UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

ENCLOSURE

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION RELATED TO A REQUEST FOR REVISIONS TO EXEMPTIONS FROM FIRE PROTECTION REQUIREMENTS OF 10 CFR PART 50, APPENDIX R QUAD CITIES STATION, UNITS 1 AND 2 DOCKET NOS. 50-254 AND 50-265

1.0 INTRODUCTION

By letter dated November 5, 1991, Commonwealth Edison Company (CECo or the licensee), provided information concerning in-situ combustible loading levels in fourteen areas at Quad Cities, Units 1 and 2. For each of these areas, the staff previously reviewed and approved exemptions from specific requirements of 10 CFR Part 50, Appendix R, Sections III.G.2, III.G.3 and III.L in letters of July 21, 1988 and February 25, 1991. A quality assurance audit at Quad Cities indicated that the values of combustible loadings stated in the licensee's exemption requests of December 18, 1984, December 4, 1985, June 25, 1986, July 22, 1986, September 30, 1987, October 1, 1987, November 23, 1987, and April 11, 1990, were not accurate. The in-situ combustible loading in each area had increased. The majority of the increases are due to cable insulation installed for various modifications, anti-contamination clothing, and the introduction of transient combustibles in the areas. When the licensee discovered that the combustible loads were not accurate, fire watches were put into place as compensatory measures pending staff reassessment of the original exemptions.

The staff visited the site on September 27, 1993, to walkdown each area discussed in the licensee's November 5, 1991, submittal. The staff evaluated the amount, type, and configuration of the combustibles in these areas to determine if the conclusions reached in the previous exemptions remained valid. During the site visit, the licensee informed the staff that the combustible loads of interest are stated in the current Quad Cities Fire Hazard Analysis (Amendment 9 of December 1991).

2.0 Separation Of Redundant RHR Trains In the Reactor Building Unit 1; Fire Area/Zone 1.1.1.1, 1.1.1.2 and 11.2.2

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

Fire Zones 1.1.1.1 and 1.1.1.2 are located in the Unit 1 reactor building on different elevations. Fire Zone 1.1.1.1 is located below Fire Zone 1.1.1.2. Fire Zones 1.1.1.1 and 11.2.2 share a barrier with Fire Zone 1.1.1.2 which, with respect to separation of redundant RHR-related cabling, deviates from the requirements of Section III.G.2 of Appendix R. The principal concern is that

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a fire in one elevation could develop, spread to the adjacent elevation and damage the redundant RHR train.

An exemption from the requirements of 10 CFR Part 50, Appendix R, Section III.G.2 to the extent that it requires that the redundant components be separated by 3-hour fire rated barriers, or provide an alternate shutdown capability independent of the fire area, was previously granted in a Safety Evaluation Report (SER) dated July 21, 1988. The combustible loading evaluated in this SER was 25,333 Btu/ft^2 for each of these zones. Since the approval of this exemption request, the physical configuration of these fire zones remains unchanged with the exception of combustible loads. The actual in-situ combustible loading is now approximately 40,000 Btu/ft^2 for each zone. The additional combustible loading is primarily from additional insulated cables installed in support of various plant modifications. The original SER stated that none of the zones exceeded an equivalent fire severity of 19 minutes. The requested limit of 40,000 Btu/ft^2 yields an equivalent fire severity of 30 minutes. The increase in the amount, type, and configuration of the combustibles in these zones does not significantly increase either the probability of a fire or consequences of a fire. The fixed fire protection features or the fire brigade should be able to control the fire before redundant shutdown components are damaged.

Fire detection is provided for all of the affected fire zones. Fire suppression systems protect the area adjacent to the single cable riser that penetrates the ceiling in Fire Zones 1.1.1.1 and 1.1.1.2 and above the suppression chamber differential pressure (DP) unit and the atmosphere containment atmosphere dilution (ACAD) air compressor in Fire Zone 1.1.1.2. 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, concrete barriers, high ceilings, space volume, and one-hour fire rated cable tray enclosures in the Fire Zone 1.1.1.1 would prevent the fire from spreading beyond the place of origin and damaging redundant RHR safe shutdown system components located in other fire zones.

The staff finds that despite the increase in combustible loading, the conclusions previously reached by the staff remain valid. Therefore, the previous exemption from the requirements of Section III.G.2 of Appendix R to 10 CFR Part 50 remains valid.

3.0 Fire Area/Zone 1.1.1.2 Reactor/Turbine Building Interface Boundary Wall

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

Fire Zone 1.1.1.2 is located in the Unit 1 reactor building and is separated from the turbine building by a 3-hour rated fire barrier except for the steam tunnel which is constructed of concrete shield walls with unrated metal access doors and unrated penetrations and therefore deviates from the requirements of

Section III.G.2 of Appendix R. The principal concern is that a fire in the turbine building or reactor building could develop, spread through the steam tunnel into the opposite building and damage the redundant RHR train.

An exemption from the requirements of 10 CFR Part 50, Appendix R, Section III.G.2 to separate the redundant components by 3-hour fire rated barriers or provide alternate shutdown capability independent of the area, was previously granted in a SER dated July 21, 1988. The combustible loading evaluated in the SER was approximately 30,000 Btu/ft^2. The actual combustible loading is 40,000 Btu/ft^2. Since the approval of this exemption, the physical configuration of Fire Zone 1.1.1.2 has not changed. The SER stated that none of the fire zones exceeded an equivalent fire severity of 23 minutes. The proposed in-situ combustible loading of 40,000 Btu/ft^2 yields an equivalent fire severity of 30 minutes. Fire protection features for Fire Zone 1.1.1.2 include an area-wide fire detection system (except inside the steam tunnel, drywell personnel air lock, and trackway) and automatic fire suppression over two air compressors. Additionally, manual fire fighting equipment is available for the fire zones. Fixed fire suppression and detection systems are installed in the turbine building fire zones adjacent to the steam chase. The combination of low combustible loading, fire protection features and construction of the turbine/reactor building interface wall assures that it is unlikely that a fire will propagate between the reactor and turbine buildings.

The staff finds that despite the increase in combustible loading, the conclusions previously reached remain valid. Therefore, the previous exemption from Section III.G.2 of Appendix R to 10 CFR Part 50 also remains valid.

4.0 Lack of Complete Detection and Suppression Throughout the Reactor Building Unit 1 Fire Zones 1.1.1.1, 1.1.1.2, 1.1.1.3, 11.1.3, 11.2.1, 11.2.3, and 11.2.4

An exemption was requested from the requirements of Section III.G.3 to install an area-wide automatic fire suppression system.

Fire Zones 1.1.1.1, 1.1.1.2, and 1.1.1.3 are located on different elevations of the Unit 1 reactor building. Fire Zones 1.1.1.1 and 1.1.1.2 are discussed in Sections 2 and 3 of this SER. Fire Zones 11.1.3, 11.2.1, 11.2.3 and 11.2.4 are located in the reactor building at Elevation 554 feet. These fire zones do not comply with the requirements of Section III.G.3 of Appendix R, because fixed fire suppression systems and/or fire detection systems are not provided in zones for which alternative safe shutdown capability is provided. The principal concern is that a fire in one of these fire zones could cause a loss of normal safe shutdown capability.

An exemption was granted from the requirements of Section III.G.3 to install an area-wide fire suppression system in a SER dated July 21, 1988. The staff concluded 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. Since the approval of this exemption for

these fire zones, the physical configuration of the fire zones has not changed. The combustible loadings originally evaluated were 30,677 Btu/ft^2 for each zone with the exception of Zone 11.1.3 which contained 120,000 Btu/ft^2. The licensee has increased the combustible loadings to 40,000 Btu/ft^2 and 160,000 Btu/ft^2, respectively. The additional combustible loading is primarily cable insulation from the insulated cables installed in support of various plant modifications. There is reasonable assurance that a fire will be detected in its early stages and readily extinguished by the fire brigade. The fire zones that do not have either fire detection or fixed suppression systems, have either negligible fire loads or no safe shutdown systems. 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 of these zones before it is extinguished, the independent alternative shutdown capability is available 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 concluded that the increase in combustible loading in these fire zones will not impact the ability to achieve and maintain safe shutdown. The conclusions previously reached by the staff remain valid. Therefore, the previous exemption from Section III.G.3 of Appendix R to 10 CFR Part 50 remains valid.

5.0 Separation Of Redundant RHR Trains In The Reactor Building Unit 2; Fire Zones 1.1.2.1, 1.1.2.2 and 11.3.2

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

Fire Zones 1.1.2.1 and 1.1.2.2 are located in the Unit 2 reactor building on different elevations; Fire Zone 1.1.2.1 is below Fire Zone 1.1.2.2. Fire Zone 11.3.2 is also located below Fire Zone 1.1.2.2. Both Fire Zones 1.1.2.1 and 11.3.2 share a barrier with Fire Zone 1.1.2.2 which, with respect to the separation of redundant RHR related cabling, deviates from the requirements of Section III.G.2 of Appendix R. The major concern is that a fire on one elevation could develop, spread to the adjacent elevation and damage the redundant RHR train.

An exemption from the requirements of 10 CFR Part 50, Appendix R, Section III.G.2 to provide 3-hour fire rated barriers to separate redundant divisions of safe shutdown components was previously granted in a SER dated July 21, 1988. In the original exemption, a combustible loading of approximately 25,333 Btu/ft^2 for each fire zone was evaluated. This loading yields a fire severity of 19 minutes. The actual combustible loading is approximately 40,000 Btu/ft^2 for each fire zone. This increased fire load yields a fire severity of 30 minutes. As stated previously, the increase in combustible loading is primarily cable insulation from additional cabling

installed in support of various plant modifications. Fire detection is provided for all of the affected fire zones. Fire detectors have been installed in each cable tray and below the bottom trays in Fire Zone 1.1.2.1. A fire suppression system is provided around the cable riser that penetrates the ceiling of Fire Zone 1.1.2.1 and above suppression chamber drywell differential pressure (DP) unit and the atmosphere containment atmosphere dilution (ACAD) air compressor in Fire Zone 1.1.2.2. There is reasonable assurance that a fire would be quickly detected and alarmed in the control room by the fire detection systems. The fire brigade or the fire suppression systems would extinguish the fire readily because of the low combustible loadings. The low fire loadings, concrete barriers, high ceilings of the fire zone, space volume, and 1-hour fire rated cable tray enclosures in Fire Zone 1.1.2.1 would prevent the fire from spreading beyond the place of origin and damaging redundant RHR safe shutdown system components located in other fire zones.

The staff finds that in spite of the increase in combustible loadings in these fire zones, the conclusions reached in the previous exemptions remain valid. Therefore, the previous exemption from Section III.G.2 of Appendix R to 10 CFR Part 50 remains valid.

6.0 Separation of Redundant RHR Trains in the Reactor Building and Turbine Building Fire Zones 1.1.2.2, 8.2.6.E and 8.2.8.C

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

Fire Zones 8.2.6.E and 8.2.8.C are located in the turbine building. Fire Zone 1.1.2.2 is discussed in Section 5.0 of this SER. These fire zones share a barrier with Fire Zone 11.3.2 which, with respect to the separation of redundant RHR-related cabling deviates from the requirements of Section III.G.2 of Appendix R. The main concern is that a fire in the turbine building or reactor building could develop, spread into the opposite building and damage the redundant RHR train.

An exemption from the requirements of 10 CFR Part 50, Appendix R, Section III.G.2. which requires that the redundant safe shutdown components be separated by 3-hour fire rated barriers was previously granted in the SER dated July 21, 1988. Since the original exemption, the physical configurations of these fire zones have not changed. The combustible load evaluated for the original exemption for Fire Zones 8.2.6.E and 8.2.8.C were approximately 30,667 Btu/ft^2 and 100,000 Btu/ft^2 respectively. The current in-situ combustible loading in these fire zones is approximately 60,000 Btu/ft^2 and 120,000 Btu/ft^2. The increase in combustible loading is primarily cable insulation from additional cabling installed in support of various plant modifications. The equivalent fire severities for these fire zones are 30 minutes and 45 minutes, respectively. Fire protection features include fire detection and fire suppression systems. There are no safe shutdown components located in Fire Zone 8.2.8.C. The only safe shutdown

components located in the steam chase tunnel are Reactor Core Isolation Cooling (RCIC) valves. However, RCIC valves are not used for a fire in these zones. Fire Zones 1.1.2.2 and 8.2.6.E are equipped with area-wide detection and automatic fire suppression systems. The combination of low combustible loading, construction of the turbine reactor building interface wall and fire protection features assures that it is unlikely for a fire to propagate between the reactor and turbine buildings.

The staff has concluded that the previous conclusions remain valid. Therefore, the previous exemption from Section III.G.2 of Appendix R to 10 CFR Part 50 remains valid.

7.0 Lack of Area Wide Detection and Suppression System throughout the Reactor Building 1.1.2.3, 11.1.4, 11.3.3 and 11.3.4

An exemption was requested from the requirements of Section III.G.3 of Appendix R to 10 CFR Part 50 to install area-wide automatic fixed suppression and fire detection systems for which an alternative shutdown capability is provided.

Fire Zones 1.1.2.3 and 11.1.4, 11.3.1, 11.3.3 and 11.3.4 are located on two different elevations of the Unit 2 reactor building. Each of these fire zones deviates from the requirements of III.G.3 of Appendix R because fixed fire suppression and fire detection systems have not been installed in fire zones for which alternative safe shutdown capability is provided. The principal concern was that a fire in one of these fire zones could cause a loss of the normal safe shutdown capability.

An exemption from the requirements of 10 CFR Part 50, Appendix R, Section III.G.3 to provide automatic fire detection and fixed suppression systems in an area room or zone for which alternative shutdown capability is provided was previously granted in a SER dated July 21, 1988. The combustible loading evaluation for the original exemption was approximately 30,667 Btu/ft^2 each for Fire Zones 1.1.2.3, 11.3.1, 11.3.3 and 11.3.4 and 120,000 Btu/ft^2 for Fire Zone 11.1.4. The licensee has increased the combustible loading to 40,000 Btu/ft^2 for Fire Zones 1.1.2.3, 11.3.1, 11.3.3 and 11.3.4, and to 160,000 Btu/ft^2 for Fire Zone 11.1.4. The increase in combustible loading is primarily cable insulation from additional cabling installed in support of various plant modifications. Fire Zone 11.1.4 has a high fire load due to lubricating oils in the HPCI pump room. This high fire load is protected by automatic fire suppression and detection systems. Fire detection is provided in all fire zones containing safe shutdown equipment. There is reasonable assurance that a fire will be detected in its early stages and readily extinguished by the fire brigade. An independent alternative shutdown capability is provided to achieve and maintain safe shutdown.

The staff has concluded that the increase in the combustible loadings in the referenced fire zones does not alter the conclusions reached in the previous exemption. Therefore, the conclusions previously reached remain valid and the exemption from Section III.G.3 of Appendix R to 10 CFR Part 50 remains valid.

8.0 Lack of 3-Hour Fire Barriers Between the Southern and Central Zone Groups; Fire Zones 8.2.2.B, 8.2.3.B, 8.2.10 and 14.1.1

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

Fire Zones 8.2.2.B, 8.2.3.B, 8.2.10 and 14.1.1 are located on different elevations of the turbine building. Fire Zone 8.2.10 shares a boundary with Fire Zone 14.1.1 and Fire Zones 8.2.2.B and 8.2.3.B share a boundary in the radwaste tunnel. These fire zones are part of different fire areas and the boundaries deviate from the requirements of Section III.G.2 of Appendix R. The principal concern is that a fire in one of these fire zones could spread to the adjacent fire area.

An exemption from the requirements of 10 CFR Part 50, Appendix R, Section III.G.2, to provide a 3-hour fire rated barrier between redundant divisions of safe shutdown system components was previously granted in the SER dated July 21, 1988. Since the approval of the original exemption, the physical configurations of the fire zones remain unchanged. The combustible loads evaluated in the original exemption for Fire Zones 8.2.2.B and 8.2.3.B were negligible. The evaluated combustible loads for Fire Zones 8.2.10 and 14.1.1 were approximately 5,000 Btu/ft^2 and 2,000 Btu/ft^2, respectively. The current in-situ combustible loading for each zone is approximately 20,000 Btu/ft^2. The majority of the increase in incombustible loading in these zones is due to insulated cable installed in support of various plant modifications. Fire Zones 8.2.10 and 14.1.1. are separated by reinforced concrete shield walls with metal personnel access doors which are kept closed and locked. This will assist in the prevention of spread of any expected fire. An automatic fire suppression system is provided in these zones. The increased combustible loading yields an equivalent fire severity of 15 minutes. Either the fire detection or fire suppression systems would detect the fire and alarm the fire brigade. The fire brigade could extinguish the expected fire. 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 spread to the adjacent zone group. The provision of 3-hour fire rated barriers between the Central and Southern zone groups would not significantly upgrade the level of fire protection for these groups.

The staff finds that in spite of the increase in combustible loading, the conclusions reached in the previous exemption remain valid. Therefore, the previous exemption from Section III.G.2 of Appendix R to 10 CFR Part 50 remains valid.

9.0 Lack of 3-Hour Fire Barriers Between the Equivalent Fire Areas 8.2.8.A, 8.2.8.B, 8.2.8.C and 8.2.8.D, Operating Floor, Turbine Building

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

Fire Zones 8.2.8.A, 8.2.8.B, 8.2.8.C, and 8.2.8.D are located on the turbine operating floor Elevation 639 feet. The fire zones share boundaries, which with respect to separation of redundant equipment, deviate from the requirements of Section III.G.2.a of Appendix R to the extent that it requires the installation of 3-hour fire rated barriers between redundant divisions of safe shutdown components. The major equipment on the operating floor includes the turbine generators, motor generator sets, and both divisions of 4KV and 480 V switchgear for both units. The switchgears are the only safe shutdown equipment on this elevation. The principal concern is that a fire in one of these fire zones could spread into the adjacent fire zone and damage redundant equipment.

An exemption from the requirements of 10 CFR Part 50, Appendix R, Section III.G.2.a to provide a 3-hour fire rated barriers between redundant divisions of safe shutdown components was previously granted in a SER dated July 21, 1988. In the original exemption a combustible loading of approximately 135,000 Btu/ft^2 for Fire Zones 8.2.8.A and 8.2.8.D and 100,000 Btu/ft^2 for Fire Zones 8.2.8.B and 8.2.8.C was evaluated. The actual in-situ combustible loading in Fire Zones 8.2.8.A, 8.2.8.D, 8.2.8.B, and 8.2.8.C ranges from 120,000 Btu/ft^2 to 160,000 Btu/ft^2. The increase in combustible loading is primarily cable insulation from additional cabling installed in support of various plant modifications. All four fire zones have complete fire detection and the motor generator (MG) sets have redundant automatic suppression systems. The combination of fire detection and fire suppression systems, high ceilings, large space volume, alternative safe shutdown capability and lack of continuity of combustibles between the fire zones provides reasonable assurance that a fire will be detected in its early stages and readily extinguished by the fire brigade. An independent alternative shutdown capability is provided to achieve and maintain safe shutdown.

The staff finds that in spite of the increase in combustible loading, the conclusions reached in the previous exemption remain valid. Therefore, the previous exemption from Section III.G.2.a of Appendix R to 10 CFR Part 50 remains valid.

10.0 Lack of 3-Hour Barriers Between Fire Zones 8.2.1.A and 11.1.1.B and the Rest of the Southern Zone Group

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

Fire Zones 8.2.1.A and 11.1.1.B are located in the southern zone group of the turbine building. Fire Zone 11.1.1.B has a floor, ceiling, and walls with 3-hour fire ratings, except for the east wall which contains a metal watertight door. This door leads into Fire Zone 8.2.1.A which is in the Southern zone group. In the event of a fire either in Fire Zone 8.2.1.A or in Fire Zone 11.1.1.B, the same shutdown path would be utilized. Fire barriers with a 3-hour rating separate the redundant safe shutdown equipment in each

fire zone, with the exception of a non-labeled watertight door which provides access between the two fire zones. Fire Zone 11.1.1.B contains one Division I RHR service water pump and one Division II RHR service water pump. This zone also has the swing diesel generator cooling water pump and its auxiliaries. Fire Zones 8.2.1.A contains the main and reserve power feeds to the swing diesel generator cooling water pump. The principal fire protection concern for these fire zones is that a fire could start in either fire zone and spread to the unaffected fire zone through the unrated watertight door.

An exemption from the requirements of 10 CFR Part 50, Appendix R, Section III.G.2, to provide a 3-hour fire barrier between the redundant safe shutdown components was granted in the previous SERs of July 21, 1988 and February 25, 1991. The increased fire load in either zone is approximately 40,000 Btu/ft^2. Both zones have automatic fire suppression systems. 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 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. The staff has concluded that the existing fire protection features combined with the low combustible loading and construction of the watertight door assures that a fire will not propagate between these fire zones.

The staff finds that in spite of the increase in combustible loading, the conclusions reached in the previous exemption remain valid. Therefore, the previous exemption from Section III.G.2 of Appendix R to 10 CFR Part 50 remains valid.

11.0 Lack of 3-Hour Barriers Between the Fire Areas 8.2.7.C, 8.2.7.E and 8.2.8.D and Northern and Central Zone Groups.

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

Fire Zone 8.2.7.C is in the central zone group located at elevation 611 feet 6 inches. Fire Zone 8.2.7.E is located in the Northern zone group at elevation 615 feet, 6 inches. Fire Zone 8.2.8.D is located on the turbine operating floor and is discussed in Section 9.0 of this SER. The floor of Fire Zone 8.2.8.D is not fire rated and separates this fire zone from the northern and central zone groups. Fire Zones 8.2.7.C and 8.2.7.E contain safe shutdown cables. Since the original exemption was granted, the physical configuration has not changed. The principal concern is that a fire could develop in either the central or northern zone groups and spread to the turbine building operating floor (Fire Zone 8.2.8.D) and vice versa.

An exemption from the requirements of 10 CFR Part 50, Appendix R, Section III.G.2, to provide a 3-hour fire barriers for the redundant safe shutdown components was granted in the SER dated July 21, 1988. In the original exemption a combustible loading of 310,000 Btu/ft^2 for Fire

Zone 8.2.7.C and 30,000 Btu/ft^2 for Fire Zone 8.2.7.E was evaluated. The actual in-situ combustible loads for these fire zones are approximately 320,000 Btu/ft^2 and 40,000 Btu/ft^2, respectively. The increase in combustible loading is primarily cable insulation from additional cabling installed in support of various plant modifications. The hazards below Fire Zone 8.2.8.D are contained in reservoirs and are protected with automatic fire detection and suppression systems. Fire Zones 8.2.7.C and 8.2.7.E are protected by suppression systems. An expected fire would be detected early and controlled by the fire suppression systems until the fire brigade responds. The fire areas of concern are also open and accessible to the fire brigade. The combination of fire detection systems, fire suppression, and fire area access still would provide a level of fire protection equivalent to the requirements of Section III.G.2 of Appendix R.

The staff finds that in spite of increase in combustible loading, the conclusions reached in the previous exemption remain valid. Therefore, the previous exemption from Section III.G.2 of Appendix R to 10 CFR Part 50 remains valid.

12.0 Lack of Complete Fixed Fire Suppression and Detection System in the Auxiliary Electric Equipment Room of Service Building Fire Zone 6.3

An exemption was requested from the requirements of Section III.G.3 to install an area-wide automatic fixed suppression and fire detection systems or provide an alternative shutdown capability.

Fire Zone 6.3 is the auxiliary electric equipment room and is located in the service building. A fire in this zone could damage the redundant divisions of normal safe shutdown components. The physical configuration has not changed since the original exemption was granted.

An exemption from the requirements of 10 CFR Part 50, Appendix R, Section III.G.3, to install an area-wide fixed fire suppression system was previously granted in the SER dated July 21, 1988. Since the original exemption request the combustible loading has increased from 75,000 Btu/ft^2 to 120,000 Btu/ft^2. The increase in combustible loading is primarily cable insulation from additional cabling installed in support of various plant modifications. The auxiliary electric equipment room (AEER) has a complete automatic fire detection system. A fire in the AEER would be promptly detected by the automatic fire detection system or fire brigade. Should fire damage be extensive, then the independent alternative safe shutdown system can be utilized to facilitate safe shutdown of the plant.

The staff finds that the increase in combustible loadings in the AEER does not alter the conclusions reached in the previous exemption. Therefore, the previous exemption from Section III.G.3 of Appendix R to 10 CFR Part 50 remains valid.

13.0 Lack of Complete Suppression System in the Control Room, Fire Zone 2.0

An exemption was requested from Section III.G.3 of Appendix R to the extent that it requires installation of automatic fixed fire suppression system in an area with alternative shutdown capability.

The control room (Fire Zone 2.0) is located in the service building at Elevation 623 feet. A fire in the control room would damage the normal safe shutdown systems.

An exemption from the requirements of 10 CFR Part 50, Appendix R, Section III.G.3 to install an area-wide fixed fire suppression system was previously granted in the SER dated July 21, 1988. The justification for granting the exemption was based on the presence of early warning fire detectors, the continuous manning of the control room, and reasonable assurance that a probable fire would be detected in its early stages and extinguished by the fire brigade. In addition, an alternative shutdown capability is provided independent of the control room. The combustible loading evaluated in the original exemption was approximately 25,000 Btu/ft^2. The existing in-situ combustible loading is approximately 40,000 Btu/ft^2. The increase in combustible loading is primarily due to installation of cable insulation from additional cabling installed in support of various plant modifications. The increase in the amount, type, and configuration of the combustibles in the control room does not significantly increase the probability of a fire overcoming the existing fire protection features of the control room.

The staff finds that the increase in the combustible loading in the control room does not alter the conclusions reached in the previous exemption. Therefore, the previous exemption from Section III.G.3 of Appendix R to 10 CFR Part 50 remains valid.

14.0 Separation of Redundant Reactor Vessel Level Indicating Instrumentation Fire Zones 1.1.1.2, 1.1.1.3, 1.1.2.2, and 1.1.2.3

An exemption was requested from the requirements of Section III.G.2.b of Appendix R to the extent that it requires 20 feet of horizontal space free of intervening combustibles or fire hazards.

Fire Zones 1.1.1.2 and 1.1.1.3 are located on different elevations of the Unit 1 reactor building. Fire Zones 1.1.2.2 and 1.1.2.3 are located on different elevations of the Unit 2 reactor building. Since the original exemption was issued, the physical configuration of the fire zones has not changed. These fire zones contain redundant reactor vessel level indicating instrumentation which, with respect to the separation of the instruments and their sensing lines, deviates from the requirements of Section III.G.2. of Appendix R. The principal concern is that a fire in one of the fire zones

could spread to the adjacent fire zone and damage redundant reactor level instruments.

An exemption from the requirements of Section III.G.2.b of Appendix R to the extent that 20 feet of horizontal space free of intervening combustibles and area wide suppression was granted by the staff in the SER dated February 25, 1991. The reactor buildings consist of multiple elevations which have been sub-divided into separate fire zones. The combustible loading evaluated in the original exemption was approximately 25,333 Btu/ft² for fire zones 1.1.1.2 and 1.1.2.2 and 30,667 Btu/ft² for fire zones 1.1.1.3 and 1.1.2.3. The existing in-situ combustible loading is approximately 40,000 Btu/ft² for each of these areas. The increased combustible loading is primarily due to installation of cable insulation from additional cabling installed in support of various plant modifications. Fire detection is provided throughout most of the fire zones containing the instrumentation of concern. If a fire were to occur in any of these fire zones, it would be detected in its incipient stages and the control room would be alerted. The control room would dispatch the plant fire brigade which would extinguish the fire using the installed manual hose stations and fire extinguishers. Based on the combustible loading and distance between instrument racks within separate fire zones, there is a reasonable assurance that a fire would be prevented from damaging all the instrument racks. The combination of low fire loading, fire detection systems, and a large volume of the fire zones would dissipate the smoke and heat from a fire towards the upper elevations.

The staff finds that the increase in combustible loads does not alter the conclusions previously reached. Therefore, the previous exemption from Section III.G.2.b of Appendix R to 10 CFR Part 50 remains valid.

15.0 Separation of Redundant Suppression Pool Level Indicators, Fire Zones 1.1.1.1, 1.1.1.2, 1.1.2.1 and 1.1.2.2

An exemption was requested from the requirements of Section III.G.2.b of Appendix R to the extent that it requires 20 feet of horizontal space free of intervening combustibles or fire hazards.

Fire Zones 1.1.1.1 and 1.1.1.2 are located in the Unit 1 reactor building on different elevations with Fire Zone 1.1.1.1 located below Fire Zone 1.1.1.2. Fire Zones 1.1.2.1 and 1.1.2.2 are located in the Unit 2 reactor building on different elevations located below Fire Zone 1.1.2.2. The Units 1 and 2 fire zones contain redundant suppression pool level instrumentation. The principal concern is that a fire developing in either of the fire zones on each unit could damage redundant suppression level instrumentation.

An exemption from the requirements of 10 CFR Part 50, Appendix R, Section III.G.2.b, to install area-wide automatic fire suppression systems, and to provide 20 feet of separation between redundant components was previously granted in a SER dated February 25, 1991. The combustible load evaluated for the original exemption was approximately 25,333 Btu/ft² for each fire zone. The current in-situ combustible loading in each fire zone is

approximately 40,000 Btu/ft^2. The increased combustible loading is primarily due to installation of cable insulation from additional cabling installed in support of various plant modifications. Since the original exemption, the physical configuration has not changed. The suppression pools for both units are equipped with pool level sight glasses and level transmitters along with the cables that provide power and instrument cables leading to the control room level indicators. The cable trays on the torus level are provided with linear thermal detectors and fire detection is provided throughout the ground floor. The accumulation of transient combustibles would be minimized by restricted access to the torus level. Additionally, pool level monitoring would not begin until three hours into the event which would allow sufficient time for the fire brigade to control any fire and for smoke removal. There is a reasonable assurance based on the low combustible loading on the torus, the suppression pool monitoring capability would be available even if the control room monitoring capability was lost. Based on the evaluation above, the lack of separation of redundant suppression pool level instrumentation, including the lack of automatic suppression in the torus level, would not adversely affect plant safety.

The staff has concluded that an increase in combustible loading does not change the conclusion previously reached by the staff. Therefore, the previous exemption from Section III.G.2.b of Appendix R to 10 CFR Part 50 remains valid.

16.0 CONCLUSION

The staff finds that in all cases, the conclusions reached when granting the exemptions in its SERs of July 21, 1988 and February 21, 1991, are still valid. Therefore, the original exemptions are still valid and additional exemptions are not required.

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