

December 31, 1986

Docket Nos. 50-277/228

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Mr. Edward G. Bauer, Jr.
Vice President & General Counsel
Philadelphia Electric Company
2301 Market Street
Philadelphia, Pennsylvania 19101

Dear Mr. Bauer:

SUBJECT: EXEMPTION FROM 10 CFR 50 APPENDIX R REGARDING DAMPERS,
STRUCTURAL STEEL AND AUTOMATIC FIRE SUPPRESSION

Re: Peach Bottom Atomic Power Station, Units 2 and 3

The Commission has issued the enclosed Exemption from the requirements of Sections III.G.2.a and III.G.2.b of Appendix R to 10 CFR Part 50 for the Peach Bottom Atomic Power Station, Units Nos. 2 and 3. As discussed in detail in the enclosure, the exemption will 1) permit certain specific areas, cable or equipment to be separated by less than a 3-hour rated fire barrier, 2) not require automatic fire suppression systems in parts of two plant areas, and 3) permit certain structural steel members forming a part of or supporting fire barriers to have a fire resistance less than required by the regulation where analysis demonstrate that the existing resistance provides adequate protection.

A copy of our Safety Evaluation is enclosed.

The exemption is being forwarded to the Office of the Federal Register for publication.

Also enclosed for your information is a copy of an Environmental Assessment and Finding of No Significant Impact which has been published in the Federal Register.

Sincerely,

Original Signed by

Richard J. Clark, Project Manager
BWR Project Directorate #2
Division of BWR Licensing

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Enclosures:

- 1. Exemption
- 2. Safety Evaluation
- 3. Environmental Assessment

cc w/enclosures:
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DBL:PD#2 DBL:PD#2 DBL:PD#2
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Philadelphia Electric Company

Peach Bottom Atomic Power Station,
Units 2 and 3

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- a. Separation of cables and equipment and associated nonsafety 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 nonsafety circuits of redundant trains by a horizontal distance of more than 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.
- c. Enclosure of cable and equipment and associated nonsafety 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.

Subsection III.G.3 of Appendix R requires that for areas where alternative or dedicated shutdown is provided, fire detection and a fixed fire suppression system shall also be installed in the area, room, or zone under consideration.

III.

By letters dated September 17, 1984 and May 23 and September 24, 1985, the Licensee requested exemptions from Section III.G of Appendix R. By letters dated March 29 and June 6, 1985 and March 7, 1986, the Licensee transmitted structural steel evaluations and delineated proposed modifications as well as requested exemptions from Section III.G.2.

The following list of exemption requests reflects the latest status:

1. Radwaste Building HVAC Equipment Area (Room 292, Elevation 150 Feet).

An exemption was requested from the specific requirement of Section III.G.2.a to the extent that duct penetrations through the fire barrier are not provided with fire dampers.

2. Turbine and Reactor Buildings (Fire Areas 8 and 50).

An exemption was requested from the specific requirements of Section III.G.2.b to the extent that automatic fire suppression systems are not installed throughout the fire areas at elevation 195 feet.

3. o Units 2 and 3 Main Steam Pipe Tunnel, Elevation 135 Feet.

An exemption was requested from the specific requirements of Section III.G.2.a to the extent that fire dampers are not provided in duct penetrations at elevation 135 feet.

o Standby Gas Treatment System Penetrations.

An exemption was requested from the specific requirements of Section III.G.2.a to the extent that duct penetrations through fire barriers are not provided with fire dampers.

o Unit 2 Control Rod Drive Equipment Area, Elevation 135 Feet.

An exemption was requested from the specific requirements of Section III.G.2.a to the extent that fire dampers are not provided in duct penetrations.

o Unit 2 Switchgear Room Duct Chase, Elevations 135 and 165 Feet.

An exemption was requested from the specific requirements of Section III.G.2.a to the extent that fire dampers with a fire rating of less than 3 hours are provided in the duct penetrations.

o Spent Resin Tank Room, Elevation 91 Feet, 6 Inches.

An exemption was requested from the specific requirements of Section III.G.2.a to the extent that fire dampers with a fire

rating of less than 3 hours are provided in the duct penetrations.

4. Outboard Main Steam Isolation Valve Rooms (Fire Areas 208 and 254).
An exemption was requested from the specific requirements of Section III.G.2.a to the extent that non-rated blowout panels and an open vertical labyrinth do not provide 3-hour fire rated barriers.

5. o Radwaste Building, Units 2 and 3 M-G Set Rooms, Elevation 135 Feet.

An exemption was requested from the specific requirements of Section III.G.2.a to the extent that certain structural steel members forming a part of or supporting fire barriers should be protected to provide fire resistance equivalent to that of the barrier.

- o Reactor Building, Units 2 and 3 HPCI Rooms, Elevation 88 Feet.
An exemption was requested from the specific requirements of Section III.G.2.a to the extent that certain structural steel members forming a part of or supporting fire barriers should be protected to provide fire resistance equivalent to that of the barrier.

- o Turbine Building, Emergency Switchgear Rooms, Elevation 135 Feet.

An exemption was requested from the specific requirements of Section III.G.2.a to the extent that certain structural steel members forming a part of or supporting fire barriers should be protected to provide fire resistance equivalent to that of the barrier.

- o Turbine Building, Battery Rooms, Elevation 135 Feet.

An exemption was requested from the specific requirements of Section III.G.2.a to the extent that certain structural steel members forming a part of or supporting fire barriers should be protected to provide fire resistance equivalent to that of the barrier.

- o Reactor Building, RHR Pump and HX Room, Elevation 91 Feet, 6 Inches.

An exemption was requested from the specific requirements of Section III.G.2.a to the extent that certain structural steel members forming a part of or supporting fire barriers should be protected to provide fire resistance equivalent to that of the barrier.

In summary, the exemptions were requested from separating cables and equipment and associated nonsafety circuits of redundant trains by a 3-hour rated fire barrier per the requirements of Section III.G.2.a of Appendix R, and from providing automatic fire suppression systems as a part of protection requirements of Section III.G.2.b of Appendix R.

In Fire Areas 8 and 50 and the radwaste building HVAC equipment area, redundant safe shutdown equipment is well separated with no intervening combustibles. Lack of intervening combustibles, the low combustible loading, and the provision of alternate shutdown capability independent of the remote shutdown panel area and the HVAC equipment area provide sufficient passive protection to ensure that one shutdown division would remain free of fire damage.

The staff also finds that there is reasonable assurance that a fire in the areas for which exemptions have been requested from the requirements of

Section III.G.2.a (redundant safe shutdown systems not separated by a 3-hour barrier) would be of low magnitude, detected in its incipient stage, and extinguished by the fire brigade. The low combustible loading in each of such areas ensures that redundant safe shutdown equipment located in the adjoining areas will not be damaged before a fire is controlled.

Automatic fire suppression systems are provided in the areas in which certain members of structural steel supporting fire barriers are not protected. The staff finds that due to the provision of these systems and/or administrative procedures, there is reasonable assurance that a fire in these areas would not affect structural steel.

Based on the review of the Licensee's analysis, the staff also concludes that the installation of 3-hour rated fire dampers, 3-hour rated blowout panels, barriers between redundant trains, the installation of automatic fire suppression systems throughout affected fire areas, and the installation of fireproofing on structural steel forming part of or supporting fire barriers would not significantly increase the level of fire protection in these areas. A more detailed evaluation concerning the exemption requests is contained in the Safety Evaluation issued concurrently.

By letter dated March 7, 1986 and in a meeting held with Philadelphia Electric Company personnel on May 6, 1986 (which was documented in the NRC's staff meeting summary dated May 13, 1986), the Licensee provided information relevant to the "special circumstances" finding required by revised 10 CFR 50.12(a) (see 50 FR 50764). In this correspondence, the licensee 1) stated how the criteria established in 10 CFR 50.12 are satisfied and that the activities to be authorized by the requested exemptions do not violate any other applicable laws or regulations, 2) discussed why the exemptions present

no undue risk to the public health and safety because when consideration is given to the effects of alternative mitigative features, there is adequate fire resistance and protection without the minimal if any additional protection that would be provided if the licensee were required to implement modifications that met a literal, strict compliance with all aspects of Appendix R, 3) discussed how and why the cost of the overall fire protection program would be substantially increased if the exemptions are not granted without any demonstrable or corresponding increase in the level of improvement in fire protection and 4) discussed how the intent and equivalency criteria of Appendix R would be achieved by granting the exemption. The Licensee stated that existing and proposed fire protection features at Peach Bottom Units 2 and 3 accomplished the underlying purpose of the rule. Implementing additional modifications to provide additional suppression systems, detection systems, and fire barriers would require the expenditure of engineering and construction resources as well as the associated capital costs which would represent an unwarranted burden on the Licensee's resources. The Licensee stated that these costs are significantly in excess of those required to meet the underlying purpose of the rule. The staff concludes that "special circumstances" exist for the Licensee's requested exemptions in that application of the regulation in these particular circumstances is not necessary to achieve the underlying purposes of Appendix R to 10 CFR 50. See 10 CFR 50.12(a)(2)(ii).

IV.

Accordingly, the Commission has determined that, pursuant to 10 CFR 50.12(a), (1) the exemptions as described in Section III are authorized by law and will not present an undue risk to the public health and safety and are consistent with common defense and security and, (2) special circumstances are present for the exemptions in that application of the regulation in these

particular circumstances is not necessary to achieve the underlying purposes of Appendix R to 10 CFR 50. Therefore, the Commission hereby grants the following exemptions from the requirements of Section III.G of Appendix R to 10 CFR 50:

1. Radwaste Building HVAC Equipment Area (Room 292, Elevation 150 Feet) to the extent that redundant safe shutdown cables and equipment are not separated by a 3-hour rated fire barrier pursuant to Section III.G.2.a.
2. Turbine and Reactor Buildings (Fire Areas 8 and 50) to the extent that automatic fire suppression systems are not installed throughout the fire areas pursuant to Section III.G.2.b.
3.
 - o Units 2 and 3 Main Steam Pipe Tunnel, Elevation 135 Feet to the extent that redundant safe shutdown cables and equipment are not separated by a 3-hour rated fire barrier pursuant to Section III.G.2.a.
 - o Standby Gas Treatment System Penetrations to the extent that safe shutdown cables and equipment are not separated by a 3-hour rated fire barrier pursuant to Section III.G.2.a.
 - o Unit 2 Control Rod Drive Equipment Area, Elevation 135 Feet to the extent that safe shutdown cables and equipment are not separated by a 3-hour rated fire barrier pursuant to Section III.G.2.a.
 - o Unit 2 Switchgear Room Duct Chase, Elevations 135 and 165 Feet to the extent that safe shutdown cables and equipment are not separated by a 3-hour rated fire barrier pursuant to Section III.G.2.a.

- o Spent Resin Tank Room, Elevation 91 Feet, 6 Inches to the extent that redundant safe shutdown cables and equipment are not separated by a 3-hour rated fire barrier pursuant to Section III.G.2.a.
- 4. Outboard Main Steam Isolation Valve Rooms (Fire Areas 208 and 254) to the extent that redundant safe shutdown cables and equipment are not separated by a 3-hour rated fire barrier pursuant to Section III.G.2.a.
- 5.
 - o Radwaste Building, Units 2 and 3 M-G Set Rooms, Elevation 135 Feet to the extent that certain structural steel members forming a part of or supporting fire barriers are not protected to provide fire resistance equivalent to that of the barrier pursuant to Section III.G.2.a.
 - o Reactor Building, Units 2 and 3 HPCI rooms, Elevation 88 Feet to the extent that certain structural steel members forming a part of or supporting fire barriers are not protected to provide fire resistance equivalent to that of the barrier pursuant to Section III.G.2.a.
 - o Turbine Building, Emergency Switchgear Rooms, Elevation 135 Feet to the extent that certain structural steel members forming a part of or supporting fire barriers are not protected to provide fire resistance equivalent to that of the barrier pursuant to Section III.G.2.a.

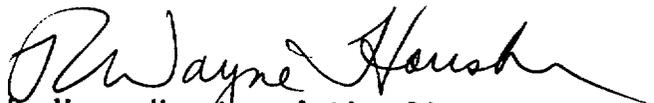
- o Turbine Building, Battery Rooms, Elevation 135 Feet to the extent that certain structural steel members forming a part of or supporting fire barriers are not protected to provide fire resistance equivalent to that of the barrier pursuant to Section III.G.2.a.
- o Reactor Building, RHR Pump and HX Room, Elevation 91 Feet, 6 Inches to the extent that certain structural steel members forming a part of or supporting fire barriers are not protected to provide fire resistance equivalent to that of the barrier pursuant to Section III.G.2.a.

Pursuant to 10 CFR 51.32, the Commission has determined that the granting of these exemptions will have no significant impact on the environment (51 FR 47324)

A copy of the concurrently issued Safety Evaluation related to this action is available for public inspection at the Commission's Public Document Room, 1717 H Street, N.W., Washington, D.C. and at the local public document room located at the Government Publication Section, State Library of Pennsylvania, Education Building, Commonwealth and Walnut Streets, Harrisburg, Pennsylvania, 17126. A copy may be obtained upon written request addressed to the U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, Attention: Director, Division of BWR Licensing.

This Exemption is effective upon issuance.

FOR THE NUCLEAR REGULATORY COMMISSION


R. Wayne Houston, Acting Director
Division of BWR Licensing
Office of Nuclear Reactor Regulation

Dated at Bethesda, Maryland this 31st day of December 1986.



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

ENCLOSURE 2

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATIVE TO APPENDIX R EXEMPTIONS REQUESTED FOR
PHILADELPHIA ELECTRIC COMPANY
PEACH BOTTOM ATOMIC POWER STATION
UNITS 2 AND 3
DOCKET NOS. 50-277 AND 50-278

1.0 INTRODUCTION

By letters dated September 17, 1984 and May 23 and September 24, 1985, the Philadelphia Electric Company (PECO, the Licensee) requested exemptions from Section III.G of Appendix R to 10 CFR 50. By letters dated March 29 and June 6, 1985, and March 7, 1986, the Licensee transmitted structural steel evaluations and delineated proposed modifications as well as requested exemptions from Section III.G.2. Additional information in support of the structural steel exemptions was provided in a letter dated June 18, 1986. These exemption requests are the subject of this evaluation. This evaluation also reflects the information provided by the Licensee and/or collected during a site visit on February 24, 1986 in which NRR fire protection engineers participated. The site visit provided an opportunity to walk down the areas where the exemptions from Appendix R have been requested.

This safety evaluation is based in part on the attached Technical Evaluation Report (TER) generated by a NRR contractor Franklin Research Center (FRC). This TER has been reviewed by the staff and the staff is in agreement with the conclusions reached in the FRC TER.

Section III.G.1 of Appendix R requires fire protection features to be provided for structures, systems, and components important to safe shutdown and 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.

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Section III.G.2 of Appendix R, except as provided for in Section III.G.3, requires that one train of cables and equipment, including associated nonsafety circuits that could prevent operation or cause maloperation due to hot shorts, open circuits, or shorts to ground, necessary to achieve and maintain safe shutdown be maintained free of fire damage by one of the following means:

- a. Separation of cables and equipment and associated nonsafety 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 nonsafety circuits of redundant trains by a horizontal distance of more than 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.
- c. Enclosure of cables and equipment and associated nonsafety 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.

If the above conditions are not met, or where redundant trains of systems required for hot shutdown may be subject to damage from fire suppression activities or from the rupture or inadvertent operation of fire suppression systems, Section III.G.3 requires that there be alternative or dedicated shutdown capability independent of cables, systems, or components in the fire area of concern. It also requires that fire detection and a fixed suppression system be installed in the fire area, zone or room under consideration.

Because it is not possible to predict the specific conditions under which fires may occur and propagate, design basis protective features rather than the design basis fire are specified in the rule. Plant-specific features may require protection different from the measures specified in Section III.G. In such a case, the Licensee must demonstrate, by means of a detailed fire hazards analysis, that existing protection or existing protection in conjunction with proposed modifications will provide a level of safety equivalent to the technical requirements of Section III.G of Appendix R.

In summary, Section III.G is related to fire protection features for ensuring that one train of systems and associated circuits necessary to achieve and maintain safe shutdown are free of fire damage. Either fire protection configurations must meet the specific requirements of Section III.G or an alternative fire protection configuration must be justified by a fire hazards analysis. Generally, the staff will accept an alternative fire protection configuration if:

- o The alternative ensures that one train of equipment necessary to achieve hot shutdown from either the control room or emergency control station(s) is free of fire damage.
- o The alternative ensures that fire damage to at least one train of equipment necessary to achieve cold shutdown is limited so that it can be repaired within 72 hours (minor repairs using components stored on the site).
- o Fire-retardant coatings are not used as fire barriers.
- o Modifications required to meet Section III.G would not enhance fire protection safety levels above that provided by either existing or proposed alternatives.
- o Modifications required to meet Section III.G would be detrimental to overall facility safety.

2.0 RADWASTE BUILDING HVAC EQUIPMENT AREA (ROOM 292, ELEVATION 150 FEET)

2.1 Exemption Requested

An exemption was requested from the requirements of Section III.G.2.a to the extent that it requires the separation of cables, equipment, and associated nonsafety circuits of redundant trains by a fire barrier having a 3-hour fire resistance rating.

2.2 Discussion

The Licensee has stated that the fire barrier between the radwaste building HVAC equipment area and a duct chase located in the remote shutdown panel area does not meet the requirements of Section III.G.2.a because of the lack of fire dampers. It is located on elevation 150 feet, room 292. The radwaste building HVAC equipment area contains no safety-related equipment. The remote shutdown panel area contains cables associated with several safe shutdown systems.

A 42-inch by 30-inch duct associated with the equipment cell exhaust system penetrates the west wall of the radwaste building fan room. This system vents the condensate phase separator tanks, the waste surge tanks, and other radwaste processing equipment located inside the radwaste building. In addition, a 42-inch by 44-inch duct associated with the radwaste building exhaust fans penetrates the same barrier. Neither of these two duct penetrations is provided with a fire damper.

The radwaste building fan room has an equivalent fire severity of 6 minutes based on the ASTM E-119 time-temperature curve. The duct chase located in the remote shutdown panel (RSP) area has an equivalent fire severity of approximately 30 minutes.

The majority of the combustible loading in the RSP area is due to cable trays located at the ceiling at elevation 165 feet, approximately 15 feet above the penetrations of concern. There are cable trays located within the duct chase in the RSP area.

The existing fire protection for the RSP area consists of fire extinguishers, smoke detectors, and manual hose stations. The Licensee has committed to install line-type heat detectors for the cable trays in the RSP area. The radwaste building HVAC equipment area is protected with portable extinguishers and manual hose stations. No automatic fire detection is provided in this area.

Ducts at the penetrations described above are of 10-gauge welded steel construction. This duct construction is maintained from the radwaste building exhaust fans through the RSP area.

The Licensee has committed to provide alternate shutdown capability independent of both the RSP area and the radwaste building HVAC equipment area for a fire in the RSP area.

2.3 Evaluation

The fire barrier separating the RSP area and the radwaste building HVAC equipment area does not comply with the technical requirements of Section III.G.2.a of Appendix R because 3-hour rated fire dampers are not installed in duct penetrations.

The staff was concerned that because of the absence of these dampers, a fire of significant magnitude could develop and damage redundant shutdown-related systems.

However, the combustible loading in the radwaste building HVAC equipment area is low. The principal combustible in the adjacent duct chase are cable trays located above and remote from the duct penetrations. If a fire were to occur, it would develop slowly with an initial low heat release rate and a slow rise in room temperature.

The duct at the penetrations is of substantial welded steel construction, reducing the probability of fire propagation through the penetration.

Line-type heat detectors will be provided for the cable trays in the RSP area. Because of the existing smoke detectors in the RSP area and the line-type heat detectors for the cable trays, a fire in this area will be detected in its incipient stage. The alarms from these detectors are annunciated in the main control room. The fire brigade would be dispatched and would extinguish the fire manually using the hose lines or portable extinguishers provided.

Until the fire is extinguished by the plant fire brigade, the substantial construction of the ducts penetrating the fire barrier, the low combustible loading of the radwaste HVAC fan area, and the provision of alternate shutdown capability independent of the RSP area and the HVAC equipment area provide sufficient passive protection to afford reasonable assurance that one shutdown division would remain free of fire damage.

A major factor that reduces the fire risk is that redundant safe shutdown system equipment is well separated with no intervening combustibles. In addition, alternative shutdown will be provided independent of the RSP area and the radwaste building equipment area for a fire in the RSP area.

With the fire protection features installed or committed to be installed, the staff has reasonable assurance that a fire in the above area will not prevent the plant from safely shutting down.

2.4 Conclusion

Based on the above evaluation, the staff concludes that the existing fire protection combined with the proposed modifications provide a level of fire protection equivalent to the technical requirements of Section III.G.2.a of Appendix R. Therefore, the exemption request for the aforementioned duct penetrations should be granted.

3.0 TURBINE AND REACTOR BUILDINGS, ELEVATION 195 FEET (FIRE AREAS 8 AND 50)

3.1 Exemption Requested

An exemption was requested from the specific requirements of Section III.G.2.b to the extent that it requires an automatic fire suppression system throughout each of the identified fire areas.

3.2 Discussion

The Licensee has stated that Fire Areas 8 and 50 at elevation 195 feet do not meet the requirements of Section III.G.2.b because automatic fire suppression systems are not installed throughout each area.

Fire Area 8 consists of the south half of elevation 135 feet of the Unit 2 reactor building and elevations 165, 195, and 234 feet of the reactor building. Fire Area 50 comprises the majority of the turbine building. The lower elevations of Fire Area 8 (elevations 135 and 165 feet) contain components/equipment of the residual heat removal (RHR) system (train A), RCIC system, and ac emergency power system. The lower elevations of Fire Area 50 (elevation 116 feet and below) contain cables for the RHR system (trains B and D), ac power system (trains B and D), and ESW system (train B). Separation between safe shutdown equipment exceeds 100 feet with several intermediate barriers including floor slabs.

Fire Areas 8 and 50 are separated by qualified 3-hour fire barriers except for certain penetrations on elevation 195 feet. The barrier between the two areas (on elevation 195 feet) is penetrated by two ventilation ducts without fire dampers and several small, unsealed openings around tubing and conduit. The door in the barrier on elevation 195 feet is a 3-hour rated fire door.

Fire Area 8 on elevation 195 feet is approximately 11,500 square feet in area. There is a clear floor-to-ceiling height of 17 feet and an open stairwell (through the ceiling only) with an effective ceiling height of 37 feet. The area contains ventilation equipment associated with the reactor building and the standby liquid control pumps and tanks. The fixed combustible loading for Fire Area 8 is approximately 5,500 Btu per square foot, which is equivalent to a fire severity of approximately 5 minutes based on the ASTM E-119 time-temperature curve. The fixed combustibles consist of cable insulation and HVAC filter media. There is no instance of combustible materials penetrating the wall between the two fire areas.

Fire Area 50 on elevation 195 feet is approximately 9,000 square feet in area with a clear floor-to-ceiling height of 15 feet. The fixed combustible loading for Fire Area 50 is approximately 19,500 Btu per square foot, which is equivalent to a fire severity of approximately 15 minutes.

General area fire detection is provided for Fire Area 8 with 10 smoke detectors on elevation 195 feet. The detectors alarm in the main control room. There is no fire detection on elevation 195 feet of Fire Area 50. Fire detection is provided on elevation 116 feet of Fire Area 50 where safety-related equipment is located.

Automatic suppression capability is not provided in these areas. Three hose reels and 10 portable extinguishers are located in Fire Area 8. Three portable extinguishers are located in Fire Area 50.

3.3 Evaluation

Fire Areas 8 and 50 on elevation 195 feet do not comply with the technical requirements of Section III.G.2.b of Appendix R because automatic fire suppression systems are not installed throughout each area. In addition, 3-hour rated fire dampers are not installed in duct penetrations and several penetration openings around tubing and conduit are unsealed on elevation 195 feet. Except for these penetrations, Fire Areas 8 and 50 are separated by qualified 3-hour fire barriers.

Because of the absence of suppression systems or fire dampers and penetration seals, the staff was concerned that a fire of significant magnitude could develop and damage redundant shutdown systems.

However, the combustible loadings in Fire Areas 8 and 50 on elevation 195 feet are low, 5,500 and 19,500 Btu per square foot, respectively. The principal combustibles consist of cable insulation and HVAC filter media. There is no instance of combustible materials penetrating the wall between the two fire areas on elevation 195 feet.

Smoke detectors are provided in Fire Area 8 on elevation 195 feet. Fire detection is provided on elevation 116 feet of Fire Area 50 where safety-related equipment is located. The alarms from these detectors are annunciated in the main control room. Upon detection of a fire, the fire brigade would be dispatched and would extinguish the fire with the hose lines or portable extinguishers provided.

A major factor that reduces the impact of potential fire propagation through these unprotected openings is that redundant safe shutdown equipment is well separated with no intervening combustibles. No safe shutdown equipment is located on either side of these penetrations of elevation 195 feet. Lower elevations of Fire Area 8 (elevations 135 and 165 feet) and Fire Area 50 (elevation 116 feet and below) contain safe shutdown cables and equipment. Fire Areas 8 and 50 are separated by qualified 3-hour rated fire barriers at these elevations. Separation between safe shutdown equipment exceeds 100 feet with no intervening combustibles and several intermediate barriers including floor slabs.

Until the fire is extinguished, the separation and intermediate barriers between safe shutdown systems, the lack of intervening combustibles, and the low combustible loading of Fire Areas 8 and 50 on elevation 195 feet will provide sufficient passive protection to afford reasonable assurance that one shutdown division would remain free of fire damage.

With the fire protection features as described above, the staff has reasonable assurance that a fire in the above area will not prevent the plant from safely shutting down.

3.4 Conclusion

Based on the above evaluation, the staff concludes that the existing fire protection features provide a level of fire protection equivalent to the technical requirements of Section III.G.2.b of Appendix R. Therefore, the exemption request from the requirement for the fixed fire suppression systems throughout each of the identified fire areas should be granted.

- 4.0
- o UNITS 2 AND 3 MAIN STEAM PIPE TUNNEL, ELEVATION 135 FEET
 - o STANDBY GAS TREATMENT SYSTEM, DAMPER PENETRATIONS
 - o UNIT 2 CONTROL ROD DRIVE EQUIPMENT AREA, ELEVATION 135 FEET
 - o UNIT 2 SWITCHGEAR ROOM DUCT CHASE, ELEVATIONS 135 AND 165 FEET
 - o SPENT RESIN TANK ROOM - COMMON, ELEVATION 91 FEET, 6 INCHES

4.1 Exemption Requested

Exemptions were requested from the specific requirements of Section III.G.2.a to the extent that it requires separation of cables, equipment, and associated nonsafety circuits of redundant trains by a fire barrier having a 3-hour fire resistance rating.

4.2 Discussion

The Licensee has stated that duct penetrations do not meet the requirements of Section III.G.2.a because of either the lack of fire dampers or the installation of dampers with a fire rating of less than 3 hours.

The following locations were addressed in an exemption request in the Licensee's letter dated September 17, 1984. For clarity, penetration numbers used in the Licensee's letter are used in this discussion.

4.2.1 Units 2 and 3 Main Steam Pipe Tunnel, Elevation 135 Feet

Four ducts that penetrate the main steam isolation valve room on elevation 135 feet are not provided with fire dampers. Penetration 1 consists of a 36-inch by 20-inch steel duct through the north wall of the Unit 3 main steam pipe tunnel. The equivalent fire severities in areas adjacent to the north wall are approximately 2 minutes and 40 minutes based on the ASTM E-119 time-temperature curve.

Penetration 2 consists of a 28-inch by 32-inch steel duct through the south wall of the Unit 3 main steam pipe tunnel. The equivalent fire severities in areas adjacent to the south wall are approximately 2 minutes and 31 minutes.

A 35-inch by 21-inch steel duct (penetration 21) penetrates the south wall of the Unit 2 main steam tunnel. The pipe tunnel side of the south wall has no combustible loading, with the adjacent side having an equivalent fire severity of approximately 36 minutes.

The north wall of the Unit 2 main steam pipe tunnel is penetrated by a 28-inch by 32-inch steel duct (penetration 22). The pipe tunnel side of the north wall has no combustible loading, with the adjacent side having an equivalent fire severity of approximately 30 minutes.

Each of the above duct penetrations is associated with the ventilation supply or exhaust of an outboard main steam isolation valve room. Fire detection is provided on at least one side of each of the above penetrations. The detectors alarm in the main control room.

4.2.2 Standby Gas Treatment System, Damper Penetrations

There are 17 duct penetrations through 3-hour rated fire barriers associated with the standby gas treatment system (SGTS) which do not have fire dampers. They are penetrations 3 through 12, 16, 17, 19, 20, 23, 24, and 27. Each location is in one of two main exhaust lines to the SGTS. One exhaust line is from the refueling floor and the second line is from the reactor building. The reactor building is separated from the refueling floor by a sealed hatch.

The maximum equivalent fire severity in an area adjoining any affected barrier is 41 minutes; however, the combustible loadings are generally considerably lower. Fire detectors which alarm in the main control room are located on at least one side of each of these penetrations.

All penetrations consist of a 24-inch-circular steel duct except for penetration 27, which is a 36-inch carbon steel exhaust pipe from the SGTS fans.

The Licensee stated that the ducts are too small to insert two dampers side by side because of system friction loss. The alternative of providing 17 bypass ducts at these locations is also not feasible based on penetrating reinforced concrete slabs as thick as 3 feet, structural integrity, plant interference, and scheduling and monitoring all work activities to assure an operable SGTS.

4.2.3 Unit 2 Control Rod Drive Equipment Area, Elevation 135 Feet

Penetration 18 is through the floor of the Unit 2 control rod drive equipment area, elevation 135 feet. This penetration is for a duct which supplies ventilation air to the torus. The penetration is not provided with a fire damper. The duct is an 18-inch carbon steel schedule 40 pipe from the barrier to the torus.

The equivalent fire severities in areas adjacent to this penetration are low, 30 minutes and 10 minutes. Fire detectors, which alarm in the main control room, are located on both sides of this penetration.

4.2.4 Unit 2 Switchgear Room Duct Chase, Elevations 135 and 165 Feet

Penetration 13 consists of a 16-inch by 28-inch duct through the west wall of the duct chase on elevation 165 feet. The duct is associated with the chemical lab exhaust system for Unit 2. This penetration contains two fire dampers in series, each rated at 1-1/2 hours, located on either side of the barrier.

On elevation 135 feet, the west wall of the switchgear room duct chase has two duct penetrations. Penetration 14 (12-inch by 28-inch) is associated with the general exhaust system for Unit 2. Penetration 15 (18-inch by 28-inch) is associated with the Unit 2 radiation chemistry lab supply system. Each of these ducts contains two fire dampers in series, each rated at 1-1/2 hours, located on either side of the barrier.

The equivalent fire severities in areas adjacent to these penetrations is minimal, approximately 5 minutes in the chemical laboratory. The duct chase has no combustible loading. Fire detectors, which alarm in the main control room, are located on at least one side of each of these penetrations.

4.2.5 Spent Resin Tank Room, Elevation 91 Feet, 6 Inches

Penetrations 25 and 26 are through the east wall of the spent resin tank room. The penetrations consist of 18-inch ducts equivalent to schedule 40 pipes which serve the equipment cell exhaust system. Each duct contains two 1-1/2-hour fire dampers, one on either side of the barrier, which is not an approved installation by Underwriters Laboratories.

The equivalent fire severities in areas adjacent to the east wall are approximately 4 minutes and 2 minutes based on the ASTM E-119 time-temperature curve. No fire detection is provided.

4.3 Evaluation

The fire protection for the above penetrations does not comply with the technical requirements of Section III.G.2.a of Appendix R because 3-hour rated fire dampers are not installed. Because of the absence of these dampers, the staff was concerned that a fire of significant magnitude could develop and damage redundant shutdown systems.

However, the combustible loading in areas adjacent to each of these penetrations is low. If a fire were to occur, it would develop slowly with an initial low heat release rate and a slow rise in room temperature. All ducts are of substantial steel construction, reducing the probability of fire propagation through the penetrations.

In addition, smoke detectors are provided on at least one side of each of these penetrations. Because of the presence of these detectors, a fire in these areas will be detected in its incipient stage. The alarms from these detectors are annunciated in the main control room. The fire brigade would be dispatched and would extinguish the fire manually using the hose lines or portable extinguishers provided.

4.3.1 Units 2 and 3 Main Steam Pipe Tunnel, Elevation 135 Feet

The Licensee has indicated that inadvertent closure of a damper in the supply or exhaust ductwork of an outboard main steam isolation valve room at penetrations 1, 2, 21, or 22 could cause a Group I isolation (i.e., MSIV closure) and a resultant reactor transient. No modification to the room temperature monitors is contemplated because of the necessity to detect a genuine steam leak.

The equivalent fire severities in areas adjacent to these penetrations are approximately 2 minutes and 40 minutes based on the ASTM E-119 time-temperature curve.

The existing fire protection in this area consists of fire extinguishers, manual hose stations, and smoke detectors on one side of each penetration. The alarms from these detectors are annunciated in the main control room. The fire brigade would be dispatched and would extinguish the fire manually using the hose lines or portable extinguishers provided.

Until the fire is extinguished, the separation and intermediate barriers between safe shutdown systems, the steel construction of the duct, and the low combustible loadings will provide sufficient passive protection to afford reasonable assurance that one shutdown division will remain free of fire damage.

4.3.2 Standby Gas Treatment System, Damper Penetrations

Penetrations 3 through 12, 16, 17, 19, 20, 23, 24, and 27 are associated with the SGTS. The maximum equivalent fire severity in an area adjacent to these penetrations is 41 minutes based on ASTM E-119.

The Licensee has stated that each of these penetrations is located in one of two main exhaust lines to the SGTS. Inadvertent closure of a damper at any of these locations would jeopardize secondary containment capability in the event of reactor building isolation. Plant technical specifications require both units to be shut down and no fuel movement allowed if one branch of SGTS is out of service for more than 7 days.

Fire detectors, which alarm in the main control room, are located on at least one side of each of these penetrations. Upon detection of a fire, the fire brigade would be dispatched and would extinguish the fire with the hose lines or portable extinguishers provided.

Until the fire is extinguished, the low combustible loading and the substantial duct construction will provide sufficient passive protection to ensure that one shutdown division would remain free of fire damage.

4.3.3 Unit 2 Control Rod Drive Equipment Area, Elevation 135 Feet

Penetration 18 is an 18-inch carbon steel pipe which supplies ventilation air to the torus. The equivalent fire severities in areas adjacent to this barrier are low, 30 minutes and 10 minutes.

Fire detectors which alarm in the main control room are located on both sides of this penetration. Upon detection of a fire, the fire brigade would be dispatched and would extinguish the fire with the hose lines or portable extinguishers provided.

Until the fire is extinguished, the low combustible loading and the substantial duct construction will provide sufficient passive protection to afford reasonable assurance that one shutdown division would remain free of fire damage.

4.3.4 Unit 2 Switchgear Room Duct Chase, Elevations 135 and 165 Feet

Penetrations 13, 14, and 15 each contain two 1-1/2-hour fire dampers in series. The maximum combustible load on either side of these penetrations is approximately 5 minutes based on the ASTM E-119 time-temperature curve.

Fire detectors, which alarm in the main control room, are located on at least one side of each of these penetrations. Upon detection of a fire, the fire brigade would be dispatched and would extinguish the fire with the hose lines or portable extinguishers provided.

Until the fire is extinguished, the two 1-1/2-hour fire dampers, the low combustibile loading, and the substantial duct construction will provide sufficient passive protection to ensure that one shutdown division would remain free of fire damage.

4.3.5 Spent Resin Tank Room - Common, Elevation 91 Feet, 6 Inches

Penetrations 25 and 26 contain 1-1/2-hour rated dampers located outside the walls on each side of the penetration. These dampers were installed outside the wall because of existing equipment interference in the area. The fire loadings on each side of the barrier are minimal and the duct is manufactured of schedule 40 steel.

Fire detectors, which alarm in the main control room, are located on at least one side of each of these penetrations. Upon detection of a fire, the fire brigade would be dispatched and would extinguish the fire with the hose lines or portable extinguishers provided.

Until the fire is extinguished, the intermediate barriers between safe shutdown systems, the two 1-1/2-hour rated fire dampers, the low combustibile loading, and the substantial duct construction will provide sufficient passive protection to ensure that one shutdown division would remain free of fire damage.

4.4 Conclusion

Based on the above evaluations, the staff concludes that the existing fire protection features provide a level of fire protection equivalent to the technical requirements of Section III.G.2.a of Appendix R. Therefore, the exemption requests for the identified penetrations in the aforementioned areas should be granted.

5.0 OUTBOARD MAIN STEAM ISOLATION VALVE ROOMS (FIRE AREAS 208 AND 254)

5.1 Exemption Requested

An exemption was requested from the specific requirements of Section III.G.2.a to the extent that it requires separation of cables, equipment, and associated nonsafety circuits of redundant trains by a fire barrier having a 3-hour fire resistance rating.

5.2 Discussion

The Licensee has stated that non-rated blowout panels and an open vertical labyrinth in these fire areas do not meet the requirements of Section III.G.2.a.

Fire Areas 208 and 254 are the outboard main steam isolation valve (MSIV) rooms. Each room is provided with a total of 386 square feet of blowout panels. The blowout panels are not fire rated for 3 hours. In addition, these rooms are open to the adjacent reactor building general access area by an open vertical labyrinth.

The blowout panels and open labyrinth are provided for steam venting in the event of a high energy line break. One panel in the labyrinth vents the MSIV room to the reactor building access area on elevation 135 feet. The MSIV room and reactor building access area have equivalent fire severities of approximately 1 and 40 minutes, respectively. A second panel vents into the moisture separator area of the turbine building which has an equivalent fire severity of approximately 25 minutes. There are no intervening combustibles between the MSIV rooms and general access area.

The only equipment required to operate inside the MSIV rooms are the injection valves for the RCIC and HPCI systems. There is also a steam supply valve for the RCIC system within the area; however, it is normally in its correct operating position.

The Licensee states that the RCIC or HPCI injection valves are operated during the initial phases of safe shutdown. Once these valves are in the operating position, there is no requirement to operate them further. The valves cannot be caused to operate spuriously from the MSIV rooms.

5.3 Evaluation

Fire barriers separating the outboard MSIV rooms, the reactor building general access area, and the moisture separator area of the turbine building do not comply with the technical requirements of Section III.G.2.a of Appendix R because of non-rated blowout panels and an open labyrinth.

The principal concern was that because of these unrated openings, a fire could propagate through the openings and damage redundant shutdown systems.

However, the combustible loading in the MSIV rooms are negligible. The combustible loadings in the reactor building access area and moisture separator area are low. The principal combustibles in these areas are cable trays. If a fire were to occur, it would develop slowly with an initial low heat release rate and a slow rise in room temperature.

There are no intervening combustibles between the MSIV rooms and adjoining spaces.

A major factor that reduces the fire risk is that equipment required inside the MSIV rooms are required early in shutdown. The equipment cannot be caused to operate spuriously from the MSIV room.

Until the fire is extinguished, the noncombustible blowout panels, the lack of intervening combustibles, the low combustible loading, and the inability for spurious operation will provide sufficient passive protection to provide reasonable assurance of the ability to achieve and maintain safe shutdown.

5.4 Conclusion

Based on the above evaluation, the staff concludes that the existing protection provides a level of fire protection equivalent to the technical requirements of Section III.G.2.a of Appendix R. Therefore, the exemption request for the blowout panels and open labyrinth should be granted.

- 6.0 o RADWASTE BUILDING, UNITS 2 AND 3 M-G SET ROOMS, ELEVATION 135 FEET
- o REACTOR BUILDING, UNITS 2 AND 3 HPCI ROOMS, ELEVATION 88 FEET
- o TURBINE BUILDING, EMERGENCY SWITCHGEAR ROOMS, ELEVATION 135 FEET
- o TURBINE BUILDING, BATTERY ROOMS, ELEVATION 135 FEET
- o REACTOR BUILDING, RHR PUMP AND HX ROOM, ELEVATION 91 FEET, 6 INCHES

6.1 Exemption Request

An exemption was requested from the requirements of Section III.G.2 to the extent that it requires structural steel forming a part of or supporting fire barriers to be protected to provide fire resistance equivalent to that of the barrier.

6.2 Discussion

The Licensee has stated that several areas where structural steel forming a part of or supporting fire barriers are not fireproofed. By letter dated March 29, 1985, the Licensee submitted a structural steel survivability analysis. By letter dated June 6, 1985, the Licensee submitted evaluations including proposed fixes of each plant area which the analysis revealed fire durations and temperatures exceeding the structural steel acceptance criteria.

The analysis uses a mathematical model to calculate the potential time-temperature profile for fires in each fire area. Two fire modeling methodologies are employed in the analysis. A fully developed enclosure fire model is used to evaluate the average gas mixture temperature in the enclosure. Secondly, local heating effects on steel members are assessed by flame and fire plume impingement calculations. These fire models form the basis of the structural steel survivability analysis.

The overall approach follows the Limerick evaluation which has been previously approved by the staff. In the Limerick evaluation, if the steel temperature exceeded 1100°F within 3 hours, the steel was protected with 3-hour rated barriers where possible. However, in areas where congestion prevented the effective application of insulating materials to the steel, an automatic sprinkler system was provided as an alternate form of protection. The staff found that this approach provided an adequate level of fire protection and was acceptable for the Limerick plant.

Specific exemptions from the technical requirements of Section III.G.2 were requested for 17 specific areas by letter dated March 7, 1986 for Peach Bottom Units 2 and 3. A discussion of these exemptions is provided below.

6.2.1 Radwaste Building, Units 2 and 3 M-G Set Rooms,
Elevation 135 Feet

The analysis revealed that Units 2 and 3 M-G set rooms, elevation 135 feet, could experience fire temperatures that would allow structural steel supporting the ceiling to reach the critical temperature of 1100°F. The assumed scenario which resulted in the critical temperature was that two doors are open for approximately 2 hours. The doors to the M-G set rooms are self-closing, electrically supervised security doors.

The M-G set rooms contain a large quantity of combustible liquids. The Licensee has committed to extend the existing sprinkler system to provide floor area coverage for an oil spill fire. The extended sprinkler system is not planned to protect the existing energized load centers in the rooms.

6.2.2 Turbine Building Emergency Switchgear Rooms (Eight Rooms),
Elevation 135 Feet

The analysis revealed that the turbine building emergency switchgear rooms could experience fire temperatures that would allow structural steel supporting the ceiling to reach the critical temperature of 1100°F. The steel survivability calculations indicated that the structural steel did not reach the critical temperature for 30 minutes if one door remained open.

The Licensee has proposed to institute administrative controls for limiting ventilation to the switchgear rooms by monitoring the doors to the area. The doors to the switchgear rooms are self-closing, electrically supervised security doors with card reader access. In a letter dated June 18, 1986, the Licensee committed to ensure that the doors will remain closed in accordance with Appendix R, Section III.N.

No automatic fire suppression systems are proposed by the Licensee for the switchgear rooms; however, automatic smoke detectors are provided in the rooms which annunciate in the main control room.

6.2.3 Reactor Building, Units 2 and 3 HPCI Rooms, Elevation 88 Feet

The analysis revealed that the HPCI rooms for Units 2 and 3 could experience fire temperatures that would allow structural steel supporting the ceiling to reach the critical temperature of 1100°F.

The HPCI rooms are provided with automatic fire detection systems and an automatic carbon dioxide (CO₂) fire suppression system which annunciate in the main control room.

6.2.4 Reactor Building, Unit 2 RHR Pump and HX Room, Elevation 91 Feet, 6 Inches

The analysis revealed that the Unit 2 RHR pump and HX room could experience fire temperatures that would allow structural steel supporting the ceiling to reach the critical temperature of 1100°F.

The Licensee has proposed to institute administrative controls for limiting ventilation to the RHR pump and HX room by monitoring the doors to the area. The steel survivability calculations for the RHR pump and HX room showed that the critical steel temperature was not reached when one door remained open. Three access doors must remain open to produce a fire of sufficient thermal intensity to jeopardize the steel in the room. Two are electrically supervised and watertight. The third is a personnel door, accessed through an electrically supervised personnel hatch and is a radiation area which further limits access.

In a letter dated June 18, 1986, the Licensee provided reasonable assurance that all three doors will not remain open simultaneously.

No automatic fire suppression system is installed in the room; however, automatic smoke detection is provided.

6.2.5 Turbine Building, Battery Rooms (Four Rooms), Elevation 135 Feet

The analysis revealed that the battery rooms could experience fire temperatures that would allow structural steel supporting the ceiling to reach the critical temperature of 1100°F.

The Licensee has proposed to institute administrative controls to limit ventilation to the battery rooms by monitoring the doors to the area. The doors to the battery rooms are electrically supervised, self-closing, and require card reader access. In a letter dated June 18, 1986, the Licensee committed to ensure that the doors will remain closed as required in accordance with Appendix R, Section III.N.

No automatic fire suppression systems are installed in the rooms. However, automatic smoke detection is provided in each of the battery rooms.

6.3 Evaluation

The Licensee's structural steel survivability analysis conforms with the methodology used by the Limerick plant, which has been previously approved by the staff. The results of the Licensee's analysis indicated failure of particular structural steel members of safe shutdown fire barriers based on the localized heating effects model and the enclosure fire model.

Seven plant areas, including a total of 25 structural steel members and the entire cable spreading room, failed due to localized heating effects. The Licensee has proposed the following measures to remedy localized heating effects problems except for the cable spreading room:

- o Coat the affected member 3 feet in each direction from the area of flame impingement with fireproofing material or, if impingement is due to cable trays, provide solid tray covers of a similar length.
- o When a cable tray runs parallel to and beneath the beam, the entire beam will be coated with a 3-foot overlap at the ends, or tray covers will be provided.
- o Beams that are jeopardized by vertical trays will be coated 5 feet in each direction from the area of flame impingement.
- o Affected structural members will be evaluated to determine their structural significance. If the members are not required structurally, no protection will be provided.

During a site visit on February 24, 1986, the Licensee stated that the boundaries of fireproofing material or tray covers (i.e., 3 or 5 feet beyond impingement area) exceeded the amount required to prevent the failure of the structural member due to localized heating effects.

The cable spreading room ceiling is not a Section III.G.2 fire barrier. An automatic CO₂ fire suppression system, which is activated by smoke detectors, is provided for the room. The provision of an automatic fire suppression system provides reasonable assurance that fire conditions in the cable spreading room would not cause steel to reach 1100°F due to localized heating effects.

The Licensee identified 17 rooms for which exemptions are requested from the requirements to fireproof required structural steel. The structural steel within each of these areas exceeded 1100°F within 3 hours based on the fully developed enclosure fire model.

Unlike the Limerick evaluation, which states that steel which exceeds 1100°F is protected with 3-hour rated insulating material where possible or, in the alternative, installed automatic sprinklers, the Licensee has proposed to institute administrative controls for limiting ventilation to certain rooms as a means of maintaining steel temperatures below 1100°F. For other rooms, the Licensee requests an exemption based on the provision of existing automatic suppression systems.

All rooms for which the Licensee proposes the administrative control of doors for limiting ventilation as a means of maintaining steel temperatures below 1100°F are provided with smoke detectors. Because of the presence of these detectors, a fire in these areas will be detected in its incipient stage. The alarms from these detectors are annunciated in the main control room. The fire brigade would be dispatched and would extinguish the fire manually using the hose lines or portable extinguishers provided.

In addition, the position of each of the above doors is electrically supervised and the Licensee has committed to ensure that the doors will remain closed in accordance with the guidelines.

The principal combustibles in these areas are cable insulation and electrical equipment. If a fire were to occur, it is expected that it would develop slowly with an initial low heat release rate and a slow rise in room temperature.

Until the fire is extinguished by the plant fire brigade, the electrical supervision of doors, the nature of installed combustibles, and the provision of administrative controls provide sufficient protection to ensure that one shutdown division would remain free of fire damage.

The provisions of automatic suppression systems provide reasonable assurance that fire conditions in the M-G set rooms and Units 2 and 3 HPCI rooms would not cause steel temperatures to reach 1100°F.

6.4 Conclusion

Based on the above evaluation, the staff concludes that the existing fire protection in conjunction with proposed modifications provide a level of fire protection equivalent to Section III.G.2.a of Appendix R. Therefore, the exemption requests for unprotected structural steel in these areas should be granted.

7.0 SUMMARY

Based on this evaluation, it is found that the level of fire safety in the areas listed below is equivalent to that achieved by compliance with the technical requirements of Section III.G of Appendix R and, therefore, the Licensee's request for exemption in the following areas should be granted.

1. Radwaste Building HVAC Equipment Area, Room 292, Elevation 150 feet.

Fire dampers in barriers between radwaste building HVAC equipment area and duct chase located in the remote shutdown panel area. Refer to Section 2.0 for additional information.

2. Turbine and Reactor Buildings, Fire Areas 8 and 50.

Fire suppression system throughout each of the identified fire areas. Refer to Section 3.0 for additional information.

3. o Units 2 and 3 Main Steam Pipe Tunnel, Elevation 135 Feet.

Fire dampers in barriers between redundant trains of cables and equipment. Refer to Section 4.0 for additional information.

- o Standby Gas Treatment System.

Fire dampers in barriers between redundant trains of cables and equipment. Refer to Section 4.0 for additional information.

- o Control Rod Drive Equipment Area.

Fire damper in barriers between redundant trains of equipment. Refer to Section 4.0 for additional information.

- o Switchgear Room Duct Chase.

Fire dampers in barriers between redundant trains of equipment. Refer to Section 4.0 for additional information.

- o Spent Resin Tank Room.

Fire dampers in barriers between redundant trains of cables and equipment. Refer to Section 4.0 for additional information.

4. Outboard Main Steam Isolation Valve Rooms.

Fire barrier between redundant trains of cables and equipment. Refer to Section 5.0 for additional information.

5. o Radwaste Building, Units 2 and 3 M-G Set Rooms, Elevation 135 Feet.

Protection of structural steel forming a part of or supporting a fire barrier. Refer to Section 6.0 for additional information.

- o Reactor Building, Units 2 and 3 HPCI Rooms, Elevation 88 Feet.

Protection of structural steel forming a part of or supporting a fire barrier. Refer to Section 6.0 for additional information.

- o Turbine Building, Emergency Switchgear Rooms, Elevation 135 Feet.

Protection of structural steel forming a part of or supporting a fire barrier. Refer to Section 6.0 for additional information.

- o Turbine Building, Battery Rooms, Elevation 135 Feet.

Protection of structural steel forming a part of or supporting a fire barrier. Refer to Section 6.0 for additional information.

- o Reactor Building, RHR Pump and HX Room, Elevation 91 Feet, 6 Inches.

Protection of structural steel forming a part of or supporting a fire barrier. Refer to Section 6.0 for additional information.

Principal Contributors

This safety evaluation was prepared by John Stang based on a Technical Evaluation Report prepared by Franklin Research Center (FRC) under a contract with the U.S. Nuclear Regulatory Commission (NRC).

Dated December 31, 1986

Attachment:
Technical Evaluation Report

TECHNICAL EVALUATION REPORT

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EVALUATION OF FIRE PROTECTION EXEMPTION REQUESTS
FROM 10CFR50.48 AND APPENDIX R TO 10CFR50

PHILADELPHIA ELECTRIC COMPANY
PEACH BOTTOM ATOMIC POWER STATION UNITS 2 AND 3

TER-C5506-629

Prepared for

Nuclear Regulatory Commission
Washington, D.C. 20555

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FOREWORD

This Technical Evaluation Report was prepared by Franklin Research Center (FRC) under a contract with the U.S. Nuclear Regulatory Commission (Office of Nuclear Reactor Regulation) for technical assistance in support of NRC operating reactor licensing actions. The technical evaluation was conducted in accordance with criteria established by the NRC.

Mr. Daniel Arnold contributed to the technical preparation of this report through a subcontract with Rolf Jensen & Associates, Inc.

1. INTRODUCTION

1.1 PURPOSE OF REVIEW

This technical evaluation report documents an independent review of exemptions or deviations from the fire protection requirements of 10CFR50.48 or Appendix R to 10CFR50 requested for Philadelphia Electric Company's (PECO) Peach Bottom Atomic Power Station Units 2 and 3. This evaluation was performed with the following objectives:

- o To assess if each exemption request demonstrates an equivalent level of overall protection of plant safe shutdown capability following a disabling fire event
- o To determine the bases for acceptance or denial of each exemption request
- o To recommend the minimum level of fire protection the Licensee should provide to achieve an equivalent level of fire protection in case a request is denied.

1.2 GENERIC BACKGROUND

Following a major fire at the Browns Ferry Nuclear Station in March 1975, the NRC established a Special Review Group which initiated an evaluation of the need for improving the fire protection programs at all nuclear power plants. The group found serious design inadequacies regarding fire protection at Browns Ferry, and its report, "Recommendation Related to Browns Ferry Fire" (NUREG-0050, February 1976), contained over 50 recommendations regarding improvements in fire prevention and control in existing facilities. The report also called for the development of specific guidance for implementing fire protection regulations, and for a comparison of that guidance with the fire protection program at each operating plant.

NRC developed technical guidance from the technical recommendations in the Special Group's report, and issued those guidelines as Branch Technical Position (BTP) APCS 9.5-1 [1]. This guidance did not apply to plants operating at that time. Guidance to operating plants was provided later in Appendix A to BTP APCS 9.5-1 [2], which, to the extent practicable, relies on BTP APCS 9.5-1. The guidance in these documents was also published as Regulatory Guide 1.120 [3].

By early 1980, most operating plants had implemented most of the guidelines in Appendix A. However, the fire protection program has had some significant problems with implementation. To establish a definitive resolution of these problems in a manner consistent with the general guidelines in Appendix A to the BTP and to assure timely compliance by licensees, the Commission issued a proposed fire protection rule and its Appendix R, which was

described as setting out minimum fire protection requirements for the unresolved issues. The fire protection features addressed included protection of safe shutdown capability, emergency lighting, fire barriers, associated circuits, reactor coolant pump lubrication system, and alternate shutdown systems.

On February 17, 1981, the final rule 10CFR50.48 [4] and Appendix R to 10CFR50 [5] became effective, replacing the proposed rule. Only three of the 15 items in Appendix R were of such safety significance that they should apply to all plants, including those for which alternative fire protection actions had been approved previously by the staff. These items are protection of safe shutdown capability (including alternate shutdown systems), emergency lighting, and the reactor coolant pump lubrication system. Accordingly, the final rule required all reactors licensed to operate before January 1, 1979, to comply with these three items even if the NRC had previously approved alternative fire protection features in these areas. However, the final rule is more flexible than the proposed rule because Item III.G now provides three alternative fire protection features which do not require analysis to demonstrate the protection of redundant safe shutdown equipment, and reduces the acceptable distance in the physical separation alternative from 50 feet to 20 feet. In addition, the rule now provides an exemption procedure which can be initiated by a licensee's assertion that any required fire protection feature will not enhance fire protection safety in the facility or that such modifications may be detrimental to overall safety.

In summary, Section III.G is related to fire protection features for ensuring that systems and associated circuits used to achieve and maintain safe shutdown are free of damage. Either fire protection configurations must meet the specific requirements of Section III.G or an alternative fire protection configuration must be justified by a fire hazards analysis. Generally, the staff will accept an alternative fire protection configuration if:

- o The alternative ensures that one train of equipment necessary to achieve hot shutdown from either the control room or emergency control stations is free of fire damage.
- o The alternative ensures that fire damage to at least one train of equipment necessary to achieve cold shutdown is limited so that it can be repaired within a reasonable time (minor repairs using components stored on the site).
- o Fire-retardant coatings are not used as fire barriers.
- o Modifications required to meet Section III.G would not enhance fire protection safety levels above those provided by either existing or proposed alternatives.
- o Modifications required to meet Section III.G would be detrimental to overall facility safety.

Guidance to the industry and the NRC position on certain requirements of Appendix R is covered by various documents, one of them being Generic Letter 83-33 [6], which has recently been superseded by Generic Letter 86-10 [7]. "The interpretations of Appendix R" and "the responses to industry questions," two sections of Reference 7, are written to facilitate industry implementation of Appendix R and represent NRC position on all issues covered.

Following the promulgation of the final rule, licensees have requested exemptions and deviations from Appendix R to 10CFR50. The exemptions and deviations are in the form of a fire hazards analysis. The NRC is to review exemption requests and associated analyses to ensure each alternative to meeting the requirements of the rule provides an equivalent level of overall protection of plant safe shutdown capability. Franklin Research Center (FRC) was to provide technical assistance to the NRC within the context of the following scope of work [8]:

Subtask 1: Review each exemption request for information deficiencies. Provide Request for Information (RFI) to resolve such deficiencies.

Subtask 2: Review and evaluate each exemption or deviation request submitted by the licensees and all additional information provided for conformance with acceptance criteria. Prepare final Technical Evaluation Report (TER) with recommendations, and their basis in support of granting or denying the exemption/deviation request.

1.3 PLANT-SPECIFIC BACKGROUND

By letters dated September 17 [12], 1984 and May 23 [10] and September 24 [9], 1985, the Philadelphia Electric Company (PECO, the Licensee) requested exemptions from Section III.G of Appendix R to 10 CFR 50. By letters dated March 29 [13], June 6, 1985 [14], and March 7, 1986 [15], the Licensee transmitted structural steel evaluations, delineated proposed modifications, as well as requested exemptions from Section III.G.2. These exemption requests are the subject of this evaluation.

The RFI required in satisfaction of Subtask 1 was transmitted to the NRC on January 2, 1986 [10] followed by a site visit on February 2, 1986.

The contents of this TER reflect the information contained in the Licensee's submittals identified above, as well as the information provided or collected during the site visit. The final TER also incorporates/resolves NRC comments received to date.

1.4 REVIEW CRITERIA

The criteria used in reviewing the Licensee-submitted exemption requests are based on the following documents:

1. Fire Protection Program for Operating Nuclear Power Plants, 10CFR50.48
2. Appendix R to 10CFR50
3. Standard Review Plan, NUREG-0800, Branch Technical Position (BTP), APCSB 9.5-1, "Guidelines for Fire Protection for Nuclear Power Plants"
4. Appendix A to BTP APCSB 9.5-1
5. Generic Letter 86-10, "Implementation of Fire Protection Requirements," dated April 24, 1986.

2. EVALUATION

2.1 GENERAL

This section presents review and evaluation of exemptions or deviations from 10CFR50.48 or Appendix R to 10CFR50 requested by the Licensee (PECO) of Peach Bottom Atomic Power Station Units 2 and 3. Evaluation of exemption requests for each fire area/zone singly or collectively follows a format suggested by the NRC and is arranged in the following subsections:

- o Exemption requested
- o Discussion
- o Evaluation
- o Conclusion.

The fire area/fire zone numbering used in this section corresponds to that used in the Licensee's submittal.

2.2 RADWASTE BUILDING HVAC EQUIPMENT AREA (ROOM 292, ELEVATION 150 FEET)

2.2.1 Exemption Requested

An exemption was requested from the requirements of Section III.G.2.a to the extent that it requires the separation of cables, equipment, and associated nonsafety circuits of redundant trains by a fire barrier having a 3-hour fire resistance rating.

2.2.2 Discussion

The Licensee has stated that the fire barrier between the radwaste building HVAC equipment area and between the duct chase located in the remote shutdown panel (RSP) area does not meet the requirements of Section III.G.2.a because of the lack of fire dampers. The barrier is located on elevation 150 feet, room 292. The radwaste building HVAC equipment area contains no safety-related equipment. The RSP area contains cables associated with several safe shutdown systems.

A 42-inch by 30-inch duct associated with the equipment cell exhaust system penetrates the west wall of the radwaste building fan room. This system vents the condensate phase separator tanks, the waste surge tanks, and other radwaste processing equipment located inside the radwaste building. In addition, a 42-inch by 44-inch duct associated with the radwaste building exhaust fans penetrates the same barrier. Neither of these two duct penetrations is provided with a fire damper.

The radwaste building fan room has an equivalent fire severity of 6 minutes based on the ASTM E-119 time-temperature curve. The

duct chase located in the RSP area has an equivalent fire severity of approximately 30 minutes.

The majority of the combustible loading in the RSP area is due to cable trays located at the ceiling at elevation 165 feet, approximately 15 feet above the penetrations of concern. There are cable trays located within the duct chase in the RSP area.

The existing fire protection for the RSP area consists of fire extinguishers, smoke detectors, and manual hose stations. The Licensee has committed to install line-type heat detectors for the cable trays in the RSP area. The radwaste building HVAC equipment area is protected with portable extinguishers and manual hose stations. No automatic fire detection is provided in this area.

Ducts at the penetrations described above are 10-gauge welded steel construction. This construction is maintained from the radwaste building exhaust fans through the RSP area.

Alternate shutdown capability is committed to be provided independent of both the RSP area and the radwaste building HVAC equipment area for a fire in the remote RSP area.

2.2.3 Evaluation

The fire barrier separating the RSP area and the radwaste building HVAC equipment area does not comply with the technical requirements of Section III.G.2.a of Appendix R because 3-hour rated fire dampers are not installed in duct penetrations.

The principal concern with the level of fire protection was that, because of the absence of these dampers, a fire of significant magnitude could develop and damage redundant shutdown-related systems.

However, the combustible loading in the radwaste building HVAC equipment area is low. The principal combustibles in the adjacent duct chase are cable trays located above and remote from the duct penetrations. If a fire were to occur, it is expected that it would develop slowly with an initial low heat release rate and a slow rise in room temperature.

The duct at the penetrations is of substantial welded steel construction, reducing the probability of fire propagation through the penetration.

Line-type heat detectors will be provided for the cable trays in the RSP area. Because of the existing smoke detectors in the RSP area and the line-type heat detectors for the cable trays, a fire in this area will be detected in its incipient stage. The alarms from these detectors are annunciated in the main control room. The fire brigade would be dispatched and would extinguish the fire manually, using the hose lines or portable extinguishers provided.

Until the fire is extinguished by the plant fire brigade, the substantial construction of the ducts penetrating the fire barrier, the low combustible loading of the radwaste HVAC fan area, the provision of alternate shutdown capability outside of the RSP and the HVAC equipment areas provide sufficient passive protection to afford reasonable assurance that one shutdown division would remain free of fire damage.

A major factor that reduces the fire risk is that redundant safe shutdown system equipment is well separated with no intervening combustibles. In addition, alternative shutdown will be installed independent of the RSP and radwaste building equipment areas for a fire in the RSP area.

With the fire protection features as described above, there is reasonable assurance that a fire in the above area will not prevent the plant from safely shutting down.

2.2.4 Conclusion

Based on the above evaluation, it is concluded that the existing fire protection combined with the proposed modifications provide a level of fire protection equivalent to the technical requirements of Section III.G.2.a of Appendix R. Therefore, the exemption request for the aforementioned duct penetrations can be granted.

2.3 TURBINE AND REACTOR BUILDINGS, ELEVATION 195 FEET (FIRE AREAS 8 AND 50)

2.3.1 Exemption Requested

An exemption was requested from the specific requirements of Section III.G.2.b to the extent that it requires an automatic fire suppression system throughout each of the identified fire areas.

2.3.2 Discussion

The Licensee has stated that Fire Areas 8 and 50 at elevation 195 feet do not meet the requirements of Section III.G.2.b because automatic fire suppression systems are not installed throughout each area.

Fire Area 8 consists of the south half of elevation 135 feet of the Unit 2 reactor building and elevations 165, 195, and 234 feet of the reactor building. Fire Area 50 comprises the majority of the turbine building. The lower elevations of Fire Area 8 (elevations 135 and 165 feet) contain components/equipment of the residual heat removal (RHR) system (train A), RCIC system, and ac emergency power system. The lower elevations of Fire Area 50 (elevation 116 feet and below) contain cables for the RHR system (trains B and D), ac power system (trains B and D), and ESW system (train B). Separation between safe shutdown equipment exceeds 100 feet with several intermediate barriers including floor slabs.

Fire Areas 8 and 50 are separated by qualified 3-hour fire barriers except for certain penetrations on elevation 195 feet. The barrier between the two areas (on elevation 195 feet) is penetrated by two ventilation ducts without fire dampers and several small, unsealed openings around tubing and conduit. The door in the barrier on elevation 195 feet is a 3-hour rated fire door.

Fire Area 8 on elevation 195 feet is approximately 11,500 square feet in area. There is a clear floor-to-ceiling height of 17 feet and an open stairwell (through the ceiling only) with an effective ceiling height of 37 feet. The area contains ventilation equipment associated with the reactor building and the standby liquid control pumps and tanks. The fixed combustible loading for Fire Area 8 is approximately 5,500 Btu per square foot, which is equivalent to a fire severity of approximately 5 minutes based on the ASTM E-119 time-temperature curve. The fixed combustibles consist of cable insulation and HVAC filter media. There is no instance of combustible materials penetrating the wall between the two fire areas.

Fire Area 50 on elevation 195 feet is approximately 9,000 square feet in area with a clear floor-to-ceiling height of 15 feet. The fixed combustible loading for Fire Area 50 is approximately 19,500 Btu per square foot, which is equivalent to a fire severity of approximately 15 minutes.

General area fire detection is provided for Fire Area 8 with 10 smoke detectors on elevation 195 feet. The detectors alarm in the main control room. There is no fire detection on elevation 195 feet of Fire Area 50. Fire detection is provided on elevation 116 feet of Fire Area 50 where safety-related equipment is located.

Automatic suppression capability is not provided in these areas. Three hose reels and 10 portable extinguishers are located in Fire Area 8. Three portable extinguishers are located in Fire Area 50.

2.3.3 Evaluation

Fire Areas 8 and 50 on elevation 195 feet do not comply with the technical requirements of Section III.G.2.b of Appendix R because automatic fire suppression systems are not installed throughout each area. In addition, 3-hour rated fire dampers are not installed in duct penetrations and several penetration openings around tubing and conduit are unsealed on elevation 195 feet. Except for these penetrations, Fire Areas 8 and 50 are separated by qualified 3-hour fire barriers.

The principal concern with the level of fire protection was that because of the absence of suppression systems or fire dampers and penetration seals, a fire of significant magnitude could develop and damage redundant shutdown systems.

However, the combustible loadings in Fire Areas 8 and 50 are low; 5,500 and 19,500 Btu per square foot, respectively. The principal combustibles consist of cable insulation and HVAC filter media. There is no instance of combustible materials penetrating the wall between the two fire areas on elevation 195 feet.

Smoke detectors are provided in Fire Area 8 on elevation 195 feet. Fire detection is provided on elevation 116 feet of Fire Area 50 where safety-related equipment is located. The alarms from these detectors are annunciated in the main control room. Upon detection of a fire, the fire brigade would be dispatched and would extinguish the fire with the hose lines or portable extinguishers provided.

A major factor that reduces fire propagation through these unprotected openings is that redundant safe shutdown equipment is well separated with no intervening combustibles. No safe shutdown equipment is located on either side of these penetrations of elevation 195 feet. Lower elevations of Fire Area 8 (elevations 135 and 165 feet) and Fire Area 50 (elevations 116 feet and below) contain safe shutdown cables and equipment. Fire Areas 8 and 50 are separated by qualified 3-hour barriers at these elevations. Separation between safe shutdown equipment exceeds 100 feet with no intervening combustibles and several intermediate barriers including floor slabs.

Until the fire is extinguished, the separation and intermediate barriers between safe shutdown systems, the lack of intervening combustibles, and the low combustible loading of Fire Areas 8 and 50 on elevation 195 feet will provide sufficient passive protection to provide reasonable assurance that one shutdown division would remain free of fire damage.

With the fire protection features as described above, there is reasonable assurance that a fire in the above area will not prevent the plant from safely shutting down.

2.3.4 Conclusion

Based on the above evaluation, it is concluded that the existing fire protection features provide a level of fire protection equivalent to the technical requirements of Section III.G.2.b of Appendix R. Therefore, the exemption request from the requirement for the fixed fire suppression systems throughout each of the identified fire areas at elevation 195 feet can be granted.

- 2.4 ○ UNITS 2 AND 3 MAIN STEAM PIPE TUNNEL, ELEVATION 135 FEET
- STANDBY GAS TREATMENT SYSTEM, DAMPER PENETRATIONS
- UNIT 2 CONTROL ROD DRIVE EQUIPMENT AREA, ELEVATION 135 FEET

- UNIT 2 SWITCHGEAR ROOM DUCT CHASE, ELEVATIONS 135 AND 165 FEET
- SPENT RESIN TANK ROOM, COMMON, ELEVATION 91 FEET, 6 INCHES

2.4.1 Exemption Requested

Exemptions were requested from the specific requirements of Section III.G.2.a to the extent that it requires separation of cables, equipment, and associated nonsafety circuits of redundant trains by a fire barrier having a 3-hour fire resistance rating.

2.4.2 Discussion

The Licensee has stated that duct penetrations do not meet the requirements of Section III.G.2.a because of either the lack of fire dampers or the installation of dampers with a fire rating of less than 3 hours.

The following locations were addressed in an exemption request in the Licensee's letter dated September 17, 1984. For clarity, penetration numbers used in the Licensee's letter are used in this discussion.

2.4.2.1 Units 2 and 3 Main Steam Pipe Tunnel, Elevation 135 Feet

There are four ducts that penetrate the main steam isolation valve room on elevation 135 feet which are not provided with fire dampers.

Penetration 1 consists of a 36-inch by 20-inch steel duct through the north wall of the Unit 3 main steam pipe tunnel. The equivalent fire severities in areas adjacent to the north wall are approximately 2 minutes and 40 minutes based on the ASTM E-119 time-temperature curve.

Penetration 2 consists of a 28-inch by 32-inch steel duct through the south wall of Unit 2 main steam pipe tunnel. The equivalent fire severities in areas adjacent to the south wall are approximately 2 minutes and 31 minutes.

A 35-inch by 21-inch steel duct (penetration 21) penetrates the south wall of Unit 2 main steam tunnel. The pipe tunnel side of the south wall has no combustible loading, with the adjacent side having an equivalent fire severity of approximately 36 minutes.

The north wall of the Unit 2 main steam pipe tunnel is penetrated by a 28-inch by 32-inch steel duct (penetration 22). The pipe tunnel side of the north wall has no combustible loading, with the adjacent side having an equivalent fire severity of approximately 30 minutes.

Each of the above duct penetrations is associated with the ventilation supply or exhaust of an outboard main steam isolation valve room. Fire detection is provided on at least one side of each of the above penetrations. The detectors alarm in the main control room.

2.4.2.2 Standby Gas Treatment System, Damper Penetrations

There are 17 duct penetrations through 3-hour barriers associated with the standby gas treatment system (SGTS) which do not have fire dampers. They are penetrations 3 through 12, 16, 17, 19, 20, 23, 24, and 27. Each location is in one of two main exhaust lines to the SGTS. One exhaust line is from the refueling floor and the second line is from the reactor building. The reactor building is separated from the refueling floor by a sealed hatch.

The maximum equivalent fire severity in an area adjoining any affected barrier is 41 minutes; however, the combustible loadings are generally considerably lower. Fire detectors, which alarm in the main control room, are located on at least one side of each of these penetrations.

All penetrations consist of a 24-inch circular steel duct, except for penetration 27, which is a 36-inch carbon steel exhaust pipe from the SGTS fans.

The Licensee stated that the ducts are too small to insert two dampers side by side because of system friction loss. The alternative of providing 17 bypass ducts at these locations is also not feasible based on penetrating reinforced concrete slabs as thick as 3 feet, structural integrity, plant interference, and scheduling and monitoring all work activities to assure an operable SGTS.

2.4.2.3 Unit 2 Control Rod Drive Equipment Area, Elevation 135 Feet

Penetration 18 is through the floor of the Unit 2 control rod drive equipment area, elevation 135 feet. This penetration is for a duct which supplies ventilation air to the torus. The penetration is not provided with a fire damper. The duct is an 18-inch carbon steel, schedule 40 pipe from the barrier to the torus.

The equivalent fire severities in areas adjacent to this penetration are low, 30 minutes and 10 minutes. Fire detectors, which alarm in the main control room, are located on both sides of this penetration.

2.4.2.4 Unit 2 Switchgear Room Duct Chase, Elevations 135 and 165 Feet

Penetration 13 consists of a 16-inch by 28-inch duct through the west wall of the duct chase on elevation 165 feet. The duct is

associated with the chemical lab exhaust system for Unit 2. This penetration contains two fire dampers in series, each rated at 1-1/2 hours, located on either side of the barrier.

On elevation 135 feet, the west wall of the switchgear room duct chase has two duct penetrations. Penetration 14 (12-inch by 28-inch) is associated with the general exhaust system for Unit 2. Penetration 15 (18-inch by 28-inch) is associated with the Unit 2 radiation chemistry lab supply system. Each of these ducts contains two fire dampers in series, each rated at 1-1/2 hours, located on either side of the barrier.

The equivalent fire severities in areas adjacent to these penetrations is minimal, approximately 5 minutes in the chemical laboratory. The duct chase has no combustible loading. Fire detectors, which alarm in the main control room, are located on at least one side of each of these penetrations.

2.4.2.5 Spent Resin Tank Room, Elevation 91 Feet, 6 Inches

Penetrations 25 and 26 are through the east wall of the spent resin tank room. The penetrations consist of 18-inch ducts equivalent to schedule 40 pipes which serve the equipment cell exhaust system. Each duct contains two 1-1/2-hour fire dampers, one on either side of the barrier, which is not an approved installation by Underwriters Laboratories.

The equivalent fire severities in areas adjacent to the east wall are approximately 4 minutes and 2 minutes based on the ASTM E-119 time-temperature curve. No fire detection is provided.

2.4.3 Evaluation

The fire protection for the above penetrations does not comply with the technical requirements of Section III.G.2.a of Appendix R because 3-hour rated fire dampers are not installed.

The principal concern with the level of fire protection was that because of the absence of these dampers, a fire of significant magnitude could develop and damage redundant shutdown systems.

However, the combustible loading in areas adjacent to each of these penetrations is low. If a fire were to occur, it would develop slowly with an initial low heat release rate and a slow rise in room temperature. All ducts are of substantial steel construction, reducing the probability of fire propagation through the penetrations.

In addition, smoke detectors are provided on at least one side of each of these penetrations. Because of the presence of these detectors, a fire in these areas will be detected in its incipient stage. The alarms from these detectors are annunciated in the main control room. The fire brigade would be dispatched and would extinguish the fire manually using the hose lines or portable extinguishers provided.

2.4.3.1 Units 2 and 3 Main Steam Pipe Tunnel, Elevation 135 Feet

The Licensee has stated that inadvertent closure of a damper in the supply or exhaust ductwork of an outboard main steam isolation valve room at penetrations 1, 2, 21, or 22 could cause a Group I isolation, (i.e., MSIV closure) and a resultant reactor transient. No modification to the room temperature monitors is contemplated because of the necessity to detect a genuine steam leak.

The equivalent fire severities in areas adjacent to these penetrations are approximately 2 minutes and 40 minutes based on the ASTM E-119 time-temperature curve.

The existing fire protection in this area consists of fire extinguishers, manual hose stations, and smoke detectors on one side of each penetration. The alarms from these detectors are annunciated in the main control room. The fire brigade would be dispatched and would extinguish the fire manually using the hose lines or portable extinguishers provided.

Until the fire is extinguished, the separation and intermediate barriers between safe shutdown systems, the steel construction of the duct, and the low combustible loadings will provide sufficient passive protection to provide reasonable assurance that one shutdown division will remain free of fire damage.

2.4.3.2 Standby Gas Treatment System, Damper Penetrations

Penetrations 3 through 12, 16, 17, 19, 20, 23, 24, and 27 are associated with the SGTS and are not provided with fire dampers. The maximum equivalent fire severity in an area adjacent to these penetrations is 41 minutes based on ASTM E-119.

Each location is in one of two main exhaust lines to the SGTS. Inadvertent closure of a damper at any of these locations would jeopardize secondary containment capability in the event of reactor building isolation. Plant technical specifications require both units to be shut down and no fuel movement allowed if one branch of the SGTS is out of service for over 7 days.

Fire detectors, which alarm in the main control room, are located on at least one side of each of these penetrations. Upon detection of a fire, the fire brigade would be dispatched and would extinguish the fire with the hose lines or portable extinguishers provided.

Until the fire is extinguished, the low combustible loading and the substantial duct construction will provide sufficient passive protection and reasonable assurance that one shutdown division would remain free of fire damage.

2.4.3.3 Unit 2 Control Rod Drive Equipment Area, Elevation 135 Feet

Penetration 18 is an 18-inch carbon steel pipe which supplies ventilation air to the torus. The equivalent fire severities in areas adjacent to this barrier are low, 30 minutes and 10 minutes.

Fire detectors, which alarm in the main control room, are located on both sides of this penetration. Upon detection of a fire, the fire brigade would be dispatched and would extinguish the fire with the hose lines or portable extinguishers provided.

Until the fire is extinguished, the low combustibile loading and the substantial duct construction will provide sufficient passive protection and reasonable assurance that one shutdown division would remain free of fire damage.

2.4.3.4 Unit 2 Switchgear Room Duct Chase, Elevations 135 and 165 Feet

Penetrations 13, 14, and 15 each contain two 1-1/2-hour fire dampers in series. The maximum combustibile load on either side of these penetrations is approximately 5 minutes based on ASTM E-119 time-temperature curve.

Fire detectors, which alarm in the main control room, are located on at least one side of each of these penetrations. Upon detection of a fire, the fire brigade would be dispatched and would extinguish the fire with the hose lines or portable extinguishers provided.

Until the fire is extinguished, the two 1-1/2-hour fire dampers, the low combustibile loading, and the substantial duct construction will provide sufficient passive protection and reasonable assurance that one shutdown division would remain free of fire damage.

2.4.3.5 Spent Resin Tank Room, Common, Elevation 91 Feet, 6 Inches

Penetrations 25 and 26 contain 1-1/2-hour rated dampers located outside the walls on each side of the penetration. These dampers were installed outside of the wall because of existing equipment interference in the area. The fire loadings on each side of the barrier are minimal and the duct is manufactured of schedule 40 steel.

Fire detectors, which alarm in the main control room, are located on at least one side of each of these penetrations. Upon detection of a fire, the fire brigade would be dispatched and would extinguish the fire with the hose lines or portable extinguishers provided.

Until the fire is extinguished, the intermediate barriers between safe shutdown systems, the two 1-1/2-hour rated fire dampers, the low combustible loading, and the substantial duct construction will provide sufficient passive protection and reasonable assurance that one shutdown division would remain free of fire damage.

2.4.4 Conclusion

Based on the above evaluations, it is concluded that the existing fire protection features provide a level of fire protection equivalent to the technical requirements of Section III.G.2.a of Appendix R. Therefore, the exemption requests for the identified penetrations can be granted.

2.5 OUTBOARD MAIN STEAM ISOLATION VALVE ROOMS (FIRE AREAS 208 AND 254)

2.5.1 Exemption Requested

An exemption was requested from the specific requirements of Section III.G.2.a to the extent that it requires separation of cables, equipment, and associated nonsafety circuits of redundant trains by a fire barrier having a 3-hour fire resistance rating.

2.5.2 Discussion

The Licensee has stated that non-rated blowout panels and an open vertical labyrinth in these fire areas do not meet the requirements of Section III.G.2.a.

Fire Areas 208 and 254 are the outboard main steam isolation valve (MSIV) rooms. Each room has a total of 386 square feet of blowout panels. The blowout panels are not fire rated for 3 hours. In addition, these rooms are open to the adjacent reactor building general access area by an open vertical labyrinth.

The blowout panels and open labyrinth are provided for steam venting in the event of a high energy line break. One panel in the labyrinth vents the MSIV room to the reactor building access area on elevation 135 feet. The MSIV room and reactor building access area have equivalent fire severities of approximately 1 minute and 40 minutes, respectively. A second panel vents into the moisture separator area of the turbine building, which has an equivalent fire severity of approximately 25 minutes. There are no intervening combustibles between the MSIV rooms and general access area.

The only equipment inside the MSIV rooms required to operate are the injection valves for the RCIC and HPCI systems. There is also a steam supply valve for the RCIC system within the area, however, it is normally in its correct operating position.

The Licensee stated that the RCIC or HPCI injection valves are operated during the initial phases of safe shutdown. Once these valves are in the operating position, there is no requirement to operate them further. The valves cannot be caused to operate spuriously from the MSIV rooms.

2.5.3 Evaluation

Fire barriers separating the outboard MSIV rooms, the reactor building general access area, and moisture separator area of the turbine building do not comply with the technical requirements of Section III.G.2.a of Appendix R because of non-rated blowout panels and an open labyrinth.

There was a concern that because of these unrated openings, a fire could propagate through these openings and damage redundant shutdown systems.

However, the combustible loading in the MSIV rooms are negligible. The combustible loadings in the reactor building access area and moisture separator area are low. The principal combustible in these areas are cable trays. If a fire were to occur, it would develop slowly with initial low heat release rate and a slow rise in room temperature.

There are no intervening combustibles between the MSIV rooms and adjoining spaces.

A major factor that reduces the fire risk is that equipment required inside the MSIV rooms are required early during shutdown. The equipment cannot be caused to operate spuriously from the MSIV room.

Until the fire is extinguished, the noncombustible blowout panels, the lack of intervening combustibles, the low combustible loading, and the inability for spurious operation will provide sufficient passive protection and reasonable assurance of the ability to achieve and maintain safe shutdown.

2.5.4 Conclusion

Based on the above evaluation, it is concluded that the existing protection provides a level of fire protection equivalent to the technical requirements of Section III.G.2.a of Appendix R. Therefore, the exemption request for the blowout panels and open labyrinth can be granted.

- 2.6 ○ RADWASTE BUILDING, UNITS 2 AND 3 M-G SET ROOMS, ELEVATION 135 FEET
- REACTOR BUILDING, UNITS 2 AND 3 HPCI ROOMS, ELEVATION 88 FEET
- TURBINE BUILDING, EMERGENCY SWITCHGEAR ROOMS, ELEVATION 135 FEET

- o TURBINE BUILDING, BATTERY ROOMS, ELEVATION 135 FEET
- o REACTOR BUILDING, RHR PUMP AND HX ROOM, ELEVATION 91 FEET, 6 INCHES

2.6.1 Exemption Requested

An exemption was requested from the requirements of Section III.G.2 to the extent that it requires structural steel forming a part of or supporting fire barriers to be protected to provide fire resistance equivalent to that of the barrier.

2.6.2 Discussion

The Licensee has stated that several areas where structural steel forming a part of or supporting required fire barriers are not fireproofed. By letter dated March 29, 1985, the Licensee submitted a structural steel survivability analysis. By letter dated June 6, 1985, the Licensee submitted evaluations including proposed fixes of each plant area which the analysis revealed fire durations and temperatures exceeding the structural steel acceptance criteria.

The analysis uses a mathematical model to calculate the potential time-temperature profile for fires in each fire area. Two fire modeling methodologies are employed in the analysis. A fully developed enclosure fire model is used to evaluate the average gas mixture temperature in the enclosure. Secondly, local heating effects on steel members are assessed by flame and fire plume impingement calculations. These fire models form the basis of the structural steel survivability analysis.

The overall approach follows the Limerick plant evaluation, which has been previously approved. In the Limerick plant evaluation, if the steel temperature exceeded 1100°F within 3 hours, the steel was protected with 3-hour rated barriers where possible. However, in areas where congestion prevented the effective application of insulating materials to the steel, an automatic sprinkler system was provided as an alternate form of protection. This approach provided an adequate level of fire protection and was acceptable for the Limerick plant.

Specific exemptions from the technical requirements of Section III.G.2 were requested by the Licensee for 17 specific areas by letter dated March 7, 1986. A discussion of these exemptions is provided below.

2.6.2.1 Radwaste Building, Units 2 and 3 M-G Set Rooms, Elevation 135 Feet

The analysis revealed that Units 2 and 3 M-G set rooms, elevation 135 feet could experience fire temperatures that would allow structural steel supporting the ceiling to reach the critical temperature of 1100°F. The only scenario which resulted in the

critical temperature required that two doors are assumed open for approximately 2 hours. The doors to the M-G set rooms are self-closing, electrically supervised security doors.

The M-G set rooms contain a large quantity of combustible liquids. The Licensee has committed to extend the existing sprinkler system to provide floor area coverage for an oil spill fire. The extended sprinkler system is not planned to protect the existing energized load centers in the rooms.

2.6.2.2 Turbine Building Emergency Switchgear Rooms (Eight Rooms), Elevation 135 Feet

The analysis revealed that the turbine building emergency switchgear rooms could experience fire temperatures that would allow structural steel supporting the ceiling to reach the critical temperature of 1100° F. The steel survivability calculations indicated that the structural steel did not reach the critical steel temperature for 30 minutes if one door remained open.

The Licensee has proposed to institute administrative controls for limiting ventilation to the switchgear rooms by monitoring the doors to the area. The doors to the switchgear rooms are electrically supervised security, self-closing doors with card reader access. In a letter dated June 18, 1986, the Licensee committed to ensure that the doors will remain closed in accordance with Appendix R, Section III.N.

No automatic fire suppression systems are proposed by the Licensee for the switchgear rooms, however, automatic smoke detectors, which annunciate in the main control room, are provided in the rooms.

2.6.2.3 Reactor Building, Units 2 and 3 HPCI Rooms, Elevation 88 Feet

The analysis revealed that the HPCI rooms for Units 2 and 3 could experience fire temperatures that would allow structural steel supporting the ceiling to reach the critical temperature of 1100° F.

The HPCI rooms are provided with automatic fire detection systems and an automatic carbon dioxide (CO₂) fire suppression system which annunciate in the main control² room.

2.6.2.4 Reactor Building, Unit 2 RHR Pump and HX Room, Elevation 91 Feet, 6 Inches

The analysis revealed that the Unit 2 RHR pump and HX room could experience fire temperatures that would allow structural steel supporting the ceiling to reach the critical temperature of 1100° F.

The Licensee has proposed to institute administrative controls for limiting ventilation to the RHR pump and HX room by monitoring the doors to the area. The steel survivability calculations for the RHR pump and HX room showed that with one of two doors assumed open, the critical steel temperature was not reached. Three access doors must remain open to produce a fire of sufficient thermal intensity to jeopardize the steel in the room. Two doors are electrically supervised and watertight. The third door is a personnel door, accessed through an electrically supervised personnel hatch. The area is a radiation area, which further limits access.

In a letter dated June 18, 1986, the Licensee provided reasonable assurance that all three doors will not remain open simultaneously.

No automatic fire suppression system is installed in the room, however, automatic smoke detection is provided.

2.6.2.5 Turbine Building, Battery Rooms (Four Rooms), Elevation 135 Feet

The analysis revealed that the battery rooms could experience fire temperatures that would allow structural steel supporting the ceiling to reach the critical temperature of 1100°F.

The Licensee has proposed to institute administrative controls for limiting ventilation to the battery rooms by monitoring the doors to the area. The doors to the battery rooms are electrically supervised, self-closing, and require card reader access. In a letter dated June 18, 1986, the Licensee committed to ensure that the doors will remain closed as required in accordance with Appendix R, Section III.N.

No automatic fire suppression systems are installed in the rooms. However, automatic smoke detection is provided in each of the battery rooms.

2.6.3 Evaluation

The Licensee's structural steel survivability analysis conforms with the methodology used by the Limerick plant, which has been previously approved. The results of the Licensee's analysis indicated failure of particular structural steel members of safe shutdown fire barriers based on the localized heating effects model and the enclosure fire model.

Seven plant areas, including a total of 25 members and the entire cable spreading room, failed due to localized heating effects. The Licensee has proposed the following measures to remedy localized heating effects problems, except for the cable spreading room:

- o Coat the affected member 3 feet in each direction from the area of flame impingement with fireproofing material or, if

impingement is due to cable trays, provide solid tray covers of a similar length.

- o When a cable tray runs parallel to and beneath the beam, the entire beam will be coated with a 3-foot overlap at the ends, or tray covers will be provided.
- o Beams that are jeopardized by vertical trays will be coated 5 feet in each direction from the area of flame impingement.
- o Affected structural members will be evaluated to determine their structural significance. If the members are not required structurally, no protection will be provided.

During a site visit on February 24, 1986, the Licensee stated that the boundaries of fireproofing material or tray covers (i.e., 3 feet or 5 feet beyond impingement area) exceeded the amount required to prevent the failure of the structural member due to localized heating effects.

The cable spreading room ceiling is not a Section III.G.2 fire barrier. An automatic CO₂ fire suppression system, which is activated by smoke detectors, is provided for the room. The provision of an automatic fire suppression system provides reasonable assurance that fire conditions in the cable spreading room would not cause steel to reach 1100°F due to localized heating effects.

The Licensee stated that there are 17 rooms for which exemptions were requested from the requirements to fireproof required structural steel. The structural steel within each of these areas exceeded 1100°F within 3 hours based on the fully developed enclosure fire model.

Unlike in the Limerick plant evaluation, which states that steel that exceeded 1100°F be protected with 3-hour rated insulating material where possible or, in the alternative, by installed automatic sprinklers, the Licensee has proposed to institute administrative controls for limiting ventilation to certain rooms as a means of maintaining steel temperatures below 1100°F. For other rooms, the Licensee requests an exemption based on the provision of existing automatic suppression systems.

All rooms for which the Licensee proposes the administrative control of doors for limiting ventilation as a means of maintaining steel temperatures below 1100°F are provided with smoke detectors. Because of the presence of these detectors, a fire in these areas will be detected in its incipient stage. The alarms from these detectors are annunciated in the main control room. The fire brigade would be dispatched and would extinguish the fire manually using the hose lines or portable extinguishers provided.

In addition, the position of each of the above-mentioned doors is electrically supervised and the Licensee has committed to ensure that the doors will remain closed in accordance with the Appendix R, Section III.N.

The principal combustibles in these areas are cable insulation and electrical equipment. If a fire were to occur, it is expected that it would develop slowly with an initial low heat release rate and a slow rise in room temperature.

Until the fire is extinguished by the plant fire brigade, the electrical supervision of doors, the nature of installed combustibles, and the provision of administrative controls provide sufficient protection and reasonable assurance that one shutdown division would remain free of fire damage.

The provisions of automatic suppression systems provide reasonable assurance that fire conditions in the M-G set rooms and Units 2 and 3 HPCI rooms would not cause steel temperatures to reach 1100°F.

2.6.4 Conclusion

Based on the above evaluation, it is concluded that the existing fire protection in conjunction with proposed modifications provide a level of fire protection equivalent to Section III.G.2.a of Appendix R. Therefore, the exemption requests for unprotected structural steel in these areas can be granted.

4. REFERENCES

1. BTP APCS 9.5-1 "Fire Protection Program," July 1981 (Standard Review Plan, NUREG-0800)
2. Appendix A to BTP APCS 9.5-1, "Guidelines for Fire Protection for Nuclear Power Plants Docketed Prior to July 1, 1976," August 23, 1976
3. Regulatory Guide 1.120, "Fire Protection Guidelines for Nuclear Power Plants," November 1977
4. 10CFR50, "Fire Protection Program for Operating Nuclear Power Plants," November 19, 1980
5. Appendix R to 10CFR50, "Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979," November 19, 1980
6. Generic Letter 83-33, "NRC Position on Certain Requirements of Appendix to 10CFR50," October 19, 1983
7. Generic Letter 86-10, "Implementation of Fire Protection Requirements," April 24, 1986
8. Final Work Assignment No. 36, transmitted by M. Carrington (NRC) to Dr. S. Pandey (FRC) on July 17, 1985
9. Letter from J. W. Gallagher (Philadelphia Electric Company) to H. L. Thompson (NRC), dated September 24, 1985
10. Requests for Information (RFI), transmitted by N. Ahmed (FRC) to J. Stang (NRC) on January 2, 1986
11. Letter from V. S. Boyer (Philadelphia Electric Company) to H. L. Thompson (NRC), dated May 23, 1985.
12. Letter from V. S. Boyer (Philadelphia Electric Company) to D. G. Eisenhut (NRC), dated September 7, 1984
13. Letter from V. S. Boyer (Philadelphia Electric Company) to H. L. Thompson (NRC), dated March 29, 1985
14. Letter from V. S. Boyer (Philadelphia Electric Company) to H. L. Thompson (NRC), dated June 6, 1985
15. Letter from J. S. Kemper (Philadelphia Electric Company) to R. M. Bernero (NRC), dated March 7, 1986.

Dated July 22, 1986

UNITED STATES NUCLEAR REGULATORY COMMISSION
PHILADELPHIA ELECTRIC COMPANY
DOCKETS NOS. 50-277 AND 50-278
ENVIRONMENTAL ASSESSMENT AND FINDING OF
NO SIGNIFICANT IMPACT

The U.S. Nuclear Regulatory Commission (NRC/the Commission) is considering issuance of an exemption from the requirements of Appendix R of 10 CFR 50 to the Philadelphia Electric Company (PECO/the Licensee), for the Peach Bottom Atomic Power Station, Units 2 and 3 located in York County, Pennsylvania.

ENVIRONMENTAL ASSESSMENT

Identification of Proposed Action:

The licensee would be exempted from the requirements of Sections II.G.2.a and III.G.2.b of Appendix R to 10 CFR Part 50 to the extent that certain specific areas, cables or equipment will be separated by less than a 3 hour rated fire barrier, automatic fire suppression systems will not be required in part of two plant areas and certain structural steel members forming a part of or supporting fire barriers may have a fire resistance less than the barrier.

The Need for the Proposed Action:

Because of low combustible loading in the locations being exempted from separation, barrier protection or automatic fire suppression, a fire in one of these areas would be of low intensity and short duration. Furthermore, safe shutdown could be effected if a fire occurred in one of these areas

because of the passive protection afforded by such separation and barriers as exist, and because of the provision of detection systems to alert the fire brigade. The fire brigade could then take action to extinguish the fire. For all of the requested exemptions, the licensee has provided analyses which show that either the existing protection features, alternative modifications and mitigating features or compensatory measures provide adequate fire protection for the maximum potential combustible loading in the area. Application of the Appendix R regulation in the particular circumstances is not necessary to achieve the underlying purpose of the rule and would not significantly enhance the level of fire protection in the plant. Compliance with the regulation would result in undue hardship or other costs that are significantly in excess of those contemplated when the regulation was adopted and additional costs significantly in excess of those incurred by others similarly situated, without a corresponding increase in the level of improvement in fire protection for the facilities.

Environmental Impact of the Proposed Action:

The proposed action would not impact the ability to effect safe shutdown of the plant in the event of a fire and would provide an acceptable level of safety, equivalent to that attained by compliance with Section III.G of Appendix R to 10 CFR 50. On this basis, the Commission concludes there are no significant radiological environmental impacts associated with this proposed exemption.

With regard to potential nonradiological impacts, the proposed exemption involves features located entirely within the restricted areas as defined in 10 CFR Part 20. It does not affect nonradiological plant effluents and has no other environmental impact. Therefore, the Commission concludes that there are no significant nonradiological environmental impacts associated with the proposed exemption.

Alternative Use of Resources:

This action involves no use of resources not previously considered in the Final Environmental Statement (construction permit and operating license) for the Peach Bottom Atomic Power Station, Units 2 and 3.

Agencies and Persons Consulted:

The NRC staff reviewed the licensee's request and did not consult other agencies or persons.

FINDING OF NO SIGNIFICANT IMPACT

The Commission has determined not to prepare an environmental impact statement for the proposed exemption.

Based upon the foregoing environmental assessment, we conclude that the proposed action will not have a significant effect on the quality of the human environment.

For further details with respect to this action, see the request for exemption dated September 17, 1984, March 29, May 23, June 6, September 24, 1985 and March 7, 1986, which are available for public inspection at the Commission's Public Document Room, 1717 H Street, N.W., Washington, D.C., and at the Government Publications Section, State Library of Pennsylvania, Education Building, Commonwealth and Walnut Streets, Harrisburg, Pennsylvania, 17126.

Dated at Bethesda, Maryland this 23rd day of December, 1986.

FOR THE NUCLEAR REGULATORY COMMISSION



Daniel R. Muller, Director
BWR Project Directorate #2
Division of BWR Licensing