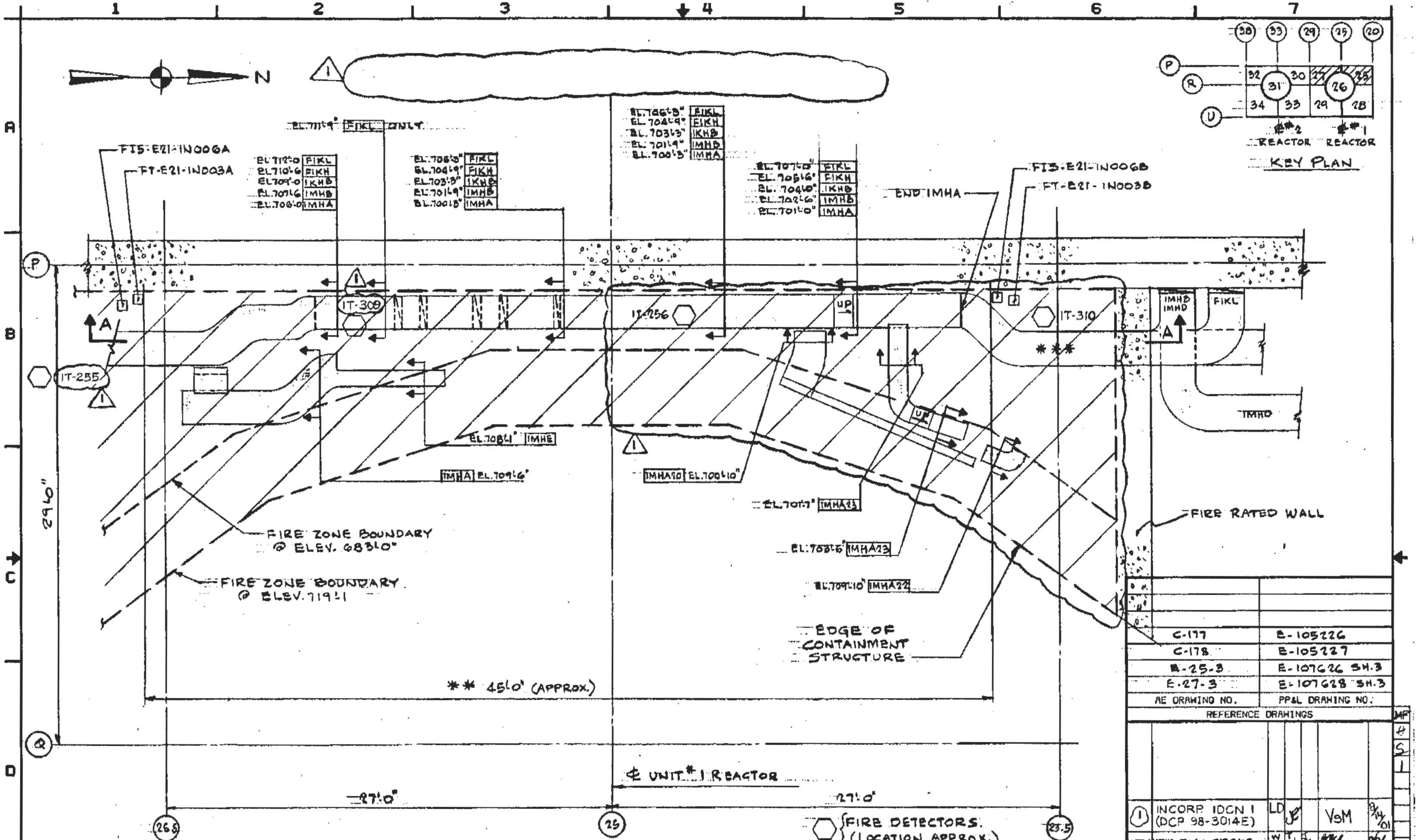
Based on: 1) the greater than 45 feet spatial separation between redundant safe shutdown equipment in Fire Zone 1-3A, 2) the existence of fire detection and automatic suppression coverage in the area of concern, and 3) the acceptable combustible loading analysis, the current configuration provides an equivalent degree of safety as that required by Section III.G.2.b of Appendix R.

The future addition of intervening combustibles in the local area of interest is controlled by program commitments that require all modifications be evaluated to ensure that combustible loading fire durations remain below the Fire Zone fire resistance rating and conclusions made here-in are reviewed for applicability.

Therefore, the following Division II components and raceway containing circuits for these components in this fire zone do not need to be protected.

- FIS-E21-1N006B
- FT-E21-1N003B
- Junction box and flex conduit to FIS-E21-1N006B
- Junction box and flex conduit to FT-E21-1N003B.

The addition of automatic fire suppression throughout Fire Area R-1A is not required. The full automatic fire suppression capability in Fire Zone 1-3A is sufficient.



C-177	E-105226
C-178	E-105227
E-25-3	E-107626 SH.3
E-27-3	E-107628 SH.3
AE DRAWING NO.	PP&L DRAWING NO.

REFERENCE DRAWINGS

REV	DESCRIPTION	DR	CH		APPROVED	DATE
①	INCORP. IDCN 1 (DCP 98-3014E)	LD	JE		VsM	9/14/01
0	INITIAL ISSUE	WTB	TNO	SMD		

MF 4 S 1

NON-QUALITY RELATED

SUSQUEHANNA S.E.S.
UNIT #1
REACTOR BUILDING
APPENDIX R-DEVIA. REQ. #25
FIRE ZONE 1-3A EL. 683'-0"

AREA 25&27 | ELEV. 683'-0 | SCALE: NOTED

PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PP&L DRAWING NO. C213420 | SHEET NO. 1 | REV. NO. 1

AE DRAWING NO. C-1834

⬡ FIRE DETECTORS. (LOCATION APPROX.)

— — — FIRE ZONE BOUNDARY.

THERE ARE SPRINKLERS INSTALLED IN ACCORDANCE WITH "NFPA-13" BENEATH THE ELEVATION 719'-1" FLOOR SLAB. △1

FIRE ZONE ABOVE FIRE RATED FLOOR SLAB: 1-4A & 1-4B.

FIRE ZONE BELOW FIRE RATED FLOOR SLAB: 1-3A.

CABLE TRAY - ALL TRAYS ARE 24" WIDE OR LESS, UNLESS NOTED OTHERWISE.

▨ CROSS HATCHING REPRESENTS AREA COVERED BY AUTOMATIC SUPPRESSION.

PART PLAN ELEV. 683'-0"

SCALE: ¼"=1'-0"

FIRE ZONE 1-3A

** THIS DISTANCE CORRESPONDS TO THE CLOSEST INSTRUMENT TUBING SEPARATION OF REDUNDANT DIVISION CS FLOW INSTRUMENTS. ACTUAL SEPARATION OF CS FLOW INSTRUMENTS IS GREATER THAN THAT IDENTIFIED.

*** SEE CALCULATION EC-013-1837 FOR THE FIRE HAZARD ANALYSIS FOR CABLE TRAYS FIKL15 & FIKH15. △1

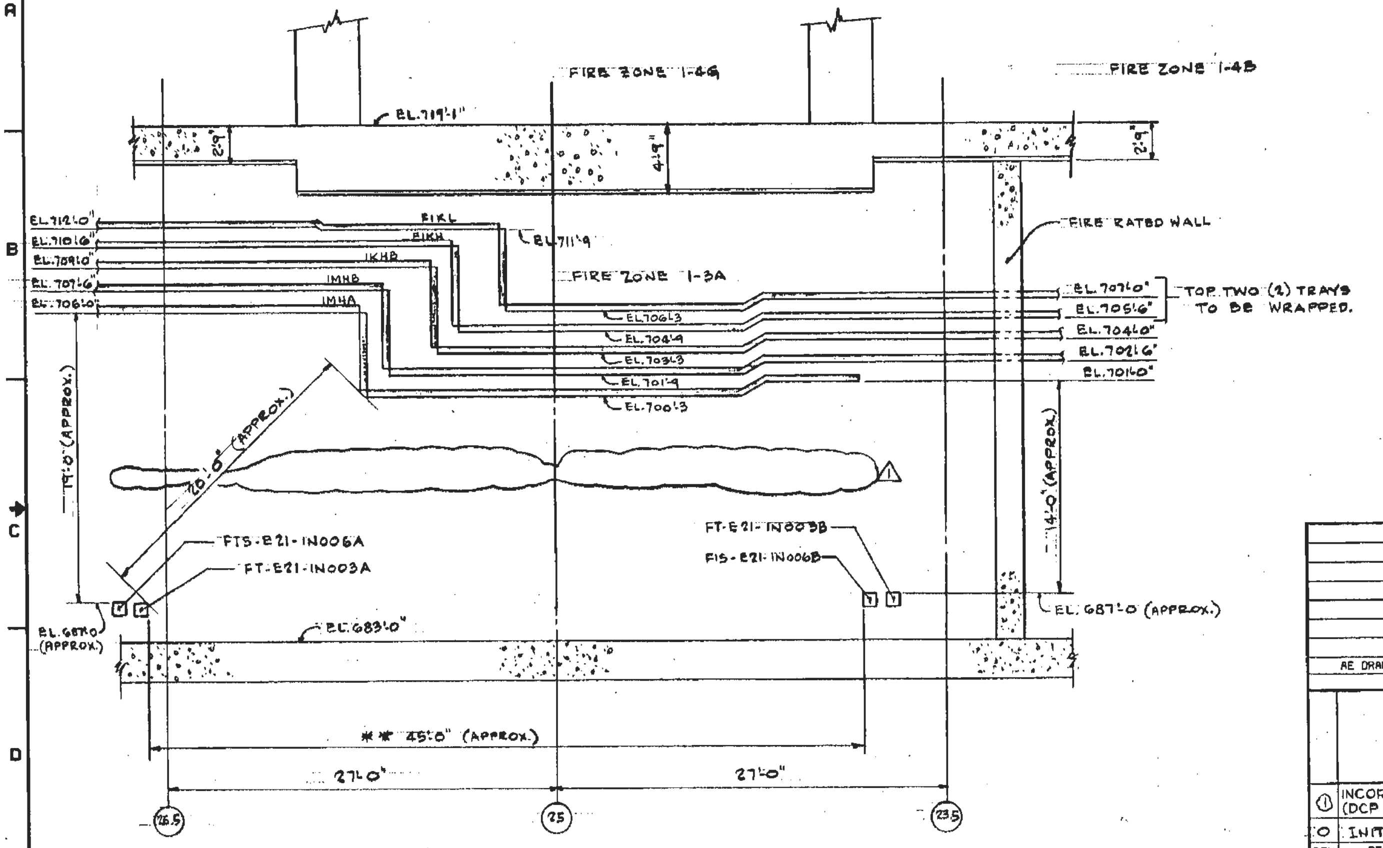
0 1 2 FRACTIONAL 2 1 0 DECIMAL

G I A 8 2 | G | G | G | G

LOCATION CODES

C F

SORTS



SECTION "A-A"

SCALE: 3/16" = 1'-0"

AE DRAWING NO.	PP&L DRAWING NO.
REFERENCE DRAWINGS	

REV	DESCRIPTION	DR	CH		APPROVED	DATE
①	INCORR IDCN 1 (DCP 98-3014E)	LD	JS		VSM	8/14/01
0	INITIAL ISSUE	WD	TNO	JND	AWB	9/8/87

NON-QUALITY RELATED

SUSQUEHANNA S.E.S.
UNIT # 1
REACTOR BUILDING
APPENDIX R-DEVIA. REQ. #25
FIRE ZONE 1-3A EL.683'-0"

AREA 25&27 | ELEV. 683'-0 | SCALE: NOTED

PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PP&L DRAWING NO. C.213420
SHEET NO. 2
REV. NO. 1
AE DRAWING NO. C-1834

MF H S 1

PP&L FORM 3555C (1/88)

FRACTIONAL DECIMAL

G1A82 G G G G

LOCATION CODES

C F

SORTS

APPENDIX R DEVIATION REQUEST NO. 26

SEPARATION OF REDUNDANT SAFE SHUTDOWN CAPABILITY IN FIRE ZONE 2-3B-N

DEVIATION REQUEST:

The current location of the Core Spray (CS) flow instruments and Residual Heat Removal (RHR) isolation valve control circuits and components relative to the combustible loading configuration in Fire Zone 2-3B-N provides a degree of safety equivalent to that required by Appendix R, Section III.G.2.b and their enclosure with fire rated barriers is not required. The affected instruments/circuits for CS include FIS-E21-2N006A, FT-E21-2N003A, FIS-E21-2N006B, FT-E21-2N003B and circuits. The affected components/circuits for RHR include HV-E11-2F008 and HV-E11-2F009 circuits, Pressure Instrument B31-N018A and Control Relay K33.

FIRE AREAS/ZONES AFFECTED:

This deviation request applies only to Fire Zone 2-3B-N (Unit 2 Reactor Building Elevation 683'), which is in Fire Area R-2B.

REASON FOR DEVIATION:

10CFR50, Appendix R, Section III.G.2.b requires the absence of intervening combustibles between redundant safe shutdown equipment, in those fire areas where separation of redundant safe shutdown cables and equipment is greater than 20 feet with automatic suppression and detection.

The redundant Core Spray (CS) flow instruments in Fire Zone 2-3B-N (in Fire Area R-2B) are separated by greater than 20 feet (approximately 41 feet) with automatic fire suppression and detection coverage in the local area of concern. However, automatic fire suppression and detection does not completely cover Fire Zone 2-3B-N; and intervening combustibles (conduits with Thermo-Lag fire barriers and cable trays) are located between the redundant CS flow instruments.

The redundant Residual Heat Removal (RHR) isolation valve control circuits and components in Fire Zone 2-3B-N (in Fire Area R-2B) are separated by greater than 20 feet (approximately 36 feet) with automatic fire suppression and detection coverage in the local area of concern. However, automatic fire suppression and detection does not completely cover Fire Zone 2-3B-N; and intervening combustibles (conduits with Thermo-Lag fire barriers and cable trays) are located between the redundant RHR isolation valve control circuits and components.

EXISTING ARRANGEMENT:

Core Spray (CS):

In Fire Zone 2-3B-N, Division I of safe shutdown equipment is assured available for plant shutdown. CS flow instruments FIS-E21-2N006A and FT-E21-2N003A are located in Fire Zone 2-3B-N and are required operable for proper functioning of the Division I CS System. The Division I CS flow instruments are separated by approximately 41 feet from Division II CS flow instruments FIS-E21-2N006B and FT-E21-2N003B, including instrument tubing for the respective flow instruments. Additionally, all other unprotected Division II safe shutdown components in Fire Zone 2-3B-N have greater spatial separation from Division I CS flow instruments than that mentioned above. Thus the 41 feet horizontal spatial separation between redundant CS flow instruments is the limiting case requiring evaluation (refer to attached Drawing C-1835).

Automatic fire suppression and detection exist in Fire Zone 2-3B-N from Column Line P to Q. The 41 feet separating the redundant CS flow instruments is fully covered by automatic fire suppression and detection (refer to attached Drawing C-1835, Sheets 1 and 2).

Several cable trays with sheet metal covers (top and bottom) and some conduits with Thermo-Lag fire barriers traverse North-South in Fire Zone 2-3B-N between the redundant CS flow instruments. The cable in the cable trays and the Thermo-Lag on the conduits are the only source of combustibles located between the redundant CS flow instruments. The cable trays are entirely enclosed by sheet metal covers between Column Lines 31.5 and 33, which constitutes greater than 25 horizontal feet in which fully enclosed raceways are protected by automatic fire suppression and detection systems. The lowest cable tray has a vertical spatial separation of approximately 12 feet from the CS flow instruments located below (refer to attached Drawing C-1835, Sheet 2). The lowest conduit with a Thermo-Lag fire barrier has a vertical spatial separation of greater than 12 feet from the CS flow instruments located below (refer to attached Drawing C-1835, Sheet 2).

Adequate separation exists between CS flow instruments FIS-E21-2N006A and FIS-E21-2N006B such that FIS-E21-2N006A and raceway (junction box and flex conduit to FIS-E21-2N006A do not require fire barriers. Adequate separation exists between CS flow instruments FT-E21-2N003A and FT-E21-2N003B such that FT-E21-2N003A and raceway (junction box and flex conduit to FT-E21-2N003A) do not require fire barriers.

Residual Heat Removal (RHR):

As stated above, in Fire Zone 2-3B-N, Division I of safe shutdown equipment is assured available for plant shutdown. Redundant RHR isolation valves, HV-E11-2F008 and HV-E11-2F009 (2F009), have control circuit cables and components located in Fire Zone 2-3B-N.

HV-E11-2F009 control circuit location is limited to the south end of 2-3B-N, south of Instrument Rack, 2C006. Pressure Instrument B31-N018A and Control Relay K33 are located on Instrument Rack 2C006 and provide an open permissive to Valve HV-E11-2F009. Relay K33 is mounted in Terminal Box TB2C006-B3 located on south end of Instrument Rack 2C006. Pressure Instrument B31-N018A is located about 1 foot above Terminal Box TB2C006-B3 and 2 feet below Terminal Box TB2C006-B2. These are the only Valve HV-E11-2F009 components outside of scheduled cable located in Fire Zone 2-3B-N. Flex conduit is used to connect wiring to these components at Instrument Rack 2C006. Rigid steel conduits E2K454 and E2K1Z1 route control circuit cables from TB2C006-B2 to Tray Section E2KH62. Tray Section E2KH62 is located directly above TB2C006-B2 at Elevation 708'-6". Adequate separation exists between RHR redundant components such that Pressure Instrument B31-N018A, Terminal Box TB2C006-B3 with Relay K33 and raceway (E2K454, E2K1Z1 and E2KH62*) do not require fire barriers.

> *This section of E2KH62 is protected with Thermo-Lag because it contains circuits for Division I CS flow instruments. Valve HV-E11-2F009 control circuit cables immediately leave Fire Zone 2-3B-N in Tray Section E2KH62 through the south wall of Fire Zone 2-3B-N (refer to attached Drawing C-1835, Sheets 1 and 2).

RHR Valve HV-E11-2F008 Division II control circuits enter Fire Zone 2-3B-N at tray F2KF61 through a 3-hour fire rated floor penetration X-30-3-61 approximately 36 feet north of Terminal Box TB2C006-B3, and 7 feet north of Column Line 33. Division II control circuits are routed vertically to Elevation 711'-9" and then north towards MCC 2D274. Division II, HV-E11-2F008, redundant components are all located in the northern section of Fire Zone 2-3B-N at MCC 2D274 and Instrument Rack TB2C022. MCC 2D274 is approximately 105 feet north of Division I components at Instrument Rack 2C006 and Division II Instrument Rack, 2C022, is approximately 81 feet north and 60 feet east of Division I Instrument Rack 2C006. (refer to C-1730, Sheet 1).

Automatic fire suppression and detection exist in Fire Zone 2-3B-N from Column Line P to Q. The 36 feet separating the redundant RHR isolation valve control circuits or components is fully covered by automatic fire suppression and detection (refer to attached Drawing C-1835, Sheet 1).

The same cable trays and conduits with Thermo-Lag fire barriers mentioned in the CS flow instruments evaluation above exist between RHR isolation valve control circuits and components. The closest spatial distance between redundant RHR Valve HV-E11-2F008 and HV-E11-2F009 control circuits or components is approximately 36 feet between Terminal Box TB2C006-B3 and Division II Tray F2KF61. The lowest cable tray has a vertical spatial separation of approximately 12 feet from the RHR isolation valve control circuits and components located below (refer to attached Drawing C-1835, Sheet 2). The lowest conduit with a Thermo-Lag fire barrier has vertical spatial separation of greater than 12 feet from the RHR isolation valve control circuits and components located below (refer to attached Drawing C-1835, Sheet 2).

JUSTIFICATION:

To meet the requirements of 10CFR50, Appendix R, Section III.G.2.b, the following features must exist to ensure that a fire is limited so that only one division of redundant components important to safe shutdown is affected:

a. Fire detection,
b. Automatic fire suppression,
c. Greater than 20 feet horizontal separation between redundant safe shutdown equipment/cables, and
d. No intervening combustibles.

Fire Detection:

In the local areas where Section III.G.2.b separation is sought, ionization detectors provide the necessary fire detection to alert operators of the onset of a fire in the location of CS flow instruments or redundant RHR isolation valve control circuits and components. Hence, the level of fire detection in Fire Zone 2-3B-N meets the requirements of Section III.G.2.b (refer to attached Drawing C-1835, Sheet 1 for approximate fire detector locations).

Automatic Fire Suppression:

The automatic fire suppression system in the local areas of concern in Fire Zone 2-3B-N (Fire Area R-2B) provides ample suppression capability to immediately suppress a fire. Fire Zone 2-3B-N has full automatic fire suppression, i.e., Preaction System PA-231, in the areas in which Section III.G.2.b separation is sought. The portion of Fire Area R-28 without automatic suppression is located between Column Lines 29 and 30.5 from Column Lines Q and S (refer to Drawing C-1730, Sheet 3). The installation of an area-wide automatic fire suppression system in Fire Area R-2B to meet the requirements of 10CFR50 Appendix R, Section III.G.2 would not augment the level of fire protection for the redundant CS flow instruments and RHR isolation valve control circuits and components.

Spatial Separation:

The spatial separation between redundant CS flow instruments (including their respective instrument tubing) in Fire Zone 2-3B-N is more than twice that required by Section III.G.2.b. The 41 feet separating the redundant CS flow instruments provides a high degree of margin for safety, in the event of a fire, to ensure both divisions of CS flow instruments will not be disabled. Due to spatial separation, E21-2N003A, FIS-E21-2N006A and raceway (junction boxes and flex conduit to FT-E21-2N003A and FIS-E21-2N006A) do not require fire barriers.

The minimum separation between redundant RHR isolation valve control circuits and components in Fire Zone 2-3B-N is sixteen feet greater than that required by Section III.G.2.b. The 36 feet separating the redundant control circuits and components provides a high degree of margin for safety, in the event of a fire, to insure both divisions of RHR valve control and components will not be disabled. Due to spatial separation, Pressure Instrument B31-N018A, Instrument Rack TB2C006 with Relay K33 and raceway (E2K454, E2K1Z1 and E2KH62) do not require fire barriers.

The minimum separation between redundant RHR isolation valve control circuits and components in Fire Zone 2-3B-N is sixteen feet greater than that required by Section III.G.2.b. The 36 feet separating the redundant control circuits and components provides a high degree of margin for safety, in the event of a fire, to insure both divisions of RHR valve control circuits and components will not be disabled. Due to spatial separation, Pressure Instrument B31-N018A, Instrument Rack TB2C006 with Relay K33 and raceway (E2K454, E2K1Z1 and E2KH62) do not require fire barriers.

The spatial separation between redundant CS flow instruments and RHR valve control circuits and components more than meets the requirements of Section III.G.2.b. All necessary raceways are protected with fire rated barriers to ensure adequate protection between redundant divisions of safe shutdown cables in the local areas of concern. In addition, the vertical spatial separation between the CS flow instruments and RHR isolation valve control circuits and components to the cable trays and conduits with Thermo-Lag fire barriers further reduces the possibility of a fire affecting the CS flow instruments or RHR isolation valve control circuits and components.

Intervening Combustibles:

Appendix R compliance assures that no intervening combustibles be located between the redundant CS flow instruments and RHR isolation valve controls and control circuits. The only combustibles located in this local area consist of cables in cable trays and conduits with Thermo-Lag fire barriers (note that cables routed in conduits, terminal boxes and junction boxes do not constitute intervening combustibles). However, each of the cable trays located in the local area of concern in Fire Zone 2-3B-N, is fully enclosed by sheet metal (top, bottom, and sides), for greater than 25 feet in which automatic suppression and detection exists. NRC Generic Letter 86-10, Enclosure 2, Section 3.6.2 states that "cables in cable trays having solid sheet metal bottom, sides and top, if protected by automatic fire detection and suppression systems and if the design is supported by a fire hazards analysis, have been found acceptable under the exemption process." Based on the above discussion, the cable trays routed between the redundant CS flow instruments and between RHR isolation valve control circuits and components do not constitute intervening combustibles. However, the Thermo-Lag fire barriers on the raceway must be considered as intervening combustibles and this deviation request constitutes the documentation of the fire hazards analysis that supports the adequacy of the existing fire protection features in the local area of concern.

Actual in-situ combustible loading fire durations of the existing arrangement have been determined. These values are based on the initial combustible loading analysis and subsequent modifications. The governing criteria for the combustible loading analysis is that the Fire Zone fire resistance rating exceeds the combustible loading fire duration. The addition of Thermo-Lag to Fire Zone 2-3B-N as a combustible adds less than 6 minutes to the existing combustible loading fire duration. The additional fire loading due to the Thermo-Lag fire barriers on the raceway in Fire Zone 2-3B-N does not result in exceeding the Fire Zone fire resistance rating.

In the local area (located between the redundant CS flow instruments and RHR isolation valve controls and control circuits), the only in-situ combustible to be considered (as per above) is the Thermo-Lag fire barriers on the conduits. Thermo-Lag 330-1 has an ignition temperature of approximately 1000°F. Due to the presence of automatic suppression and detection in this fire zone, temperatures in this range will never be reached and a fire will not propagate along the Thermo-Lag on the conduits to either redundant CS or RHR components.

Also note that the likelihood of introduction of transient combustibles is highly unlikely due to the narrow passageway (approximately three feet wide) in the location under review. Moreover, NRC Generic Letter 86-10 specifically states that transient materials are not considered intervening combustibles.

Conclusion:

Based on: 1) the 41 and 36 foot spatial separations between redundant safe shutdown equipment in Fire Zone 2-3B-N, 2) the existence of fire detection and automatic suppression coverage in the local area of concern, and 3) the acceptable combustible loading analysis, the current configuration provides an equivalent degree of safety as that required by Section III.G.2 of Appendix R without the addition of fire rated barriers.

In addition, the installation of automatic fire suppression throughout the remainder of Fire Area R-2B to meet the requirements of 10CFR50 Appendix R, Section III.G.2 would not significantly augment the level of fire protection for the redundant CS flow instruments or the RHR isolation valve control circuits and components in this specific section of Fire Area R-28.

The future addition of intervening combustibles in the local area of interest is controlled by program commitments that require all modifications be evaluated to ensure that combustible loading fire durations remain below the Fire Zone fire resistance rating and conclusions made here-in are reviewed for applicability.

Therefore, the following components and raceway containing circuits for these components in this fire zone do not need to be protected.

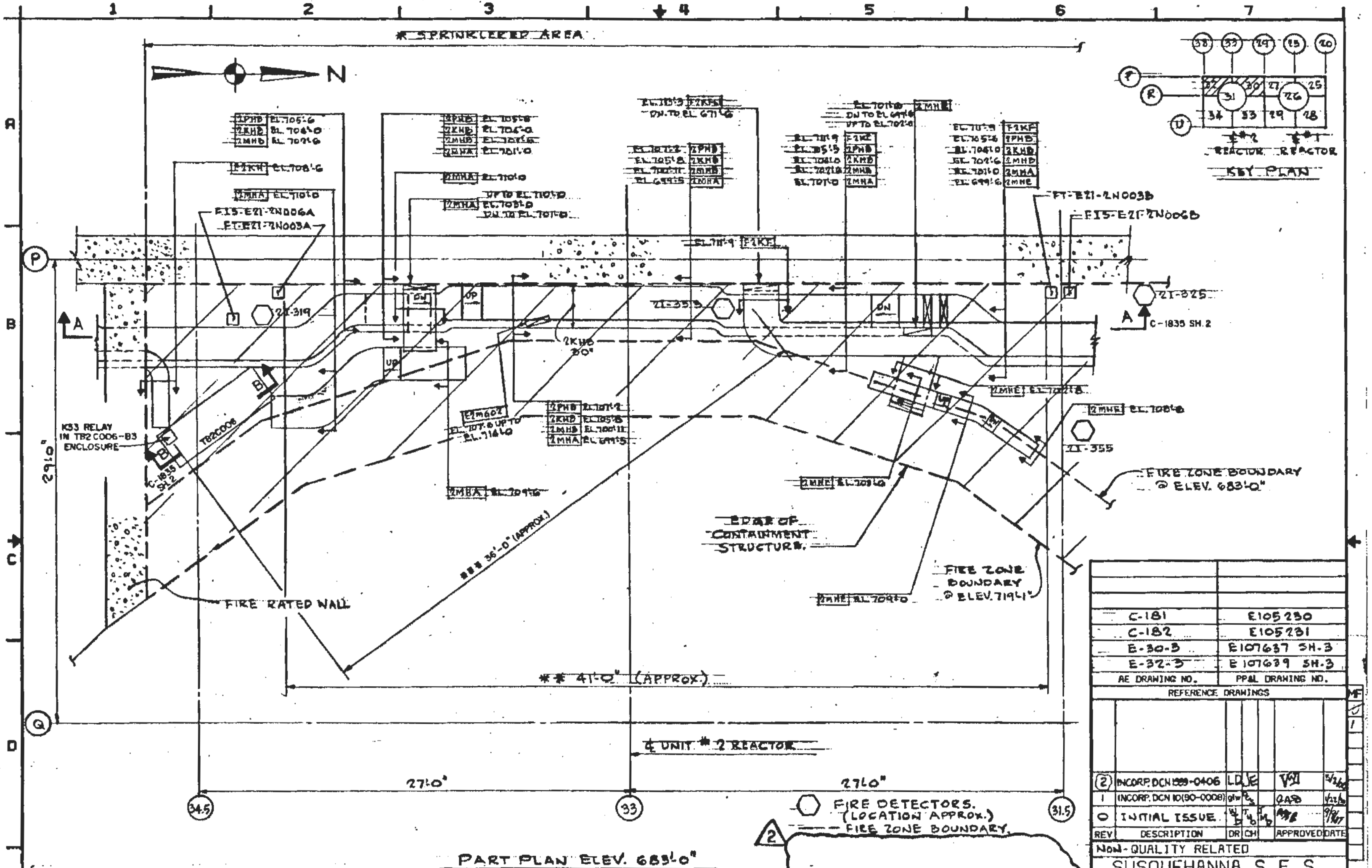
Core Spray

- FIS-E21-2N006A
- FT-E21-2N003A
- Junction box and flex conduit to FIS-E21-2N006A
- Junction box and flex conduit to FT-E21-2N003A

RHR

- Pressure Instrument B31-N018A
- Relay K33 in TB2C006-B3 on Instrument Rack TB2C006
- Raceway E2K454, E2K1Z1 and E2KH62*

  *E2KH62 is protected with a qualified raceway fire barrier for the CS flow instrument circuits, but is not required to be protected for the RHR HV-E11-2F009 circuits.



FIRE DETECTORS. (LOCATION APPROX.)

FIRE ZONE BOUNDARY.

CABLE TRAY - ALL TRAYS ARE 24" WIDE OR LESS, UNLESS NOTED OTHERWISE.

CROSS HATCHING REPRESENTS AREA COVERED BY AUTOMATIC SUPPRESSION.

PART PLAN ELEV. 683'-0"

SCALE: ¼"=1'-0"

FIRE ZONE 2-3B-N

** THIS DISTANCE CORRESPONDS TO THE CLOSEST INSTRUMENT TUBING SEPARATION OF REDUNDANT DIVISION CS FLOW INSTRUMENTS. ACTUAL SEPARATION OF CS FLOW INSTRUMENTS IS GREATER THAN THAT IDENTIFIED.

*** THIS DISTANCE CORRESPONDS TO THE CLOSEST RHR VALVE CONTROL CIRCUIT SEPARATION OF REDUNDANT ISOLATION VALVES.

2

NOTE: FOR CONDUITS WITH THERMO-LAG FIRE BARRIERS LOCATED IN FIRE ZONE 2-3B-N. REFER TO DRAWING C-1730, SHEETS 5 AND 6.

THE VERTICAL SPATIAL SEPARATION IS GREATER THAN 12 FEET FROM THE CORE SPRAY FLOW INSTRUMENTS/RHR ISOLATION VALVE CONTROL CIRCUITS AND COMPONENTS TO THE CONDUITS WITH THERMO-LAG FIRE BARRIERS.

AE DRAWING NO.	PP&L DRAWING NO.
C-181	E105230
C-182	E105231
E-30-3	E107637 SH.3
E-32-3	E107639 SH.3

REFERENCE DRAWINGS

REV	DESCRIPTION	DR	CH		APPROVED	DATE
2	INCORP. DCN 1999-0406	LD	JE		VJ	5/2/00
1	INCORP. DCN ID(90-0008)	glw			QAS	1/22/90
0	INITIAL ISSUE					9/9/87

NON-QUALITY RELATED

SUSQUEHANNA S.E.S.
UNIT #2
REACTOR BUILDING
APPENDIX R-DEVIA. REQ. #26
FIRE ZONE 2-3B-N EL. 683'-0"

AREA 30 & 32 | ELEV. 683'-0 | SCALE: NOTED

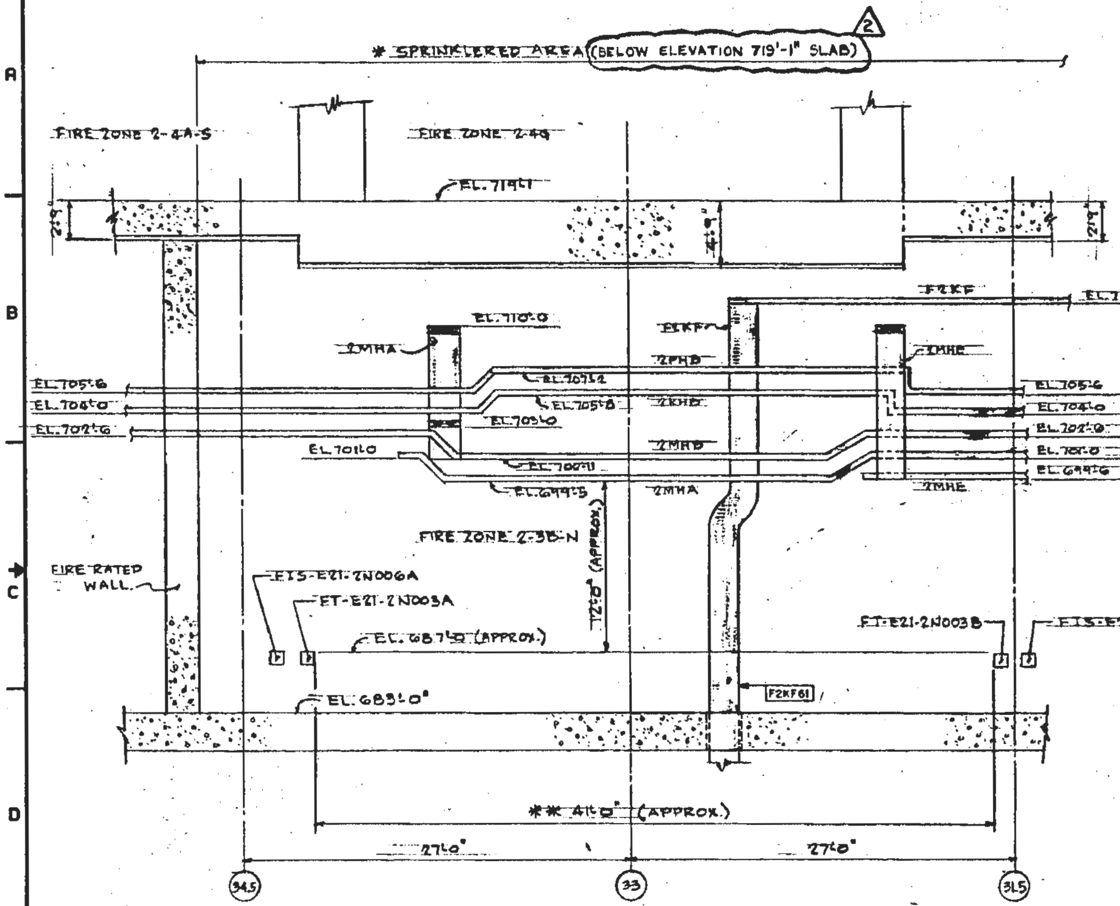
PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PP&L DRAWING NO. C213421 SHEET NO. 1 REV. NO. 2

AE DRAWING NO. C-1835 SHEET NO. 1

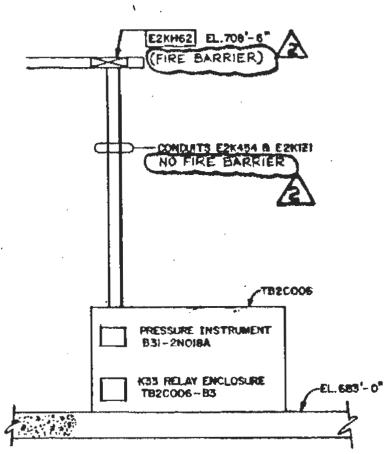
0 1 FRACTIONAL 2 | 2 DECIMAL 1 0

G 2 A 8 2 G G G G LOCATION CODES C F SORTS



SECTION "A-A"

SCALE: 3/16"=1'-0"



SECTION B-B

N.T.S.

2 * SPRINKLERS INSTALLED IN ACCORDANCE WITH "NFPA-13"

2 NOTE: FOR CONDUITS WITH THERMO-LAG FIRE BARRIERS LOCATED IN FIRE ZONE 2-3B-N. REFER TO DRAWING C-1730, SHEETS 5 AND 6.

THE VERTICAL SPATIAL SEPARATION IS GREATER THAN 12 FEET FROM THE CORE SPRAY FLOW INSTRUMENTS/RHR ISOLATION VALVE CONTROL CIRCUITS AND COMPONENTS TO THE CONDUITS WITH THERMO-LAG FIRE BARRIERS.

AE DRAWING NO.	PP&L DRAWING NO.
REFERENCE DRAWINGS	

REV	DESCRIPTION	DR	CH		APPROVED	DATE
②	INCORP. DCN 1999-0406	LD				9/1/00
1	INCORP. DCN 10(90-0009)					1/22/90
0	INITIAL ISSUE	WT	TND	HD		

NON-QUALITY RELATED

SUSQUEHANNA S.E.S.
UNIT #2
REACTOR BUILDING
APPENDIX R-DEVIA. REQ. #26
FIRE ZONE 2-3B-N EL.683'-0"

AREA 25&27	ELEV. 683'-0	SCALE: NOTED

PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN PA.

PP&L DRAWING NO.	SHEET NO.	REV. NO.
C213421	2	2
AE DRAWING NO.	SHEET NO.	
C-1835	2	

FRACTIONAL DECIMAL

LOCATION CODES: G 2 A 8 2 G G G G

SORTS: C F

Security-Related Information
Figure Withheld Under 10 CFR 2.390

APPENDIX R DEVIATION REQUEST NO. 27

NUCLEAR BOILER INSTRUMENTATION IN FIRE ZONE 1-5A-S

DEVIATION REQUEST:

The current arrangement of Nuclear Boiler Instrumentation in Fire Zone 1-5A-S provides an equivalent degree of safety as that required by 10CFR50, Appendix R, Section III.G.2.b based on the present in-situ combustible loading configuration, horizontal separation of redundant safe shutdown ECCS interlock components of 14 feet, horizontal separation of redundant safe shutdown vessel indication components of 6 feet, plant procedure to control transient combustibles and the existing fire suppression and detection provided in the area.

FIRE AREAS/ZONES AFFECTED:

This deviation request applies only to Fire Zone 1-5A-S, which is in Fire Area R-1A.

REASON FOR DEVIATION REQUEST:

10CFR50, Appendix R, Section III.G.2.b requires the existence of an automatic fire suppression system, in addition to fire detectors, in those fire areas where separation of redundant safe shutdown cables and equipment is greater than 20 feet with no intervening combustibles.

The redundant Nuclear Boiler Instrumentation in Fire Zone 1-5A-S as identified in Table DR27-1 does not meet the separation criteria as required by Appendix R, Section III.G.2.b. The horizontal separation of individual redundant ECCS interlock components is 14 feet and horizontal separation of the redundant vessel indication components is 6 feet. Automatic fire suppression and detection is provided in Fire Zone 1-5A-S above the instrument racks.

EXISTING ARRANGEMENT

Both divisions of required nuclear boiler instruments are located in Fire Zone 1-5A-S. The instruments and terminal boxes on instrument rack 1C004 required for Unit 1 safe shutdown are identified in Table DR27-1. The instruments and terminal boxes on instrument rack 1C005 required for Unit 1 safe shutdown are also identified on Table DR27-1. The arrangement of the instruments was designed to insure proper RPS input of the "1-out-of-2-taken-twice" logic for a single instrument line failure. A fire which damages these instruments or their circuitry could result in either a loss of automatic functions or a spurious signal to the automatic initiation logic. The existing arrangement of the nuclear boiler instrument racks and other related equipment is shown on Drawing C-213437.

The combustible loading in Fire Zone 1-5A-S is low. The area around these racks is protected by automatic fire suppression installed using NFPA 13 as a guide and fire detection installed using NFPA 72D and 72E as a guide.

Several cable trays traverse East-West in front of and above the nuclear boiler instrument racks. Three cable trays are enclosed by sheet metal, while one other is a ladder type tray enclosed on the top. The lowest cable tray is 13 feet above the floor and 7 feet above the instrument racks. Cable insulation meets the requirements of IEEE-383 Flame Test.

JUSTIFICATION:

To meet the requirements of 10CFR50, Appendix R, Section III.G.2.b, the following features must exist to ensure that a fire is limited so that one division of redundant components important to safe shutdown is available:

a. fire detection,
b. automatic fire suppression,
c. no intervening combustibles, and
d. greater than 20 feet horizontal separation between redundant safe shutdown equipment/cables.

Requirements a and b are met and a fire hazard analyses has demonstrated that the existing configuration is acceptable even though requirements c and d are not met.

Justification is as follows:

1. Fire Detection & Suppression

Fire Zone 1-5A-S is protected by an automatic fire suppression and detection system.

The automatic fire suppression system in Fire Zone 1-5A-S provides suppression capability to suppress a fire. This fire zone has full ceiling and lower level coverage in the area of the reactor building chillers and the instrument racks 1C004 and 1C005.

2. In-Situ Combustible Fire Hazard Analyses

The only combustibles located in the immediate vicinity of the nuclear boiler instrumentation are fire protected raceways, cable trays, terminal blocks and the instruments themselves. The instruments contain negligible combustibles and are completely encased in metal enclosures which will contain any internal fire within the housing. Terminal blocks for external cable connections are also completely enclosed in metallic boxes. Therefore, even with very little horizontal spatial separation, any fire on an instrument rack will not be propagated to other racks, equipment, or cable trays. There are four cable trays in the area; three are completely enclosed by sheet metal and one is a ladder type enclosed on top but open on the bottom. The trays completely enclosed are not considered to constitute intervening combustibles, while the open tray does constitute an intervening combustible. The cable tray that is not enclosed is equipped with fire resistant cables that have passed the IEEE-383 flame test. Due to the type of materials used, the cables have a low probability for spreading fire. Any fire in the cable trays will not propagate downward to impact the nuclear boiler instruments. All Division II safe shutdown cables in this fire zone have been addressed as a part of the Appendix R Safe Shutdown Analysis and have been protected if necessary. The fire protective barrier on the raceways in the vicinity of the racks is Thermo-Lag which is considered to be an intervening combustible. Due to the high ignition temperature and distance from the racks, the protective barrier has no impact on the required nuclear boiler instrumentation.

Other combustibles within the fire zone are various control panels and lube oil from the reactor building chillers and fuel pool cooling pumps. The control panels contain very little combustible materials within enclosed metallic housing, have spatial separation greater than 8 feet, and therefore, have no impact on the required nuclear boiler instrumentation. The lube oil equipment is located in areas where the floor is sloped to local floor drains. The drainage areas are of sufficient size to contain any oil spill. The areas are equipped with full suppression over the chillers and pumps to mitigate the spread of a fire. Horizontal spatial separation between pumps/chiller and the instruments rack is greater than 20 feet. In addition, the fuel pool cooling pumps are located within the fuel pool cooling room which is surrounded by concrete walls.

3. Transient Combustible Fire Hazard Analysis

Based on limited quantities of transient combustibles and fire suppression systems, any fire caused by transients will be limited in size. The resultant fire is defined to be a cylindrical area of influence with a radius of 5 feet and a height of 10 feet. Therefore, a transient combustible fire can only disable 3 of the 4 nuclear boiler instrument racks, 1C004, 1C224, and 1C225 or 1C005, 1C225, and 1C224. This will insure that either Rack 1C004 or 1C005 will always be unaffected by the postulated fire. A failure of this instrumentation which results in a loss of automatic functions will have no impact to Appendix R Safe Shutdown, since the manual operation of these systems is unaffected. Inadvertent operation of the safety systems is not a concern, because for this to occur, as a minimum, an instrument on each rack must provide a spurious signal. This evaluation has demonstrated that fire impact to both racks as a result of the same fire is not feasible.

Both divisions of nuclear boiler vessel wide range pressure and level transmitters, however, are located within the cylinder of influence and may be lost. Although availability of this instrumentation is highly desirable, its loss is acceptable because safe shutdown can be achieved and maintained without it. Due to the number of alternative instruments available to monitor RPV level and pressure, the complete loss of RPV level and pressure indication due to this localized fire is highly unlikely. Should RPV level indication be lost and no alternate level indication be available, however, the operator would enter EO-100-114, RPV Flooding. EO-100-114 requires the operator to verify a minimum 62 psid between the RPV pressure and the suppression chamber pressure to assure adequate core cooling. Should the RPV pressure indication also be lost and no alternate pressure indication be available, the operator would enter EO-100-115, Primary Containment Flooding. In any case, safe shutdown conditions would be able to be established either by the use of alternative indication instrumentation or through implementation of the required steps in the Emergency Operating Procedures.

The main concern is a fire that results in a sufficient number of spurious signals to cause an inadvertent system actuation which results in an adverse impact to Appendix R Safe Shutdown. Based on the Spurious Operations Criteria provided to the NRC in Attachment A to PLA-4505 dated December 6, 1996 and accepted by the NRC in a SER dated October 21, 1997, the number of spurious operations required for inadvertent system actuation to occur is beyond the number required to be assumed. As an additional precaution, however, the following approach will be used to assess the impacts of fires on Appendix R Safe Shutdown in this fire zone. Since all required Division II safe shutdown raceways will be protected in Fire Zone 1-5A-S, loss of Division I components and Division II cables is not probable. However, it is possible for a fire to disable Division II components and Division I cables. Therefore, all Division I safe shutdown raceways in the area around Rack 1C005, which contains the Division II components, defined by:

- Height of 10 feet
- On the South by the fuel pool cooling room wall,
- On the East by a line 14 feet from the East end of Rack 1C005,
- On the North by the containment wall, and
- On the West by a line 10 feet from the West end of Rack 1C005,

have been evaluated for impact on achieving Appendix R Safe Shutdown. Those raceways identified as impacting Appendix R Safe Shutdown have been protected with 1-hour fire rated wrap.

4. Effects of Sprinklers

The actuation of the sprinkler system will not disable any safe shutdown nuclear boiler instrumentation.

The analysis provided above has demonstrated the following conclusions:

1. The in-situ combustible loading arrangement will not support a design basis fire that will disable both divisions of nuclear boiler instrumentation.

2. A transient combustible fire will not be of sufficient magnitude to disable both divisions of safe shutdown ECCS interlock components.

3. The necessary safe shutdown cables will be protected to insure that a fire will not disable one division's components and the opposite division's cables where fire damage to such cables can have an adverse impact on the ability to achieve and maintain safe shutdown.

4. Initiation of the fire suppression system will not disable any required nuclear boiler system.

Therefore, the existing arrangement, along with protecting any critical Division I cables in the vicinity of Division II components, provides an equivalent degree of safety to that required by Appendix R, Section III.G.2.b.

From the justification above, it can be concluded that there is no fire (in-situ or transient) in Fire Zone 1-5A-S that will prevent achieving and maintaining cold shutdown. Therefore, it is concluded that the current configuration provides an equivalent degree of safety to that required by Section III.G.2.b of Appendix R.

Security-Related Information
Figure Withheld Under 10 CFR 2.390

Security-Related Information
Figure Withheld Under 10 CFR 2.390

TABLE DR27-1

UNIT 1 SAFE SHUTDOWN NUCLEAR BOILER INSTRUMENTS

Instrument #	Description	Area	Elev.	Safe Shutdown Path	Fire Zone	Required Path	Rack
LIS-B21-1N024A	Level Indicating Switch for RPS & RCIC (High Water Level Trip)	29	749	1	1-5A-S	3	1C004
*LIS-B21-1N-024C		27	749	3	1-5A-S	3	1C005
LIS-B21-1N024B	Level Indicating Switch for RPS & HPCI (High Water Level Trip)	29	749	1	1-5A-S	3	1C004
*LIS-B21-1N024D		27	749	3	1-5A-S	3	1C005
LIS-B21-1N031A	Level Indicating Switch CS, ADS & RHR (Level 1 Initiation Signal)	29	749	1	1-5A-S	3	1C004
*LIS-B21-1N031B		27	749	3	1-5A-S	3	1C005
LIS-B21-1N-031C		29	749	1	1-5A-S	3	1C004
*LIS-B21-1N031D		27	749	3	1-5A-S	3	1C005
LIS-B21-1N042A	Level Indicating Switch for ADS (Confirmatory Level 3)	29	749	1,2	1-5A-S	3	1C004
*LIS-B21-1N042B		27	749	2,3	1-SA-S	3	1C005
LT-14201A	Wide Range Reactor Level Indication	27	749	1	1-5A-S	3	1C225
*LT-14201B		27	749	3	1-5A-S	3	1C224
PS-B21-1N021A	Pressure Indicating Switch for CS & RHR (High Drywell Permissive)	29	749	1	1-5A-S	3	1C004
*PIS-B21-1N021B		27	749	3	1-5A-S	3	1C005
PS-B21-1N023A	Pressure Switch for RPS (High Pressure Trip)	29	749	1	1-5A-S	3	1C004
PS-B21-1N023B		29	749	1	1-5A-S	3	1C004
*PS-B21-1N023C		27	749	3	1-5A-S	3	1C005
*PS-B21-1N023D		27	749	3	1-5A-S	3	1C005
PT-14201A	Wide Range Reactor Pressure Indication	27	749	1	1-5A-S	3	1C225
*PT-14201B		27	749	3	1-5A-S	3	1C224
TB1C004-A1	Terminal Box	29	749	1	1-5A-S	3	1C004
TB1C004-A2	Terminal Box	29	749	1	1-5A-S	3	1C004
TB1C004-B1	Terminal Box	29	749	1	1-5A-S	3	1C004
TB1C004-B2	Terminal Box	29	749	1	1-5A-S	3	1C004
TB1C005-A1	Terminal Box	27	749	3	1-5A-S	3	1C005
TB1C005-A3	Terminal Box	27	749	3	1-5A-S	3	1C005
TB1C005-B1	Terminal Box	27	749	3	1-5A-S	3	1C005
TB1C005-B2	Terminal Box	27	749	3	1-5A-S	3	1C005

*Denotes the Required Safe Shutdown Components for This Fire Zone

APPENDIX R DEVIATION REQUEST NO. 28

NUCLEAR BOILER INSTRUMENTATION IN FIRE ZONE 2-5A-N

DEVIATION REQUEST:

The current arrangement of nuclear boiler instrumentation in Fire Zone 2-5A-N provides an equivalent degree of safety as that required by 10CFR50, Appendix R, Section III.G.2.b, based on the present in-situ combustible loading configuration, horizontal separation of redundant safe shutdown ECCS interlock components of 14 feet and plant procedure to control transient combustibles.

FIRE AREAS/ZONES AFFECTED:

This deviation request applies only to Fire Zone 2-5A-N, which is in Fire Area R-2A.

REASON FOR DEVIATION REQUEST:

10CFR50, Appendix R, Section III.G.2.b requires the existence of an automatic fire suppression system, in addition to fire detectors, in those fire areas where separation of redundant safe shutdown cables and equipment is greater than 20 feet with no intervening combustibles.

The redundant nuclear boiler instrumentation in Fire Zone 2-5A-N as identified in Table 28-1 does not meet the separation criteria as required by Appendix R, Section III.G.2.b. The horizontal separation of individual redundant ECCS interlock components is 14 feet. Automatic fire suppression and detection is provided throughout Fire Zone 2-5A-N. An analysis has demonstrated the following conclusions:

1. The in-situ combustible loading arrangement will not support a fire that will disable both divisions of nuclear boiler instrumentation.
2. A transient combustible fire will not be of sufficient magnitude to disable both divisions of safe shutdown ECCS interlock components.
3. The necessary safe shutdown cables will be protected to insure that a fire will not disable one division's components and the opposite division's cables where fire damage to such cables can have an adverse impact on the ability to achieve and maintain safe shutdown.
4. Initiation of the fire suppression system will not disable any required nuclear boiler system.

Therefore, the existing arrangement, along with protecting any critical Division II cables in the vicinity of Division I components, provides an equivalent degree of safety to that required by Appendix R, Section III.G.2.b.

EXISTING ARRANGEMENT:

In Fire Zone 2-5A-N, Division I of safe shutdown equipment is assured available for plant shutdown. Both divisions of required nuclear boiler instruments are located in Fire Zone 2-5A-N. The instruments and terminal boxes on instrument rack 2C004 required for Unit 2 safe shutdown are identified on Table DR28-1. The instruments and terminal boxes on instrument rack 2C005 required for Unit 2 safe shutdown are also identified on Table DR28-1. The arrangement of the instruments was designed to insure proper RPS input of the "1-out-of-2-taken-twice" logic for a single instrument line failure. A fire which damages these instruments or their circuitry could result in either a loss of automatic functions or a spurious signal to the automatic initiation logic. The existing arrangement of the nuclear boiler instrument racks and other related equipment is shown on Drawing C-213438.

The combustible loading in the entire Fire Zone 2-5A-N was conservatively calculated to be low. Automatic fire suppression is installed using the guidelines of NFPA 13 and fire detection is provided throughout Fire Zone 2-5A-N.

Three cable trays traverse east-west in front of and above the nuclear boiler instrument racks in Fire Zone 2-5A-N. Two cable trays are enclosed by sheet metal, while the other is enclosed with fireproof insulation. The lowest cable tray is 14 feet above the floor and 8 feet above the instrument racks. All cable insulation meets all requirements of IEEE-383 Flame Test.

JUSTIFICATION:

To meet the requirements of 10CFR50, Appendix R, Section III.G.2.b, the following features must exist to ensure that a fire is limited so that one division of redundant components important to safe shutdown is available:

a. Fire detection.

b. Automatic fire suppression.

c. No intervening combustibles.

d. Greater than 20 feet horizontal separation between redundant safe shutdown equipment/cables.

Requirements a and b are met and a fire hazard analyses has demonstrated that the existing configuration is acceptable even though requirements c and d are not met.

Justification is as follows:

1. Fire Detection and Suppression

Fire Zone 2-5A-N is fully covered by an automatic fire detection system.

The automatic fire suppression system in Fire Zone 2-5A-N provides suppression capability to suppress a fire. This fire zone has full ceiling and lower level coverage in the area of the Reactor Building chillers using the guidelines of NFPA 13.

2. In-Situ Combustible Fire Hazard Analyses

The only combustibles located in the immediate vicinity of the nuclear boiler instrumentation are the cable trays, terminal blocks, and the instruments themselves. The instruments contain negligible combustibles and are completely encased in metal enclosures which will contain any internal fire within the housing. Terminal blocks for external cable connections are also completely enclosed in metallic boxes. Therefore, even with very little horizontal spatial separation, any fire on an instrument rack will not be propagated to other racks, equipment, or cable trays.

There are three cable trays in the area; two are completely enclosed by sheet metal while the third is wrapped with fireproof insulation. The trays completely enclosed are not considered to constitute intervening combustibles, while the wrapped tray does constitute an intervening combustible. Due to the type of material used, the wrap has a low probability for spreading the fire or propagating downward to impact the Nuclear Boiler Instruments. All Division I safe shutdown cables in this fire zone have been addressed and protected if required.

Other combustibles within the fire zone are various control panels and lube oil from the Reactor Building chillers and fuel pool cooling pumps. The control panels contain very little combustible materials within enclosed metallic housing, have spatial separation greater than 8 feet, and therefore, have no impact on the required nuclear boiler instrumentation. The lube oil equipment is located in areas where the floor is sloped to local floor drains. The drainage areas are of sufficient size to contain any oil spill. The areas are equipped with full suppression over the chillers and pumps to mitigate the spread of a resultant fire. Horizontal spatial separation between pumps/chiller and the instruments rack is greater than 20 feet. In addition, the fuel pool cooling pumps are located within the fuel pool cooling room which is surrounded by concrete walls.

3. Transient Combustible Fire Hazard Analysis

Based on limited quantities of transient combustibles and fire suppression systems, any fire caused by transients will be limited in size. The resultant fire is defined to be a cylindrical area of influence with a radius of 5 feet and a height of 10 feet. Therefore, a transient combustible fire will only disable two of the four nuclear boiler instrument racks, 2C004 and 2C224, or 2C225 and 2C005, or 2C225 and 2C004. This will insure that either Rack 2C004 or 2C005 will always be unaffected by the postulated fire. A failure of this instrumentation which results in a loss of automatic functions will have no impact to Appendix R Safe Shutdown, since the manual operation of these systems is unaffected. Inadvertent operation of the safety systems is not a concern, because for this to occur, as a minimum, an instrument on each rack must provide a spurious signal. This evaluation has demonstrated that fire impact to both racks as a result of the same fire is not feasible. Also, one division of nuclear boiler vessel wide range pressure and level instrumentation will be available to achieve safe shutdown.

The main concern is a fire that results in a sufficient number of spurious signals to cause an inadvertent system actuation which results in an adverse impact to Appendix R Safe Shutdown. Based on the Spurious Operations Criteria provided to the NRC in Attachment A to PLA-4505 dated December 6, 1996 and accepted by the NRC in a SER dated October 21, 1997, the number of spurious operations required for inadvertent system actuation to occur is beyond the number required to be assumed. As an additional precaution, however, the following approach has been used to assess the impacts of fires on Appendix R Safe Shutdown in this fire zone. Since required Division I safe shutdown raceways will be protected in Fire Zone 2-5A-N, loss of Division II components and Division I cables is not probable. However, it is possible for a fire to disable Division I components and Division II cables. Therefore, all Division II safe shutdown raceways in the area around Rack 2C004, which contains the Division I components, defined by:

- Height of 10 feet,
- On the north by the fuel pool cooling room wall,
- On the east by a line 10 feet from the east end of Rack 2C004,
- On the south by the containment wall, and
- On the west by a line 14 feet from the west end of Rack 2C004,

will be evaluated for impact on achieving Appendix R Safe Shutdown.

4. Effects of Sprinklers

The actuation of the sprinkler system will not disable any safe shutdown nuclear boiler instrumentation.

From the justification above, it can be concluded that there is no fire (in-situ or transient) in Fire Zone 2-5A-N that will prevent achieving and maintaining cold shutdown.

Therefore, it is concluded that the current configuration provides an equivalent degree of safety as that required by Section III.G.2.b of Appendix R.

Security-Related Information
Figure Withheld Under 10 CFR 2.390

Security-Related Information
Figure Withheld Under 10 CFR 2.390

TABLE DR28-1

UNIT 2 SAFE SHUTDOWN NUCLEAR BOILER INSTRUMENTS

Instrument #	Description	Area	Elev.	Safe Shutdown Path	Fire Zone	Required Path	Rack
*LIS-B21-2N024A	Level Indicating Switch for RPS and RCIC (High Water Level Trip)	33	749'	1	2-5A-N	1	2C004
LIS-B21-2N024C	Level Indicating Switch for RPS and RCIC (High Water Level Trip)	30	749'	3	2-5A-N	1	2C005
*LIS-B21-2N024B	Level Indicating Switch for RPS and HPCI (High Water Level Trip)	33	749'	1	2-5A-N	1	2C004
LIS-B21-2N024D	Level Indicating Switch for RPS and HPCI (High Water Level Trip)	30	749'	3	2-5A-N	1	2C005
*LIS-B21-2N031A	Level Indicating Switch CS, ADS and RHR (Level 1 Initiation Signal)	33	749'	1	2-5A-N	1	2C004
LIS-B21-2N031B	Level Indicating Switch CS, ADS & RHR (Level 1 Initiation Signal)	30	749'	3	2-5A-N	1	2C005
*LIS-B21-2N031C	Level Indicating Switch CS, ADS & RHR (Level 1 Initiation Signal)	33	749'	1	2-5A-N	1	2C004
LIS-B21-2N031D	Level Indicating Switch CS, ADS & RHR (Level 1 Initiation Signal)	30	749'	3	2-5A-N	1	2C005
LIS-B21-2N042A	Level Indicating Switch for ADS (Confirmatory Level 3)	33	749'	1, 2	2-5A-N	1	2C004
LIS-B21-2N042B	Level Indicating Switch for ADS (Confirmatory Level 3)	30	749'	2, 3	2-5A-N	1	2C005
*LT-24201A	Wide Range Reactor Level Indication	30	749'	1	2-5A-N	1	2C225
LT-24201B	Wide Range Reactor Level Indication	33	749'	3	2-5A-N		2C224

TABLE DR28-1

UNIT 2 SAFE SHUTDOWN NUCLEAR BOILER INSTRUMENTS

Instrument #	Description	Area	Elev.	Safe Shutdown Path	Fire Zone	Required Path	Rack
*PIS-B21-2N021A	Pressure Indicating Switch for CS and RHR (High Drywell Permissive)	33	749'	1	2-5A-N	1	2C004
PIS-B21-2N021B	Pressure Indicating Switch for CS and RHR (High Drywell Permissive)	30	749'	3	2-5A-N	1	2C005
*PS-B21-2N023A	Pressure Switch for RPS (High Pressure Trip)	33	749'	1	2-5A-N	1	2C004
*PS-B21-2N023B	Pressure Switch for RPS (High Pressure Trip)	33	749'	1	2-5A-N	1	2C004
PS-B21-2N023C	Pressure Switch for RPS (High Pressure Trip)	30	749'	3	2-5A-N	1	2C005
PS-B21-2N023D	Pressure Switch for RPS (High Pressure Trip)	30	749'	3	2-5A-N	1	2C005
*PT-24201A	Wide Range Reactor Pressure Indication	30	749'	1	2-5A-N	1	2C225
PT-24201B	Wide Range Reactor Pressure Indication	33	749'	3	2-5A-N	1	2C224
TB2C004-A1	Terminal box	33	749'	1	2-5A-N	1	2C004
TB2C004-A2	Terminal box	33	749'	1	2-5A-N	1	2C004
TB2C004-B1	Terminal box	33	749'	1	2-5A-N	1	2C004
TB2C004-B2	Terminal box	33	749'	1	2-5A-N	1	2C004
TB2C005-A1	Terminal box	30	749'	3	2-5A-N	1	2C005
TB2C005-A3	Terminal box	30	749'	3	2-5A-N	1	2C005
TB2C005-B1	Terminal box	30	749'	3	2-5A-N	1	2C005
TB2C005-B2	Terminal box	30	749'	3	2-5A-N	1	2C005

* Denotes the Required Safe Shutdown Components for this Fire Zone.

APPENDIX R DEVIATION REQUEST NO. 29

CATEGORY I COMPONENTS AND SAFE SHUTDOWN RACEWAY IN FIRE ZONES 1-3C-W AND 2-3C-W

DEVIATION REQUEST:

Automatic fire suppression is not required for the protection of redundant safe shutdown components in Fire Zones 1-3C-W and 2-3C-W. Additionally, the 13 feet spatial separation between the two redundant temperature elements in each of these fire zones is adequate to assure that all redundant safe shutdown equipment (i.e. components, cables and raceway) separated by more than 13 feet is free of fire damage for all postulated fires in these zones.

FIRE AREAS/ZONES AFFECTED:

This deviation request applies to Fire Areas R-1A and R-1B (Fire Zone 1-3C-W) and R-2A and R-2B (Fire Zone 2-3C-W). These are Wraparound Zones as defined in Deviation Request No. 4.

REASON FOR DEVIATION REQUEST:

10CFR50 Appendix R, Section III.G.2.b, requires separation of cables and equipment and associated non-safety circuits of redundant trains by a horizontal distance of more than 20 feet with no intervening combustible or fire hazards. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area.

Fire Zones 1-3C-W (Unit 1 Reactor Building Elevation 683'-0) and 2-3C-W (Unit 2 Reactor Building Elevation 683'-0) do not have automatic suppression and the redundant trains of safe shutdown equipment and cables in these fire zones are separated by less than 20 feet. Fire detection does not extend completely throughout the fire areas of which these fire zones are a part.

This deviation justifies that, even though these aspects of Appendix R Section III.G.2.b are not fully satisfied, there are additional compensating factors which demonstrate that the existing configuration provides an equivalent level of assurance to that provided by Appendix R Section III.G.2.b that safe shutdown can be achieved and maintained.

EXISTING ARRANGEMENT:

Drawing C-213431 shows the raceway and Category I component locations in Fire Zone 1-3C-W and Drawing C-213432 shows the raceway and Category I component locations in Fire Zone 2-3C-W.

The following Category I components located in these fire zones are included in this deviation request:

Division I Component	Division II Component	Spatial Separation	Component Description
Unit 1			
HV-E11-1F048A	HV-E11-1F048B	64 ft.	RHR Heat Exch. Bypass Valve
HV-E11-1F015A	HV-E11-1F015B	33 ft.	RHR Inboard Isolation Valve
TE-E11-1N027A	TE-E11-1N027B	13 ft.	RHR Heat Exch. Outlet Temp. Element
HV-E11-1F009 (Not in this Fire Zone)	HV-E11-1F008	N/A	RHR SDC Outboard Isolation Valve
Unit 2			
HV-E11-2F048A	HV-E11-2F048B	64 ft.	RHR Heat Exch. Bypass Valve
HV-E11-2F015A	HV-E11-2F015B	35 ft.	RHR Inboard Isolation Valve
TE-E11-2N027A	TE-E11-2N027B	13 ft.	RHR Heat Exch. Outlet Temp. Element
HV-E11-2F009 (Not in this Fire Zone)	HV-E11-2F008	N/A	RHR SDC Outboard Isolation Valve

All of the affected components and raceway are located in a controlled radiation area where transient combustibles are minimized due to limited accessibility within the room. The redundant safe shutdown components and raceway contained in these fire zones are shown on drawing C213431 sheet 1 for Fire Zone 1-3C-W and C213432 sheet 1 for Fire Zone 2-3C-W. The combustible loading for both of these rooms is relatively low and there are no intervening combustibles in the 13 ft. distance between the two redundant temperature elements. These fire zones have fire detection but do not have an automatic suppression system.

POTENTIAL SAFE SHUTDOWN IMPACTS:

Tables 1.0 and 2.0 list the non-fire protected safe shutdown raceway in Fire Zones 1-3C-W and 2-3C-W, respectively. For each raceway, the safe shutdown components that could be affected should a fire damage the circuits contained in the raceway are also provided along with an assessment of the worst case impact for each component. Cable faults are evaluated for the effects of hot shorts, open circuits and shorts to ground. The effects of associated circuits, including spurious operations, breaker coordination and multiple high impedance faults are also evaluated. The information compiled in these tables is later used in conjunction with the raceway layout information on the attached drawings in the justification section of this deviation request under the heading of "Physical Separation of Redundant Safe Shutdown Functions".

Circuits which are contained in non-fire protected raceways in Fire Zone 1-3C-W and which provide control or power to components required in support of safe shutdown in this fire zone are identified in Table 1.0 below.

Table 1.0 Control and Power Circuits for Safe Shutdown Components in non-fire protected raceway in Fire Zone 1-3C-W

Raceway No.	SSD Div.	Affected Component	Impact Assessment
Control & Instrument Circuits			
E1KH18-21	Div. I	RHR 1F009 Valve	Spurious Valve Opening[1]
		RHR 1F015A Valve	Loss of Valve Control
		RHR 1F048A Valve	Loss of Valve Control
E1K385	Div. I	RHR 1F048A Valve	Loss of Valve Control
E1K2L4	Div. I	RHR 1F009 Valve	Loss of Valve Control[2]
E1M209	Div. I	TE-E11-1N027A	Loss of Function
		CKT1Y11505/1Y21620	No Impact/SRU Isolates
F1KH50-54	Div. II	RHR 1F008 Valve	Loss of Valve Control
		RHR 1F015B Valve	Loss of Valve Control
		RHR 1F017B Valve	Spurious Valve Operation
		RHR 1F048B Valve	Loss of Valve Control
F1KH61-63	Div. II	RHR 1F015B Valve	Loss of Valve Control
		RHR 1F017B Valve	Spurious Valve Operation
		RHR 1F048B Valve	Loss of Valve Control
F1K388	Div. II	RHR 1F008 Valve	Loss of Valve Control
F1K395	Div. II	RHR 1F048B Valve	Loss of Valve Control
F1M068	Div. II	TE-E11-1027B	Loss of Function
		CKT1Y12505/1Y22623	No Impact/SRU Isolates

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[1] Cable EK1Q3016M is in cable tray E1KH18 and a hot short on this cable could spuriously open the 1F009 valve. Cable Tray E1KH18, however, is outside of the 50 foot distance defined to be part of the wraparound area.

[2] A hot short could cause the spurious opening of this valve, except that the cable is routed in a dedicated conduit with no other energized circuits.

Table 1.0 Control and Power Circuits for Safe Shutdown Components in non-fire protected raceway in Fire Zone 1-3C-W

Raceway No.	SSD Div.	Affected Component	Impact Assessment
Power to RHR Valves & Other Equipment			
E1PH18-21	Div. I	1B219 (RHR 15A & 7A)	Loss of Power to Valves
		1B237 (See Table 1.0a)	Loss of Power to Equipment
		RHR 1F015A Valve	Loss of Power to Valve
		RHR 1F048A Valve	Loss of Power to Valve
E1P364	Div. I	RHR 1F048A Valve	Loss of Power to Valve
		1B237 (See Table 1.0a)	Loss of Power to Equipment
E1P368 &	Div. I	1B219 (RHR 15A & 7A)	Loss of Power to Valves
JB 0446		RHR 1F015A Valve	Loss of Power to Valve
E1P372	Div. I	1B219 (RHR 15A & 7A)	Loss of Power to Valves
		RHR 1F015A Valve	Loss of Power to Valve
F1PH50-55	Div. II	RHR 1F008 Valve	Spurious Valve Opening
		RHR 1F017B Valve	Loss of Power to Valve
		RHR 1F048B Valve	Loss of Power to Valve
		1D274 (See Table 1.0b)	Loss of Power to Equipment
F1P023	Div. II	1B229 (RHR 7B & 15B)	Loss of Power to Valves
		RHR 1F015B Valve	Loss of Power to Valve
F1P364 &	Div. II	RHR 1F017B Valve	Loss of Power to Valve
JB 0311		RHR 1F048B Valve	Loss of Power to Valve
F1P368	Div. II	RHR 1F048B Valve	Loss of Power to Valve
F1P408	Div. II	RHR 1F048B Valve	Loss of Power to Valve
F1P510 &	Div. II	RHR F008 Valve	Spurious Valve Opening
JB 3946		1D274 (See Table 1.0b)	Loss of Power to Equipment
F1P511	Div. II	RHR F008 Valve	Spurious Valve Opening
		1D274 (See Table 1.0b)	Loss of Power to Equipment

The following table provides information related to the impacts to equipment powered from 1B237:

Table 1.0a - Components Powered from 1B237

Comp. ID	Comp. Description	Comments
HV-11210A	RHRSW Heat Exch. Inlet Valve	normally closed/required open
HV-11215A	RHRSW Heat Exch. Outlet Valve	normally closed/required open
HV-15766	Supp. Pool Flow Div. Valve	normally closed/required closed
HV-E11-1F103A	RHR Heat Exch. A Vent Valve	not required for SSD
HV-E11-1F075A	RHR/RHRSW Cross Tie Iso. Valve	not required for SSD
HV-E11-1F024A	RHR SPC Return Valve	normally closed/required open
HV-E11-1F006C	RHR SDC Suction Valve	normally closed/required closed
HV-E11-1F004C	RHR Supp. Pool Pump Suction	not required for SSD
HV-E11-1F048A	RHR Heat Exch. Bypass Valve	normally open/required closed
HV-B31-1F023A	Rx. Recirc. Pump Suction Valve	not required for SSD in this area
1V208B	RCIC Pump Rm. Unit Cooler B	not required for SSD in this area
1V211C	CS Pump Rm. Unit Cooler C	not required for SSD
1V210C	RHR Pump Rm. Unit Cooler C	not required for SSD
HV-B21-1F016	MSL Drain Iso. Valve	normally open/required closed
HV-E11-1F022	RHR Head Spray Valve	not required for SSD
HV-E21-1F015A	CS Full Flow Test Valve	normally closed/required closed
HV-E41-1F002	HPCI Stm Supply Cont. Iso. Valve	not required for SSD in this area
1P210B	RBCCW Pump B	not required for SSD

The following table provides information related to the impacts to equipment powered from 1D274:

Table 1.0b - Components Powered from 1D274

Comp. ID	Comp. Description	Comments
HV-15768	Supp. Pool Flow Div. Valve	normally closed/required closed
1P216	HPCI Vac. Tk. Cond. Pump	not used for SSD
HV-E41-1F066	HPCI Turb. Exh./Supp. Pool	not used for SSD in this area
1P213	HPCI Aux. Oil Pump	not used for SSD in this area
HV-B21-1F019	MSL Drain Iso.Valve	need to close this or 1F016
HV-G33-1F004	RWCU Iso. Valve	need to close this or 1F001
1P215	HPCI Bar. Cond. Vac. Pump	not used for SSD
HV-E11-1F023	RHR Head Spray	normally closed/not used for SSD
HV-E11-1F049	RHR Letdown to LRW/Cond.	normally closed/not used for SSD
HV-E11-1F008	RHR SDC Iso. Valve	normally closed/required closed
HV-E41-1F008	HPCI Test to CST	not used for SSD in this area
HV-E41-1F007	HPCI Pump Disch. Valve	not used for SSD in this area

Circuits which are contained in non-fire protected raceways in Fire Zone 2-3C-W and which provide control or power to components required in support of safe shutdown in this fire zone are identified in Table 2.0 below.

Table 2.0 Control and Power Circuits for Safe Shutdown Components in non-fire protected raceway in Fire Zone 2-3C-W

Raceway No.	SSD Div.	Affected Component	Impact Assessment
Control & Instrumentation Circuits			
E2KH22-25	Div. I	ESWS Pump 0P504C	Loss of Pump Control
		RWCU 2F001 Valve	Spurious Valve Opening
		RHR 2F009 Valve	Spurious Valve Opening
		RHR 2F015A Valve	Loss of Valve Control
		RHR 2F017A Valve	Loss of Valve Control
		RHR 2F048A Valve	Loss of Valve Control
E2M125	Div. I	TE-E11-2N027A	Loss of Function
		CKT2Y11505/2Y21620	No Impact/SRU Isolates
E2M098	Div. I	Div. I SPOTMOS	Loss of Function
F2KH32-37	Div. II	RHR 2F048B Valve	Loss of Valve Control
		Div. II ADS Logic	Loss of Div. II Control
		RHR 2F008 Valve	Loss of Valve Control
		RHR 2F015B Valve	Loss of Valve Control
		RHR 2F017B Valve	Loss of Valve Control
F2KH61-62	Div. II	RHR 2F048B Valve	Loss of Valve Control
		RHR 2F015B Valve	Loss of Valve Control
		RHR 2F017B Valve	Loss of Valve Control
F2K096	Div. II	RHR 2F008 Valve	Loss of Valve Control
F2K111	Div. II	RHR 2F048B Valve	Loss of Valve Control
F2K622	Div. II	RHR 2F048B Valve	Loss of Valve Control
F2M077	Div. II	TE-E11-2N027B	Loss of Function
		CKT2Y12505/2Y22623	No Impact/SRU Isolates

Table 2.0 Control and Power Circuits for Safe Shutdown Components in non-fire protected raceway in Fire Zone 2-3C-W

Raceway No.	SSD Div.	Affected Component	Impact Assessment
Power to RHR Valves & Other Equipment			
E2PH22-25	Div. I	RHR 2F048A Valve	Loss of Power to Valve
		RHR 2F015A Valve	Loss of Power to Valve
		RHR 2F017A Valve	Loss of Power to Valve
		2B219 (RHR 7A & 15A)	Loss of Power to Valves
		2B237 (See Table 2.0a)	Loss of Power to Equipment
E2P181/182 & JB 1957	Div. I	RHR 2F015A Valve	Loss of Power to Valve
		2B219 (RHR 7A & 15A)	Loss of Power to Valves
F2PH32-37	Div. II	RHR 2F008 Valve	Spurious Valve Opening
		RHR 2F015B Valve	Loss of Power to Valve
		RHR 2F017B Valve	Loss of Power to Valve
		RHR 2F048B Valve	Loss of Power to Valve
		2B229 (RHR 15B & 7B)	Loss of Power to Valves
		2D274 (See Table 2.0b)	Loss of Power to Equipment
F2P086	Div. II	RHR 2F008 Valve	Spurious Valve Opening
		2D274 (See Table 2.0b)	Loss of Power to Equipment
F2P087 & JB 1978	Div. II	RHR 2F017B Valve	Loss of Power to Valve
		RHR 2F048B Valve	Loss of Power to Valve
F2P089	Div. II	RHR 2F048B Valve	Loss of Power to Valve
F2P092	Div. II	RHR 2F048B Valve	Loss of Power to Valve
F2P094	Div. II	RHR 2F015B Valve	Loss of Power to Valve
		2B229 (RHR 15B & 7B)	Loss of Power to Valves

The following table provides information related to the impacts to equipment powered from 2B237:

Table 2.0a - Components Powered from 2B237

Comp. ID	Comp. Description	Comments
HV-21210A	RHRSW Heat Exch. Inlet Valve	normally closed/required open
HV-21215A	RHRSW Heat Exch. Outlet Valve	normally closed/required open
HV-25766	Supp. Pool Flow Div. Valve	normally closed/required closed
HV-E11-2F103A	RHR Heat Exch. A Vent Valve	not required for SSD
HV-E11-2F075A	RHR/RHRSW Cross Tie Iso. Valve	not required for SSD
HV-E11-2F024A	RHR SPC Return Valve	normally closed/required open
HV-E11-2F006C	RHR SDC Suction Valve	normally closed/required closed
HV-E11-2F004C	RHR Supp. Pool Pump Suction	not required for SSD
HV-E11-2F048A	RHR Heat Exch. Bypass Valve	normally open/required closed
HV-B31-2F023A	Rx. Recirc. Pump Suction Valve	not required for SSD in this area
2V208B	RCIC Pump Rm. Unit Cooler B	not required for SSD in this area
2V211C	CS Pump Rm. Unit Cooler C	not required for SSD
2V210C	RHR Pump Rm. Unit Cooler C	not required for SSD
HV-B21-2F016	MSL Drain Iso. Valve	normally open/required closed
HV-E11-2F022	RHR Head Spray Valve	not required for SSD
HV-E21-2F015A	CS Full Flow Test Valve	normally closed/required closed
HV-E41-2F002	HPCI Stm Supply Cont. Iso. Valve	not required for SSD in this area
2F116A/B	Instrument Air Dryer Towers	not required for SSD

The following table provides information related to the impacts to equipment powered from 2D274:

Table 2.0b - Components Powered from 2D274

Comp. ID	Comp. Description	Comments
HV-25768	Supp. Pool Flow Div. Valve	normally closed/required closed
2P216	HPCI Vac. Tk. Cond. Pump	not used for SSD
HV-E41-2F066	HPCI Turb. Exh./Supp. Pool	not used for SSD in this area
2P213	HPCI Aux. Oil Pump	not used for SSD in this area
HV-B21-2F019	MSL Drain Iso.Valve	need to close this or 2F016
HV-G33-2F004	RWCU Iso. Valve	need to close this or 2F001
2P215	HPCI Bar. Cond. Vac. Pump	not used for SSD
HV-E11-2F023	RHR Head Spray	normally closed/not used for SSD
HV-E11-2F049	RHR Letdown to LRW/Cond.	normally closed/not used for SSD
HV-E11-2F008	RHR SDC Iso. Valve	normally closed/required closed
HV-E41-2F008	HPCI Test to CST	not used for SSD in this area
HV-E41-2F007	HPCI Pump Disch. Valve	not used for SSD in this area

JUSTIFICATION:

Fire Zones 1-3C-W and 2-3C-W are similar in physical layout including raceway layout and, with the exception of the abandoned in place Thermo-Lag 330-1 material in Fire Zone 2-3C-W, combustible loading. Where the differences are pronounced, the features of each fire zone are described separately. Otherwise, the description provided is the limiting condition which bounds both fire zones.

Fire Zones 1-3C-W and 2-3C-W are "wraparound zones" which, as described in Deviation Request (DR) No. 4, function to provide separation between Fire Areas R-1A and R-1B and Fire Areas R-2A and R-2B, respectively. Fire Areas R-1A and R-2A rely on Safe Shutdown Path No. 3. Fire Areas R-1B and R-2B rely on Safe Shutdown Path No. 1. In Deviation Request No. 4, it is stated that both safe shutdown paths are protected in the "wraparound area" unless a deviation is provided which specifically justifies the existing conditions. Due to the unique attributes of Fire Zones 1-3C-W and 2-3C-W, as described below, this deviation justifies a condition different than that described in Deviation Request No. 4.

Physical Separation of Redundant Safe Shutdown Functions:

Deviation Request No. 29 was previously evaluated in SAIC TAC No. 59647/48 attached to the NRC SER dated August 9, 1989 which accepted and granted the deviation. In performing the evaluation of the initial issue of DR No. 29, it was concluded that the installation of automatic suppression and the separation of the temperature elements by more than 13 feet would not significantly increase the level of plant fire safety. This conclusion was based on the fact that there are no intervening combustibles in the 13 foot distance between the temperature elements, the area is a high radiation area with limited access, the combustible loading in the area is low and there is a lack of an ignition source. Finally, the area is protected with fire detection and contains manual fire fighting equipment.

This change to DR No. 29 does not alter any of these conditions of the initial issue of the DR, but only provides additional information on the potential impacts to the redundant safe shutdown trains and additional justification on the acceptability of this condition.

All redundant components and raceway in Fire Zones 1-3C-W and 2-3C-W are separated by at least 20 feet, except for those associated with the RHR Heat Exchanger Outlet Temperature Elements.

Fire Zone 1-3C-W:

As shown on Drawing C213431 Sheet 1, all unprotected redundant safe shutdown components and raceway are separated by at least 20 feet except for the RHR Heat Exchanger Outlet Temperature Elements, TE-E11-1N027A and TE-E1-1N027B, and raceway E1M209 which contains the instrument cable for TE-E11-1N027A, F1M068, which contains the instrument cable for TE-E11-1N027B, and E1P368, E1P372 and JB0446, which contain power cables affecting the power feeds to the RHR LPCI Injection Inboard Containment Isolation Valve, 1F015A and the RHR Pump Min. Flow Valve, 1F007A. In the unlikely event that a fire were to impact all of these components and raceway, the worst case result would be a loss of the temperature reading on the RHR Heat Exchanger Outlet Temperature and a loss of power to the certain RHR System Valves with the following result:

> TE-E11-1N027A and B, the RHR Heat Exchanger Outlet Temperature Elements, provide an indication to the Control Room of the temperature of the water leaving the RHR Heat Exchanger. For safe shutdown in this area, RHR is used in the Suppression Pool Cooling mode of operation. Therefore, the temperature reading from these temperature elements would be an indication of the temperature of the water returning to the Suppression Pool. When using RHR in the Suppression Pool Cooling mode, these temperature elements are only a back-up to the Suppression Pool Temperature Monitoring System (SPOTMOS). For a fire in Fire Zone 1-3C-W, there is no impact to either of the redundant trains of SPOTMOS. Therefore, SPOTMOS will be available to provide information on

the Suppression Pool temperature to the plant Control Room operator and the reading from TE-E11-1N027A and B is not required to support safe shutdown.

1F007A, the Loop A RHR Pump Minimum Flow Valve, is initially required to be open and then close when the RHR Pump flow increases to an acceptable level. A loss of power would result in the failure of this valve to close. This failure, however, will not impact the ability to achieve and maintain safe shutdown. The flow capacity of one RHR Pump is approximately 12,000 gpm. The flow diversion through an open minimum flow valve is approximately 1,000 gpm. Any flow diversion through the 1F007A Valve would be returned to the Suppression Pool. The RHR flow through the RHR Heat Exchanger is to be limited to less than 10,000 gpm. Even with the postulated flow diversion, the RHR flow would need to be throttled back and, therefore, adequate flow through the heat exchanger would still be available.

1F015A, the RHR LPCI Injection Inboard Containment Isolation Valve, is normally closed and is required to be closed in support of safe shutdown. A loss of power to this valve would result in it remaining in the closed position.

The assessments provided above use the assumption from Calculation EC-013-0843 that at fire onset, all safe shutdown systems are assumed operable and available for post-fire shutdown. This assumption requires that all safe shutdown components are initially in their normal position. Therefore, there is no impact to safe shutdown as a result of fire damage to those components or raceway within Fire Zone 1-3C-W that are separated by less than 20 feet.

Fire Zone 2-3C-W:

As shown on Drawing C213432 Sheet 1, all unprotected redundant safe shutdown components and raceway are separated by at least 20 feet except for the RHR Heat Exchanger Outlet Temperature Elements, TE-E11-2N027A and TE-E11-2N027B, and raceway E2M125, which contains the instrument cable for TE-E11-2N027A, F2M077, which contains the instrument cable for TE-E11-2N027B, and E2P181, E2P182 and JB1957, which contain power cables affecting the power feeds to the RHR LPCI Injection Inboard Containment Isolation Valve, 2F015A, and the RHR Pump Min. Flow Valve, 2F007A. In the unlikely event that a fire were to impact all of these components and raceway, the worst case result would be a loss of the temperature reading on the RHR Heat Exchanger Outlet Temperature and a loss of power to the certain RHR System Valves with the following result:

TE-E11-2N027A and B, the RHR Heat Exchanger Outlet Temperature Elements, provide an indication to the Control Room of the temperature of the water leaving the RHR Heat Exchanger. For safe shutdown in this area, RHR is used in the Suppression Pool Cooling mode of operation. Therefore, the temperature reading from these temperature elements would be an indication of the temperature of the water returning to the Suppression Pool. When using RHR in the Suppression Pool Cooling mode, these temperature elements are only a back-up to the Suppression Pool Temperature Monitoring System (SPOTMOS). For a fire in Fire Zone 2-3C-W, there is no impact to Division II of SPOTMOS. Therefore, Division II of SPOTMOS will be available to provide information on the Suppression Pool temperature to the plant Control Room operator and the reading from TE-E11-2N027A and B is not required to support safe shutdown.

2F007A, the Loop A RHR Pump Minimum Flow Valve, is initially required to be open and then close when the RHR Pump flow increases to an acceptable level. A loss of power would result in the failure of this valve to close. This failure, however, will not impact the ability to achieve and maintain safe shutdown. The flow capacity of one RHR Pump is approximately 12,000 gpm. The flow diversion through an open minimum flow valve is approximately 1,000 gpm. Any flow diversion through the 2F007A Valve would be returned to the Suppression Pool. The RHR flow through the RHR Heat Exchanger is to be limited to less than 10,000 gpm. Even with the postulated flow diversion, the RHR flow would need to be throttled back and, therefore, adequate flow through the heat exchanger would still be available.

2F015A, the RHR LPCI Injection Inboard Containment Isolation Valve, is normally closed and is required to be closed in support of safe shutdown. A loss of power to this valve would result in it remaining in the closed position.

The assessments provided above use the assumption from Calculation EC-013-0843 that at fire onset, all safe shutdown systems are assumed operable and available for post-fire shutdown. This assumption requires that all safe shutdown components are initially in their normal position. Therefore, there is no impact to safe shutdown as a result of fire damage to those components or raceway within Fire Zone 2-3C-W that are separated by less than 20 feet.

<u>In-situ and Intervening Combustibles:</u>

The only in-situ combustibles in these fire zones are cables in enclosed cable trays and, in Fire Zone 2-3C-W only, abandoned-in-place Thermo-Lag 330-1 raceway wrap. Due to the low level of in-situ combustibles in Fire Zone 2-3C-W, other than the abandoned Thermo-Lag 330-1 material, insufficient combustibles exist to involve the abandoned Thermo-Lag 330-1 material and, therefore, this abandoned Thermo-Lag does not represent a fire hazard of concern. Fire Zones 1-3C-W and 2-3C-W are radiation areas and are located in rooms with limited accessibility due to the physical layout and radiological conditions. Due to the limited accessibility of the rooms, the potential for the introduction of transient combustibles is remote. Additionally, both fire zones are provided with a fire detection system.

The redundant RHR Heat Exchanger Outlet Temperature Elements are separated by a distance of 13 feet with no intervening combustibles. All other redundant safe shutdown components are separated by greater distances with most being separated by more than 20 feet. Due to the presence of fire detection, the low amount of in-situ combustibles, and the limited potential for the introduction of transient combustibles into this area, this separation distance is considered to be sufficient to preclude damage to redundant safe shutdown components and raceway.

Administrative Controls:

The floor area between the redundant safe shutdown raceway is identified to indicate that it is a restricted area for storage of transient combustible materials. No transient combustible materials will be stored in this area without the review and acceptance of the Site Fire Protection Engineer.

Fire Protection Features:

Both Fire Zones 1-3C-W and 2-3C-W are provided with fire detection.

SUMMARY AND CONCLUSION:

The configuration of the redundant safe shutdown components and raceway, the low quantity of combustibles, the limited access to this plant area and the administrative controls on transient combustible storage along with the presence of fire detection ensure that a fire will not damage the redundant safe shutdown components and raceway in these fire zones.

Therefore, the separation distance of 13 feet between the redundant temperature elements in these fire zones is adequate to ensure that a fire will not adversely affect the ability to achieve and maintain safe shutdown without any additional fire protection features in the form of qualified raceway fire barriers or automatic fire suppression systems.

Security-Related Information
Figure Withheld Under 10 CFR 2.390

Security-Related Information
Figure Withheld Under 10 CFR 2.390

DEVIATION REQUEST NO. 30 HAS BEEN WITHDRAWN

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APPENDIX R DEVIATION REQUEST NO. 32

OUTSIDE AREAS

LACK OF SEPARATION OF SAFE SHUTDOWN COMPONENTS AND ELECTRICAL CABLES

DEVIATION REQUEST:

The existing installation (location) of certain safe shutdown electrical cables in underground manholes and duct banks and components located in outside areas is considered acceptable.

FIRE AREAS/ZONES AFFECTED:

This deviation request applies to Fire Area A-1 (Fire Zone 0-00).

REASON FOR DEVIATION REQUEST:

10CFR50, Appendix R, Section III.G.2.b requires that the redundant trains of cables and equipment required for safe shutdown be separated by a minimum distance of 20 feet with no intervening combustibles or fire hazards. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area. The fire hazards analysis for the outside areas has identified redundant safe shutdown electrical cables located in underground electrical manholes and safe shutdown components which are not separated by 20 feet and do not have fire detection or automatic suppression.

EXISTING CONDITIONS:

Electrical Manholes

Class IE electrical manholes 16,17,18,19,22,23,27,28,31 and 32 and their connecting duct banks contain safe shutdown cables. These manholes were located and plotted on Drawing C-213439. Electrical manholes 16,17,18 and 19 are located east of the underground diesel generator fuel oil tanks at a distance greater than 25 feet. Electrical manholes 22 and 23 are located along the east to west access road adjacent to the Service and Administration Building at a distance of 25 feet or more from either the building or road. Electric manholes 27 and 28 are located northeast of the Unit 2 Cooling Tower and southwest of the plant access road to the Emergency Safeguard Service Water pumphouse at a distance in excess of 25 feet. The tops of manholes 27 and 28 extend above a mound of earth that is at least 6 feet above the road. Electrical manholes 31 and 32 are located adjacent to the south wall of the ESSW Pumphouse.

Emergency Diesel Generator Fuel Oil Storage Tank Transfer Pumps

The four diesel generator fuel oil storage tank transfer pumps (OP514A, OP514B, OP514C and OP514D) which are required for SSD are submerged inside the diesel fuel oil tanks.

RHR Service Water Spray Pond Valves

Six RHR Service Water Spray Pond Valves are located in the spray pond valve vault. The Division I valves (HV-01222A, HV-01222A1, and HV-01222A2) are located in the north compartment of the valve vault structure and the Division II valves (HV-01222B, HV-01222B1 and HV-01222B2) are located in the south compartment of the structure.

JUSTIFICATION:

A Fire Hazards Analysis was conducted for the electrical manholes and the safe shutdown components located in the Outside Areas and it was concluded that no plausible fire hazards exist which affect safe shutdown.

The electrical manholes are seismically designed and constructed to be watertight concrete boxes which would resist the in-leakage of any combustible oils that might be present. In all cases, the manholes extended twelve (12) inches above grade and are seismically designed and constructed with walls, tops and bottoms of reinforced concrete with a minimum thickness of six (6) inches. The conduit ductbank penetrations are installed prior to pour and are an integral part of the manholes.

The affected manholes are separated by a distance of 100 ft. from any in situ combustibles (ESS transformers) and greater than 25 ft. from the underground diesel generator fuel oil tanks. The transient combustibles such as transferring fuel oil from tanker trucks to the diesel generator fuel storage tanks and the delivery of the lube oil truck to the Turbine Building were analyzed in the Fire Hazards Analysis. In each case, a fire hazard which could jeopardize safe shutdown was found not to exist.

Therefore, it is our position that the location and configuration of the subject electrical manholes and their associated safe shutdown cables provide an equivalent degree of safety as specified in 10CFR50, Appendix R, Section III.G.2.

The fuel oil transfer pumps are submerged inside the fuel oil tanks. The electrical cables are totally enclosed in rigid steel conduit and located in a vault above the diesel generator tanks. The vault is seismically designed and constructed and has a missile protective cover. The operating considerations, protective cover construction and lack of an ignition source provide acceptable fire protection, equivalent to the technical requirements of Appendix R, Section III.G.2.

The six RHR service water spray pond valves are located in a valve pit. Division I valves are separated from the Division 2 valves by a 18 inch thick concrete wall. There is one, three-hour rated penetration between compartments. The valve pit construction, the routing of all safe shutdown cables in conduit and the lack of in-situ combustibles in the vicinity of the valve pits provides acceptable fire protection and provides protection equivalent to the technical requirements of Appendix R, Section III.G.2.

Security-Related Information
Figure Withheld Under 10 CFR 2.390

APPENDIX R DEVIATION REQUEST NO. 33

REACTOR COOLANT MAKEUP AND DEPRESSURIZATION SYSTEMS

DEVIATION REQUEST:

A deviation from the guidance of Appendix R to 10CFR50 is required since reactor coolant process variables may vary from those predicted for a loss of normal ac power when accomplishing safe shutdown at Susquehanna Steam Electric Station. Core Spray/ADS is used to achieve safe shutdown in the event of fires outside of the Control Room. RHR in the alternate shutdown cooling mode accompanied by the SRVs for depressurization is used in the event of a fire in the Control Room that damages certain Motor Operated Valves (MOVs) on the Remote Shutdown Panel. Appendix R Section III.L.1 that is applicable to Alternative Safe Shutdown contains the requirement related to process variables. This guidance is also contained in NRC Generic Letter 84-09 Attachment 1 Section V for Redundant Safe Shutdown and Section VIII for Alternative Safe Shutdown.

FIRE AREAS/ZONES AFFECTED:

This deviation request applies to all plant fire areas.

REASON FOR DEVIATION REQUEST:

Alternative Safe Shutdown is governed by the requirements of Appendix R Section III.G.3 and III.L. Appendix R Section III.L.1 states that the reactor coolant process variables shall be maintained within those predicted for a loss of normal ac power. This deviation addresses the fact that when using ADS SRVs and RHR for Alternative post-fire safe shutdown, the reactor coolant process variables may vary from those predicted for a loss of normal ac power.

For Redundant Safe Shutdown governed by the requirements of Appendix R Sections III.G.1 and 2, there are no specific requirements relative to safe shutdown methodology. The Guidance in NRC Generic Letter 84-09, however, does contain words similar to the words contained in Appendix R Section III.L.1. Therefore, this deviation addresses a variance from the guidance contained in NRC Generic Letter 84-09 relative to the use of ADS SRVs and Core Spray.

The meaning of the requirement that process variables be no worse than for a loss of normal ac power is not clearly defined within the body of the regulations. This deviation requests demonstrates that even with a conservative interpretation of the requirement, the safe shutdown methodology used at the Susquehanna Steam Electric Station is acceptable because it satisfies the performance goals established by the regulations.

The reason that these systems were chosen is that they are clearly separated on an Electrical Divisional basis. A clear separation of paths ensures that long-term compliance can be maintained with a minimum of complexity. Still another reason that they were chosen is that the systems are composed of "Quality Related" or "Q" components. Since these components are closely tracked from design specification, through purchase and actual installation, long-term compliance is again ensured.

EXISTING CONDITIONS:

The reactor depressurization function utilizing ADS with low pressure makeup systems is discussed in FSAR Section 15.2.9. The reactor heat removal process utilizing alternate shutdown cooling with suppression pool cooling is discussed in FSAR Section 15.2.9 and Table 15.E.2.9-1. More specifically to PPL's Appendix R analysis, reactor coolant makeup is provided by different divisions of core spray while the reactor depressurization function is provided by the ADS valves. Also, the reactor heat removal process utilizes alternate shutdown cooling with suppression pool cooling. Alternate shutdown cooling utilizes the core spray and ADS systems. To enter alternate shutdown cooling, the reactor head vents, the MSIVs, and main steam line drain lines must all be closed. Six safety relief valves are opened and one core spray pump taking a suction from the suppression pool slowly increases reactor water level. The suppression pool cooling mode of RHR is initiated, and the reactor water level is slowly raised to about 131" to flood the main steam lines and establish a flow path through the open SRVs and back to the suppression pool.

Discussion of LOOP and ADS/Core Spray

LOOP

The loss of offsite power (LOOP) results in a sequence of events similar to that resulting from a loss of feedwater flow. The most severe case occurs during power operation.

The reactor protection system and control rod drive system produce a scram after receiving either a main turbine trip signal or loss of reactor protection system power source signal. The turbine trip will initiate a recirculation pump trip. The Main Steam Isolation Valves (MSIVs) close and there is no flow diversion from the reactor vessel. After the MSIVs close, decay heat slowly raises system pressure to the lowest relief valve setting. Core cooling is necessary to restore and maintain water level. HPCI and RCIC initiate at level 2.

ADS/Core Spray

In the PPL Appendix R analysis, water level is maintained using the Core Spray System since RCIC and HPCI are assumed damaged by fire or unavailable. The Core Spray System is designed to provide cooling to the reactor core only when the reactor pressure is low. However, when Core Spray is used in conjunction with ADS, the RPV can be rapidly depressurized by ADS into the pressure range where the Core Spray System can be used for core cooling and RPV water level control.

ADS has six manually and automatically controlled safety relief valves that are installed on the main steam lines inside the primary containment. These six valves perform both the ADS and SRV function. The depressurization by manual or automatic action of the control system is intended to reduce reactor pressure during specific postulated size pipe breaks in which the HPCI system is not available so that the Core Spray System or RHR LPCI System can inject water into the reactor vessel. In the Appendix R analysis, no pipe break exists.

JUSTIFICATION:

Deviation from LOOP Parameters

Manual Actions

For the PPL Appendix R analysis, shutdown is achieved utilizing standard, emergency operating procedures where degraded modes can result from any cause including a postulated Appendix R fire.

Although the reactor coolant process variables are not maintained strictly within those predicted for a loss of offsite power (level may go lower than Level 2 and the depressurization rate may be faster), the fission product boundary integrity will not be affected, i.e., there will be no fuel clad damage, rupture of any primary coolant boundary, or rupture of the containment boundary.

The performance goal of the shutdown function will be met, i.e., the reactor coolant makeup function will be capable of rapidly restoring the reactor coolant level and maintaining the reactor coolant level above the top of the core. The other performance goals for the reactivity control function, the reactor heat removal function, the process monitoring function, and the supporting functions are unaffected.

The acceptability of this shutdown methodology for Appendix R post-fire safe shutdown has been addressed by the Boiling Water Reactor Owner's Group (BWROG) in GE Nuclear Energy Report No. GE-NE-T43-00002-00-03-R01, BWROG Position on the Use of Safety Relief Valves (SRVs) and Low Pressure Systems as Redundant Safe Shutdown Paths. This report was submitted to the NRC for their acceptance in August of 1999. The conclusion of this report is that the use of SRVs and Low Pressure Systems is an acceptable post-fire safe shutdown path meeting the requirements of Appendix R Sections III.G.1, III.G.2 and III.G.3, including III.L.

The BWROG made two additional submittals relative to this issue to address NRC comments on the initial report. These submittals were included in BWROG Letter Nos. BWROG-00073, dated July 20, 2000, and BWROG-00082, dated September 28, 2000.

In a Safety Evaluation Report (SER) dated December 12, 2000, the NRC accepted the position of the BWROG on the use of SRVs and Low Pressure Systems (LPS) for post-fire safe shutdown. This SER concluded the following:

(1) The use of SRV/LPS meets the requirements of a redundant means of post-fire safe shutdown under Section III.G.2 of 10 CFR 50 Appendix R.

(2) The use of SRV/LPS is also an appropriate means of satisfying Section III.G.3 of Appendix R.

Since the generic evaluations related to this topic in the GE Report are based on the Susquehanna Steam Electric Station plant design and operation, the conclusions of the NRC in their SER are directly applicable to Susquehanna and constitute an acceptance of this shutdown methodology for Susquehanna.

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DEVIATION REQUEST NO. 36 HAS BEEN WITHDRAWN

APPENDIX R DEVIATION REQUEST NO. 37

CONTROL ROOM RAISED FLOOR AND CONTROL STRUCTURE CABLE CHASE FIRE PROTECTION

DEVIATION REQUEST:

Fire protection features for cable routed under the main control room raised floor, in the cable shafts and in the cable chases within the Control Structure are adequate and provide an equivalent degree of safety as that required by Appendix R, Section III.G.2.

FIRE AREAS/ZONES AFFECTED:

The deviation request applies to Fire Areas CS-6 (Fire Zones 0-24J, 0-25B, 0-26B, 0-26S, 0-27F and 0-28P), CS-7 (Fire Zones 0-24L, 0-24M, 0-25C, 0-25D, 0-26C, 0-26D, 0-26T, 0-26V, 0-27G, 0-27H, 0-28Q and 0-28R) and CS-9 (Fire Zones 0-26F, 0-26G, 0-26H, 0-26I, 0-26J, 0-26M and 0-26R) in the Control Structure. Fire Area CS-6 covers the south cable chase and CS-7 includes the north and center cable chases. For this Deviation Request, Fire Area CS-9 is limited to the area under the main control room, vestibules, Operational Support Center and Security Office raised floor and the cable shafts under the control room soffits.

REASON FOR DEVIATION REQUEST:

10CFR50, Appendix R, Section III.G.2a, b and c requires spatial separation or fire barrier-type protection features to separate redundant divisions of systems required for hot shutdown when they are located within the same fire area. Additionally, the specific requirements also include the absence of intervening combustibles and the installation of fire detectors and an automatic fire suppression system in the fire area.

Cable routed in raceways under the raised floor of the main control room and adjacent areas include redundant safety-related control and instrumentation circuits. The underfloor fire area is protected with ionization detectors and a fixed manual spurt fire suppression system. There are no discrete fire barriers between redundant trains and automatic CO_2 fire suppression is not provided in this fire area because of safety concerns for control room personnel.

The cable chases adjacent to the control room in the Control Structure are used for the vertical runs of cable trays, conduits and wireways which route safety-related and non-safety circuits between the control room and the relay rooms and cable spreading areas. Vertical shafts under soffits within the control room area are similarly used to install raceways for conveying cable between the control room and the upper and lower relay rooms. The cable chases are protected with ionization detectors and total flooding CO_2 automatic fire suppression systems. The control room cable shafts are provided with ionization detectors and a manual spurt CO_2 fire suppression system. The cable trays and wireways in the cable chases and shafts are not provided with fire barriers to separate redundant divisions within the fire zones.

EXISTING CONDITIONS:

The space below the control room raised floor (Fire Zones 0-26F, 0-26G, 0-26H, 0-26I and 0-26J) and above the 13½" reinforced concrete floor on Elev. 728'-1" furnishes a convenient means to install raceways for routing cables to various panels, cabinets and equipment in the control room. There are a limited number of cables which pass through but do not terminate in the control room panels. The space is covered by the control room sectional and flame-retardant carpet access flooring which is supported on a steel framework independent of the underfloor raceway supports. The raceways consist of cable trays, wireways and conduit containing control instrumentation and small power cables for redundant safety-related and non-safety cables which enter the bottom of the control room panels. The space under the raised floor covers approximately 6,516 square feet, is 12-inches high and is protected by ionization detection and a manual spurt CO_2 fire suppression system activated by pushbutton stations inside and outside the control room. This area is bounded on all sides by fire-rated construction. Due to the confined space and fire protection features in this area, fire barriers are not provided between redundant safety-related cables. Automatic CO_2 fire suppression is not provided in this fire area due to the continual presence of control room personnel.

The three electrical cable chases in the west wall of the control room each have approximately 7 feet by 6 feet of open vertical space extending from Elevation 698'-0" to Elevation 783'-0" in the Control Structure. (See drawings E-205988 through E-205993 in Section 8). Each chase is enclosed by fire-rated construction on all sides. The chases contain cable trays, wireways and conduit used for routing redundant safety-related and non-safety circuits from the cable spreading areas to the control room, relay rooms and other areas in the Control Structure. An automatic total flooding CO_2 fire suppression system in conjunction with heat detectors protects the entire length of the cable chase except at the control room floor Elevation 729'-1" (Fire Zones 0-26B, 0-26C & 0-26D) where a manual spurt CO_2 system with ionization-type combustion detectors is installed. The chases are also provided with barriers and seals at every floor elevation which limit air supply and fire spread and control the concentration of carbon dioxide if the fire protection system is activated.

In addition to the cable chases in the west wall, the control room has two cable shafts under the north and south soffits (Fire Zones 0-26M & 0-26R). The cable shafts are basically 1-foot wide open spaces along the north and south walls of the control room and are used for vertical runs of trays and wireways for safety-related and non-safety circuits from the control room to the relay rooms. The cable shafts are enclosed by 3-hour fire-rated concrete walls at the north and south sides of the control room and by 2-hour gypsum board/metal stud walls on the inside. Each cable shaft and soffit is protected by four ionization-type combustion detectors and manual spurt CO_2 fire suppression system.

JUSTIFICATION:

Appendix R, Section III.G.2 requires that fire protection features be provided to ensure that one division of redundant components important to safe shutdown is free of fire damage. When the redundant divisions of safe shutdown systems are located within a common fire area, one of the following features shall be provided:

1. 3-hour fire barrier.
2. More than 20-feet spatial separation with no intervening combustibles, plus installation of fire detectors and an automatic fire suppression system.
3. Cable and equipment enclosure with a 1-hour fire rating, plus installation of fire detectors and an automatic fire suppression system.

The areas under the control room raised floor are highly confined spaces. The spaces are not normally accessible since the control room sectional flooring must be removed to expose the raceway areas. Although redundant safety-related circuits exist in this area, the horizontally configured raceways consisting of Division I cable trays and wireways and a few Division II conduits are installed in conformity with minimum electrical separation requirements. There are no open raceways containing Division II circuits under the raised floor. Division II conduits vertically enter the bottom of the control room panels from the lower cable spreading area below, which is a different fire area isolated by a 3-hour fire-rated concrete floor and sealed floor penetrations. The only potential hazards in this fire area are those due to internal faults in the cable and this is mitigated by the fact that the circuits handle only control, instrument and small power functions. Cables use non-flame propagating insulation with fire-retardant jackets and are qualified in accordance with IEEE 383. The use of a manual spurt CO_2 fire suppression system in conjunction with ionization detection adequately protects the fire area since immediate operator action from the control room directly above is anticipated in the event of a fire.

The cable chases and cable shafts in Fire Area CS-6, CS-7 and CS-9 are limited access areas used mainly for the installation of electrical raceways. The steel doors provided at certain elevations of the south, center and north cable chases are alarmed to monitor unauthorized entry. Where raceways for redundant safety-related divisions are installed in a chase, the minimum electrical separation is observed. The use of combustion detectors and a total flooding CO_2 automatic fire suppression system in most of the cable chase fire zones meets Appendix R, Section III.G.2 requirements. The cable chases and cable shafts at the control room elevation are adequately protected by combustion detectors and a manual spurt CO_2 fire suppression system because of proximity to the control room where operators can quickly respond to any contingency. The only combustibles located in these fire areas consist of control and instrument cables in open trays, which are subject to fire hazards caused by internal faults only. The low probability of inducing fire by self-ignition is further minimized by the use of non-flame propagating cable insulation which conforms to the requirements of IEEE 383.

The fire protection features provided under the control room raised floor and the cable chases and cable shafts as described above are adequate for the existing cable installation and provide an equivalent degree of safety as required by Appendix R. The addition of raceway wrapping and fully automatic fire suppression systems in Fire Areas CS-6, CS-7 and CS-9 to meet the requirements of 10CFR50 Appendix R, Section III.G.2 would not significantly increase the level of fire protection in these fire areas.

APPENDIX R DEVIATION REQUEST NO. 38

PROTECTION OF REDUNDANT SAFE SHUTDOWN RACEWAYS IN THE UNIT 2 MAIN STEAM PIPEWAY

DEVIATION REQUEST:

It is acceptable to protect redundant safe shutdown cables in raceways E2KJ78, E2KJ79, E2KJ80, E2KJ81, F2K024, F2K409, F2K411, F2K412, F2K413, F2K414, JB3018 and JB1464 in Fire Zone 2-4G by installing them in conduits, junction boxes or metal enclosed trays.

FIRE AREAS/ZONES AFFECTED:

This deviation request applies to Fire Zone 2-4G which is in Fire Area R-2A in the Unit 2 Reactor Building.

REASON FOR DEVIATION REQUEST:

10CFR50 Appendix R, Section III.G.2 requires that redundant safe shutdown cables be protected by a fire barrier having a 3-hour rating in areas where there is no automatic fire suppression system and no fire detection.

EXISTING CONDITONS:

Fire Zone 2-4G is the Main Steam Pipeway. It is a high radiation area and is inaccessible during normal plant operation. It does not contain automatic fire suppression; however, it does contain fire detection. All cables are routed in conduits or metal enclosed trays. The combustible loading of the fire zone, not including cables, is less than 5 minutes. This combustible loading is comprised of lube oil contained within various valves in the piping systems in the pipeway. The largest single quantity of oil (8.5 gallons) is used in each of the Feedwater Stop Check Valves HV-241-F032A&B.

Actual in-situ combustible loading durations are provided to document existing arrangement and justify the deviation request. These values are based on the initial combustible loading analysis. Modifications subsequent to this analysis have revised these values with the possibility of future modifications revising them again. The governing criteria for the combustible loading analysis is that the fire resistance rating of the fire area boundaries exceed the combustible loading duration. The combustible loading durations specified in the deviation request will not be updated in the future since program commitments require that all modifications be evaluated to assure that additional combustibles are controlled to remain below the fire area fire resistance rating.

Additionally, although Fire Zone 2-4G is contained in Fire Area R-2B, it is bounded on two sides and the floor by 3 hour fire rated construction. One wall is enclosed by primary containment; fire will neither originate in nor mitigate to the containment due to the inerted nitrogen atmosphere during power operation. The fourth wall to the west is of concrete construction and steel. The concrete construction is considered three hour rated. There are two steel portions in this wall located at 717'-3" and 799'-1". The lower steel panel is the location of Main Steam Lines penetrations into the Turbine Building. The upper steel panel is the blowout panel in the event of a High Energy Line Break (HELB) in the MSL Tunnel. Both of these locations have been evaluated and would not adversely effect the ability to safely shutdown the plant in the event of a fire in Fire Zone 2-4G or either adjacent fire zone.

The fire zone contains safe shutdown cables for Division I and II equipment which are routed in separate raceways within the pipeway. These cables include circuits for the four Division II outboard main steam isolation valves (MSIVs) HV-B21-2F028A, B, C & D and for three of the four Division I inboard MSIVs HV-B21-2F022A, B, & C. All MSIV cables are installed in conduit or metal enclosed cable trays. The outboard MSIVs and their valve operators are physically located in the fire zone; the electrical components are located approximately 10 feet above the enclosed tray containing cables for the redundant inboard MSIVs.

A fire hazards analysis has shown that other safe shutdown systems with Division I and II cables in this fire zone would be able to perform their safety functions and would not prevent safe shutdown in the event of a fire in the pipeway.

JUSTIFICATION:

Electrical raceways E2KJ78, E2KJ79, E2KJ80 and E2KJ81 containing Division I cables for MSIVs HV-B21-F022A, B & C are totally enclosed metal covered trays. Raceways F2K024, JB1464, F2K409, JB3018, F2K411, F2K412, F2K413 and F2K214 containing Division II cables for MSIVs HV-B21-F028A, B, C & D are rigid steel conduits and junction boxes. These raceways are located in a normally inaccessible high radiation area containing very small quantities of combustible materials. Raceways E2KJ78, E2KJ79, E2KJ80 and E2KJ81 are single cable trays located approximately 18" below another cable tray which is also totally enclosed. The orientation of these raceways and the location of the outboard MSIVs are shown on attached Drawings C-213952, Shts. 1 and 2.

The location of the combustible materials in Fire Zone 2-4G are also shown on the attached drawings. In the unlikely event of the ignition of any of the combustibles, the resultant heat release would not impact any of the subject raceways. The ceiling of Fire Zone 2-4G is at Elevation 760'-7 ½", approximately 20 to 25 feet above the raceways. Any heat generated by a fire would rise to the ceiling level. Furthermore, as shown on

Drawing E-213485, Sht. 1 in Section 8.0 of this report, the steam pipeway actually continues further up from Elevation 760'-7 ½" to allow air pressure to escape through blowout panels in the event of a pipe rupture in the steam pipeway.

The MSIVs must isolate for safe shutdown. Failure analysis for the cables of concern indicates that fire-induced hot shorts would have to occur on both the Division I (inboard MSIVs) and Division II (outboard MSIVs) cables to maintain the AC or DC solenoids energized and hold open both redundant MSIVs on a main steam line. Similarly, once the MSIVs have closed, multiple hot shorts on each MSIV's solenoids are required to reopen the valves. The limited quantity of combustible materials in the fire zone and the use of separate metal-enclosed raceways for cable routing- would render these occurrences highly unlikely.

The introduction of transient combustibles into this fire zone is highly unlikely since the fire zone is a high radiation area with its entrance door locked and access prohibited during normal plant operation. During periods of low power operation or plant shutdown, access is restricted and controlled due to radiological concerns.

Fire Zone 2-4G has fire detection which alarms in the main control room. Although there is no automatic fire suppression system in this fire zone, manual hose reels and portable fire extinguishers are located in the immediate vicinity.

Fire Zone 2-4G is bounded by concrete walls and floor and the primary containment wall within the fire area. There are two steel barriers that supplement the boundary of this fire zone. One steel constructed barrier is located at elevation 717'-3" at column line M. This steel barrier contains the four (4) penetrations for the Main Steam Lines. Additionally, this barrier acts as a blowout panel in the event of a HELB. The combustible loading of adjacent fire zone 2-35C is negligible and does not pose a threat to Fire Zone 2-4G. The second steel constructed barrier is located at elevation 799'-1" which solely acts as a blowout panel to the roof of the turbine building in the event of a HELB. The combustible loading for adjacent Fire Zone 0-00, Outside Areas, has been evaluated and does not present a threat to Fire Zone 2-4G.

Therefore, based on the negligible quantity of combustible materials in Fire Zone 2-4G, the location of these combustibles with respect to the raceway in question, the use of totally-enclosed metallic raceways, the unlikely addition of transient combustibles to the pipeway and the enclosure of the fire zone with barriers which have been analyzed to ensure protecton from a fire, including the containment wall, raceways E2KJ78, E2KJ79, E2KJ80 and E2KJ81, F2K024, F2K409, F2K411, F2K412, F2K413, F2K414, JB3018 and JB1464 do not require the protection of a 3-hour fire rated barrier material between redundant divisions.

Security-Related Information
Figure Withheld Under 10 CFR 2.390

Security-Related Information
Figure Withheld Under 10 CFR 2.390

DEVIATION REQUEST NO. 39 HAS BEEN WITHDRAWN

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DEVIATION REQUEST NO. 41 HAS BEEN WITHDRAWN

APPENDIX R DEVIATION REQUEST NO. 42

PROTECTION OF SAFE SHUTDOWN RACEWAY IN FIRE ZONES 1-3B-W AND 2-3B-W

DEVIATION REQUEST:

Based on the fire protection features, administrative controls, combustible levels and physical separation distances between redundant safe shutdown functions described in this deviation request, the redundant trains of raceway depicted on drawing C240924 sheet 1 for Fire Zone 1-3B-W (Unit 1 Reactor Building Elevation 683'-0) and on drawing C240924 sheet 2 for Fire Zone 2-3B-W (Unit 2 Reactor Building Elevation 683'-0) do not require protection with a raceway fire barrier even though all aspects of Appendix R Section III.G.2.b are not satisfied.

Exceptions include raceways E1F132, E1F137, C1F033, C1F034, C1F055 and JB0008 in Fire Zone 1-3B-W and C1F040, C1F045, C2F030 and JB0013 in Fire Zone 2-3B-W. These raceways are protected with a qualified 1-hour fire barrier.

FIRE AREAS/ZONES AFFECTED:

This deviation request applies to Fire Areas R-1A and R-1B (Fire Zone 1-3B-W) and R-2A and R-2B (Fire Zone 2-3B-W). These are Wraparound Zones as defined in Deviation Request No. 4.

REASON FOR DEVIATION REQUEST:

10CFR50 Appendix R, Section III.G.2.b, requires separation of cables and equipment and associated non-safety circuits of redundant trains by a horizontal distance of more than 20 feet with no intervening combustible or fire hazards. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area.

Fire Zones 1-3B-W has a minimum separation distance of 17 feet between unprotected raceway containing circuits for the redundant safe shutdown trains. In Fire Zone 1-3B-W there is also a group of raceway protected with Thermo-Lag 330-1 fire barrier material along the east wall. Thermo-Lag 330-1 has been determined to be a combustible material and, as such, must be considered as an intervening combustible. Finally, there are fire detectors and an automatic suppression system throughout this fire zone.

Fire Zones 2-3B-W has a minimum separation distance of 22 feet between unprotected raceway containing circuits for the redundant safe shutdown paths. In Fire Zone 2-3B-W there is a single repeater cable for the Radiax system (i.e., portable radio system) along the west wall and a group of raceway protected with Thermo-Lag 330-1 fire barrier material along the east wall. Thermo-Lag 330-1 has been determined to be a combustible material and, as such, must be considered as an intervening combustible along with the single repeater cable. Finally, there are fire detectors and an automatic suppression system throughout this fire zone.

The automatic suppression system and fire detection in each of these fire zones extends throughout each wraparound zone and into the adjacent fire zones on either side of the wraparound zone, but the automatic sprinkler system and fire detection do not extend completely throughout the adjacent fire areas of which these fire zones are a part.

This deviation justifies that, even though these aspects of Appendix R Section III.G.2.b are not fully satisfied, there are additional compensating factors which demonstrate that the existing configuration provides an equivalent level of assurance to that provided by Appendix R Section III.G.2.b such that safe shutdown can be achieved and maintained.

EXISTING ARRANGEMENT:

Drawing C240924 Sheet 1 shows the layout, equipment and combustible configuration of Fire Zone 1-3B-W and drawing C240924 Sheet 2 shows the layout, equipment and combustible configuration (except for the single repeater cable) of Fire Zone 2-3B-W.

In-situ combustibles in these fire zones are limited to the cables in cable trays, Thermo-Lag 330-1 on conduits and junction boxes required to be protected, and any abandoned in place Thermo-Lag on cable trays, junction boxes and conduits not required to be protected. Of these in-situ combustibles, the only intervening combustibles are the Thermo-Lag 330-1 raceway fire barriers along the east wall in each fire zone and the single repeater cable for the Radiax system in Fire Zone 2-3B-W. Cable trays are separated by a minimum of 17 feet in Fire Zone 1-3B-W and 22 feet in Fire Zone 2-3B-W.

Both fire zones are provided with fire detection and automatic sprinkler protection.

The cable trays and conduits containing redundant safe shutdown circuits are approximately 28 feet above the floor in both fire zones. The embedded junction boxes along the east wall containing redundant safe shutdown circuits are separated from each other by a minimum distance of approximately 43 feet.

POTENTIAL SAFE SHUTDOWN IMPACTS:

In the attached tables, the safe shutdown raceway in these Fire Zones 1-3B-W and 2-3B-W are tabulated. For each raceway, the safe shutdown components that could be affected should a fire damage the circuits contained in the raceway are also provided. In addition, an assessment of the worst case impact for each component is also provided. The cable faults are evaluated for the effects of hot shorts, open circuits and shorts to ground along with the effects of associated circuits, including spurious operations, breaker coordination and multiple high impedance faults. The information compiled in these tables is later used in conjunction with the raceway layout information on the attached drawings in the justification section of this deviation request under the heading of "Physical Separation of Redundant Safe Shutdown Functions".

Circuits which are contained in non-fire protected raceways in Fire Zone 1-3B-W and which provide control or power to components required in support of safe shutdown in this fire zone are identified in Table 1.0 below.

Table 1.0 Control and Power Circuits for Safe Shutdown Components in non-fire protected raceway in Fire Zone 1-3B-W

Raceway No.	SSD Div.	Affected Component	Impact Assessment
Control Circuits for RHR Valves			
E1KH21-25	Div. I	RHR 1F009 Valve	Loss of Valve Control
		RHR 1F015A Valve	Loss of Valve Control
		RHR 1F017A Valve	Loss of Valve Control
E1K2L4	Div. I	RHR 1F009 Valve	Loss of Valve Control[1]
F1KH47-50	Div.II	RHR 1F008 Valve	Loss of Valve Control
		RHR 1F015B Valve	Loss of Valve Control
		RHR 1F017B Valve	Loss of Valve Control
		RHR 1F048B Valve	Loss of Valve Control
Power to RHR Valves & Other Equipment			
E1PH21-23	Div. I	1B219 (RHR 15A & 7A)	Loss of Power to Valves
E1PJ63	Div. I	1B219 (RHR 15A & 7A)	Loss of Power to Valves
F1PH47-50	Div. II	RHR 1F008 Valve	Spurious Valve Opening
		RHR 1F017B Valve	Loss of Power to Valve
		RHR 1F048B Valve	Loss of Power to Valve
		1D274 (See Table 1.0a)	Loss of Power to Equipment
Power to Switchgear and Pumps			
JB0009	Div. I	1/2A201 4.16 kv Swgr.	Loss of Power to 4.16 kv
		CS Pump 1P206A	Loss of Power to Pump
		ESWS Pump 0P504A	Loss of Power to Pump
		RHR Pump 1P202A	Loss of Power to Pump
JB0007	Div.II	1/2A202 4.16 kv Swgr.	Loss of Power to 4.16 kv
		CS Pump 1P206B	Loss of Power to Pump
		ESWS Pump 0P504B	Loss of Power to Pump
JB0073	Div. II	RHR Pump 1B202B	Loss of Power to Pump

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(1) A hot short could cause the spurious opening of this valve, except that the cable is routed in a dedicated conduit with no other energized circuits.

The following table provides information related to the impacts to equipment powered from 1D274.

Table 1.0a - Components Powered from 1D274		
Comp. ID	**Comp. Description**	**Comments**
HV-15768	Supp. Pool Flow Div. Valve	normally closed/required closed
1P216	HPCI Vac. Tk. Cond. Pump	not used for SSD
HV-E41-1F066	HPCI Turb. Exh./Supp. Pool	not used for SSD in this area
1P213	HPCI Aux. Oil Pump	not used for SSD in this area
HV-B21-1F019	MSL Drain Iso.Valve	need to close this or 1F016
HV-G33-1F004	RWCU Iso. Valve	need to close this or 1F001
1P215	HPCI Bar. Cond. Vac. Pump	not used for SSD
HV-E11-1F023	RHR Head Spray	normally closed/not used for SSD
HV-E11-1F049	RHR Letdown to LRW/Cond.	normally closed/not used for SSD
HV-E11-1F008	RHR SDC Iso. Valve	normally closed/required closed
HV-E41-1F008	HPCI Test to CST	not used for SSD in this area
HV-E41-1F007	HPCI Pump Disch. Valve	not used for SSD in this area

Circuits which are contained in non-fire protected raceways in Fire Zone 2-3B-W and which provide control or power to components required in support of safe shutdown in this fire zone are identified in Table 2.0 below.

Table 2.0 Control and Power Circuits for Safe Shutdown Components in non-fire protected raceway in Fire Zone 2-3B-W

Raceway No.	SSD Div.	Affected Component	Impact Assessment
Control & Instrumentation Circuits			
E2KH26-28	Div. I	ESWS Pump 0P504C	Loss of Pump Control
		RWCU 2F001 Valve	Spurious Valve Opening
		RHR 2F009 Valve	Spurious Valve Opening
		RHR 2F017A Valve	Loss of Valve Control
E1K715	Div. I	RHRSW 24A1 Valve	Loss of Valve Control
		RHRSW 24A2 Valve	Loss of Valve Control
		RHRSW 22A Valve	Loss of Valve Control
E2M098	Div. I	Div. I SPOTMOS	Loss of function
F2KH29-32	Div. II	RHR 2F048B Valve	Loss of Valve Control
		Div. II ADS Logic	Loss of Div. II Control
Power to RHR Valves & Other Equipment			
F2PH29-32	Div. II	RHR 2F008 Valve	Spurious Valve Opening
		RHR 2F015B Valve	Loss of Power to Valve
		RHR 2F017B Valve	Loss of Power to Valve
		RHR 2F048B Valve	Loss of Power to Valve
		2B229 (RHR 15B & 7B)	Loss of Power to Valves
		2D274 (See Table 2.0a)	Loss of Power to Equipment
Power to Switchgear and Pumps			
JB0012	Div. I	1/2A201 4.16 kv Swgr.	Loss of Power to 4.16 kv
		CS Pump 2P206A	Loss of Power to Pump
		RHR Pump 2P202A	Loss of Power to Pump
		RHRSW Pump 2P506A	Loss of Power to Pump
JB0014	Div. II	1/2A202 4.16 kv Swgr.	Loss of Power to 4.16 kv
		CS Pump 2P206B	Loss of Power to Pump
		RHRSW Pump 2P506B	Loss of Power to Pump
JB0075	Div. II	RHR Pump 2P202B	Loss of Power to Pump

The following table provides information related to the impacts to equipment powered from 2D274:

Table 2.0a - Components Powered from 2D274

Comp. ID	Comp. Description	Comments
HV-25768	Supp. Pool Flow Div. Valve	normally closed/required closed
2P216	HPCI Vac. Tk. Cond. Pump	not used for SSD
HV-E41-2F066	HPCI Turb. Exh./Supp. Pool	not used for SSD in this area
2P213	HPCI Aux. Oil Pump	not used for SSD in this area
HV-B21-2F019	MSL Drain Iso.Valve	need to close this or 2F016
HV-G33-2F004	RWCU Iso. Valve	need to close this or 2F001
2P215	HPCI Bar. Cond. Vac. Pump	not used for SSD
HV-E11-2F023	RHR Head Spray	normally closed/not used for SSD
HV-E11-2F049	RHR Letdown to LRW/Cond.	normally closed/not used for SSD
HV-E11-2F008	RHR SDC Iso. Valve	normally closed/required closed
HV-E41-2F008	HPCI Test to CST	not used for SSD in this area
HV-E41-2F007	HPCI Pump Disch. Valve	not used for SSD in this area

JUSTIFICATION:

Fire Zones 1-3B-W and 2-3B-W are similar in physical layout including raceway layout and combustible loading. Where the differences are pronounced, the features of each fire zone are described separately. Otherwise, the description provided is the limiting condition which bounds both fire zones.

Fire Zones 1-3B-W and 2-3B-W are "wraparound zones" which, as described in Deviation Request No. 4, function to provide separation between Fire Areas R-1A and R-1B and Fire Areas R-2A and R-2B, respectively. Fire Areas R-1A and R-2A rely on Safe Shutdown Path No. 3. Fire Areas R-1B and R-2B rely on Safe Shutdown Path No. 1. In Deviation Request No. 4, it is stated that both safe shutdown paths are protected in the "wraparound area" unless a deviation is provided which specifically justifies the existing conditions. Due to the unique attributes of Fire Zones 1-3B-W and 2-3B-W, as described below, this deviation justifies a condition different than that described in Deviation Request No. 4.

Physical Separation of Redundant Safe Shutdown Functions:

Fire Zone 1-3B-W:

As shown on Drawing C240924 Sheet 1, all non-fire protected redundant safe shutdown circuits are separated by more than 20 feet except those contained in E1PH22, E1PJ63 and F1KH 49-50. In the unlikely event that a fire were to impact all of these raceway, the worst case result would be a loss of power to the following RHR System Valves with the following result:

> 1F007A, Loop A RHR Pump minimum flow valve, is initially required to be open and then to close when the RHR Pump flow increases to an acceptable level. A loss of power would result in the failure of this valve to close. This failure, however, will not impact the ability to achieve and maintain safe shutdown. The flow capacity of one RHR Pump is approximately 12,000 gpm. The flow diversion through an open minimum flow valve is approximately 1,000 gpm. Any flow diversion through the 1F007A Valve would be returned to the Suppression Pool. The RHR flow through the RHR Heat Exchanger is to be limited to less than 10,000 gpm. Even with the postulated flow diversion, the RHR flow would need to be throttled back and, therefore, adequate flow through the heat exchanger would still be available.
>
> 1F008, the RHR SDC Outboard Containment Isolation Valve, is normally closed and is required to be closed in support of safe shutdown. A loss of power to this valve would result in this valve remaining in the closed position.
>
> 1F015A and B, the RHR LPCI Injection Inboard Containment Isolation Valves, are normally closed and are required to be closed in support of safe shutdown. A loss of power to these valves would result in these valves remaining in the closed position.
>
> 1F017B, Loop B RHR LPCI Injection Outboard Containment Isolation Valve, is not required to be operated in support of safe shutdown in this area. Loss of valve control due to loss of power, therefore, is of no concern.
>
> 1F048B, Loop B RHR Heat Exchanger bypass valve, is normally open, but is required to be closed in support of safe shutdown. Failure of this valve to close would cause a flow diversion around the RHR Heat Exchanger. This could impact the efficiency and, therefore, the availability of the RHR System the Suppression Pool Cooling mode of operation.

The assessments provided above use the assumption from Calculation EC-013-0843 that at fire onset, all safe shutdown systems are assumed operable and available for post-fire shutdown. This assumption requires that all safe shutdown components are initially in their normal position.

The net result of the impacts described above would be a potential loss of RHR Loop B Suppression Pool Cooling. Loop A of RHR, however, would still be available to operate in the Suppression Pool Cooling mode. The only potential impact to Loop A of RHR is to the 1F007A Valve. The failure of the 1F007A Valve to close would have no impact on the ability of RHR to operate efficiently in the Suppression Pool Cooling mode.

All other raceway and redundant safe shutdown functions are separated by greater than 20 feet with insignificant intervening combustibles and, as such, there will be no other impacts to safe shutdown functions.

Fire Zone 2-3B-W:

As shown on Drawing C240924 Sheet 2 all non-fire protected redundant safe shutdown circuits are separated by more than 20 feet with insignificant intervening combustibles. Therefore, there will be no impacts to safe shutdown functions.

In-situ and Intervening Combustibles:

The only in-situ combustibles in these fire zones consist of cables in enclosed raceway (e.g., conduits, cable trays and junction boxes), Thermo-Lag 330-1 installed on raceway required to be protected, abandoned in place Thermo-Lag 330-1 on raceway not required to be protected, and a single repeater cable for the Radiax system (Fire Zone 2-3B-W only). The Thermo-Lag 330-1 on the protected raceway along the east wall, which represent intervening combustibles, are shielded to a great extent from the redundant raceway on the west wall by structural steel floor framing for Elevation 719'-1. The non-protected redundant raceway themselves are separated by a minimum of 17 feet and, in most cases, by greater than 20 feet. Due to the presence of fire detection and automatic sprinkler protection in this fire zone, this 17 foot distance is considered to be sufficient to preclude damage to redundant raceway due to in-situ combustibles. Since the combustible material contribution from the single repeater cable for the Radiax System is insignificant, it is not considered to be a fire hazard.

A transient fire, such as a trash can fire, would not affect the safe shutdown raceway which are in close proximity to each other since the safe shutdown raceways are located approximately 28 feet above the Elevation 683'-0 floor.

Administrative Controls:

The floor area between the redundant safe shutdown cable trays are identified to indicate that it is a restricted area for storage of transient combustible materials. No transient combustible materials will be stored in this area without the review and acceptance of the Site Fire Protection Engineer.

Fire Protection Features:

Both Fire Zones 1-3B-W and 2-3B-W are provided with fire detection and automatic sprinkler protection. Due to the limited amount of in-situ combustibles in this area and the administrative controls described above for controlling the introduction of transient combustibles, the automatic suppression system and fire detection installed in these fire zones are adequate to ensure that both redundant trains will not be damaged. Therefore, an automatic suppression system and fire detection do not need to be installed throughout the fire areas of which these fire zones are a part.

SUMMARY AND CONCLUSION:

The configuration of the redundant raceway, the use of qualified raceway fire barriers where shown on Drawing C240924 Sheets 1 and 2 and the low quantity of combustibles ensure that the fire detection and fire suppression installed in Fire Zones 1-3B-W and 2-3B-W will prevent damage to redundant safe shutdown raceway. Therefore, protection of the redundant raceway with a qualified 1-hour fire barrier is not required in Fire Zone 1-3B-W, other than E1F132, E1F137, C1F033, C1F034, C1F055 and JB0008 which are protected with a qualified 1-hour fire barrier, and in Fire Zone 2-3B-W, other than C1F040, C1F045, C2F030 and JB0013 which are protected with a qualified 1-hour fire barrier.

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8.0 DRAWINGS

The drawings listed below contain the key information for the design and control of fire protection features at the plant.

DRAWING #	TITLE	SHEETS
E-105002	General Site Arrangement	1
E-105176	Yard Main Arrangement	1 and 2
E-106227	P&ID – Fire Protection	1 thru 7 and 9
E-205949	SSES Unit 1 Reactor Building Fire Zone Plan of Elevation 645'-0"	1,2
E-205950	SSES Unit 1 Reactor Building Fire Zone Plan of Elevation 670'-0"	1,2
E-205951	SSES Unit 1 Reactor Building Fire Zone Plan of Elevation 683'-0"	1,2
E-205952	SSES Unit 1 Reactor Building Fire Zone Plan of Elevation 719'-1"	1,2
E-205953	SSES Unit 1 Reactor Building Fire Zone Plan of Elevation 749'-1"	1,2
E-205954	SSES Unit 1 Reactor Building Fire Zone Plan of Elevation 779'-1"	1,2
E-205955	SSES Unit 1 Reactor Building Fire Zone Plan of Elevation 799'-1"	1,2
E-205956	SSES Unit 1 Reactor Building Fire Zone Plan of Elevation 818'-1"	1,2
E-205957	SSES Unit 2 Reactor Building Fire Zone Plan of Elevation 645'-0"	1,2
E-205958	SSES Unit 2 Reactor Building Fire Zone Plan of Elevation 670'-0"	1,2
E-205959	SSES Unit 2 Reactor Building Fire Zone Plan of Elevation 683'-0"	1,2
E-205960	SSES Unit 2 Reactor Building Fire Zone Plan of Elevation 719'-1"	1,2
E-205961	SSES Unit 2 Reactor Building Fire Zone Plan of Elevation 749'-1"	1
E-205962	SSES Unit 2 Reactor Building Fire Zone Plan of Elevation 779'-1"	1,2
E-205963	SSES Unit 2 Reactor Building Fire Zone Plan of Elevation 799'-1"	1,2

DRAWING #	TITLE	SHEETS
E-205964	SSES Unit 2 Reactor Building Fire Zone Plan of Elevation 818'-1"	1,2
E-205965	SSES Units 1 & 2 Reactor Building Fire Zone Section A-A	1
E-205966	SSES Units 1 & 2 Reactor Building Fire Zone Section B-B	1
E-205967	SSES Units 1 & 2 Reactor Building Fire Zone Section C-C	1
E-205968	SSES Units 1 & 2 Reactor Reactor Building Fire Zone Section D-D	1
E-213485	SSES Units 1 & 2 Reactor Reactor Building Fire Zone Sections G-G and H-H	1
E-205985	SSES Units 1 & 2 Control Structure Fire Zone Plan of Elevation 656'-0"	1,2
E-205986	SSES Units 1 & 2 Control Structure Fire Zone Plan of Elevation 676'-0"	1
E-205987	SSES Units 1 & 2 Control Structure Fire Zone Plan of Elevation 686'-0"	1,2
E-205988	SSES Units 1 & 2 Control Structure Fire Zone Plan of Elevation 698'-0"	1,2
E-205989	SSES Units 1 & 2 Control Structure Fire Zone Plan of Elevation 714'-0"	1,2
E-205990	SSES Units 1 & 2 Control Structure Fire Zone Plan of Elevation 729'-1"	1,2
E-205991	SSES Units 1 & 2 Control Structure Fire Zone Plan of Elevation 741'-1"	1,2
E-205992	SSES Units 1 & 2 Control Structure Fire Zone Plan of Elevation 754'-0"	1,2
E-205993	SSES Units 1 & 2 Control Structure Fire Zone Plan of Elevation 771'-0"	1,2
E-205994	SSES Units 1 & 2 Control Structure Fire Zone Plan of Elevation 783'-0"	1,2
E-205995	SSES Units 1 & 2 Control Structure Fire Zone Plan of Elevation 806'-0"	1,2
E-205996	SSES Units 1 & 2 Control Structure Fire Zone Section A-A	1
E-205997	SSES Units 1 & 2 ESSW Pumphouse Fire Zone Plan of Elevation 660'-0"	1,2
E-205998	SSES Units 1 & 2 ESSW Pumphouse Fire Zone Plan of Elevation 686'-6"	1,2
E-205999	SSES Units 1 & 2 ESSW Pumphouse Fire Zone Section A-A	1

DRAWING #	TITLE	SHEETS
E-206000	SSES Units 1 & 2 Diesel Generator Building Fire Zone Plan of Elevation 660'-0"	1,2
E-206001	SSES Units 1 & 2 Diesel Generator Building Fire Zone Plan of Elevation 677'-0"	1,2
E-206002	SSES Units 1 & 2 Diesel Generator Building Fire Zone Plan of Elevation 710'-9"	1,2
E-206003	SSES Units 1 & 2 Diesel Generator Building Fire Zone Section A-A	1
E-213410	SSES Units 1 & 2 Diesel Generator E Building Fire Zone Plan of Elevation 656'-6"	1,2
E-213411	SSES Units 1 & 2 Diesel Generator E Building Fire Zone Plan of Elevation 675'-6"	1,2
E-213412	SSES Units 1 & 2 Diesel Generator E Building Fire Zone Plan of Elevation 708'-0"	1,2
E-213413	SSES Units 1 & 2 Diesel Generator E Building Fire Zone Plan of Elevation 726'-0" and 741'-6"	1,2
E-213414	SSES Unit 1 & 2 Diesel Generator E Building Fire Zone Section A-A	1

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