July 21, 1988

Docket Nos. 50-254
and 50-265

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Mr. Henry Bliss
Nuclear Licensing Manager
Commonwealth Edison Company
Post Office Box 767
Chicago, Illinois 60690

Dear Mr. Bliss:

SUBJECT: REVISED SAFETY EVALUATION FOR EXEMPTIONS FROM 10 CFR 50, APPENDIX R, SECTION III.G (TAC NOs. 57282, 57283, 61291, 61292, 62024, 62025, 63556, AND 63557)

By letter dated December 11, 1987, the NRC staff issued a Safety Evaluation Report (SER) to address exemption requests from the regulatory requirements of 10 CFR 50, Appendix R, Section III.G submitted by Commonwealth Edison Company (CECo, the licensee) for the Quad Cities Nuclear Power Station (QCNPS). Subsequently, CECo reviewed our SER for consistency with the as-built configuration of QCNPS and provided us with their documented comments, as well as applicable justifications, on February 19, 1988. The NRC staff evaluated these comments and incorporated those that were germane. Consequently, in response to CECo comments offered on February 19, 1988, we revised our previous SER on Appendix R, Section III.G. The revised SER is enclosed herein, and shall replace the previous SER of December 11, 1987 in its entirety. However, the cover letter for this previous SER is still appropriate. Although, CECo should be made aware that the date identified as September 9, 1987 in the cover letter (for an NRC site visit) is erroneous. The site visit was actually conducted on that day in 1986.

Sincerely,

/S/

Thierry Ross, Project Manager
Project Directorate III-2
Division of Reactor Projects - III,
IV, V and Special Projects

Enclosure: As stated

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which detailed the chronology of their submittals requesting schedular exemptions for QCNPS from 10 CFR 50.48, including related status updates on completion of Appendix R modifications. To date, all plant modifications required to comply with Appendix R (except for exemptions that were granted or are pending) have been completed, with only two exceptions. As such, excluding emergency lighting and RCIC valve related modifications, schedular exemptions from 10 CFR 50.48 are no longer necessary. Consequently, the staff considers the status of these schedular exemption requests to be moot, and does not plan any further review effort. The two outstanding modifications will be addressed at some later date.

With regard to a letter dated April 9, 1987, CECo requested NRC staff approval to replace the foam water spray system, used to protect recirculation pump motor generator (MG) sets, with a standard water spray system. Additionally, this letter highlighted a previous modification in the associated fire detection system which resulted in installation of compensation type thermostats vice flame or infrared detector. The staff recognizes this plant alteration of fire protection features for the recirculation pump MG sets and finds them acceptable.

Based upon CECo comments provided by their letter dated February 19, 1988, NRC staff revised the Safety Evaluation enclosed in our letter dated December 11, 1987. The SE enclosed in this letter shall be considered to supersede the December 11, 1987 SE in its entirety.

Sincerely,

/S/

Thierry M. Ross, Project Manager
Project Directorate III-2
Division of Reactor Projects - III,
IV, V and Special Projects

Enclosures:
Safety Evaluation

cc w/enclosures:
See next page

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As Corrected

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

July 21, 1988

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Nuclear Licensing Manager
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Post Office Box 767
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Sincerely,

Thierry Ross, Project Manager
Project Directorate III-2
Division of Reactor Projects - III,
IV, V and Special Projects

Enclosure: As stated

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

ENCLOSURE

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATIVE TO APPENDIX R EXEMPTIONS REQUESTED FOR

QUAD CITIES STATION UNITS 1 AND 2

DOCKET NOS. 50-254 AND 50-265

1.0 Introduction

By letter dated December 18, 1984, Commonwealth Edison Company (CECo, the licensee) submitted their Appendix R Reverification Interim Compensatory Measures and Exemption Requests. By letter dated December 4, 1985, the licensee transmitted additional exemption requests and modified some of their previously submitted exemption requests. On April 8, 1986, a meeting was held at the NRC offices in Bethesda, Maryland. The licensee received the latest NRR staff interpretations of Section III.G to Appendix R in Generic Letter (GL 86-10). Based on these new interpretations, the licensee withdrew certain exemption requests and modified others. These actions are documented in Revision 2, June 1986, of the licensee's Appendix R submittal which was sent to the NRC by letter dated June 25, 1986. By letter dated July 22, 1986, the licensee submitted a new exemption request as a result of receiving Inspection and Enforcement Information Notice 86-25 arising from the drywell expansion gap fire at Dresden Unit 3. In order to expedite the review of the licensee's Appendix R exemption requests and to obtain clarifying information, site visits were conducted on September 9, 1986 and February 23, 1987. This evaluation is based on the information provided in the licensee submittals as well as information made available during the site visits.

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.

Section III.G.2 of Appendix R requires that one train of cables and equipment 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 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.

If the above conditions are not met, Section III.G.3 requires that there be an alternative shutdown capability independent of the area of concern. It also requires that a fixed suppression system be installed in the area of concern. These alternative requirements are not deemed to be equivalent; however, they provide equivalent protection for those configurations in which they are accepted.

Because it is not possible to predict the specific conditions under which fires may occur and propagate, the 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 systems and associated circuits used 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:

- 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.

- 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).

- Fire-retardant coatings are not used as fire barriers.

- Modifications required to meet Section III.G would not enhance fire protection safety levels above that provided by either existing or proposed alternatives.

- Modifications required to meet Section III.G would be detrimental to overall facility safety.

Guidance to the industry and the NRC's position on certain requirements of Appendix R are covered by various documents, one of them being Generic Letter 83-33, which has recently been superseded by Generic Letter 86-10.

"The Interpretations of Appendix R" and "The Responses to Industry Questions," two sections of GL 86-10, are written to facilitate industry implementation of Appendix R and represent the NRC's position on all issues covered.

2.0 Fire Area RB 1

- Fire Zones 1.1.1.2 and 11.2.2, Unit 1 Reactor Building
- Fire Zones 1.1.1.1S and 1.1.1.2, Unit 1 Reactor Building
- Southern (1.1.1.1S) and Northern (1.1.1.1N) Torus Level, Unit 1 Reactor Building Column Line 16

Fire Area RB 2

- Fire Zones 1.1.2.2 and 11.3.2, Unit 2 Reactor Building
- Fire Zones 1.1.2.1S and 1.1.2.2, Unit 2 Reactor Building
- Southern (1.1.2.1S) and Northern (1.1.2.1N) Torus Level, Unit 2 Reactor Building Column Line 10

2.1 Exemptions Requested

Exemptions were requested from Section III.G.2 of Appendix R to the extent that it requires redundant safe shutdown components to be separated by complete 3-hour fire rated barriers.

2.2 Discussion

2.2.1 Fire Zones 1.1.1.2 and 11.2.2, Unit 1 Reactor Building

Fire zone 1.1.1.2 is located on elevation 595 feet (grade level) and, in part, is directly over fire zone 11.2.2, which is on elevation 554 feet. Both zones are enclosed by reinforced concrete barriers. However, in the ceiling of fire zone 11.2.2 there exist penetrations in the form of equipment hatches, an open stairway, and unsealed mechanical penetrations. The ceiling height is about 38 feet.

The fire load in fire zone 1.1.1.2 is less than 30,000 Btu per square foot and, in fire zone 11.2.2, it is less than 20,000 Btu per square foot. Both of these fire loadings are low and are equivalent to a fire severity of about 19 minutes as represented by the ASTM E-119 fire test curve. The combustibles are in the form of cables and oil in the RHR pumps.

Safe shutdown equipment consists of Division II RHR pumps and cables in fire zone 11.2.2 and redundant Division I RHR cables in fire zone 1.1.1.2. The concern for these two fire zones is a fire in either fire zone communicating to the other zone where redundant RHR system components are located.

Fire protection is in the form of a complete fire detection system for fire zones 1.1.1.2 (excluding the steam tunnel, drywell personnel air lock, and 1/2 trackway) and linear detection in fire zone 11.2.2. Further, fire zone 11.2.2

has an area wide automatic fire suppression system to preclude fire spread from zone 11.2.2 to zone 1.1.1.2. Fire hose stations and fire extinguishers are also available to both fire zones.

2.2.2 Fire Zones 1.1.1.1S and 1.1.1.2, Unit 1 Reactor Building

Fire zone 1.1.1.1S is located on elevation 554 feet (the torus) and fire zone 1.1.1.2 is on elevation 595 feet (grade). In the ceiling of fire zone 1.1.1.1S there exist unsealed mechanical penetrations and HVAC ducts, without fire rated dampers, that pass into fire zone 1.1.1.2.

The fire load in fire zone 1.1.1.1S is negligible and for fire zone 1.1.1.2 it is low (about a 19 minute fire severity). The combustibles are in the form of cable insulation materials.

Safe shutdown components located in these two fire zones consist only of redundant RHR cables. The concern for these two zones is that a fire in either zone could communicate between the zones and damage the redundant RHR cables. The barrier that interfaces between these two zones is the ceiling of fire zone 1.1.1.1S.

Fire protection is in the form of a linear thermal fire detection system installed in and close to the cable trays routed in fire zone 1.1.1.1S (torus area). Fire zone 1.1.1.2 has an area wide fire detection system excluding the steam tunnel, drywell personnel air lock and 1/2 trackway. An automatic fire suppression system is installed in fire zone 1.1.1.1 near the single cable tray riser that penetrates the floor/ceiling assembly between the two fire zones to preclude fire spread from fire zone 1.1.1.1S to fire zone 1.1.1.2. The riser is sealed with a fire resistant material. Manual fire fighting equipment is available to both zones.

2.2.3 Southern and Northern Torus Level, Unit 1 Reactor Building Column Line 16

The torus area has been previously described in Section 2.2.2 above.

Safe shutdown system components of concern in the torus include the cables associated with the RHR system. Division II cables are routed in the southern portion of the torus. Division I cables related to the RHR functional redundancy are located over 125 feet apart. Additionally, these Division I cables are located in the northeast corner room and in fire zone 1.1.1.2. This corner room is separated from the general torus area by a reinforced concrete barrier and a heavy steel, water-tight door, which is maintained closed. Intervening cable trays are enclosed by a 1-hour fire rated barrier to maintain a minimum of 20 feet without intervening combustibles between the northern and southern torus areas around column line 16.

The fire protection features and fire load for the torus area are given in section 2.2.2 above.

2.2.4 Fire Zones 1.1.2.2 and 11.3.2, Unit 2 Reactor Building

Unit 1 and Unit 2 are of the same design and, therefore, the description of fire zones 1.1.1.2 and 11.2.2 in Section 2.2.1 also applies to fire zones 1.1.2.2 and 11.3.2, except that no stairway exists between fire zones 1.1.2.2

and 11.3.2. The fire protection features and fire loadings are also identical. Finally, the fire protection concern is identical to Unit 1 in that unsealed penetrations exist in the ceiling of fire zone 11.3.2 that communicate to fire zone 1.1.2.2.

2.2.5 Fire Zones 1.1.2.1S and 1.1.2.2, Unit 2 Reactor Building

Units 1 and 2 are of the same design, therefore, the description of fire zones 1.1.1.1 and 1.1.1.2 in Section 2.2.2 also applies to fire zones 1.1.2.1.S and 1.1.2.2. The fire protection features and fire loadings are also identical except for the use of conduit seals, instead of wraps, on the west side of the torus area. Finally, the concern is identical in that unsealed mechanical penetrations and HVAC ducts without fire rated dampers pass through the floor/ceiling assembly between fire zones 1.1.2.1S and 1.1.2.2.

2.2.6 Southern and Northern Torus Level Unit 2 Reactor Building Column Line 10

Units 1 and 2 are of the same design and, therefore, the description of the southern and northern torus level in Unit 1 reactor reactor building put forth in Section 2.2.3 also applies to Unit 2. The fire protection features, fire loadings, and safe shutdown concern are also identical to that for Unit 1.

2.3 Evaluation

The fire protection in the above-described six fire zones/areas does not comply with the technical requirements of Section III.G.2 of Appendix R because complete 3-hour fire rated barriers do not separate redundant divisions of safe shutdown components.

There was a concern that a fire in one of these fire zones could spread to the redundant safe shutdown component in an adjacent fire zone. However, the fire loading in all of these fire zones ranges from negligible to low and, in no case, does the equivalent fire severity exceed 19 minutes. Because of the low combustible loading, a fire of significant magnitude or duration is not expected to occur. Fire detection is available for all affected zones. Also, in fire zones 11.2.2 and 11.3.2 there exists an area wide automatic fire suppression system. Fire suppression systems protect the area adjacent to the single cable riser that penetrates the ceiling in fire zones 1.1.1.1 and 1.1.2.1S, and above the drywell to suppression chamber differential pressure (DP) unit and the atmosphere containment atmosphere dilution (ACAD) air compressor in fire zones 1.1.1.2 and 1.1.2.2. Therefore, there is reasonable assurance that a fire would be quickly detected and annunciated in the control room. The fire brigade or the fire suppression systems would extinguish the fire readily because of the low combustible loadings.

Prior to fire extinguishment, the low fuel loadings, concrete barriers, high ceilings, space volume, and 1-hour fire rated cable tray enclosures in the torus areas would prevent the fire from spreading beyond the place of origin and/or damaging redundant RHR safe shutdown system components located in other fire zones.

The staff finds that the provision of complete 3-hour fire rated barriers would not significantly upgrade the level of fire protection for these fire zones or torus areas.

2.4 Conclusion

Based on the above evaluation, the staff concludes that the existing fire protection features and fire zone barriers in the reactor building provide a level of fire protection equivalent to the technical requirements of Section III.G.2 of Appendix R. Therefore, these exemption requests may be granted.

3.0

o Unit 1 Reactor/Turbine Building Interface Boundary

o Unit 2 Reactor/Turbine Building Interface Boundary

3.1 Exemptions Requested

Exemptions were requested from Section III.G.2.a of Appendix R to the extent that it requires 3-hour fire rated barriers to separate redundant safe shutdown system components.

3.2 Discussion

3.2.1 Unit 1 Reactor/Turbine Building Interface Boundary Wall

The Unit 1 reactor building shares a common boundary with the turbine building. This is generally a 3-hour fire rated barrier with certain exceptions. These exceptions include fire zones 11.1.3, 11.2.3, 11.2.1, 1.1.1.1 and 1.1.1.3, which contain unrated mechanical penetration seals and removable concrete plugs and 1.1.1.4, which has a partial 2 hour rated barrier separating it from the 480 V switchgear and 1.1 1.5, which has HVAC ducts to the turbine building without fire dampers, and the steam chase in 1.1.1.2 within the Unit 1 reactor building. Of these fire zones, only fire zones 1.1.1.4, 1.1.1.5 and the steam chase are of concern with respect to redundant safe shutdown system component separation. That is to say, the reactor/turbine building wall separates redundant divisions of RHR only for these fire zones.

In fire zone 1.1.1.2, all walls are 3-hour fire rated except for the portion that separates the steam chase in 1.1.1.2 from the turbine building (the floor/ceiling assemblies are part of an exemption presented in section 2.2.2). The steam chase is separated from the turbine building by shield walls with metal access doors. Fire zone 1.1.1.5 is separated from the turbine building by 3-hour fire barriers except for HVAC ducts that lack fire rated dampers. Also, from elevation 623 feet to 630 feet, a small section of the wall is 2-hour fire rated in the predominantly 3-hour fire rated wall.

Fire protection for fire zone 1.1.1.2 includes an area wide fire detection system (except inside the steam tunnel, drywell personnel air lock, and 1/2 trackway) and automatic fire suppression over two air compressors. Fire zones 1.1.1.4 and 1.1.1.5 do not have fire detection or fire suppression systems (see Sections 4.2.4 and 4.2.5). Manual fire fighting equipment is available for the fire zones. Fixed fire suppression and fire detection systems are installed in the turbine building fire zones adjacent to the steam chase.

The fire loading for fire zone 1.1.1.2 is low (30,000 Btu per square foot), which corresponds to a fire severity of 23 minutes on the ASTM E-119 fire test curve. The steam chase per se has a negligible fire load as well as fire zones 1.1.1.4 and 1.1.1.5.

Fire zone 1.1.1.2 contains Division I RHR cables that serve as part of a redundant safe shutdown method for fire zone 8.2.6.A, which is in the turbine building adjacent to the steam chase (part of 1.1.1.2). The only safe shutdown system components located in the steam chase are RCIC safe shutdown valves. However, the RCIC valves are not used for shutdown in the event of fire in either the reactor building or in those fire zones on the other side of the steam tunnel wall. Fire zones 1.1.1.4 and 1.1.1.5 also have no safe shutdown equipment or cables located therein, however, it is of concern because complete 3-hour fire rated barriers between it and the turbine building and other adjacent fire zones in the reactor building are not provided. (Certain other fire zone barriers in 1.1.1.5 and 1.1.1.4 are the subject of other exemption requests presented in section 4.2.5 and 4.2.4.)

3.2.2 Unit 2 Reactor/Turbine Building Interface Boundary Wall

Unit 1 and Unit 2 are of the same design. Therefore, the discussion in 3.2.1 is applicable to Unit 2 as it pertains to fire zones 1.1.2.1, 1.1.2.2 (steam chase), 1.1.2.3, 1.1.2.4, 1.1.2.5, 11.1.4, 11.3.1, 11.3.3, and fire zone 8.2.6.E.

3.3 Evaluation

The fire protection in the above-described fire zones does not comply with the technical requirements of Section III.G.2.a of Appendix R because a complete 3-hour fire rated barrier does not separate redundant divisions of safe shutdown components.

The principal concern was that a fire in any one of these fire zones could spread to the redundant safe shutdown components in an adjacent fire zone. As stated in section 3.2.1, only certain fire zones are affected because the turbine/reactor building wall is 3-hour fire rated with only a few exceptions.

Because of the negligible to low fire loadings in the affected fire zones of Unit 1 and 2, a fire of significant magnitude or duration is not expected to occur. The fire severity does not exceed 23 minutes for any zone and, in the steam chases, it is negligible. The fire zones of interest in the turbine building all have fire detection and/or fire suppression systems in the vicinity of the reactor/turbine building wall, thus, greatly minimizing the fire hazard and its consequences. Fire zone 1.1.1.2 has an area wide fire detection system; however, the steam chase and fire zones 1.1.1.5 and 1.1.1.4 do not, but these areas have negligible fire load and zones 1.1.1.5 and 1.1.1.4 do not contain safe shutdown components. This situation is also true for Unit 2.

The deficiencies in the, Unit 1 and Unit 2, 3-hour fire rated turbine/reactor building interface wall include:

1. Two unrated penetrations in the steam chase, which are in the form of an airlock having two heavy metal doors to the turbine building and a single metal door to the reactor building (Note - this small door is normally open during plant operation).

2. A small section of 2-hour fire rated wall from elevation 623 feet to 630 feet (fire zones 1.1.1.3 and 1.1.2.3).

3. Lack of fire dampers in HVAC ducts in fire zone 1.1.1.5 and 1.1.2.5.

For the steam chase metal door access into the turbine building, automatic fixed fire suppression systems are installed in the turbine building side adjacent to the steam chase, except in the safe shutdown makeup pump room which is adjacent to the unit 2 main steam tunnel. Coupled with negligible combustibles (only grease and cables associated with several valves) in the steam chase, a fire would not propagate at this location between the reactor and turbine building. The small portion of 2-hour fire rated interface wall is of no concern because of the negligible fire loads adjacent to it. This is also the case for the location having the HVAC duct penetration without a fire damper. For Unit 2, the foregoing evaluation holds true.

3.4 Conclusion

Based on the above evaluation, it is concluded that the existing fire protection features and fire rated barrier between the turbine and reactor building provide a level of fire protection equivalent to Section III.G.2 of Appendix R. Therefore, these exemption requests may be granted.

4.0

- Fire Zone 1.1.1.1, Unit 1 Reactor Building, Elevation 554 Feet, 6 Inches
- Fire Zone 1.1.1.2, Unit 1 Reactor Building, Elevation 595 Feet, 0 Inches
- Fire Zone 1.1.1.3, Unit 1 Reactor Building, Elevation 623 Feet, 0 Inches
- Fire Zone 1.1.1.4. Unit 1 Reactor Building, Elevation 647 Feet, 6 Inches
- Fire Zone 1.1.1.5, Unit 1 Reactor Building, Elevation 666 Feet, 6 Inches
- Fire Zone 1.1.1.6, Unit 1 Reactor Building, Elevation 690 Feet, 6 Inches
- Fire Zone 11.1.3, Unit 1 Reactor Building, Elevation 554 Feet, 0 Inches
- Fire Zone 11.2.1, Unit 1 Reactor Building, Elevation 554 Feet, 0 Inches
- Fire Zone 11.2.2, Unit 1 Reactor Building, Elevation 554 Feet, 0 Inches
- Fire Zone 11.2.3, Unit 1 Reactor Building, Elevation 554 Feet, 0 Inches
- Fire Zone 11.2.4, Unit 1 Reactor Building, Elevation 554 Feet, 0 Inches
- Fire Zone 1.2.2.1, Unit 2 Reactor Building, Elevation 554 Feet, 0 Inches
- Fire Zone 1.1.2.2, Unit 2 Reactor Building, Elevation 595 Feet, 0 Inches
- Fire Zone 1.1.2.3, Unit 2 Reactor Building, Elevation 623 Feet, 0 Inches
- Fire Zone 1.1.2.4, Unit 2 Reactor Building, Elevation 647 Feet, 6 Inches

- Fire Zone 1.1.2.5, Unit 2 Reactor Building, Elevation 666 Feet, 6 Inches
- Fire Zone 11.1.4, Unit 2 Reactor Building, Elevation 554 Feet, 0 Inches
- Fire Zone 11.3.1, Unit 2 Reactor Building, Elevation 554 Feet, 0 Inches
- Fire Zone 11.3.2, Unit 2 Reactor Building, Elevation 554 Feet, 0 Inches
- Fire Zone 11.3.3, Unit 2 Reactor Building, Elevation 554 Feet, 0 Inches
- Fire Zone 11.3.4, Unit 2 Reactor Building, Elevation 554 Feet, 0 Inches

4.1 Exemptions Requested

Exemptions were requested from Section III.G.3 of Appendix R to the extent that it requires the installation of automatic fire detection systems and fixed fire suppression systems in an area room or zone for which alternative shutdown capability is provided.

4.2 Discussion

4.2.1 Unit 1 Reactor Building Torus Level Elevation 554 Feet, 0 Inches (Fire Zones 1.1.1.1, 11.1.3, 11.2.1, 11.2.2, 11.2.3 and 11.2.4)

The south, east, and west walls are reinforced concrete and are exterior walls except for the part of the wall that separates fire zones 11.2.3 and 11.1.3, and a portion of the west wall of fire zone 11.2.1 which interfaces with the cable tunnel. The north wall separates fire zones 1.1.1.1, 11.2.3, 11.2.4, and 11.1.3 (all part of Unit 1) from fire zones 1.1.2.1, 11.3.1, 11.3.2, and 11.1.4 (all part of Unit 2) and is a 3-hour fire rated wall with properly sealed penetrations. The ceiling above these fire zones is the floor of fire zones 1.1.1.2, 8.2.6.A, 8.2.6.C, and 8.1, and is of reinforced concrete. Unrated seals and concrete plugs exist in the portion of the ceiling that separates fire zones 1.1.1.1, 11.2.4, and 11.2.3 from 8.2.6.A and 8.2.6.C.

Fire protection is in the form of linear thermal fire detection for fire zones 11.2.1, 11.2.2, 11.2.3, and 11.2.4. Linear fire detection exists in fire zone 1.1.1.1. A fixed automatic water fire suppression system is provided in fire zone 11.1.3 for the HPCI pump and turbine oil hazard and in the southeast corner room of the torus, which is fire zone 11.2.2, and at the single vertical cable riser below the 595 foot elevation. Manual fire fighting equipment is available for all of those areas.

The fire loading in these fire zones is low to negligible except for fire zone 11.1.3, which has a lube oil fire hazard (1,041 gallons).

Independent alternative shutdown methods that are physically separated from these fire zones are provided to assure safe plant shutdown in the event of fire in any one of the zones (see Sections 2.0 and 3.0 for additional details on this separation).

4.2.2 Unit 1 Reactor Building Elevation 595 Feet, 0 Inches (Fire Zone 1.1.1.2)

The south and east walls are reinforced concrete exterior walls, except those portions that boarder the air lock and 1/2 diesel generator room which have minimum 3-hour fire rating. The other fire zone barriers are 3-hour fire rated

with the exception of the ceiling (which is the floor of fire zone 1.1.1.3), the floor and the steam tunnel walls. The ceiling has open stairs, hatches, and unsealed mechanical penetrations. The electrical penetrations are sealed with nonfire rated noncombustible materials.

Fire protection is in the form of automatic fire suppression over the two air compressors. Fire detection is provided throughout the zone except in the steam tunnel. Manual fire fighting equipment is available to this zone.

Independent alternative shutdown methods that are physically separated from these fire zones are provided to assure safe plant shutdown in the event of fire in any one of the zones (see Sections 2.0 and 3.0 for additional details on this separation).

The fire loading in this fire zone is low (30,000 Btu per square foot), which corresponds to a fire severity of 23 minutes per the ASTM E-119 fire test curve.

4.2.3 Unit 1 Reactor Building Elevation 623 Feet, 0 Inches (Fire Zone 1.1.1.3)

The south and east walls are reinforced concrete exterior walls and the north wall is a complete 3-hour fire rated barrier except for the 1/2 diesel 4KV bus duct penetration. The west wall is shared with the turbine building and it is a complete 3-hour fire rated barrier except for the 2-hour rated block shield wall and the]/2 Diesel 4KV bus duct. The ceiling and floor barriers, however, are unrated reinforced concrete penetrated by open stairwells, hatches, and unsealed mechanical penetrations. (See Section 6.0 for 4KV bus duct penetration exemption.)

Fire protection is in the form of a fire detection system. Manual fire fighting capability is available to this fire zone.

Independent alternative shutdown methods that are physically separated from these fire zones are provided to assure safe plant shutdown in the event of fire in any one of the zones (see Sections 2.0 and 3.0 for additional details on this separation).

The fire loading in this fire zone is low (less than 20,000 Btu per square foot), which corresponds to a fire severity of 15 minutes per the ASTM E-119 fire test curve.

4.2.4 Unit 1 Reactor Building Elevation 647 Feet, 6 Inches (Fire Zone 1.1.1.4)

The south and east walls are reinforced concrete exterior walls and the north wall is a complete 3-hour fire rated barrier. The west wall separates the reactor building from the turbine building and is also a 3-hour fire rated barrier except for a portion of the wall between column line 13 and 15 and from 658-foot to 663-foot elevation. The floor and ceiling are of reinforced concrete but have unprotected mechanical penetrations, open stair wells, and hatches.

Fire protection is in the form of manual fire fighting equipment and there are no fire detection or fixed fire suppression systems installed.

Independent alternative shutdown methods that are physically separated from these fire zones are provided to assure safe plant shutdown in the event of fire in any one of the zones (see Sections 2.0 and 3.0 for additional details on this separation).

There are no safe shutdown cables or equipment in this zone.

The fire loading in this fire zone is negligible.

4.2.5 Unit 1 Reactor Building Elevation 666 Feet, 6 Inches (Fire Zone 1.1.1.5)

The south and east walls are reinforced concrete exterior walls that are equivalent to a 3-hour fire rating. The north wall is 3-hour fire rated except for three standby gas treatment system line penetrations. The west wall separates the turbine building from the reactor building and is 3-hour fire rated except for HVAC duct penetrations. Fire Zone 1.1.1.5 surrounds the drywell with a wall that is at least 5 foot thick and constructed of reinforced concrete. The floor and ceiling of this fire zone has open stairwells, hatches, and unsealed mechanical penetrations connected to the zones below.

Fire protection is in the form of manual fire fighting equipment and there are no fire detection or fixed fire suppression systems installed.

The fire loading in this fire zone is negligible.

4.2.6 Unit 1 Reactor Building Elevation 690 Feet, 6 Inches (Fire Zone 1.1.1.6)

This fire zone is the entire refueling floor on elevation 690 feet, 6 inches. The north, south, and east walls are constructed of insulated metal siding on exposed structural steel and these walls have no fire rating. The west wall from elevation 690 feet, 6 inches to elevation 700 feet, 0 inches is 1 foot thick reinforced concrete. This portion of the wall separates the reactor building from the turbine building. From elevation 700 feet to the roof of the reactor building, this wall is of insulated metal siding on structural steel. The floor of this fire zone has open stairways, hatches, and unsealed mechanical penetrations connected to zones in both Units below.

Fire protection is in the form of manual fire fighting equipment and there are no fire detection or suppression systems installed.

There are no safe shutdown cables or equipment in this zone. The fire loading is negligible in this zone.

4.2.7 Unit 2 Reactor Building Torus Level Elevation 554 Feet, 0 Inches (Fire Zones 1.1.2.1, 11.3.1, 11.3.2, 11.3.3, 11.3.4, and 11.1.4)

Unit 2 is of the same design as Unit 1 (except there is no stairway between fire zones 1.1.2.2. and 11.3.2) and, therefore, the area description, fire protection features, fire loadings, and safe shutdown concerns are identical to that presented in section 4.2.1.

4.2.8 Unit 2 Reactor Building Elevation 595 Feet, 0 Inches (Fire Zone 1.1.2.2)

Unit 2 is of the same design as Unit 1 and, therefore, the area description, fire protection features, fire loadings, and safe shutdown concerns are identical to that presented in Section 4.2.2.

4.2.9 Unit 2 Reactor Building Elevation 623 Feet, 0 Inches (Fire Zone 1.1.2.3)

Unit 2 is of the same design as Unit 1 and, therefore, the area description, fire protection features, fire loadings, and safe shutdown concerns are identical to that presented in Section 4.2.3. (See Section 6.0)

4.2.10 Unit 2 Reactor Building Elevation 647 Feet, 6 Inches (Fire Zone 1.1.2.4)

Unit 2 is of the same design as Unit 1 and, therefore, the area description, fire protection features, fire loadings, and safe shutdown concerns are identical to that presented in Section 4.2.4.

4.2.11 Unit 2 Reactor Building Elevation 666 Feet, 6 Inches (Fire Zone 1.1.2.5)

Unit 2 is of the same design as Unit 1 and, therefore, the area description, fire protection features, fire loadings, and safe shutdown concerns are identical to that presented in Section 4.2.5.

4.3 Evaluation

The fire protection in the above described 21 fire zones does not comply with the technical requirements of Section III.G.3 of Appendix R because fixed fire suppression systems and/or fire detection systems have not been installed in zones for which an alternative safe shutdown capability is provided.

The principal concern was that a fire in one of these fire zones could cause a loss of normal safe shutdown capability. Although two of these fire zones 11.1.3 and 11.1.4 have a high fire load, the fire loading is due to lubricating oils in the turbine and the HPCI pump. In addition, these high fire loads are protected by automatic fire suppression system(s). The cable tray wraps in the torus area near Column Line 16 (Unit 1) and Column Line 10 (Unit 2) provide 20-feet of separation without intervening combustibles and also serve as a fire stop to the potential spread of fire. With the exceptions of the oil fire hazards, the fire loads range from negligible to low and, in no case, do they exceed an equivalent fire severity of 23 minutes. Because of these low fire loadings, and given that the oil fire hazards are contained and protected by fire suppression systems, a fire of significant magnitude or duration is not expected to occur. Fire detection is provided for all zones containing safe shutdown equipment. Automatic fire suppression is provided for protection of specific hazards as discussed above. Therefore, there is reasonable assurance that a fire in any of these fire zones will be detected in its early stages and extinguished by the fire brigade before adjacent safety-related locations are threatened. The fire zones that do not have either fire detection or fixed fire suppression systems have either negligible fire loads or no safe shutdown system components or both. The existing barriers and space volumes in these fire zones are sufficient to contain the minimal fire hazard associated with these fire zones.

Should a fire damage any normal redundant shutdown components in any one of these zones (note, no safe shutdown equipment is located in zones 1.1.1.4, 1.1.1.5, 1.1.1.6, 1.1.2.4, or 1.1.2.5) before it is extinguished, the independent alternative shutdown capability (the dedicated safe shutdown pump and associated cables) is available to be used to achieve and maintain safe shutdown. The staff has determined that there is reasonable assurance that a fire in any of these fire zones will not spread beyond the zone from which it originates and therefore will not result in the loss of alternative safe shutdown capability. The staff has also determined that the installation of additional fire detection and/or fixed fire suppression systems would not significantly increase the level of fire protection in these fire zones.

4.4 Conclusion

Based on the above evaluation, the staff concludes that the existing fire protection and physical features combined with the independent alternate shutdown capability provide an acceptable level of protection. Therefore, the exemptions may be granted.

5.0

- Fire Zone 2.0, Units 1 and 2 Control Room
- Fire Zone 4.0, Units 1 and 2 Auxiliary Computer Room
- Fire Zone 6.3, Units 1 and 2 Auxiliary Electric Equipment Room

5.1 Exemption Requested

Exemptions were requested from Section III.G.3 of Appendix R to the extent that it requires installation of a fixed fire suppression system in fire zones for which an alternative shutdown capability is provided.

5.2 Discussion

The control room (CR) and the auxiliary electric equipment room (AEER) are both located in the service building (SB). The SB is located to the far south side of the turbine building and is divided into two fire areas, viz., SB-I and SB-II. The SB has three basic floor elevations and the SB-I fire area contains the CR, auxiliary computer room, cable spreading room, and the AEER. The cable spreading room is located below the CR and above the AEER and each are located on top of one another. The auxiliary computer room is enclosed by the AEER. These rooms are separated from the balance of the SB by complete 3-hour fire rated barriers. The north wall of the SB (and of each of these three rooms) is adjacent to the turbine building trackway. This wall is a complete 3-hour fire rated barrier. The floors/ceilings between the CR, AEER, and cable spread rooms elevations are unrated.

Fire protection features in the CR, auxiliary computer room and AEER include a complete automatic early warning fire detection system. The cable spreading room has a fire detection system and also an automatic fire suppression system. Manual fire fighting equipment in the form of fire extinguishers and hose stations are available to the CR, auxiliary computer room and the AEER. The CR is continuously manned during plant operation.

The CR has a fire loading of less than 25,000 Btu per square foot, whereas, the AEER has a fire load of less than 75,000 Btu per square foot, and the auxiliary computer room has a fire loading of less than 21,000 Btu/ft. Therefore, the fire severity for these fire zones is less than 1 hour as represented by the ASTM E-119 fire test curve.

Redundant divisions of normal safe shutdown system components are located in both fire zones 2.0 and 6.3. Therefore, a single fire could damage redundant divisions. For this event, the licensee has provided an alternative safe shutdown path that is physically and electrically independent of these fire zones and for the balance of the SB-I fire area.

5.3 Evaluation

The fire protection in these fire zones (control room, auxiliary computer room, and auxiliary electric equipment room) does not comply with the technical requirements of Section III.G.3 of Appendix R because a fixed fire suppression system is not installed in the control room or the auxiliary electric equipment room.

The primary concern for these fire zones was that a fire in the auxiliary electric equipment room (AEER) and the control room (CR) could cause the loss of normal shutdown capability. However, should a fire occur within the CR or the AEER, it is expected that it would be promptly detected by the automatic fire detection system, one of the station personnel, or the fire brigade. Should fire damage be extensive, then the independent alternative safe shutdown system can be utilized to safely shutdown the plant. Because the CR and the AEER are all part of fire area SB-I which is surrounded by 3-hour fire rated barriers, except for insulated metal hatches to the Unit 1 and Unit 2 cable tunnels, it is expected that a fire would not spread to adjacent fire areas/zones. The staff finds that the installation of a fixed suppression system in the control room, the AEER, and the auxiliary computer room, would not significantly increase the level of fire protection.

5.4 Conclusion

Based on the above evaluation, the staff concludes that the existing fire protection features combined with the alternative shutdown capability provided for the aforementioned fire zones provide a level of protection equivalent to the technical requirements of Section III.G.3 of Appendix R. Therefore, the exemption from fixed fire suppression in the control room, the AEER, and the auxiliary computer room may be granted.

6.0 4-kV Bus Duct Penetrations

6.1 Exemption Requested

An exemption was requested from Section III.G.2.a of Appendix R to the extent that it requires redundant safe shutdown components to be separated by complete 3-hour fire rated barriers.

6.2 Discussion

A 4-kV bus duct from the diesel generator (DG 1/2) to an associated switchgear (SWGR 23-1) is routed through the Unit 2 reactor building and the turbine building operating floor. The 4-kV bus duct penetrates certain fire rated barriers as follows:

BARRIER	FIRE ZONES
Unit 2 Reactor Building West Wall	1.1.2.3/8.2.7.D
Unit 1 and 2 Reactor Building Common Wall	1.1.2.3/1.1.1.3
Turbine Building Operating Floor	8.2.7.D/8.2.8.D

Shutdown paths between these related zones utilize redundant divisions of RHR. The bus duct enclosure is constructed of metal 1/8" thick and is mechanically fastened at the wall penetration locations. At the wall, there is a 1/4" thick steel collar. The bus duct has no combustibles within its enclosure.

Fire zones 1.1.2.3 and 8.2.8.D are provided with complete automatic fire detection, except for the regenerative and non-generative heat exchanger room and the cleanup decant pump phase separator pump room. Fire zone 8.2.7.D is protected by automatic sprinklers below fire zone 8.2.8.D. Manual fire fighting equipment is available to the affected fire zones.

The fire load in the affected zones is low and there are, based on a site inspection, no fire hazards located near the bus duct penetrations.

6.3 Evaluation

The fire protection in the fire zones having the 4-kV bus duct penetrations does not comply with the technical requirements of Section III.G.2.a of Appendix R because a complete 3-hour fire rated barrier is not provided between redundant divisions of safe shutdown system components.

The principal concern with a fire in one of the fire zones having a bus duct penetration is that the fire could spread through the bus duct penetration. Because of the low fire loadings in the affected fire zones, a fire of major proportions is not expected to occur. Further, all affected fire zones have an early warning fire detection system or an automatic sprinkler protection. Hence, a fire would be quickly detected and the fire brigade would be dispatched. The bus duct metal enclosure would be resistant to small fires and, as is the case with HVAC ductwork, the bus duct would not likely fail for up to a one hour time period. This inherent fire resistance is enhanced by the fact that each side of bus duct is mechanically fastened to the wall. The lack of combustibles inside the bus duct ensure that a spread of fire would not occur internally through the duct. The installation, therefore, of a 3-hour fire rated bus duct penetration would not significantly increase the level of fire protection for these fire zones.

6.4 Conclusion

Based on the above evaluation, it is concluded that the existing fire protection features and physical characteristics of the 4-kV bus duct provide a level of fire protection equivalent to the technical requirements of Section III.G.2.a of Appendix R. Therefore, this exemption request may be granted.

7.0

o Standby Gas Treatment System Piping Penetrations

o Reactor Building Vent System Piping Penetrations

7.1 Exemptions Requested

Exemptions were requested from Section III.G.2.a of Appendix R to the extent that it requires redundant safe shutdown components to be separated by complete 3-hour fire rated barriers.

7.2 Discussion

The standby gas treatment (SBGTS) and reactor building vent system piping run from the Unit 1 and 2 reactor buildings and drywells through the turbine building and, finally, out through the stack. The standby gas treatment and reactor building vent piping penetrations are located as follows:

BARRIER PENETRATION	FIRE ZONES
Unit 1 and 2 SBGTS Suction Crosstie (24 in.)	1.1.1.5/1.1.2.5
Unit 2 SBGTS Fan Discharge Line (24 in.)	1 1.1.5/1.1.2.5
Unit 1 and 2 SBGTS Fan Suction Crosstie (8 in.)	1.1.1.5/1.1.2.5
Unit 2 SBGTS Turbine Building Suction (6 in.)	1.1.2.3/8.2.7.C
Unit 1 SBGTS and Reactor Building Vent System Drywell Suction (18 in.)	1.1.1.4/1.2.1
Unit 2 SBGTS and Reactor Building Vent System Drywell Suction (18 in.)	1.1.2.4/1.2.2
Unit 1 Reactor Building Vent Exhaust Fan Suction (18 in.)	1.1.1.4/8.2.8.A
Unit 2 Reactor Building Vent Exhaust Fan Suction (18 in.)	1.1.2.4/8.2.8.C

The SBGTS piping and the reactor building vent system piping is constructed of metal and is at least 1/8" thick. The pipe is mechanically restrained at the penetrations. The piping systems have no combustibles inside and there is no continuity of combustibles in the penetrations.

Manual fire fighting equipment is available to the affected fire zones.

The fire load in the affected fire zones is low or under the coverage of a fire suppression system.

As stated in section 4.0 of this report, fire zones 1.1.1.5, 1.1.2.5, 1.1.1.4, and 1.1.2.4 do not have safe shutdown system components located therein. Fire Zones 1.2.1 and 1.2.2 are in the drywell which is inerted with nitrogen during plant operations. The remaining fire zones (1.1.2.3, 8.2.7.C, 8.2.8.A and 8.2.8.C) are protected with automatic detection and/or automatic suppression. This then, resolves most of the penetration locations listed above. For the remaining fire zones, there exist an independent safe shutdown path for the division of safe shutdown components located therein.

7.3 Evaluation

The fire protection in the fire zones having the SBGTS and reactor building vent system piping penetrations does not comply with the technical requirements of Section III.G.2.a of Appendix R because a complete 3-hour fire rated barrier is not provided between redundant divisions of safe shutdown system components.

Our primary fire protection concern for these penetration locations is that a fire could spread through the piping penetration. Because of the low fire loadings in the affected fire zones, a fire of major significance is not expected to occur. Further all affected fire zones have early warning fire detection and/or a fire suppression protection, an inerted atmosphere, or contain no safe shutdown components.

The SBGTS and vent system piping is of metal and would resist the affects of heat released from a small fire. As in the case of metal HVAC ductwork, the piping proper would not fail for up to a 1-hour time period. This inherent fire resistance is enhanced by the lack of combustibles within the piping system. With respect to the SBGTS, an installed damper could fail closed and possibly degrade the system, which could increase the likelihood of a radioactive release. The installation, therefore, of a 3-hour fire rated damper would not significantly increase the level of fire protection for these fire zones.

7.4 Conclusion

Based on the above evaluation, it is concluded that the existing fire pro-protection features and physical characteristics of the SBGTS and reactor building vent system piping penetrations provide a level of fire protection equivalent to the technical requirements of Section III.G.2.a of Appendix R. Therefore, these exemption requests may be granted.

8.0 Drywell Expansion Gap, Unit 1 and Unit 2

8.1 Exemption Requested

An exemption was requested from Section III.G.3 of Appendix R to the extent that it requires the installation of automatic fire detection and fixed fire suppression systems in an area for which an alternative shutdown capability is provided.

8.2 Discussion

The drywell is constructed of a steel containment shell that is surrounded by a concrete shield structure. The steel containment shell is spherical on the bottom and cylindrical at the top. The normal operation of the reactor (or accidents) will cause the steel shell to expand in all directions. This expansion has to be accommodated and it is done so by providing a 2-inch space (gap) around the steel shell except for the bottom, which rests on a pocket of sand. In order to create this 2-inch gap during construction, polyurethane foam sheets were installed over the exterior of the steel shell. An epoxy impregnated fiberglass tape was used over the joints, then 1/4 and 3/8-inch thick fiberglass-epoxy prefabricated cover panels were installed over the foam sheets, and then concrete was placed over this material. After the concrete hardens, the sandwiched materials serve as the 2-inch gap because they are crushable as the steel containment shell expands. The foam materials serve no other purpose.

There is no fire protection provided within the 2-inch gap. However, fire detectors are located in the reactor building fire zones adjacent to the electrical and mechanical drywell penetrations on the ground and mezzanine floors. Manual fire fighting equipment is available throughout the reactor building.

The only safe shutdown components located in the expansion gap that could potentially be affected by fire are electrical conductors inside the electrical penetration assembly canisters and instrumentation taps in mechanical penetrations. These electrical conductors are associated with valves required for hot and cold shutdown and associated cables for automatic RHR system functions. The taps for reactor level indicating switches and pressure indicators are routed in mechanical penetrations.

The fire load in the 2-inch gap is composed of the polyurethane sheets and fiberglass cover panels. The urethane is combustible. The 2-inch gap is bounded on one side by the steel shell and on the other side by a 4-foot thick reinforced concrete shield/wall. In Unit 1, the concrete wall separates the drywell gap from fire area RB-1 and, for Unit 2, from fire area RB-2.

The electrical penetrations all have the same basic configuration. An electrical assembly is sized so that it can be inserted into the electrical penetration nozzle. The nozzles are 12-inch, schedule 80 pipe, which has a steel shell wall thickness of 0.688 inches. Each assembly is in conformance to the ASME Boiler and Pressure Code, Section III, Class B Vessels. The penetrations extend 1 foot beyond the drywell wall on both sides. The drywell wall in the vicinity of the penetrations is about 6 feet thick.

The mechanical penetrations are of two types, viz., hot and cold. The hot ones are designed to accommodate thermal expansion and have guard pipes between the line and the penetration nozzle. The mechanical penetration's are also constructed of thick walled steel pipes and plates. The penetration nozzles conform to the ASME Pressure Vessel Code, Section VIII. The nozzle walls are welded to the steel shell containment structure.

8.3 Evaluation

The fire protection in the drywell expansion gap does not comply with the technical requirements of Section III.G.3 of Appendix R because a fixed fire suppression and fire detection system have not been installed in an area for which an alternative shutdown system has been provided.

There was a concern that a fire event within the drywell expansion gap could damage safe shutdown related penetrations (electrical and/or mechanical). Because of the combustible material sandwiched within the 2-inch expansion gap, it is possible that a fire could develop and spread throughout the gap. A fire of this nature has previously occurred at Dresden Unit 3 and an I&E Information Notice 86-25 was issued pursuant thereto.

The fire protection concern for the drywell expansion gap consists of two parts. The first concern is whether or not a fire in the gap can spread out of the gap and into a separate fire area or fire zone. The second concern revolves around whether or not a fire in the 2-inch gap proper can affect the safe shutdown capability by damaging the penetrations directly.

For the case of a fire in the drywell expansion gap spreading into other areas, it is mitigated by the fact that the 2-inch gap is sandwiched between the steel shell containment structure, which is massive, and the 4 to 6 foot thick reinforced concrete shield wall. The total mass of these two boundaries would serve as a heat sink and dissipate much of the drywell gap fire energy. The penetrations consist of steel penetration nozzles that are held firmly in place by welds and the concrete wall. Therefore, this forms a complete enclosure of the gap. Also, the drywell is inerted during operation and the spread of fire into the drywell is not possible because of it. Should a fire in the drywell gap somehow spread into the reactor building side, then it would only affect one fire area of any one Unit and, therefore, an independent safe shutdown path would be available. This was discussed and evaluated in Sections 2.0 and 4.0 of this report.

The second part of the fire protection issue deals with the effects of a drywell gap fire on the penetrations and the possible degradation of safe shutdown capability. Firstly, it is unlikely (because of the schedule 80 steel pipe, heavy metal plates, and their weld attachment to the steel containment shell) that the penetrations (electrical and mechanical) would be significantly damaged by an expansion gap fire to the extent that their function would be impaired. However, the licensee considered this possibility and identified all safe shutdown functions contained within the penetrations. These were listed out in detail within Tables 8.2-3 and 8.2-4 of their June 1986, submittal. The impairment of either Unit 1 or Unit 2 safe shutdown capability would not result because of the following reasons:

(1) The safe shutdown related RHR valves that are powered by cables routed through the penetrations are normally in a closed position and a fault or circuit short will not likely change the valve position.

(2) In the event a valve position changes, manual actions can be performed to operate the associated valves for the RHR system during cold shutdown.

(3) RHR pumps are associated with electrical cables for RHR Logic Functions. These cables are routed through the penetrations. The RHR Logic circuits can be isolated and the pumps can be operated locally.

(4) The mechanical function of the Target Rock valve or the safety valves is not affected by an expansion gap fire, thus RPV pressure control will remain available.

(5) Normally closed valves that are serviced by cables routed through the penetrations are in series with another closed valve but these valves are not a high/low pressure interface and the valve does not need to be operated.

(6) There exists an independent system to supply reactor water makeup that would not be affected by a drywell gap fire.

Also, in the gap space there are taps for reactor water level indicating switches and reactor pressure indicators. A fire could cause a spurious read-out of these instruments. However, the correct readings could still be obtained because the spacing between the redundant divisions routed through the gap is 45 feet for Unit I and 29 feet for Unit 2. The amount of urethane is limited and the fire would involve only one division at a time. Once the material burned away from a penetration the temperature would quickly return to ambient level. In the Dresden Unit 3 gap fire investigative report dated May 1986, this was found to be the case and, further, it was also concluded that plant safe shutdown capability would be maintained given a drywell expansion gap fire. This is also applicable to the Quad Cities Units 1 and 2.

A final reason that a fire detection and a fixed fire suppression system should not be required for the drywell expansion gap space is that it would be physically impossible to remove the existing foam and install the fire protection systems. In any event, the installation of a fire detection system and a fixed fire suppression would not significantly upgrade the level of fire protection for either Unit 1 or Unit 2.

8.4 Conclusion

Based on the above evaluation, it is concluded that the existing fire protection features and physical characteristics of the drywell expansion gap and its boundaries provide a level of fire protection equivalent to the technical requirements of Section III.G.3 of Appendix R. Therefore, this exemption request may be granted.

9.0 Southern and Central Zone Groups, Turbine Building, Units 1 and 2

9.1 Exemption Requested

An exemption was requested from Section III.G.2.a of Appendix R to the extent that it requires the installation of complete 3-hour fire rated barriers between redundant divisions of safe shutdown system components.

9.2 Discussion

The turbine building is one large fire area that is subdivided by extensive reinforced concrete shield walls. The turbine building consists of three major floor elevations and two partial basement elevations. The turbine building is separated from the reactor building by a 3-hour fire rated barrier with exceptions that are covered by exemption requests presented in Section 3.0 of this evaluation.

The licensee has divided the turbine building, with the exception of the operating floor, into three fire zone groups. These are the northern zone group (Fire Area TB-I), the central zone group (Fire Are TB-II), and the southern zone group (Fire Area TB-III). The operating floor is open between Unit 1 and Unit 2. The only safe hutdown equipment located hereon are the redundant divisions of switchgear (4-kV and 480-V) for Units 1 and 2. This is the focus of a separate exemption request presented in Section 12.0 of this report.

The Central Zone Group consists of fire zones 5.0, 8.1, 8.2.6.C, 8.2.7.C, and 8.2.10, which are on the ground and mezzanine floor levels of the turbine building. The Central Zone contains cabling related to Unit 1 and Unit 2 safe shutdown. The Central Zone is separated from the Northern and Southern Zone Groups by complete reinforced concrete shield walls on the ground and mezzanine floors with the exception of the corridor that penetrates these barriers on the ground level. The reinforced concrete shield walls do not have a formal fire rating but they are equivalent to a 3-hour fire rating because of their mass. Personnel access between zone groups is through substantial, locked, unlabeled metal personnel access doors. Automatic fire detection and fire suppression systems are installed in the corridors on the ground floor to prevent the spread of fire between zone groups at this elevation. The corridors do not contain safe shutdown equipment or cables for the safe shutdown paths used by the zone groups that these corridors connect. This fire protection will provide a buffer of more than 50 feet of corridor space.

At the mezzanine level, the Southern Zone Group and the Central Zone Group are separated by continuous shield walls with metal, personnel access doors that are kept locked. All penetrations are sealed with nonfire rated noncombustible materials. Sprinkler systems are installed in fire zones on both sides of this shield wall except for a portion of fire zone 8.2.7.C in the Central Zone Group. Fire zone 8.2.7.C contains only a minor amount of combustible material.

The Southern Zone Group has fire zones 6.1.A, 6.1.B, 7.1, 8.2.1.A, 8.2.1.C, 8.2.3.A, 8.2.3.B, 8.2.4, 8.2.6.A, 8.2.6.B, 8.2.7.A, 8.2.7.B, 9.1, 11.1.1.A, 11.1.1.B, 11.1.1.C, and 14.1.1 which contain cabling and equipment for Unit 1. The basic separation of this zone group from the Central Zone Group is described in the preceding paragraphs.

Other specific boundary borders shared by the Southern Zone Group and the Central Zone Group include an open doorway to the stairs, manlift, and pipe chase between the western portion of the Central Zone Group (Fire Zone 8.2.6.C) and the Unit 1 CRD Fire Zone 8.2.3.A in the Southern Zone Group. The only safe shutdown cabling or equipment within 20 feet of the doorway in the Central Zone Group is the alternate feed to the DG 1/2 cooling water pump. The normal feed runs through the Southern Zone Group. Automatic sprinkler protection is provided for fire zone 8.2.3.A and there is no continuity of combustibles between the zone groups at this point. Another shared border is the Unit 1/2 radwaste tunnel (fire zones 8.2.3.B and 8.2.2.B). This tunnel has open hatches and pipe chases and runs underneath the Central Zone Group and connects with the Northern Zone Group. The radwaste tunnel has no safe shutdown related cables, or equipment and negligible combustibles. Finally, at the 626 foot elevation, separation of the Central and Southern Zones (fire zones 8.2.10 and 14.1.1) is by shield walls with metal, personnel access doors that are locked shut. However, these fire zones contain no safe shutdown cables and the combustible loading is negligible (1,000-3,000 Btu's per square foot).

The Central Zone Group on the ground and mezzanine levels contains redundant cabling for both Units. However, the necessary cables and equipment required to operate the RCIC shutdown path for Unit 1 and the RCIC shutdown path for Unit 2 are not located in the fire zones within the Central Zone Group. Therefore, the RCIC shutdown paths are available for shutdown of both units for a fire in this area.

The Southern Zone Group contain only Unit 1 cables and equipment, except for the Diesel Generator 1/2 cooling water pump and alternate feed. This alternate feed is fire wrapped in the Southern Zone Group to the RHR service water vault 11.1.1.B. This vault has 3-hour fire rated walls, except for the heavy steel water-tight door. For a fire in this zone group, the safe shutdown makeup pump path can be utilized, which is independent of this zone group.

9.3 Evaluation

The fire protection in the Central and Southern Zone Groups does not comply with Section III.G.2 of Appendix R because a complete 3-hour fire rated barrier has not been provided between redundant divisions of safe shutdown system components as described above.

The principal concern for a fire in either the Central or Southern Zone Group is that a fire could develop and spread to an adjacent zone group and damage necessary safe shutdown system components. However, these two fire zone groups (Central and Southern) are separated by reinforced concrete shield walls.

Openings in the fire barriers consist of locked unrated metal personnel access doors that are kept locked, unrated penetration seals, open hatches, a doorway and an open connecting corridor. These exceptions have compensating features in the form of fire detection and fire suppression either at the barrier of concern or nearby in an adjacent fire zone. The open connecting corridor has more than 50 feet protected by complete fire suppression and detection systems to prevent the spread of fire between zone groups. The open connecting corridor does not contain cables that will prevent achieving safe shutdown if damaged by fire. The metal personnel access doors are substantial and kept closed and locked and would assist in the prevention of spread of any expected fire. For the cases of open hatches and the one open doorway, no safe shutdown equipment or cables

are located in the vicinity; negligible combustibles are located in the immediate area. An automatic fire suppression system exists on one side of the open door in the Central Zone Group (Fire Zone 8.2.6.C).

Overall, the fire load is low except for areas of combustible concentration which are protected by automatic water suppression systems. For this reason, a fire in either the Central or Southern Zone Groups is expected to develop slowly and remain small. Its heat would dissipate to the surroundings without spreading to an adjacent zone group. Either the fire detection or fire suppression systems would detect the fire and summon the fire brigade. The fire brigade could extinguish the expected fire.

Since a fire in either the Central or Southern Zone Group would not damage an alternative safe shutdown path located out of each of the zone groups and/or spread to the adjacent zone group, the provision of complete 3-hour fire rated barriers between the Central and Southern Zone Groups would not significantly upgrade the level of fire protection is these two zone groups.

9.4 Conclusion

Based on the above evaluation, the staff concludes that the existing fire protection, physical barriers, and redundant safe shutdown paths available outside of the zone group of concern provide a level of fire protection equivalent to the technical requirement of Section 111.G.2 of Appendix R. Therefore, this exemption request may be granted.

10.0 Southern and Northern Zone Groups, Turbine Building, Units 1 and 2

10.1 Exemption Requested

An exemption was requested from Section III.G.2 of Appendix R to the extent that it requires the installation of complete 3-hour fire rated barriers between redundant divisions of safe shutdown system components.

10.2 Discussion

A description of the turbine building operating floor and the Southern Zone Group has been previously discussed in Section 9.2 of this report. The Northern Zone Group consists of Fire Zones 6.2.A, 6.2.B, 7.2, 8.2.1.B, 8.2.1.D, 8.2.2.A, 8.2.2.B, 8.2.5, 8.2.6.D, 8.2.6.E, 8.2.7.D, 8.2.7.E, 9.2, 11.1.2.A, 11.1.2.B, 11.1.2.C, and 14.1.2. All floors of the Northern Zone Group contain only Unit 2 cabling and equipment. The interface between the Northern and Southern Zone Groups involves the Unit 2 cable tunnel (Fire Zone 8.2.5), which is part of the Northern Zone Group. It runs underneath Fire Zones 8.2.6.A and 8.2.6.B of the Southern Zone Group and the radwaste pipe tunnel where Fire Zones 8.2.2.B and 8.2.3.B meet.

The Unit 2 cable tunnel (Fire Zone 8.2.5) passes under each Zone Group and there are unprotected access points into each one. The cable tunnel is constructed of reinforced concrete with all electrical penetrations sealed with 3-hour fire rated materials to Fire Zones 8.2.6.A. and 8.2.6.B. The cable tunnel is also provided with complete fire detection and automatic wet pipe protection at the ceiling level and in each level of trays. At the two points where the Unit 2 cable tunnel accesses the Southern Zone Group, the access is

covered with heavy metal checkered plate. Also, fire detection and fire suppression systems are provided above the access points in the Southern Zone. The Unit 1 and Unit 2 cable tunnels are separated by 3-hour rated block walls. A fire cannot spread from the Unit 2 cable tunnel to the Southern Zone Group through the two access hatches since fire detection and ceiling level sprinkler protection are provided above and immediately below the plates.

With respect to the interface between the radwaste piping tunnel and the Northern/Southern Zone Groups, the radwaste tunnel proper contains no safe shutdown cables or equipment. Also, there are negligible combustibles contained in the radwaste piping tunnel. The unrated ceiling of the radwaste piping tunnel is of concrete. There are unprotected openings into both the Northern and Southern Zone Groups. Automatic sprinkler systems are installed in the fire zones contained within the Northern and Southern Zone Groups that are adjacent to the radwaste piping tunnel.

The issue of safe shutdown capability relative to the Northern and Southern Zone Groups is to ensure that for a fire in one of the zone groups, the other zone group is free of fire damage.

10.3 Evaluation

The fire protection in the Northern and Southern Zone Groups does not comply with Section III.G.2.a of Appendix R because a complete 3-hour fire rated barrier has not been provided between redundant divisions of safe shutdown system components.

Our primary fire protection concern for a fire event in one of these zone groups is that a fire could develop and spread to the adjacent zone group and damage cable or equipment necessary for safe shutdown.

The Southern and Northern Zone Groups border each other only along portions of the Unit 2 cable tunnel and the radwaste piping tunnel. For the Unit 2 cable tunnel, the barrier has a 3-hour fire rating except for the accesses into the Southern Zone Group. However, the access points have heavy metal covers and automatic fire detection and suppression system coverage on both sides. Therefore, should a fire develop in either zone group or the cable tunnel, it would not spread between the two zone groups because it would have to overcome two separate fire suppression systems. Essentially, the barrier is 3-hour fire rated and the metal covers serve as adequate passive barriers. The fire detection system(s) would detect the fire in a timely manner and the automatic suppression systems and fire brigade would extinguish the fire prior to the need for reliance on the concrete barriers and the metal plates.

Part of the Northern/Southern Zone Group interface is with the radwaste piping tunnel that has unprotected openings into both of the zone groups. In this tunnel, a fire could start but, because of the negligible fire load, it would not develop into a fire of significant magnitude or pose a threat to either zone group. Also, if a fire originated in either the Northern or Southern Zone Group, then it could not spread to the adjacent zone group via the tunnel for this same reason. Finally, there is added insurance in the form of fire suppression systems in the fire zones of both zone groups that have unprotected openings into the radwaste piping tunnel.

The staff finds that the provision of a complete 3-hour fire rated barrier between the Northern and Southern Zone Groups would not significantly upgrade the level of fire protection in these two zone groups. On the basis of the previously described fire protection.

10.4 Conclusion

Based on the above evaluation, the staff concludes that the existing fire protection, physical barriers, and the location of one division of power feed to the safe shutdown pump in each zone group provide a level of fire protection equivalent to the technical requirements of Section III.G.2.a of Appendix R. Therefore, this exemption may be granted.

11.0

- Northern Zone Group, Turbine Building
- Central Zone Group, Turbine Building
- Operating Floor, Turbine Building
- Southern and Northern Zone Groups (Fire Zones 8.2.1.A, 11.1.1.A, and 8.2.7.D)

11.1 Exemptions Requested

Exemptions were requested from Section III.G.3 of Appendix R to the extent that it requires the installation of fire detection and fixed fire suppression systems in areas for which alternative or dedicated safe shutdown capability has been provided.

11.2 Discussion

By letter dated April 25, 1986, the NRC issued Fire Protection Generic Letter 86-10. The purpose of this letter was to clarify fire protection issues and render the latest NRC positions on Appendix R issues. Enclosure 1 to GL 86-10 contains six Appendix R interpretations and one of these (number 5) deals with the issue of automatic detection and fire suppression systems. The NRC position is that sufficient fire detection/suppression must be installed to protect against the hazards of the area and less than full area coverage may be acceptable. If partial coverage is provided, then the licensee must provide an evaluation justifying same and, if no coverage is provided, then an exemption is required. Hence, for partial coverage situations such as in the case with Quad Cities, an exemption request is not required for these three plant areas. The evaluations submitted in their June 1986 submittal, however, qualify as a basis for justifying their partial coverages in the four subject plant areas. Therefore, no evaluation is required for these exemption requests because they are not required.

11.3 Evaluation

Not required.

11.4 Conclusion

These exemption requests are not required per the guidance contained in Generic Letter 86-10 dated April 25, 1986. However, they should be evaluated at the time of the Regional Inspection.

12.0 Operating Floor, Turbine Building (Fire Zones 8.2.8.A, 8.2.8.B, 8.2.8.C, and 8.2.8.D), Elevation 639 Feet

12.1 Exemption Requested

An exemption was requested from Section III.G.2.a of Appendix R to the extent that it requires the installation of complete 3-hour fire rated barriers between redundant divisions of safe shutdown system components.

12.2 Discussion

The turbine building and the operating floor layout has been partly discussed in Section 9.0 and 10.0 of this report. The operating floor has five fire zones (8.2.8.A, B, C, D, and E) with Fire Zone 8.2.8.E having no safe shutdown system components. Fire Zone 8.2.8.E is the major portion of the operating floor and holds the turbine equipment. The major equipment on the operating floor includes the turbine generators, MG sets, and both divisions of 4kV and 480V switchgears for both units. The switchgears are the only safe shutdown equipment on this elevation (639 feet). The turbine building is open between Units 1 and 2 at column row 13.

The switchgear on the operating floor has been separated by three partial barriers having a rating of 3-hours in conjunction with a water spray (water curtain) system. The water curtain uses open nozzles to deliver a minimum of 3 gpm per linear foot of opening. The system is actuated by operation of any two of the three detectors (one photoelectric and two ionization) in the area. Shields are provided to prevent spray onto the switchgear. Detectors are located on each side of and between the shields. Fire Zones 8.2.8.A, 8.2.8.B, 8.2.8.C, and 8.2.8.D are adjacent to each other and sit within an alcove along the east wall of the turbine building from column line 19 through column line 7 and between column lines G and H. Also, there is partial 3-hour fire rated barrier which separates each Unit s 480V switchgear at column line 13 east of column line H. Each division of 4kV switchgear for each Unit is separated by a partial fire barrier. Switchgear 13-1 and 24-1 are separated by an automatic water curtain. The 480V switchgear area is separated from the reactor building by a complete 2- or 3-hour fire barrier with Class A fire doors.

The separation of Fire Zone 8.2.8.E from the other fire zones on the operating floor is by the use of a thermally actuated water spray system protecting the curbed area surrounding the MG sets and by the use of a sprinkler system above the MG sets.

With respect to safe shutdown capability, a fire event in any of the four fire zones that contain safe shutdown equipments/cables would only affect one unit. A safe shutdown path for the affected fire zone is available that uses independent cables and equipment. Specifically, given a fire in:

(1) Fire Zone 8.2.8.A - only Unit 1 would be affected and safe shutdown capability is with the safe shutdown pump and RHR Division 1 Method D.

(2) Fire Zone 8.2.8.B - only Unit 1 would be affected and safe shutdown capability is with the safe shutdown pump and RHR Division 2 Method A.

(3) Fire Zone 8.2.8.C - only Unit 2 would be affected and safe shutdown capability is with the safe shutdown pump and RHR Division 1 Method C.

(4) Fire Zone 8.2.8.D - only Unit 2 would be affected and safe shutdown capability is with the safe shutdown pump and RHR Division 2 Method K.

All four fire zones in the area have complete fire detection and the MG sets have redundant automatic suppression installed. Also, fire hoses and fire extinguishers are available.

The fire load in the four fire zones is negligible in the vicinity of the switchgear and there is no continuity of cables or combustibles between any of the four fire zones.

12.3 Evaluation

The fire protection on the operating floor of the turbine building does not comply with Section III.G.2.a of Appendix R because a complete 3-hour fire rated barrier has not been provided between redundant divisions of safe shutdown system components.

There was a concern that a fire in one of these fire zones could spread to the redundant safe shutdown component in an adjacent fire zone. However, the floor fire loading in all of these fire zones is negligible. Because of the low combustible loading, a fire of significant magnitude or duration is not expected to occur. Fire detection is available for all four zones having safe shutdown system components. Also, all fire hazards nearby, such as the MG sets and turbine bearings, are protected by suppression systems. Therefore, a fire would be quickly detected and annunciated in the control room. The large open area on the operating floor would serve as an adequate heat and smoke reservoir for the fire until it is extinguished by the fire brigade or the suppression systems.

Until the fire is extinguished, the partial 3-hour fire rated barriers and the water curtain installed between the fire zones serve as adequate passive protection. These barriers, the negligible fire load, high ceilings and space volume, and the installation of an alternative power feed from Unit 1 to the Unit 2 RHR Division 1 room cooler fan for fire would prevent the fire from spreading and affecting redundant divisions of safe shutdown system components.

The staff finds that the provision of complete 3-hour fire rated barriers around each of the five fire zones would not significantly upgrade the fire protection level.

12.4 Conclusion

Based on the above evaluation, the staff concludes that the existing fire protection, physical barriers, water curtains, and the provision of an alternative power feed for Fire Zone 8.2.8.C provide a level of fire protection equivalent to Section III.G.2.a of Appendix R. Therefore, this exemption may be granted.

13.0 Fire Zone 11.1.1.B - Watertight Door

13.1 Exemption Requested

An exemption was requested from Section III.G.2 of Appendix R to the extent that it requires redundant safe shutdown components to be separated by complete 3-hour fire rated barriers.

13.2 Discussion

Fire Zone 11.1.1.B has a floor, ceiling, and all walls with a 3-hour fire rating except for the east wall that contains a metal, watertight door. This door leads into Fire Zone 8.2.1.A which is in the Southern Zone Group. The Southern Zone group has been previously discussed in Section 9.0 of this report. The metal watertight door is kept closed and is held closed by a number of latches. The door is built of steel about 1/2-inch thick with a small glass portal.

Fire Zone 11.1.1.B contains one Division I RHR service water pump and one Division II RHR service water pump. Also, this zone has the swing (1/2) diesel generator cooling water pump and its auxiliaries. Fire Zone 8.2.1.A contains the main and reserve power feeds to the swing (1/2) diesel generator cooling water pump. The reserve feed is protected with a 1-hour fire rated wrap. In the event of a fire in either fire zone, an alternative safe shutdown path is available. This alternative safe shutdown path is independent of the zones. Cooling water for the swing diesel generator is provided by either the diesel generator 1/2 cooling water pump in Fire Zone 11.1.1.B for a fire outside Fire Zone 11.1.1.B or the diesel generator 1 cooling water pump in Fire Zone 11.1.1.A. The swing diesel 1/2 reserve feed in Fire Zones 8.2.1.A and 11.1.1.A is protected with a 1-hour fire rated wrap. The Division I and Division II RHR service water pumps are protected by using the other unit pump by means of mechanical crossties.

Fire Zones 11.1.1.A and 11.1.1.B contain complete area coverage by a fire detection (rate compensated thermal detectors) and automatic fire suppression system. Fire Zone 8.2.1.A has complete area coverage by an automatic fire suppression system. Fire hose stations and fire extinguishers are available to both zones.

The fire load in both fire zones is negligible (less than 2,500 BTUs per square foot).

13.3 Evaluation

The fire protection in Fire Zones 11.1.1.B and 8.2.1.A does not comply with the technical requirement of Section III.G.2. of Appendix R because a complete 3-hour fire rated barrier is not provided between redundant safe shutdown system components.

The principal fire protection concern for these fire zones was that a fire could start in either fire zone and spread to the unaffected fire zone through an unrated, metal, watertight door. However, the fire load in either zone is negligible and both zones have automatic fire suppression systems. Therefore,

a fire would not develop into significant proportions. The watertight door is of substantial steel construction, sufficient to withstand any expected fire in these zones with or without sprinkler protection. In the event of fire damage to safe shutdown components in either zone, an alternate safe shutdown path is available independent of these fire zones.

It is found that upgrading the existing watertight door to a 3-hour fire rating would not significantly increase the level of fire protection.

13.4 Conclusion

Based on the evaluation, it is concluded that the existing fire protection features combined with the proposed fire protection measures in the above fire zones provide a level of fire protection equivalent to the technical requirements of Section III.G.2 of Appendix R. Therefore, the exemption request for the aforementioned zone may be granted.

14.0 Northern/Central Zone Groups and Fire Zone 8.2.8.D

14.1 Exemption Requested

An exemption was requested from Section III.G.2 of Appendix R to the extent that it requires redundant safe shutdown components to be separated by complete 3-hour fire rated barriers.

14.2 Discussion

The Northern and Central Zone Groups have been discussed in Sections 9.2 and 10.2 of this report. The turbine building operating floor, which contains Fire Zone 8.2.8.0, has been discussed in Sections 9.2 and 12.2 of this report. The Central Zone Group Fire Zone 8.2.7.C and the Northern Zone Group Fire Zones 8.2.7.D and 8.2.7.E are all located directly below Fire Zone 8.2.8.D, which is on the turbine building operating floor.

There are safe shutdown cables in Fire Zone 8.2.7.C (Central Zone Group). In addition, safe shutdown system components and cables are located in Fire Zones 8.2.7.0 and 8.2.7.E of the Northern Zone Group. For a fire event in these two fire zones, there is an independent alternative safe shutdown system. Fire Zone 8.2.8.D also contains safe shutdown 4kV switchgear 23-1. It has an independent alternative safe shutdown system path that is separate from the alternative shutdown path in place for Fire Zones 8.2.7.D, 8.2.7.E and 8.2.7.C.

The basic fire protection features for the four fire zones discussed above have been previously stated in this report. In brief, Fire Zone 8.2.8.D (4kV switchgear 23-1) has its fire hazards protected by complete automatic fire detection in addition to redundant suppression systems for the MG sets. The floor in the immediate vicinity of switchgear 23-1 east of the MG sets is 3-hour rated in Fire Zone 8.2.8.D. In Fire Zone 8.2.7.C of the Central Zone Group, fixed (water) fire suppression is provided throughout the area except for the western portion which has negligible combustibles. The portion of Fire Zone 8.2.7.C which is located beneath zone 8.2.8.D is protected by automatic sprinklers and fire detection. The portion of Fire Zone 8.2.7.D below 8.2.8.D is protected by automatic sprinklers in addition to partial fire detection. In addition, local automatic water spray systems are provided for the turbine oil

reservoirs. Fire Zones 8.2.7.D and 8.2.7.E in the Northern Zone Group are provided with automatic sprinklers and/or fire detection. All major fire hazards are protected by suppression or detection.

14.3 Evaluation

The fire protection in the Northern/Central Zone Groups and Fire Zone 8.2.8.D on the turbine building operating floor does not comply with the requirements of Section 111.G.2 of Appendix R because a complete 3-hour fire rated barrier has not been provided between redundant divisions of safe shutdown system components.

Our principal fire protection concern for these plant areas is that a fire could develop in either the Central (Fire Zone 8.2.7.C) or Northern (Fire Zones 8.2.7.D or 8.2.7.E) Zone Groups and spread to the turbine building operating floor (Fire Zone 8.2.8.D) and vice versa. This concern exists because each of these plant areas has a portion of the alternative safe shutdown system components that are utilized for a fire in one of the other fire zones.

The fire barrier of concern is the turbine building operating floor, which is the ceiling of Fire Zones 8.2.7.C, 8.2.7.D, and 8.2.7.E. This is not a complete 3-hour fire rated barrier, however, the floor in the immediate vicinity of switchgear 23-1 of concern (Fire Zone 8.2.8.D east of the MG set) is 3-hour rated. In addition, because the hazards below the operating floor (Fire Zone 8.2.8.D) are contained in reservoirs and are protected with automatic fire detection and fire suppression systems, an expected fire would be detected early and controlled/extinguished by the fire suppression systems. Also, these areas are open and accessible to the fire brigade. Fire Zone 8.2.8.D has a negligible fire load (excluding the MG sets). This zone is protected by complete automatic fire detection and redundant automatic fire suppression system coverage over the MG sets. Therefore, a fire would not spread downward through the operating floor (Fire Zone 8.2.8.D) because of these features and, also, because there is no continuity of combustibles through the floor slab. The operating floor slab, therefore, has water fire suppression system provided below Fire Zone 8.2.8.D and for the MG set in the zone.

The staff has determined that the provision of a complete 3-hour fire rated barrier between the subject fire zones (turbine building operating floor) would not significantly upgrade the level of fire protection for these plant fire zones.

14.4 Conclusion

Based on the above evaluation, the staff concludes that the existing fire protection, physical features, and the availability of an alternative safe shutdown system independent of the fire zones under consideration provide a level of fire protection equivalent to the technical requirements of Section III.G.2.a of Appendix R. Therefore, this exemption may be granted.

15.0 Summary

Based on our evaluation, we find 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 these areas may be granted:

(1) Unit 1 Reactor Building (Fire Zones 1.1.1.2, 11.2.2, 1.1.1.1S - Torus South, 1.1.1.1N - Torus North) and Unit 2 Reactor Building (Fire Zones 1.1.2.2, 11.3.2, 1.1.2.1S Torus South, and 1.1.2.1N Torus North) to the extent that complete 3-hour fire rated barriers are not provided. See Section 2.0 for additional information.

(2) Unit 1 Reactor/Turbine Building Interface Boundary and Unit 2 Reactor/Turbine Building Interface Boundary to the extent that 3-hour fire rated barriers are not provided. See Section 3.0 for more information.

(3) Unit 1 Reactor Building (Fire Zones 1.1.1.1, 1.1.1.2, 1.1.1.3, 1.1.1.4, 1.1.1.5, 1.1.1.6, 11.1.3, 11.2.1, 11.2.2, 11.2.3, and 11.2.4) and Unit 2 Reactor Building (Fire Zones 1.1.2.1, 1.1.2.2, 1.1.2.3, 1.1.2.4, 1.1.2.5, 11.1.4, 11.3.1, 11.3.2, 11.3.3, and 11.3.4) to the extent that automatic fire detection and fixed fire suppression systems are not provided. See Section 4.0 for additional information.

(4) Units 1 and 2 Control Room (Fire Zone 2.0), Unit 1 and 2 Auxiliary Computer Room, and Unit 1 and 2 Auxiliary Electric Equipment Room (Fire Zone 6.3) to the extent that a fixed fire suppression is not provided. See Section 5.0 for additional information.

(5) 4-kV Bus Duct Penetrations to the extent that complete 3-hour fire rated barriers are not provided. See Section 6.0 for additional information.

(6) Standby Gas Treatment System and the Reactor Building Vent System Piping Penetrations to the extent that a complete 3-hour fire rated barrier is not provided. See Section 7.0 for additional information.

(7) Drywell Expansion Gap in Unit 1 and 2 to the extent that automatic fire detection and fixed fire suppression systems are not installed. See Section 8.0 for additional information.

(8) Units 1 and 2 Turbine Building Southern and Central Zone Groups to the extent that a complete 3-hour fire rated barrier is not provided. See Section 9.0 for additional information.

(9) Units 1 and 2 Turbine Building Southern and Northern Zone Groups to the extent that a complete 3-hour fire rated barrier is not provided. See Section 10.0 for additional information.

(10) Turbine Building Operating Floor (Fire Zones 8.2.8.A, 8.2.8.B, 8.2.8.C, 8.2.8.0, and 8.2.8.E) to the extent that complete 3-hour fire rated barriers are not provided. See Section 12.0 for additional information.

(11) Watertight Door (Fire Zone 11.1.1.B) to the extent that a complete 3-hour fire rated barrier is not provided. See Section 13.0 for additional information.

(12) Northern/Central Zone Groups and Fire Zone 8.2.8.D to the extent that a complete 3-hour fire rated barrier is not provided. See Section 14.0 for additional information.

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

Dated: