



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



SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATIVE TO APPENDIX R EXEMPTIONS REQUESTED FOR
ROCHESTER GAS AND ELECTRIC CORPORATION
R. E. GINNA NUCLEAR POWER PLANT
DOCKET NO. 50-244

1.0 INTRODUCTION

By letter dated October 4, 1984 and supplemented on January 16, 1985, Rochester Gas and Electric Corporation submitted an Appendix R analysis. Twelve exemptions from the technical requirements of Section III.G.2. and III.G.3 were requested. Our review of these exemptions is based on the existing level of fire protection as delineated in the Appendix R Report.

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:

- (1) Separation of cables and equipment and associated non-safety circuits of redundant trains by a fire barrier having a 3-hour rating. Structural steel forming a part of or supporting such fire barriers shall be protected to provide fire resistance equivalent to that required of the barrier.
- (2) Separation of cables and equipment and associated non-safety circuits of redundant trains by a horizontal distance of more than 20 feet with no intervening combustibles or fire hazards. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area; or
- (3) Enclosure of cable and equipment and associated non-safety circuits of one redundant train in a fire barrier having a 1-hour rating. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area.

If these conditions are not met, Section III.G.3 requires an alternative shutdown capability independent of the fire area of concern. It also requires a fixed fire suppression system to be installed in the fire area of concern if it contains a large concentration of cables or other combustibles. These alternative requirements are not deemed to be equivalent; however, they provide equivalent protection for those configurations in which they are accepted.

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Because it is not possible to predict the specific conditions under which fires may occur and propagate, the design basis protective features are specified in the rule rather than the design basis fire. Plant specific features may require protection different than 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 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. Fire protection configurations must either meet the specific requirements of Section III.G or an alternative fire protection configuration must be justified by a fire hazard analysis.

Our general criteria for accepting an alternative fire protection configuration are the following:

- ° The alternative assures 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 assures that fire damage to at least one train of equipment to achieve cold shutdown is limited such that it can be repaired within a reasonable time (minor repairs with components stored on-site).
- ° Modifications required to meet Section III.G would not enhance fire protection safety above that provided by either existing or proposed alternatives.
- ° Modifications required to meet Section III.G would be detrimental to overall facility safety.

2.0 REFUELING WATER STORAGE TANK (RWST)

2.1 Exemption Requested

The licensee requested an exemption from the technical requirements of Section III.G.2 to the extent that it requires a continuous fire-rated barrier between redundant shutdown systems in the Auxiliary Building Fire Areas ABBM and ABI.

2.2 Discussion

The RWST extends from elevation 235 feet 8 inches of the Auxiliary Building through elevation 253 feet and terminates on elevation 271 feet. The concrete floor/ceiling at elevation 271 feet is the common boundary between Fire Area ABBM (below) and ABI (above). As



the RWST passes through this fire barrier, there is a 6-inch gap in the floor/ceiling around the circumference of the tank. An 8-foot high concrete block wall partially circles the gap on the 271 feet elevation.

The only shutdown-related systems that are vulnerable to fire damage in these two fire areas are emergency switchgear bus 14, which is located on elevation 271 feet of Fire Area ABI, and emergency switchgear bus 16, located directly below on elevation 253 feet of Fire Area ABBM. Each bus is approximately 8-feet high and is located about 7-feet from the RWST gap at its closest point.

The fire loading within area ABBM consists of cable insulation, charcoal and transient combustibles, and has been calculated to be 18,000 and 8,150 BTU/ft² for the two fire zones which comprise this area. This represents a fire severity of about 13 and 6 minutes respectively, as determined by the ASTM E-119 time-temperature curve. The fire loading within area ABI is of no concern for this exemption because fire would not propagate downward from elevation 271 feet through the gap so as to damage the redundant bus on elevation 253 feet.

Existing fire protection includes area-wide fire detection systems, preaction-type sprinkler systems, manual hose stations and portable fire extinguishers.

The licensee justifies the exemption on the basis of the low fire loading, existing fire protection and the physical configuration of the fire areas.

2.3 Evaluation

The technical requirements of Appendix R are not met because the redundant shutdown systems on elevations 235 feet 8 inches through 271 feet of the Auxiliary Building are not separated and protected as delineated in Sections III.G.2.a., b., or c.

We were concerned that if a fire occurred within Area ABBM, the products of combustion would rise up through the gap around the RWST and damage redundant shutdown-related systems on elevation 271 feet in Fire Area ABI. However, the fire loading in ABBM is low. Combustible materials are generally widely dispersed. Where there exists a location of significant concentration of combustibles, the fire hazard is mitigated by the presence of an automatic sprinkler system. Because of these conditions, we have reasonable assurance that any potential fire would be of limited magnitude and extent.

Because of the presence of an area-wide fire detection system, we have reasonable assurance that a fire will be detected in its initial stages, before significant propagation occurs. The fire would then be extinguished by the plant fire brigade using the existing manual fire fighting equipment.

With the exception of the gap at the RWST, the construction of the floor/ceiling at elevation 271 feet is continuous and fire-rated. Because of the gap, smoke and hot gases from a fire might filter up into area ABI. However, the block wall at the gap will tend to channel the products of combustion up and away from the redundant bus. The floor-to-ceiling height in Area ABI at the RWST is in excess of 50 feet. Therefore, any products of combustion rising up through the gap will dissipate in the large ceiling area and will not pose a significant threat to the bus.

2.4 Conclusion

Based on our evaluation, we conclude that the licensee's alternate fire protection configuration will achieve an acceptable level of safety equivalent to that provided by Section III.G.2. Therefore, the licensee's request for exemption at the common boundary between Fire Areas ABBM and ABI at the RWST should be granted.

- 3.0.1 AUXILIARY BUILDING FIRE AREA ABBM
- 3.0.2 CONTROL COMPLEX FIRE AREA CC
- 3.0.3 CONTROL BUILDING FIRE AREA BR1B
- 3.0.4 EMERGENCY DIESEL GENERATOR 1B VAULT
- 3.0.5 SCREEN HOUSE BUILDING

3.1 Exemption Requested

The licensee requested exemptions from the technical requirements of Section III.G.3 to the extent that it requires the installation of a complete area-wide fixed fire suppression system in an area for which an alternate shutdown capability has been provided.

3.2.1 Discussion (Fire Area ABBM)

This fire area consists of two zones, ABM and ABB. Zone ABM is the mezzanine level of the Auxiliary Building and is located at elevation 253 feet. Zone ABB is the basement level of the Auxiliary Building and is located at elevation 235 feet 8 inches. The perimeter construction of the fire area is continuous and 3-hour fire-rated except for 2 open stairs, an open hatch and the gap around the RWST. Most penetrations of the fire area boundary construction are protected to provide a 3-hour rating. The licensee committed in the Appendix R Report to protect all other penetrations so as to achieve a 3-hour

rating. At the stairways and hatchway the licensee committed to install close-spaced automatic sprinklers designed to discharge water in a "curtain" fashion so as to prevent fire spread through the opening.

Safety-related equipment which is located in the fire area consists of the 480V ac switchgear bus 16; MCCs 1D and 1M; both bus 14 and 16 emergency diesel generator power feeds; the safety injection and RHR pumps and their respective cooling units; and the RHR heat exchangers, control valves and flow instrumentation.

As was previously described in Section 2.0 of this report, the fire loading for this area is 18,000 and 8,150 BTU/ft².

Existing fire protection includes an area-wide fire detection system, preaction sprinkler systems, manual hose-stations and portable fire extinguishers. In addition to the "water curtains" and fire barrier improvements previously identified, the licensee also committed in the Appendix R Report to protect the power feed and control circuits to charging pump 1A and the emergency diesel generator 1A power feed to bus 14 by a 1-hour fire-rated barrier [refer to Section 7.0 of this Safety Evaluation (SE)].

For the other vulnerable shutdown-related systems, the licensee has provided an alternate shutdown capability which will enable the plant to reach and maintain cold shutdown if fire damages redundant cables or components.

3.2.2 Discussion (Fire Area CC)

This fire area consists of 4 zones: Zones CR, AHR, BR1A and RR. Zone RR is protected by a complete Halon fire suppression system and, therefore, the exemption pertains to be remaining zones.

Fire Zone CR is the Control Room located on elevation 289 feet 6 inches of the Control Complex. It contains all the control panels and power control systems for plant operations and is manned on a 24-hour basis.

Fire Zone AHR is the Air Handling Room for the Control Room and the Computer Room in the Control Complex. It is located at elevation 253 feet 6 inches and contains the air handling unit and return air fan for the Control Room, with control and instrument cable.

Fire Zone BR1A is the Train A Battery Room located on elevation 253 feet 6 inches and contains the 125V dc battery 1A, inverters, main dc distribution panel 1A, battery charger 1A, battery disconnect switches and main fuse cabinet 1A.

Fire Zone RR is the Relay Room located on elevation 271 feet and contains redundant shutdown-related relays, instrumentation, control racks and cabinets.



The fire loadings in the three zones, for which exemptions have been requested, are: 900, 89,000, and 16,700 BTU/ft², respectively.

Existing fire protection includes area-wide fire detection systems; an automatic deluge fire suppression system for the cable trays along the north wall of Zone AHR; a Halon fire suppression system in the Relay Room; and portable fire extinguishers and manual hose stations.

The licensee has provided an alternate shutdown capability (Zones CR, RR and AHR) and redundant shutdown capability (Zone BR1A) that is physically and electrically independent of this fire area.

3.2.3 Discussion (Fire Area BR1B)

This fire area is designated as Battery Room 1B and contains the 125 dc battery 1B, inverters, main dc distribution panel 1B, battery charger 1B, battery disconnect switches and main fuse cabinet 1B. It is located at elevation 253 feet 6 inches of the Control Building.

The perimeter walls and floor/ceilings of this fire area are constructed of reinforced concrete or concrete block possessing a 2- or 3-hour fire rating. All openings in these barriers, except for the 1½-hour rated access doors, are protected by fire dampers or penetration seals with a fire rating equivalent to the rating of the barrier.

The fire loading has been calculated to be 16,700 BTU/ft² with an equivalent fire severity of about 13 minutes as determined by the ASTM E-119 time-temperature curve.

Existing fire protection includes an area-wide fire detection system, manual hose stations and portable fire extinguishers.

In the Appendix R Report, the licensee also committed to protect the train A power feeds to buses 14 and 16, the dc conductor supplying the emergency diesel generator 1A dc distribution panel from Battery Room 1A, and the conductor for the Auxiliary Building distribution panel 1A with a 1-hour fire-rated barrier (See Section 7.0 of this SE).

For all of the other vulnerable redundant shutdown systems within this location, the licensee has identified a redundant capability or provided an alternate shutdown capability that is independent of the fire area.

3.2.4 Discussion (Emergency Diesel Generator 1B Vault)

This fire area is the emergency diesel generator (EDG) 1B Vault located at elevation 244 feet 6 inches of the Diesel Generator Building. The perimeter walls and floor/ceilings are of reinforced concrete

construction with a fire rating in excess of 3 hours. The only access to the fire area is provided through a metal checker-plate manhole cover which is bolted to the floor of the vertically adjoining fire area at elevation 253 feet 6 inches.

This area contains the 480V ac bus 14 and 16 power feeds, the dc power feeds and control circuits for emergency diesel generators 1A and 1B, along with 480V ac bus 17 power feed, and the control cables for 480V ac buses 17 and 18. The redundant service water pumps are powered from buses 17 and 18, all of which are located in the Screen House. The power and control feeds for EDG 1A are separated by a fire barrier (Refer to Section 6.0 of this SE for the staff's evaluation of this barrier).

The fire loading in the area has been calculated to be 56,000 BTU/ft² with an equivalent fire severity of 42 minutes.

Existing fire protection includes an area-wide fire detection system, manual hose stations and portable fire extinguishers.

For those redundant shutdown systems that have not been separated by the above referenced fire barrier, the licensee has provided an alternate shutdown capability that is physically and electrically independent of the fire area.

3.2.5 Discussion (Screen House Building)

This fire area is a 2-floor structure, physically separated from the rest of the plant. It houses the circulating water equipment, service water pumps, fire pumps, plant auxiliary boiler, and 480V ac buses 17 and 18 that supply the power to this equipment.

The fire load on the upper and lower floor levels have been calculation to be 8,320 and 16,030 BTU/ft², respectively. This represents a fire severity of about 6 and 12 minutes as determined from the ASTM E-119 time-temperature curve.

Existing fire protection includes an area-wide fire detection system, partial "wet-pipe and deluge" sprinkler protection, manual hose stations and portable fire extinguishers.

The licensee has provided an alternate shutdown capability for the redundant shutdown systems in this area that is independent of the Screen House.

The licensee justifies the exemptions in these areas on the ability of the perimeter construction to confine the effects of the fire to the immediate fire area until either the plant fire brigade arrived or the partial automatic fire suppression systems actuated, and the fire is extinguished. Also, the fire loading in these areas is low-to-moderate. Where concentrated combustibles exist, the hazard is mitigated by a



fire suppression system in that area. Redundant shutdown systems are either protected by fire barriers or the licensee has identified a redundant capability or provided an alternate shutdown system that is physically and electrically independent of the fire area.

3.3 Evaluation

The technical requirements of Appendix R have not been met because these fire areas have not been provided with a fixed fire suppression system as stipulated in Sections III.G.2 and III.G.3.

We had two concerns with the level of fire safety in these areas. The first is that if a fire occurred, products of combustion would propagate into adjoining fire areas and damage redundant shutdown cables and/or components. However, the perimeter construction of these areas are generally continuous and fire-rated. Where they are not, the licensee has either provided an automatic fire suppression system that will actuate to prevent fire spread into the adjoining fire areas or, the perimeter construction is an exterior wall or floor/ceiling, with no unmitigated fire hazard within 50 feet. Therefore, the effects of a potential fire will either be confined to the immediate fire area or will be vented to the outside with little or no adverse safety consequences. Where this is not the case, at the manhole cover in the Emergency Diesel Generator 1B vault, vertical fire propagation will have no effect on safe shutdown capability because there are no unprotected redundant shutdown systems in the vertically adjoining fire area.

Our second concern was that a significant fire would develop within any of the above referenced areas. However, these areas can generally be characterized as having a low-to-negligible fire loading, with combustible materials widely dispersed. Where concentrated combustible materials exist, the licensee had mitigated the hazard by providing an automatic fire suppression system in that area.

These locations are all equipped with early-warning fire detection systems. We, therefore, have reasonable assurance that a potential fire will be detected in its formative stages before significant propagation or temperature rise occurs. The fire will then be extinguished by the fire brigade using manual fire fighting equipment or by the partial automatic fire suppression systems that are presently installed.

If the fire should damage unprotected components of redundant shutdown systems, the licensee will utilize the alternate shutdown capability that is independent of the fire area to achieve and maintain safe shutdown conditions.



3.4 Conclusion

Based on our evaluation, we conclude that the licensee's alternate fire protection configuration will achieve an acceptable level of fire safety equivalent to that provided by Section III.G. Therefore, the licensee's request for exemption in the following areas should be granted:

Auxiliary Building Fire Area ABBM
Control Complex Fire Area CC
Control Building Fire Area BR1B
Emergency Diesel Generator 1B Vault
Screen House Building

4.0 INTERMEDIATE BUILDING, NORTH SECTION

4.1 Exemption Requested

The licensee requested an exemption from the technical requirements of Section III.G.2 to the extent that it requires that redundant shutdown systems be separated by more than 20 feet free of intervening combustibles. The licensee also requested an exemption for the same location from the requirements of Section III.G.3 to the extent it requires a fixed fire suppression system in an area for which an alternate shutdown capability has been provided.

4.2 Discussion

The Intermediate Building, North Section (IBN) is a zone within a larger fire area (ABI) which includes the South Section of the Intermediate Building, the Auxiliary Building Operating Floor at elevation 271 feet, and the Nitrogen Storage Building. Within the overall fire area, the licensee has assessed compliance with our regulations and has identified two deviations from Section III.G, both of which are located within Zone IBN.

This location contains cables and components associated with the auxiliary feedwater system, reactor control rod drive, ventilation equipment, main steam safety and isolation valves and the remote shutdown panel.

The fire load in this zone is distributed as follows:

Elevation 253 feet, 6 inches - 71,000 BTU/ft²
Elevation 278 feet, 4 inches - 1,220 BTU/ft²
Elevation 298 feet, 4 inches - 6,800 BTU/ft²
Elevation 315 feet, 4 inches - 11,000 BTU/ft²

Existing fire protection includes a fire detection system, partial manual and automatic sprinkler systems, manual hose stations and portable fire extinguishers. In the Appendix R Report, the licensee committed to install additional fire detectors so as to achieve complete area-wide coverage. The licensee also committed to protect steam generator 1B pressure indication circuits (PT-478) with a 1-hour fire barrier.

With the exception of the steam generator pressure transmitters themselves, all other redundant shutdown systems in fire area ABI are either protected and separated according to Section III.G.2, or an alternate shutdown capability is provided which is independent of the fire area. The above referenced transmitters are separated by a distance of 75 feet on elevation 253 feet. Intervening combustibles consist of cables in trays. The trays are protected by an automatic fire suppression system as previously discussed.

The licensee justifies these exemptions on the bases of the limited fire load, the sprinkler protection for cable trays, the existing and proposed fire protection, the separation between redundant transmitters and the availability of an alternate shutdown capability for vulnerable redundant shutdown systems.

4.3 Evaluation

The technical requirements of Appendix R have not been met in the north section of the Intermediate Building (IBN) because the space between redundant steam generator pressure transmitters contain cable insulation (Section III.G.2) and a fixed fire suppression system has not been installed per (Section III.G.3).

We had two concerns with the level of fire protection in IBN. The first was that a fire in the vicinity of the redundant steam generator pressure transmitters would damage both before the fire is extinguished. However, the spatial separation between them is 75 feet with intervening combustibles consisting of cables in trays. The trays are protected by a preaction sprinkler system. Therefore, we have reasonable assurance that if the cable insulation ignited, the resulting fire would be suppressed by the sprinkler system.

Our second concern was that a significant fire would develop within this location, resulting in the loss of redundant shutdown capability. However, the fire area will be protected by an area-wide fire detection system. We, therefore, have reasonable assurance that any potential fire will be discovered in its formative stages, before significant propagation or temperature rise occurs. The fire would then be suppressed manually by the plant fire brigade or automatically by the partial fire suppression systems.

Until the fire is extinguished, the perimeter walls and floor/ceilings of the fire area would limit the spread of products of combustion. If the fire damages redundant shutdown system that have not been adequately separated or protected, the licensee would rely on the alternate shutdown capability to achieve and maintain safe shutdown.

4.4 Conclusion

Based on our evaluation, we conclude that the licensee's proposed fire protection configuration will achieve an acceptable level of fire safety equivalent to that provided by Section III.G. Therefore, the licensee's request for exemptions in the Intermediate Building, North Section, should be granted.

5.0 BATTERY ROOM 1A AND 1B

5.1 Exemption Requested

The licensee requested an exemption from the technical requirements of Section III.G.2 to the extent that it requires that structural steel which forms a part of the barrier be protected to provide fire resistance equivalent to that of the barrier.

5.2 Discussion

Battery Rooms 1A and 1B are situated side by side along the south wall of the Turbine Building. Battery Room 1A is part of the larger Control Complex Fire Area CC. Battery Room 1B is part of Control Building Fire Area BR1B. The walls, floors and ceilings are of 2-hour rated construction or better, except for the exposed structural steel supporting the ceiling.

The fire loading within these rooms consists of cable insulation and battery cases for a total of 16,700 BTU/ft². This represents a fire severity of about 12 minutes as determined from the ASTM E-119 time-temperature curve.

Existing fire protection includes a smoke detection system in each room along with manual hose stations and portable fire extinguishers outside the entrances to these rooms. In the Appendix R Report, the licensee committed to protect the exposed steel in Battery Room 1B with material that has a 1-hour fire-rating. The exposed steel in Battery Room 1A will not be protected because the floor/ceiling is not relied upon to separate redundant shutdown systems in adjoining fire areas.

The licensee justifies the exemption on the basis of the low fire loading, existing fire protection and the ability of the proposed fire-proofing to withstand the effects of a fire pending extinguishment.

5.3 Evaluation

The technical requirements of Section III.G.2 have not been met because the protection provided by the exposed steel which supports the ceiling of Battery Room 1B is not equivalent in fire rating to the ceiling itself. There is no deviation from Section III.G.2 in Battery Room 1A because the exposed structural steel does not form a part of a fire barrier that separates redundant shutdown systems.

We had two concerns with the level of fire protection in the battery rooms. The first was that the 2-hour rated common wall between battery rooms would not be sufficient to prevent fire damage to redundant shutdown-related systems. The second was that the exposed steel would fail under a postulated fire. However, the licensee will provide protection for the steel sufficient to withstand an ASTM E-119 fire exposure for at least 1-hour. If all of the combustibles within the battery rooms were totally consumed, the resulting fire would be represented by a severity of about 12 minutes. Therefore, both the common wall between battery rooms and the fire proofing for the exposed steel will offer adequate protection with conservative margin.

Because of the presence of an early-warning fire detection system, we do not expect a total room burn-out, as implied in the 12-minute fire severity. A potential fire will be detected in its initial stages before significant temperature rise occurs. We, therefore, have reasonable assurance that the fire will be extinguished by the fire brigade before it becomes a significant threat to the integrity of the fire barriers in Battery Room 1B.

5.4 Conclusion

Based on our evaluation, we conclude that the licensee's alternate fire protection configuration will achieve an acceptable level of fire safety equivalent to that provided by Section III.G.2. Therefore, the licensee's request for exemption in Battery Rooms 1A and 1B should be granted.

6.0.1 CABLE TUNNEL

6.0.2 EMERGENCY DIESEL GENERATOR VAULT

6.1 Exemption Requested

The licensee requested an exemption from the technical requirements of Appendix R to the extent that it requires either a 1-hour or 3-hour fire-rated barrier between redundant shutdown divisions.



6.2.1 Discussion (Cable Tunnel)

The Cable Tunnel (Fire Area CT) is a reinforced concrete structure approximately 9 feet wide by 7 feet high. It contains redundant cables associated with normal shutdown systems. However, the licensee has provided an alternate shutdown capability that is independent of this area.

Except where the Cable Tunnel interfaces with the Air Handling Room (AHR), Intermediate Building, North Section (IBN), and the mezzanine level of the Auxiliary Building (ABBM), the boundary fire barriers of this fire area are of continuous 3-hour rated construction. The common wall at the AHR is about 63 ft². It is constructed of a sheet of 20-28 gauge sheet metal, 5½ inches of ceramic fiber insulation, and a sheet of 20-28 gauge sheet metal. All cable penetrations of the barrier have been sealed with a fire-rated silicone based penetration sealant.

The common wall at the IBN is about 15 feet wide by about 23 feet in height. It is constructed of gypsum wallboard and internal metal studs in a configuration that has a 1-hour fire rating. All cable penetrations of the barrier have been sealed with a fire-rated silicone foam. A 1½-hour fire-rated door provides access into the Cable Tunnel through this barrier.

The common wall at ABBM is similar to that at AHR except that 3 inches of ceramic fiber insulation is used in the core. A door is also located in this barrier. It is sealed shut and is constructed of 3 layers of 12 gauge sheet metal sandwiched by 2 inches and 2½ inches of insulating blanket material on the Auxiliary Building and Cable Tunnel sides of the center sheet, respectively.

Existing fire protection includes area-wide fire detection systems on both sides of the unrated barriers; an automatic deluge water spray system in the Cable Tunnel; automatic preaction sprinkler systems on the opposite side of the barriers in AHR, IBN, and ABBM, as described in the Appendix R Report, manual hose stations and portable fire extinguishers.

6.2.2 Discussion (Emergency Diesel Generator Vault 1B)

This fire area contains the circuits associated with the operation of both diesel generators. An existing full-height sheet metal enclosure separates the redundant circuits for emergency diesel generator (EDG) 1A from those of EDG 1B.

The sheet metal enclosure consists of two sheets of 16 gauge galvanized steel separated by 7½ inch wide 20 gauge galvanized steel channels. The steel channels sectionalize the space between the two layers into

"cells" no greater than 450 square inches in area. Each of these sections is filled with a fire rated silicone foam in sufficient depth to achieve a 3-hour rating.

The fire loading in the vault has been calculated to be 56,000 BTU/ft² which represents an equivalent fire severity of 42 minutes.

Existing fire protection includes an early warning fire detection system, manual hose stations and portable fire extinguishers as delineated in the Appendix R Report. At our request, the licensee committed in the Report to apply a listed "fire-proofing" material on the exposed metal surfaces of the barrier to prevent heat from being conducted through the barrier to the unexposed side. The material will be installed to a thickness sufficient to achieve at least a 1-hour rating.

The licensee justifies the exemptions in these two areas on the basis of the ability of the fire barrier to provide sufficient passive protection until a potential exposure fire is extinguished.

6.3 Evaluation

The technical requirements of Appendix R are not met in these areas because redundant shutdown divisions are not separated by 1-hour and 3-hour fire rated barriers as stipulated in Sections III.G.2.a., and III.G.2.c.

Our principal concern was that because these barriers have not been subjected to the ASTM E-119 test fire in the configuration that exists in the plant, they may fail under a potential exposure fire and allow products of combustion to spread from one fire area to another. However, the barriers are continuous and constructed of noncombustible materials as described above. We, therefore, have reasonable assurance that during the initial stages of a fire, before significant temperature rise occurs, the barriers will be able to confine the products of combustion to one side of the barrier.

These locations are all provided with area-wide fire detection systems as previously described. This provides an early fire warning capability that will enable the plant fire brigade to respond quickly and suppress the fire manually before significant fire propagation occurs. The fire hazards in these areas are well within the capability of the brigade to deal with using portable fire extinguishers or manual hose stations.

If rapid temperature rise occurs at the Cable Tunnel before the arrival of the fire brigade, the existing automatic sprinkler systems will activate to control the fire, reduce room temperature and protect the barrier from the effects of the fire. We, therefore, conclude that the barriers at the Cable Tunnel will not be subjected to conditions that would cause them to fail before the fire is put out.



In the Emergency Diesel Generator Vault 1B, the licensee has utilized a silicone foam in the construction of the fire barrier that has passed the ASTM E-119 fire exposure test for 3 hours. Our only concern was with the unprotected steel frame that would tend to allow heat from a fire to pass through the barrier by conduction, and possibly damage the cables on the non-fire-exposed side. However, the licensee committed to protect the steel with a U.L. listed fire proofing, which provides us with reasonable assurance that conducted heat will not pose a threat to the shutdown-related cables within the barrier.

6.4 Conclusion

Based on our evaluation, we conclude that the licensee's alternate fire protection configuration will achieve an acceptable level of fire safety equivalent to that provided by Section III.G.2. Therefore, the licensee's request for exemptions in the Cable Tunnel and Emergency Diesel Generator Vault 1B should be granted.

7.0 ONE-HOUR RATED FIRE BARRIERS

7.1 Exemption Requested

- The licensee requested an exemption from the technical requirements of Section III.G.2 of Appendix R to the extent that it requires a 1-hour fire-rated barrier to protect one shutdown division. The licensee requested this exemption because in certain locations the fire-rated barrier material that will be provided will not be installed in the same configuration as that which was subjected to an ASTM E-119 fire exposure test.

7.2 Discussion

The licensee has committed in the Appendix R Report to provide 1-hour fire-rated barriers in several locations throughout the plant. In the following locations the licensee has indicated that the barrier material may not be installed according to the tested configuration:

1. Steam generator pressure indication circuits in Fire Area ABI.
2. Power feed for charging pump 1A in Auxiliary Building Fire Area ABBM.
3. Train "A" power circuits for switchgear bus 14 in Auxiliary Building Fire Area ABBM.

The reason for not installing the material in the tested configuration is because of physical obstructions near the cables and trays protected.

However, the fire barrier material that will be used to protect the vulnerable cables has been subjected to the standard time-temperature exposure fire of ASTM E-119 and has passed the acceptance criteria of the test method.

In addition, the continuity of the material will be maintained in the plant, i.e., the material will form a continuous barrier to hot gases from the fire. The thickness of the barrier material will be maintained and the nature of the support assembly, if used, is unchanged from the tested configuration. Also, the end use configuration has been reviewed by a qualified fire protection engineer and found to provide an equivalent level of protection. We agree with the licensee's evaluation that this material, when installed as described above will achieve a 1-hour fire-rating.

7.3 Conclusion

The licensee's request for exemption from Section III.G.2 related to the installation of a 1-hour fire barrier is not needed.

8.0 SUMMARY

Based on our evaluation, we found that the licensee's alternate fire protection configuration represents an acceptable level of fire safety to that which would be achieved with compliance with the requirements of Section III.G. of Appendix R to 10 CFR Part 50. We, therefore, conclude that the following exemption requests be granted:

1. The absence of a continuous fire-rated barrier at the common boundary between Fire Areas ABI and ARBM at the Refueling Water Storage Tank.
2. The lack of a complete area wide fixed fire suppression system in the Auxiliary Building Fire Area ABRM.
3. The lack of a complete area-wide fixed fire suppression system in the Control Complex Fire Area CC.
4. The lack of a complete area-wide fixed fire suppression system in the Control Building Fire Area BR1B.
5. The lack of a complete area-wide fixed fire suppression system in the Emergency Diesel Generator 1B Vault.
6. The lack of a complete area-wide fixed fire suppression system in the Screen House Building.
7. The lack of twenty feet of separation, free of intervening combustible materials, between redundant shutdown divisions in the Intermediate Building, North Section.

One-hour Rated Fire Barriers

The licensee requested an exemption from the technical requirements of Section III.G.2 of Appendix R to the extent that it requires a 1-hour fire-rated barrier to protect one shutdown division. The licensee requested this exemption because in certain locations the fire-rated barrier material that will be provided will not be installed in the same configuration as that which was subjected to an ASTM E-119 fire exposure test.

The licensee's request for exemption from Section III.G.2 related to the installation of a 1-hour fire barrier is not needed because we agree with the licensee's evaluation that the material when installed will achieve a 1-hour fire-rating.

IV.

Accordingly, the Commission has determined that, pursuant to 10 CFR 50.12, an exemption is authorized by law and will not endanger life or property or the common defense and security and is otherwise in the public interest. Therefore, the Commission hereby grants the exemption requests identified in Section III above.

Pursuant to 10 CFR 51.32, the Commission has determined that the granting of these exemptions will have no significant impact on the environment (50 FR 11274, March 20, 1985).

A copy of the Safety Evaluation dated March 21, 1985, related to this action is available for public inspection at the Commission's Public Document Room, 1717 H Street, N.W., Washington, D.C. and at the local public document room located at the Rochester Public Library, 115 South





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December 4, 1995

U.S. Nuclear Regulatory Commission
Document Control Desk
Attn: Allen R. Johnson
Project Directorate I-1
Washington, D.C. 20555

Subject: Thirty (30) Day Special Report
Inoperable Fire Barrier Penetration Seal in the Auxiliary
Building
R.E. Ginna Nuclear Power Plant
Docket No. 50-244

Reference (a): NRC Safety Evaluation Report dated March 21, 1985,
Exemption from Section III.G of 10CFR50 Appendix R

Dear Mr. Johnson:

In accordance with the Ginna Station Updated Final Safety Analysis Report (UFSAR), Table 9.5-2, Item 6, this thirty day special report on an inoperable fire barrier penetration seal is being submitted.

Between September 25 and October 12, 1995 work activities were performed to disassemble and remove an 8 foot high block wall that extended circumferentially around a portion of the refueling water storage tank (RWST) on the operating level (floor elevation 271'-0") of the auxiliary building. The wall was originally installed as a radiological shield barrier, a feature no longer necessary for that area. The wall disassembly was being conducted to facilitate installation of supports for the RWST in conjunction with seismic upgrade (SQUG) efforts. The floor between the operating level of the auxiliary building (ABO) and the level below, the auxiliary building mezzanine (ABM), constitutes a fire barrier necessary for compliance with 10CFR50 Appendix R, Section III.G.2.

There is a 6" gap around the RWST at the floor elevation of ABO. The existence of this gap received NRC approval (documented in the SER, reference (a), Section 2.0.) under an exemption to Appendix R, Section III.G.2, to the extent that a continuous fire rated barrier exist between redundant trains of safe shutdown equipment. Among several other plant attributes that formed the basis for approval of that exemption was the "chimney" effect created by the block wall, that would cause a tendency for products of combustion to be channelled upward and away from safeguards bus 14 and other safety-related motor control centers in fire zone ABO, should a postulated unmitigated fire occur in the fire zones below at elevations 253'-0" (ABM) or 235'-8" (ABB).

On October 27, 1995, members of RG&E's staff discovered that a portion of the overall basis for approval of this exemption was not being met, due to the removal of the shield wall. As a



conservative measure, an hourly fire watch was immediately posted as required by the UFSAR Table 9.5-2, Item 6, as if the entire fire barrier representing the floor separating the auxiliary building mezzanine level (fire zone ABM) and the operating level (fire zone ABO) was inoperable. Efforts to restore the fire barrier penetration seal to operable status commenced by planning the installation of a temporary fire penetration seal around the RWST within the 6" gap area. Restoration of the penetration seal to fully operable status within the 7 days allowed in the UFSAR was not possible, therefore, this 30 day report is being submitted.

The temporary seal consists of ceramic fiber (kaowool) insulation materials with a density of 8 lbs/cu. ft. installed in a friction fit configuration to a minimum depth of 12 inches. The installation of the material within this gap is judged to be an acceptable temporary seal and an acceptable configuration which would limit the passage of the products of combustion from a postulated fire in the levels below. This conclusion is based upon a detailed analysis performed in accordance with the guidance of Generic Letter 86-10 and documented in Design Analysis DA-ME-95-154 dated 11/1/95. It was concluded that this temporary seal configuration provides an increased resistance to potential fire propagation from fire zone ABM as compared to the previous configuration with a 6 inch gap and the shield wall in place.

Prior to completion of the temporary seal configuration, the hourly fire watch remained in effect. Additional administrative controls were also put in place, involving the prohibition of transient combustibles in the area of the RWST and all safety-related equipment adjacent to the RWST. The posting of an hourly fire watch was consistent with the requirements of the UFSAR, since fire detection system components on one side of the barrier were in service. These consisted of the detection components that are part of suppression system S03; detection system Z03 near the penetration area cable trays on the 253'-0" elevation; detection system Z04 on the 271'-0" elevation; and detection system Z02 in the basement level west end of the 235'-8" elevation. The temporary seal configuration was completed and the penetration seal declared operable on November 28, 1995. The hourly fire watch was removed.

The degraded condition that existed between September 25, 1995, when disassembly of the wall commenced, and October 27, 1995, when the condition was discovered and the fire watch posted, is not judged to have had a significant impact on plant safety. The principal fire barrier was not seriously degraded and all other significant factors forming the basis for the approved exemption remained in effect, which would have acceptably minimized the impact of a potential fire in the 253'-0" elevation from affecting components on the 271'-0" elevation. These factors include:

- 1) The width of the gap around the RWST is small, only 6 inches, and the floor barrier is constructed of poured concrete of nominal 18 inches depth so that the amount of heat/flame which would flow through the gap would have been limited.

- 2) The average combustible loading in fire zone ABM (253'-0") is low, only 23,000 BTU/sq.ft. or a fire severity of 18 minutes.
- 3) The average combustible loading in fire zone ABB (235'-8") is low, only 6245 BTU/sq.ft. or a fire severity of 5 minutes.
- 4) The open floor to ceiling height of 50 feet would still have allowed the products of combustion to rise up through the gap and dissipate in the large ceiling area of the auxiliary building operating level.
- 5) All cable trays forming the concentrated combustible loading of approximately 100,000 BTU/sq.ft. in the vicinity of the cable tunnel entrance of fire zone ABM are protected by automatic pre-action sprinklers in the trays and smoke detection.
- 6) The 235'-8" elevation concentrated combustible loading in the area of the safety injection pump cable trays are protected by a pre-action sprinkler system and smoke detection.
- 7) The detection and suppression systems alarm both audibly and visually in the control room.
- 8) The minimum separation between the RWST gap and safeguards bus 14 is 6.5 feet and increases to 20 feet due to the curvature of the RWST.
- 9) All other floor barrier penetrations at the 271'-0" elevation are sealed to provide a level of fire protection commensurate with the hazards.
- 10) Control room auxiliary operator rounds through the auxiliary building occur every 4 hours.
- 11) Plant security staff tours for each major area outside containment, such as the auxiliary building, occur every hour, although by design do not occur in the same order or frequency. Thus, the area received routine visual surveillance.
- 12) During the disassembly period between September 25 and October 12, personnel performing the work were in the immediate area of concern, thereby providing the equivalent of a fire watch.

Based upon the above factors, our GL 86-10 evaluation concluded that the lack of the 8 foot high shield wall around the RWST at the auxiliary building operating level during the time interval prior to posting of the fire watch did not result in a fire penetration seal degraded to an extent that would invalidate the basis for the previously approved exemption.

The most probable cause which created the condition in which this one portion of the Appendix R exemption was not being met was a mis-classification of the safety class for the 8 foot high block

wall. While it was known that the wall was originally installed as a radiological shield wall, and that the 6 inch gap around the RWST was the subject of an Appendix R exemption, the credit taken for the chimney effect of the wall was not generally known. The safety classification for the wall incorrectly contained no association with Appendix R.

Disassembly of the wall was preliminary work as part of an overall plant structural modification to the RWST. The modification design includes covering the 6 inch gap with 3/4-inch steel plate sections, welded together and pinned to the floor, together with the attachment of stiffeners to the RWST for structural support as part of the SQUG program. Since the modification would remove the original need for the Appendix R exemption, it was believed that the Appendix R issues were being adequately addressed.

Because the insertion of kaowool within the 6 inch gap is now being utilized as a temporary seal (to restore the fire penetration seal to operable status and allow removal of the fire watch), that seal will remain in place as a permanent portion of the gap closure in conjunction with the 3/4-inch thick steel plate. This combined seal will provide a far superior fire seal than either the 8 foot high shield wall or the temporary seal previously described. The gap closure will also eliminate the need to track the 6 inch gap configuration as an Appendix R exemption. The new seal around the RWST will be made part of the fire barrier penetration seal program and as such be surveilled every 18 months to ensure that the seal is appropriately maintained and controlled.

Very truly yours,



Robert C. Mecredy

GAH\409

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