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JAN 06 1983

Docket Nos. 50-250
and 50-251

Dr. Robert E. Uhrig, Vice President
Advanced Systems and Technology
Florida Power and Light Company
Post Office Box 529100
Miami, Florida 33152

Dear Dr. Uhrig:

SUBJECT: DRAFT SER ON APPENDIX R EXEMPTION REQUEST

We have completed our review of your Appendix R exemption requests and have enclosed our draft SER.

We request that you review this draft SER for accuracy of technical content and inform us within three weeks of any corrections you consider necessary. With respect to followup action regarding exemption denials, there are three options: (1) appeal denials to NRR management; (2) propose another alternative that requires an exemption; or (3) make modifications to meet the specific requirements of Appendix R. Please inform us within three weeks regarding which action you plan to take.

If an appeal meeting is requested, it should be limited to the technical review of the information on the record and should be held within six weeks.

If, for denied exemptions, you choose to propose an alternative which also requires an exemption, it should be filed under the provisions of Section 50.12 of 10 CFR Part 50. If you choose to propose such an alternative we request that you do so within 60 days.

If, for denied exemptions, you propose to make modifications which meet the specific requirements, of Section III.G of Appendix R, no additional submittal is necessary, unless the modifications are to provide alternative shutdown capability. In these cases, you will be given 6 months to provide the description of the modifications for alternative shutdown capability.

If you have any questions regarding this letter or the draft SER, please contact your Project Manager.

Sincerely,
Original signed by:
S. A. Varga

Steven A. Varga, Chief
Operating Reactors Branch No. 1
Division of Licensing

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PDR

Enclosure:

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DATE	See next page	1/5/83	1/5/83	1/5/83			

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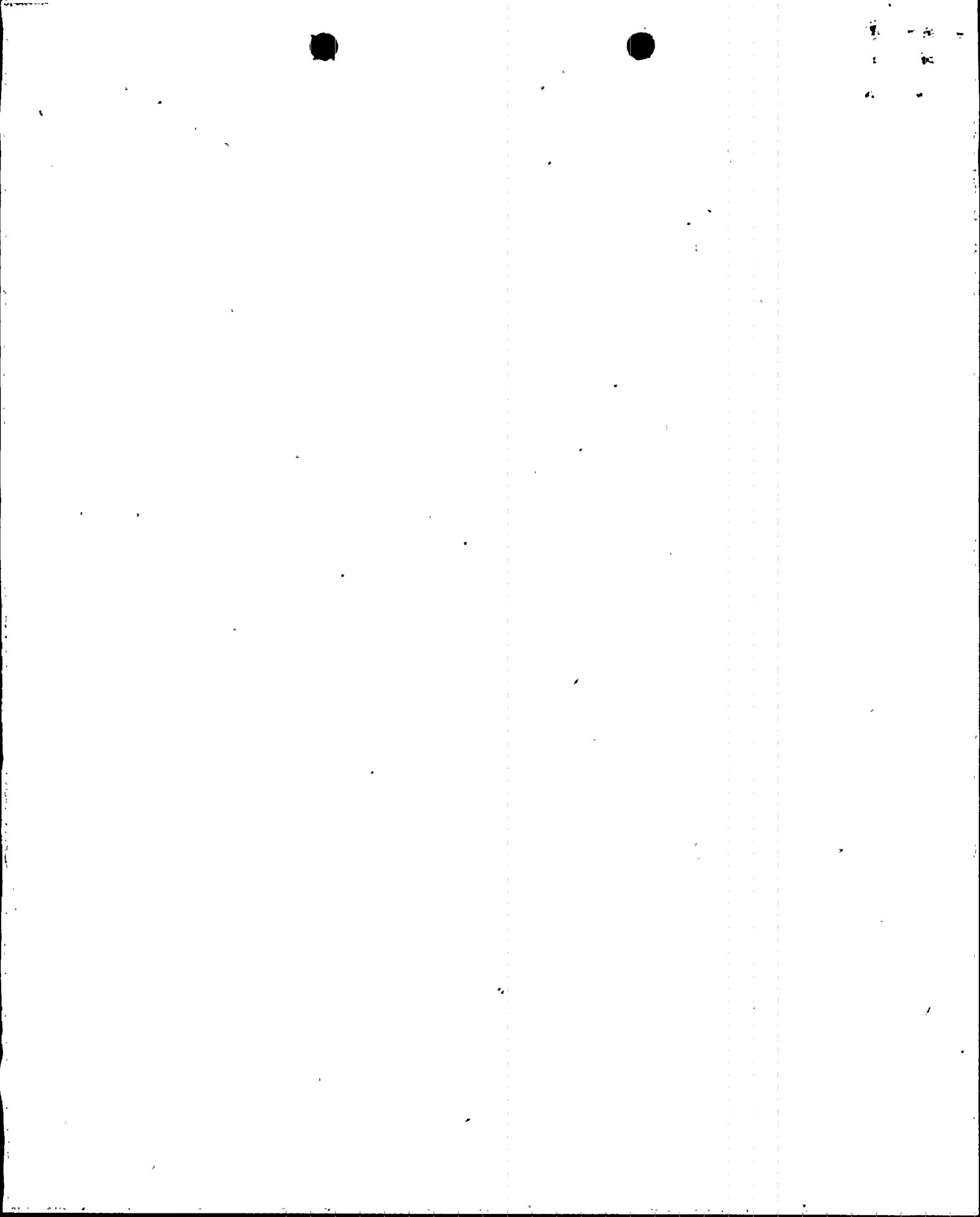
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Chemical Engineering Branch/Fire Protection Section
Exemption Request.
Turkey Point Unit Nos. 3 & 4
Docket Nos. 250/251

1.0 Introduction

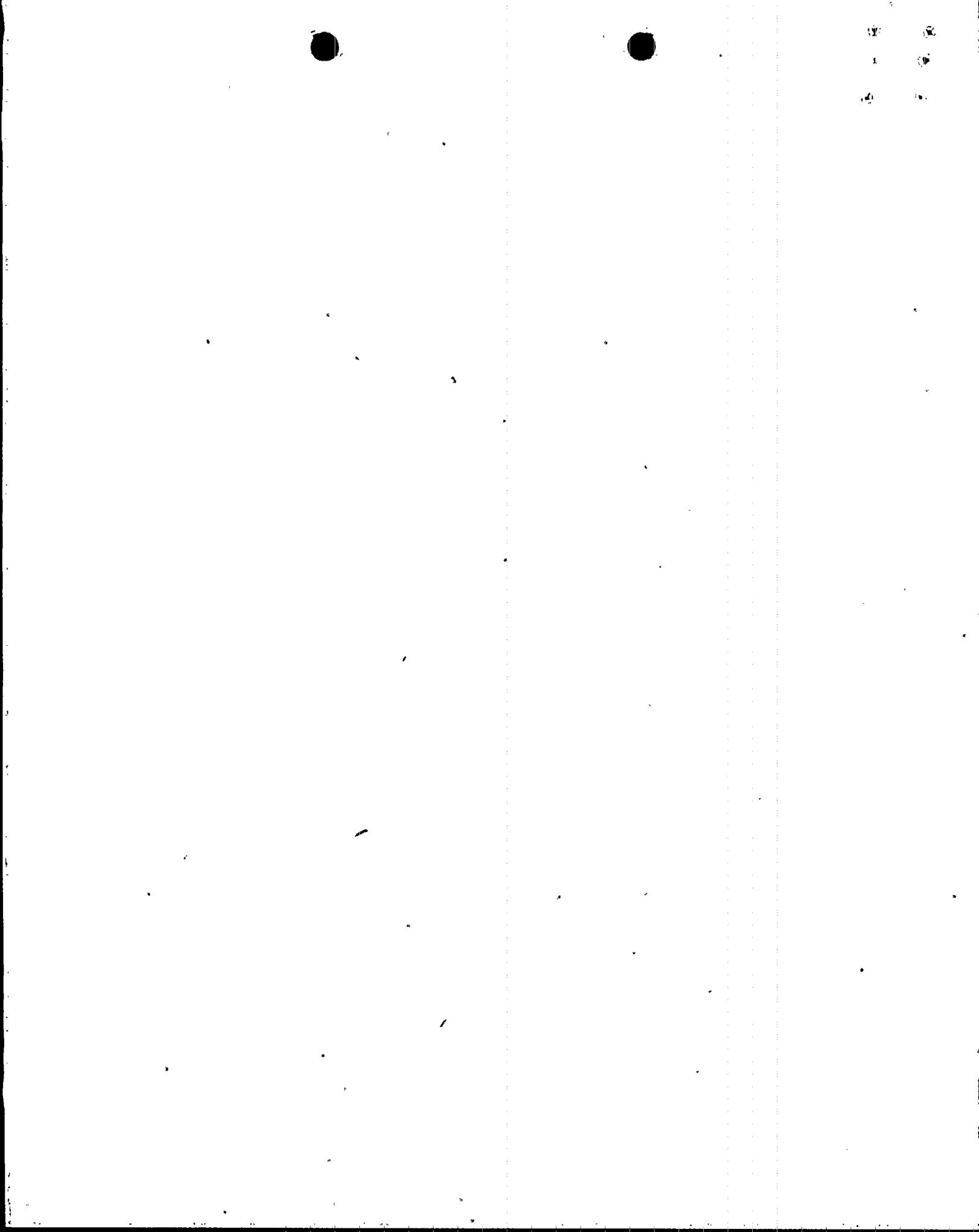
By letter dated March 19, 1981, the licensee requested exemptions from Sections III.G, III.J, and III.O of Appendix R to 10 CFR 50. By letter dated November 9, 1981 we granted the schedular requirements of Section III.A. However we denied exemption requests on Section III.J for lack of specificity and III.G; specifically those items which were previously approved in the fire protection SER. We indicated that the licensee needs to either meet the requirements of Section III.G for previously closed areas, or provide a detailed fire hazard analysis supporting an alternative approach.

We deemed their exemption request on Section III.O unnecessary.

By letters dated July 1, 1982 and October 22, 1982 the licensee requested additional exemptions from Section , III.G and III.J of Appendix R. In the fire protection SER we reported the following open items:

- Item 3.1.2/3.2.3, Fire Water Supply
- Item 3.2.4, Auxiliary Building Corridor
- Item 3.2.5, Cable Spreading Room
- Item 6.0, Fire Brigade Size

By letter dated February 4, 1981 the licensee committed to meet our guidelines for fire brigade size. The remaining open items are dealt with in the following evaluation. We therefore consider all open items to be resolved.



Section III.G.2 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 non-safety circuits of redundant trains by a fire barrier having a 3-hour rating. Structural steel forming a part of or supporting such fire barriers shall be protected to provide fire resistance equivalent to that required of the barrier.
- b. Separation of cables and equipment and associated non-safety circuits of redundant trains by a horizontal distance of more than 20 feet with no intervening combustibles or fire hazards. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area; or
- c. Enclosure of cables 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 alternative shutdown capability independent of the fire area of concern. It also requires a fixed suppression system in the fire area of concern. These alternative requirements are not deemed to be equivalent but are considered to provide an acceptable level of protection for redundant safe shutdown trains.

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



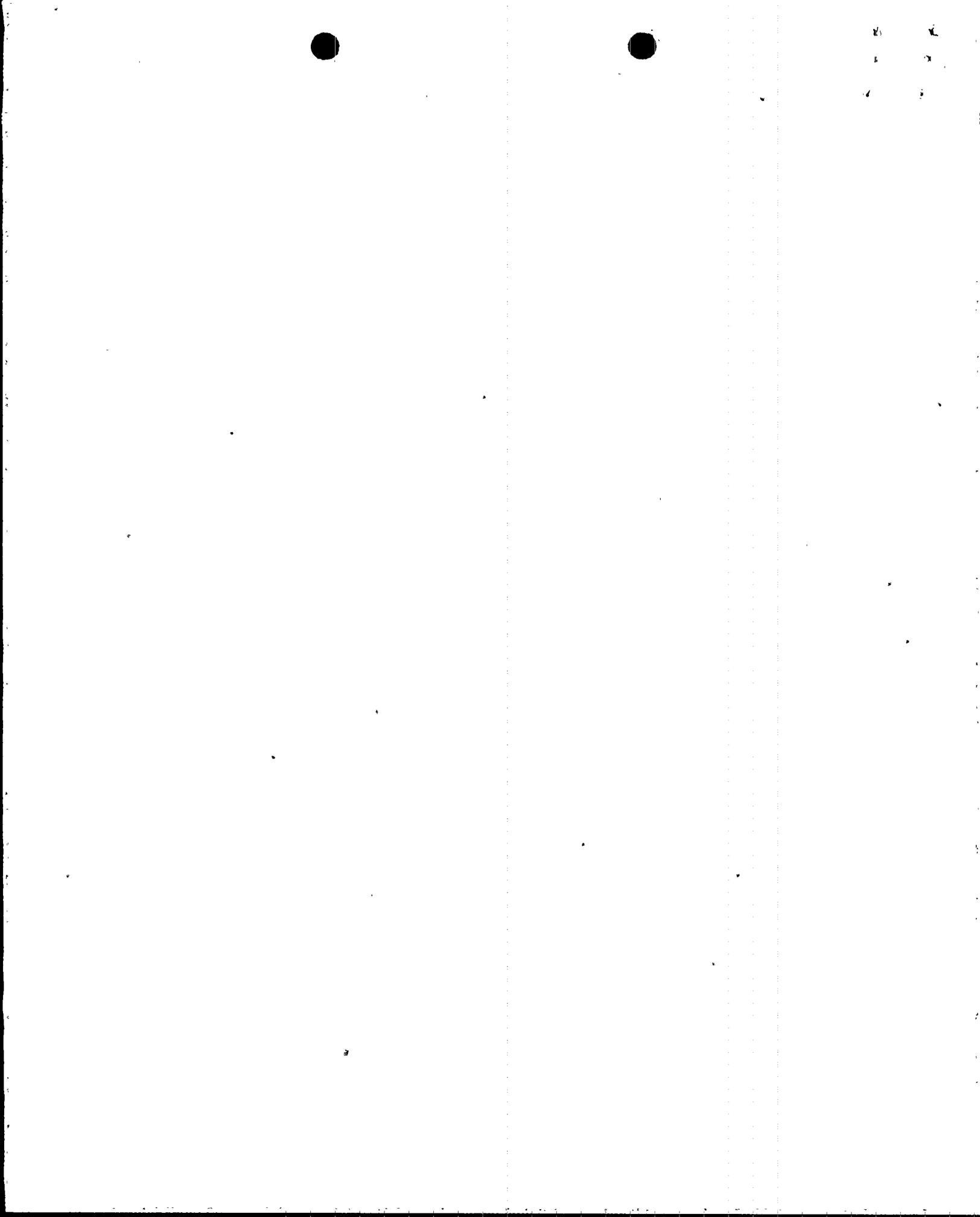
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fire. Plant specific features may require protection configurations different than the measures specified in Section III.G. In such cases, the licensee must demonstrate, by means of a detailed fire hazards analysis that existing protection or existing 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. 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 hazards 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 is limited such that at least one train of equipment necessary to achieve cold shutdown 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 Analytical Method

The licensee employed an analytical method to demonstrate the inherent protection afforded to existing safe shutdown systems. The intent of this method was to provide common parameters by which individual fire areas could be judged, and to demonstrate that verbatim compliance with Section III.G of Appendix R would not enhance the fire protection for safe shutdown.

The method can be summarized as follows:

- The redundant cables and components of concern are identified.
- Their geometry and configuration within the fire area are described.
- The type of cable insulation and failure criteria are specified.
- The minimum quantity of flammable liquid needed to produce sufficient heat flux and heat energy to damage the cables is calculated, considering several heat transfer modes, i.e. radiation, plume impingement, and stratification.
- The analysis determines the heat flux into the room needed to cause electrical failure of redundant cables. This heat flux is converted to a quantity of flammable liquid, usually acetone, of approximately 10 to 20 gallons, in a circular pool configuration.

We and our contractor, Brookhaven National Laboratory, have reviewed the analytical method. We have determined that the results of the methodology as applied do not demonstrate the equivalence of the protection provided for safe shutdown to the specific alternatives set forth in Section III.G of Appendix R. For example:



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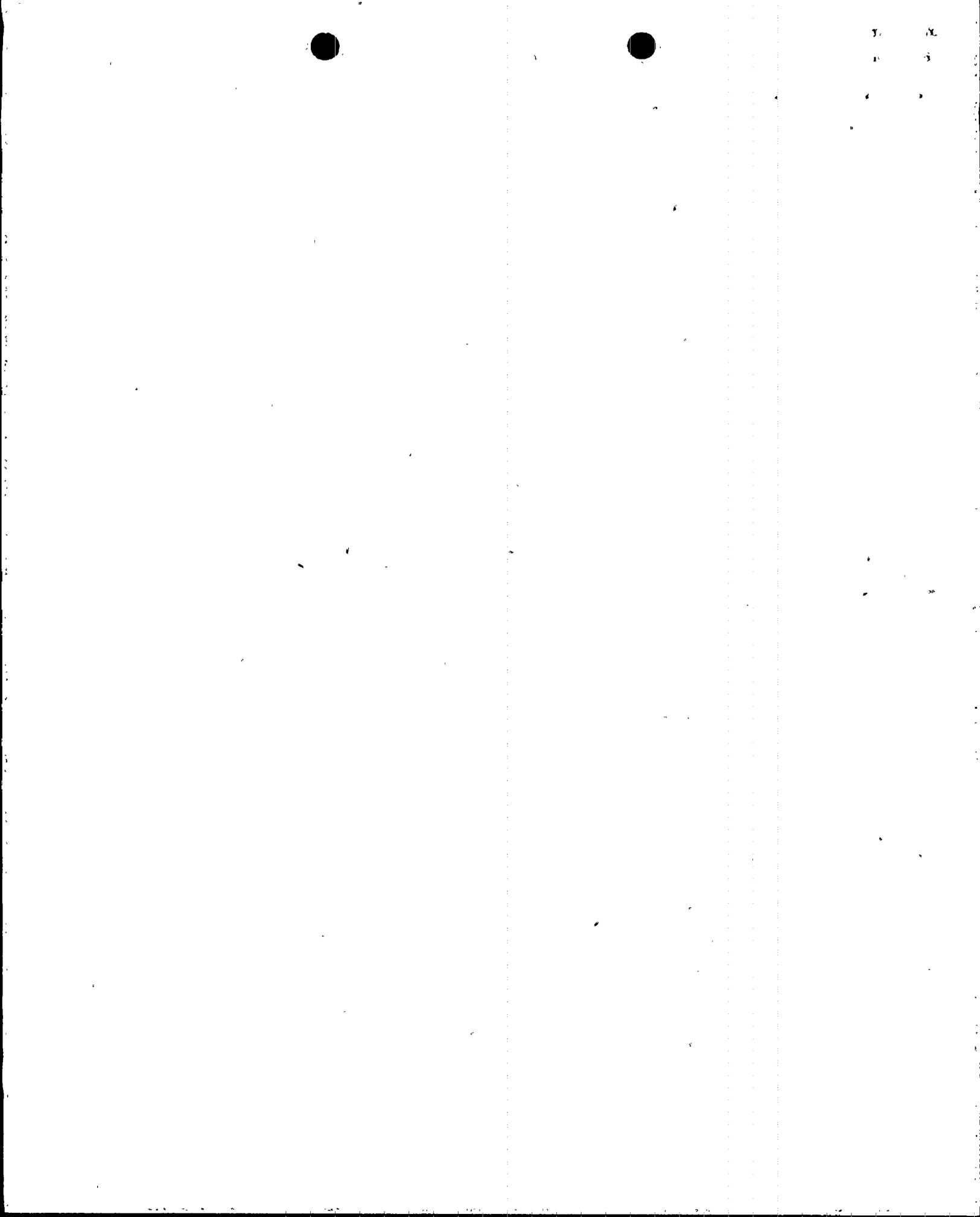
- . The method does not consider the heat released to the room by secondary fires involving in-situ combustibles. The method uses an electrical failure criteria with the thermal energy release to the room by a single exposure fire. When the cables of concern are at the conditions of electrical failure, other cables within the enclosure are burning and also releasing energy to the room.

- . The method does not consider the increased heat release rate of a given fire when it occurs against a wall or in a corner; the method only considers the heat release of a fire as it occurs in an open area.

- . The method does not consider the effects of excess pyrolyzate resulting from the degradation of plastics burning in the stratified layer.

- . The method does not consider all of the alternatives set forth in Section III.G, i.e., 3-hour barrier, 1-hour fire barrier with suppression system, twenty-foot separation free of combustibles with automatic suppression and alternate or dedicated shutdown capability independent of the area. The method considers only separation without automatic suppression and uses a stratification model which does not include the effects of separation.

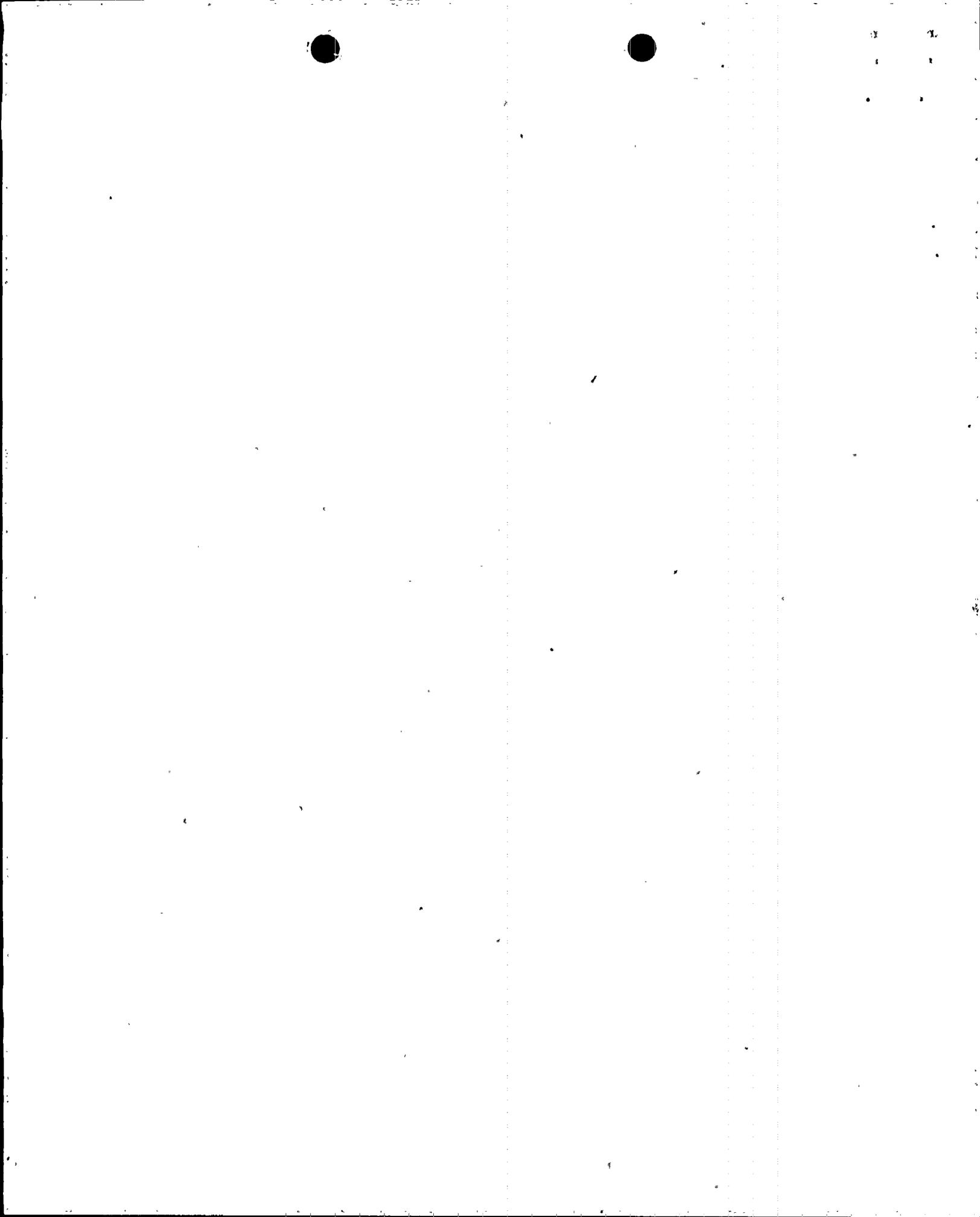
The licensee has not used the results of this analysis to compare the protection provided with that specified in Section III.G. The licensee has only stated that the accumulation of the calculated quantity of flammable liquids in the required configuration is an unrealistic condition, and will be prevented by administrative controls. We do not deem this to be a valid argument because



there is no positive means of preventing the accumulation of transient materials in individual plant areas. As documented in Inspection and Enforcement Branch Reports, recent inspections at plants such as Davis Besse (50-346/82-03, April 1, 1982), Duane Arnold (50-331/81-25, January 11, 1982), D.C. Cook (50-315-82-11, December 31, 1981), and Nine Mile Point (50-220/82-09), have demonstrated that substantial quantities of hazardous substances such as 55 gallon drums of waste oil are located in even highly restricted and controlled entry areas.

We have not relied upon the results of the licensee's analysis in our evaluation. We have evaluated each exemption request using our standard method of review, i.e., we have:

- a) Reviewed the information submitted and related information existing in the docket file to determine the configuration of the redundant components, and in-situ combustibles in the fire area of concern.
- b) Evaluated the existing fire protection, proposed modifications, compensating design features and mitigating factors to determine the overall level of fire protection in the area of concern, and
- c) Determined if the overall level of safety meets the criteria given previously and therefore is equivalent to that provided by Section III:G of Appendix R.



3.0 Fire Area 4, 5, 9 and 10 (one area) - Auxiliary Building
Main Corridor at the 4- ft. elevation

3.1 Exemption Requested

The licensee requests an exemption from Section III.G to the extent that it requires 1-hour rated fire barrier for protection of redundant safe shutdown cables and the installation of automatic fire suppression capability throughout the area.

3.2 Discussion

Fire Area 4, 5, 9, and 10 is a single fire area of irregular shape consisting of the Auxiliary Building main corridor, the Chemical Drain Tank, Laundry and Hot Shower Tank areas, and the Auxiliary Building main pipeway at the 10' elevation with floor area of approximately 4700 sq. ft. Ceiling height ranges from 6' to 13½'. Redundant safe shutdown power and control cables are located throughout the area in open ladder trays and in conduits as they exit the trays. Redundant cable trays are run one above the other and separated by 1' foot vertical distance. The two redundant trays are generally within ½' and 1½' of the ceiling except in the 6' high area where they range from about 1-¾' and 2-¾' to about 3½' and 4½' above the floor.

The licensee states that due to the close spacing of cable trays throughout the area it is not possible to install a 3-hour barrier between redundant trains of safe shutdown cables. In lieu of a 1-hour barrier, the licensee has applied a fire retardant mastic coating on all cables in open cable trays and proposes to install thermal shields or baffles of noncombustible mineral insulating board within 4" of the lowest tray of each stack of trays to prevent direct flame impingement from an exposure fire. The



licensee is also proposing to install noncombustible mineral thermal insulating blanket around all conduits of one redundant train of safe shutdown cables. Ionization type fire detectors are installed throughout the areas. Manual hose stations and fire extinguishers are available for use throughout the areas. No automatic suppression is installed in any of these areas.

3.3 Evaluation

Fire protection for this fire area does not comply with Section III.G.2 of Appendix R to 10 CFR 50 in that redundant safe shutdown cables are located within 1 foot of each other. The fire retardant mastic covering that has been applied to the cables is not equivalent to a 1-hour fire barrier as required by Section III.G.2. The licensee has not quantified the combustible loading in the area, due to the use of flame retardant coatings. It is our concern that the quantity of plastic cable insulation and jacket material in the auxiliary building corridor may provide a significant fuel load. This fuel load is not reduced by the flame retardant coating; this coating only increases the amount of energy required to ignite the cables.

The limitations of the protection provided by fire retardant coatings are recognized by the fire protection industry. The National Fire Protection Association Handbook states that, "One popular misconception is that fire retardant treatments give a fire resistance rating. This is not true since the treated material does not resist destruction and is still subject to complete consumption by exposing fire. The treatment does, however, retard both the rate of burning and the rate at which fuel is contributed by the treated material."⁽¹⁾



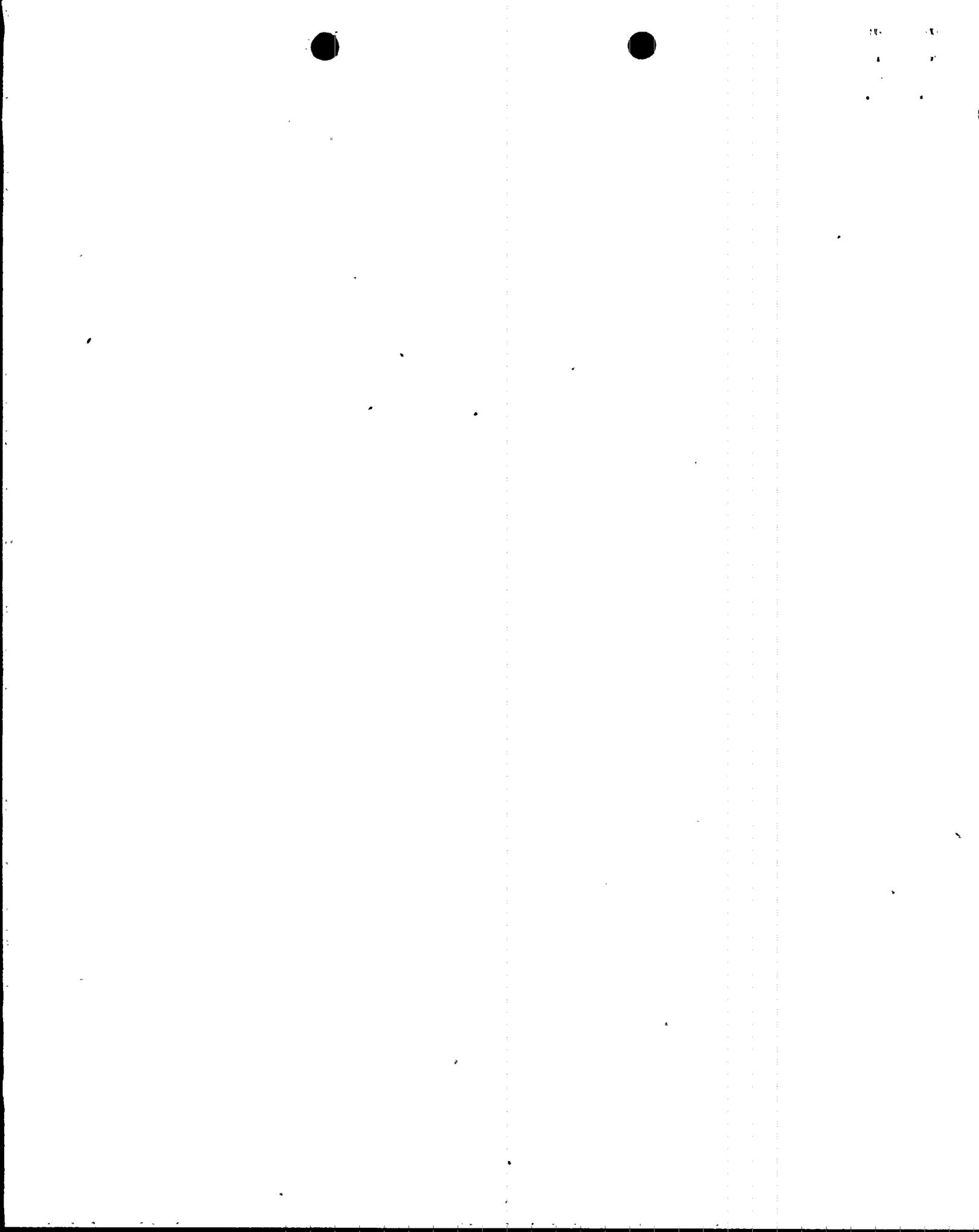
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Tests of flame retardant coatings on cables that were conducted for the NRC at Sandia Laboratories show that the rate of fuel contribution of the burning cables is retarded to a varying degree, however, the entire quantity of cable insulation will eventually be consumed during fire exposure. The test results showed that the protection provided by fire retardant coatings varies with the type of coating. However, heat release data measured during the tests show that coated cables ultimately contribute an amount of fuel similar to that of uncoated cables.

Based on our evaluation of several tests conducted by Sandia Laboratories and others (2) (3) (4) (5) (6) (7) (8) it is our opinion, that the heat flux from a moderate size exposure fire could result in the propagation of a fire throughout the coated cable trays. The only means the licensee is proposing to control such a fire is manual action to be taken by the fire brigade. Manual fire fighting involving burning cable insulation may be ineffective due to the large quantities of thick, black smoke and toxic gases commonly produced in burning plastics and flame retardant coatings. In tests, small plastic fires have produced sufficient smoke in five minutes to overcome ventilation systems and reduce visibility in large rooms. This reduced visibility will significantly hamper fire brigade activities.

Administrative controls alone are not considered adequate to prevent exposure fires that might damage the redundant cables, especially when considering the fact that cables used at Turkey Point are not IEEE-383 qualified.

The licensee states that the accumulation of the needed quantity of flammable liquids in the required configuration to cause damage is an unrealistic condition, and will be prevented by administrative controls. We do not deem this to be a valid argument because there is no positive means of preventing the accumulation of



transient materials in individual plant areas. As documented in Inspection and Enforcement Branch Reports, recent inspections at plants such as Davis Besse (50-346/82-03, April 1, 1982), Duane Arnold (50-331/81-25, January 11, 1982), D.C. Cook (50-315/82-11, December 31, 1981), and Nine Mile Point (50-220/82-09), have demonstrated that substantial quantities of hazardous substances such as 55 gallon drums of waste oil are located in even highly restricted and controlled entry areas.

Because we do not have an indication of the in-situ fuel load, including the cable jacket and insulating materials, we cannot complete our evaluation on the adequacy of the fire protection. We, therefore, do not have assurance that the existing protection provides a level of fire protection equivalent to the technical requirements of Section III.G.

3.4 Conclusion

Based upon our evaluation, the protection for the auxiliary building corridor, 4' elev. is not equivalent to the technical requirements of Section III.G of Appendix R to 10 CFR 50. Therefore, the request for exemption should be denied.

4.0 Fire Area 11, 12, and 13 (one area) Unit 3 Residual Heat Removal Area Fire Area 14, 15, and 16 (one area) Unit 4 Residual Heat Removal Area

4.1 Exemption Requested

The licensee requests an exemption from Section III.G to the extent that it requires 1-hour rated fire barrier for protection of redundant safe shutdown cables and equipment and the installation



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of fire detection and automatic fire suppression capability throughout these areas.

4.2 Discussion

These two areas are essentially identical areas consisting respectively of the Unit 3 and Unit 4 residual heat removal (RHR) pump and heat exchanger areas in the Auxiliary Building.

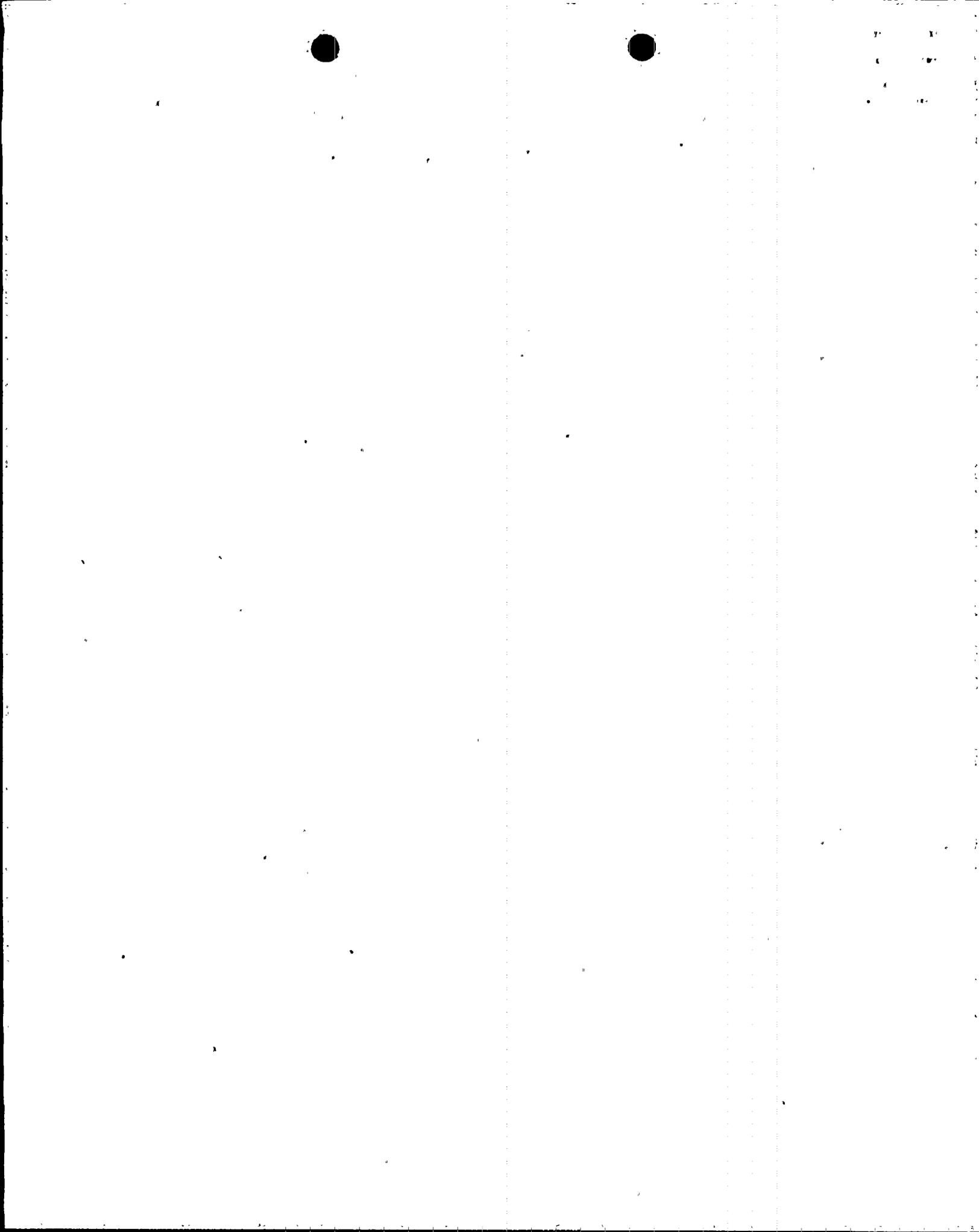
For analysis purposes, because of the unprotected openings in the floor/ceiling assemblies, the applicant has combined these areas into one fire area. Each contains both redundant RHR heat exchangers and associated valves and piping. Power and control cables for the motor operated valves associated with these RHR heat exchangers are located in these sub areas, and other safe shutdown cables run through the areas in conduit.

Each room contains one of the redundant RHR pumps with its own associated valves, controls, instrumentation, and power and control cables. The two rooms are separated from each other by a 16-foot high reinforced concrete partial height wall..

The combustible loading for these areas consists primarily of the oil and grease associated with the various pumps and motor operated valves. There is approximately two pounds of grease per motor operator for each of the motor operators in each area and one gallon of oil per residual heat removal pump.

The licensee proposes the following modifications:

1. Upgrade perimeter walls, floors, and ceiling to 3-hour rated barriers by sealing all piping and other penetrations and installation of 3-hour rated fire dampers and doors on all ventilation duct penetrations and doorways.

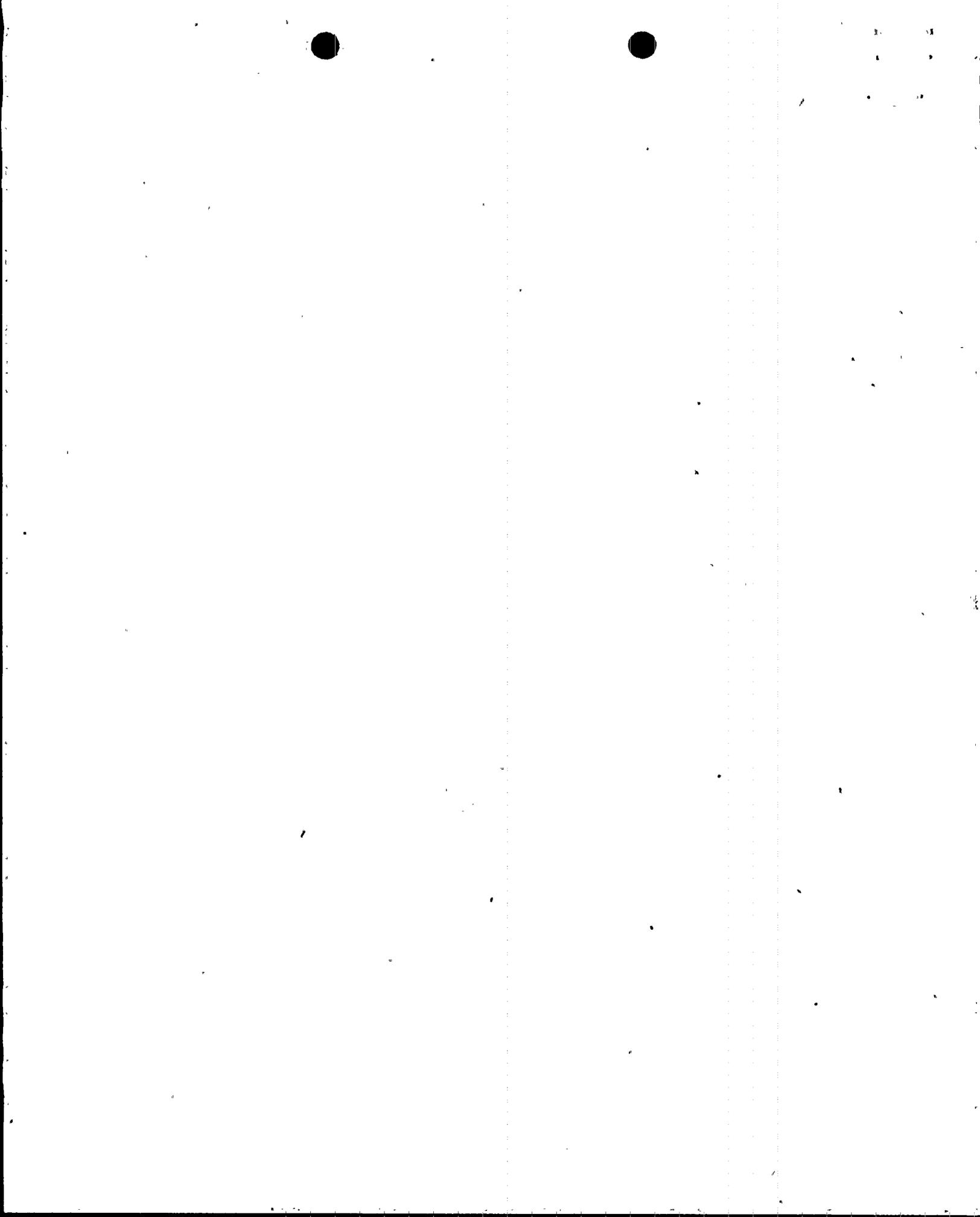


2. Upgrade part height wall separating the areas and upgrade full height wall separating Areas 11 and 12 by sealing all piping and other penetrations in the existing walls.
3. Provide a fire barrier or enclosure of non-combustible material, $\frac{1}{2}$ ' thick marinite, or equivalent around valve operators for valves HCV-3-758, MOV-3-863A, MOV-3-863B, MOV-3-862A, HCV-4-758, MOV-4-863A, MOV-40863B and MOV-4-862A.
4. Provide the equivalent of a 1-hour rated barrier for the electrical conduit associated with valves HCV-3-758, MOV-3-863A, MOV-3-863B, MOV-3-862A, HCV-4-758, MOV-4-863A, MOV-863B, and MOV-4-862A.
5. Protect one train of conduit utilizing a 1-hour rated barrier.

Manual standpipe and hose installations and fire extinguishers are available for fire brigade use in each area. No automatic fire detection or fire suppression capability is installed in the area.

4.3 Evaluation

This area does not comply with Section III.G because 1-hour barriers, automatic suppression and detection are not provided. In the RHR area the licensee proposes to provide partial fire barrier, however the separation of redundant equipment is less than the 20 feet specified by Section III.G. The only significant in-situ combustible in the fire area is grease and the pump motor lubricating oil. We agree with the licensee that the probability of ignition of the oil is low because the lubricating oil has a high flashpoint (approximately 450°F) and that sufficiently hot surfaces do not exist in this fire area to cause the ignition of the lube oil.



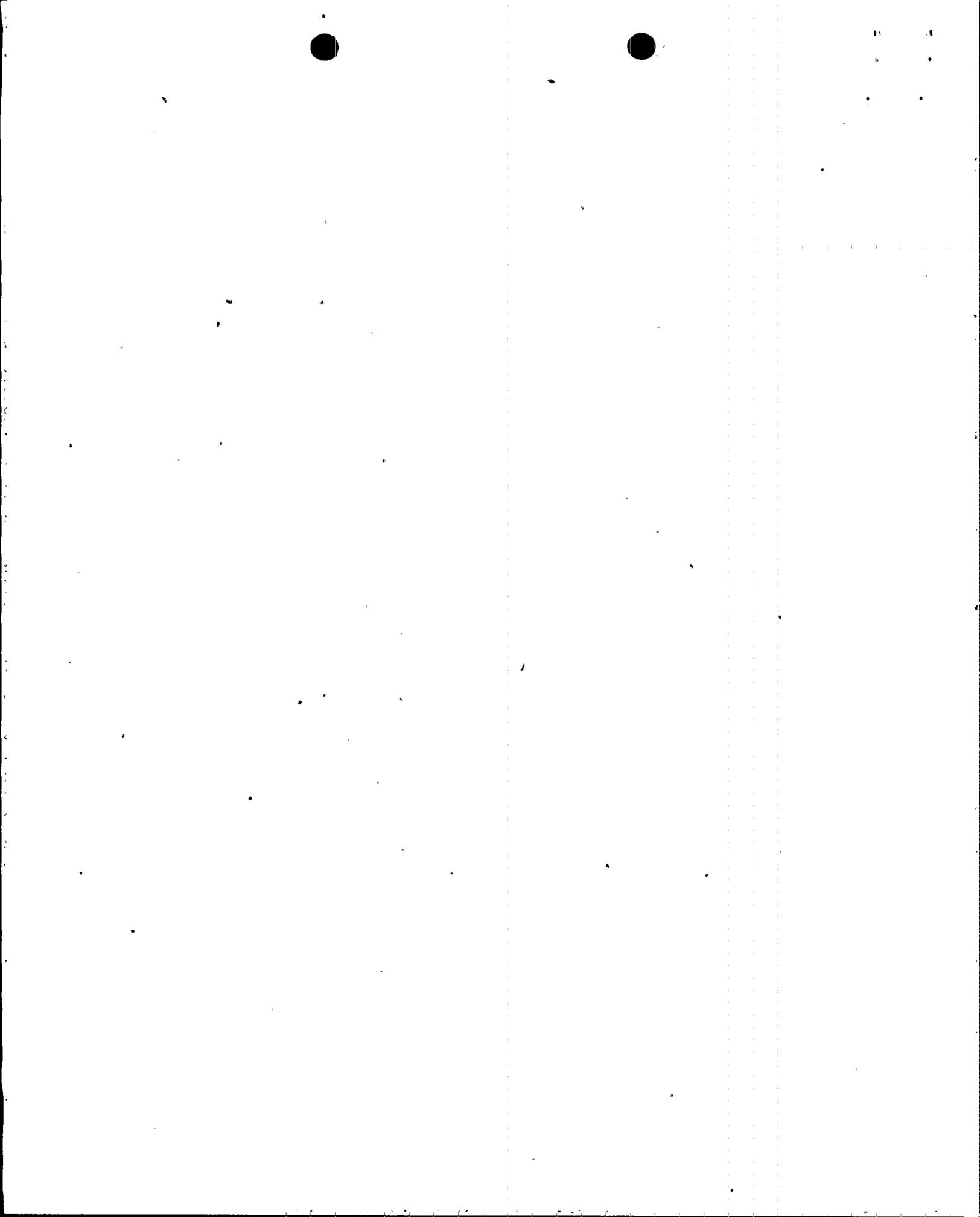
While the licensee has proposed to provide passive fire protection, no active protection is available, such as a fire detection or suppression system. Both forms of protection are necessary to provide reasonable assurance that a single train of safe shutdown systems is free of fire damage. The active and passive fire protection achieve a synergistic effect: the barrier provides sufficient protection until the fire is discovered and extinguished by the fire brigade.

The lack of both, a fire detection and fire suppression system in the area could result in a fire of significant magnitude burning unnoticed for some time. In such a case, redundant safety divisions could be affected. Consequently, the licensee's proposed modifications do not provide reasonable assurance that one train of safe shutdown systems will be free of fire damage.

Therefore, the existing protection in this fire area does not provide a level of fire protection equivalent to Section III.G. Modifications such as the installation of an automatic fire detection system would provide the requisite level of safety.

4.4 Conclusion

Based on our evaluation, the level of protection provided in the RHR areas does not provide a level of protection equivalent to the technical requirements of Section III.G, therefore the exemption should be denied.



5.0 Fire Areas 30 and 40 - Pipe and Valves Rooms for Units 4 and 3 (Respectively)

5.1 Exemption Requested

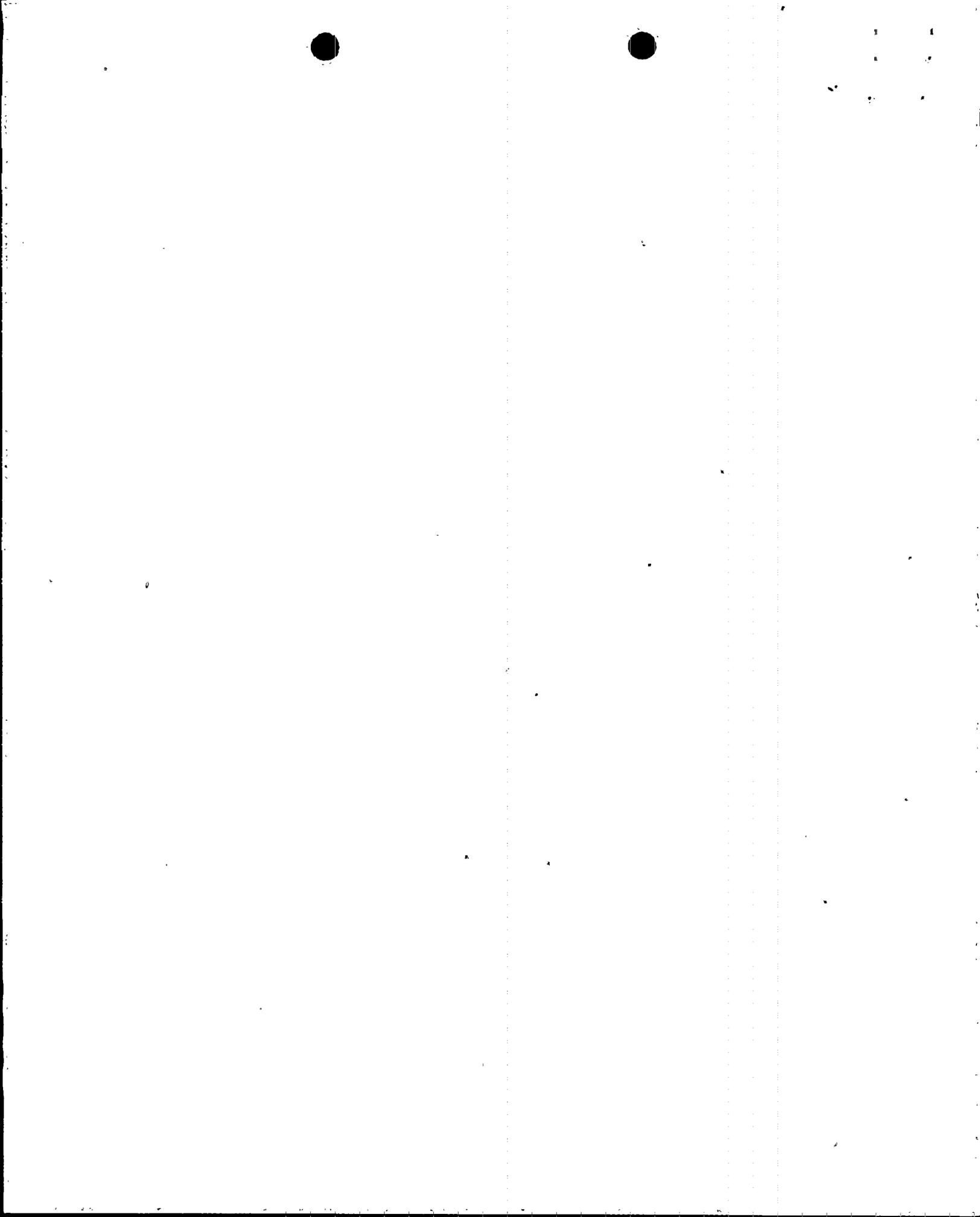
The licensee requests an exemption from Section III.G to the extent that it requires 1-hour rated fire barriers for protection of redundant safe shutdown cables and equipment and the installation of fire detection and automatic fire suppression capability throughout these areas.

5.2 Discussion

These fire areas are identical rooms in the Auxiliary Building having floor area of 800 sq. ft. and ceiling height of 14½ ft. and are the Pipe and Valve Room respectively for Unit 4 (Fire Area 30) and Unit 3 (Fire Area 40). Safe shutdown cables are routed through each area about 9 ft. above the floor (5½ ft. below the ceiling) and the cables are coated with a fire retardant material. No automatic fire detection or suppression capability is installed in either area.

The combustible loading for both areas consists primarily of the grease contained within each of the motor operated valves (MOV's) in the area and the cables routed in the cable trays. Since there are 14 MOV's in each area, with 1 lb. of grease per valve, this amounts to about 14 lbs. of grease total. This grease is contained within the respective steel enclosure of each valve motor operator. Cables in the area are sprayed with a flame retardant coating. The licensee has not quantified the fuel load added by the cables.

Standpipe and base station and fire extinguishers are available for fire brigade use throughout the area.

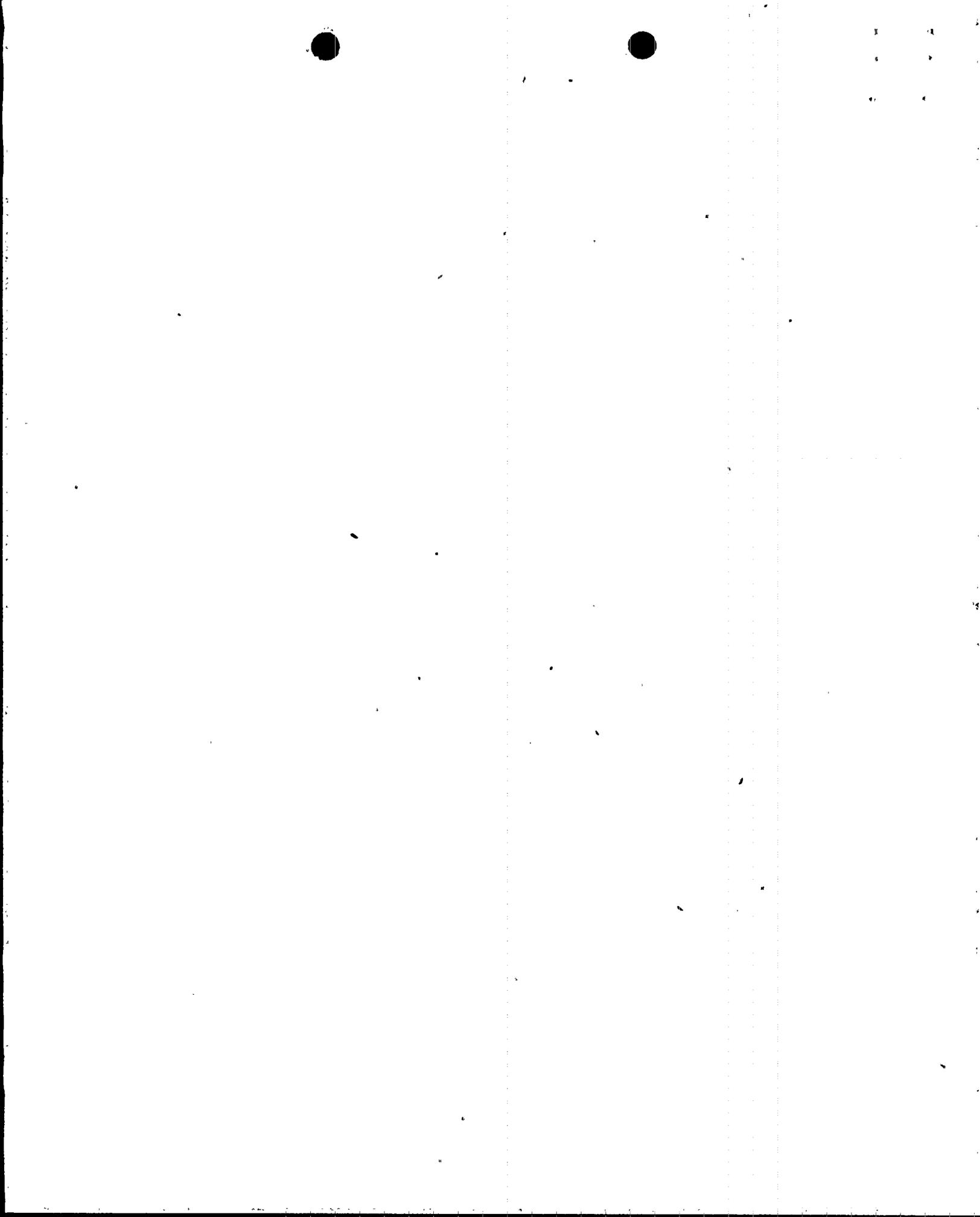


The licensee proposes the following fire protection modifications in each area:

1. Protect one train of cable trays utilizing a thermal insulating wrap to provide the equivalent protection of a 1-hour rated barrier.
2. Upgrade perimeter walls and floor to 3-hour rated barrier by sealing all piping and other penetrations and installation of 3-hour rated fire dampers and doors on all ventilation duct penetrations and doorways.
3. Provide a fire barrier or enclosure of noncombustible material $\frac{1}{2}$ " thick marinite or equivalent around valve operators for valves HCV-4-121, 4-1417, 4-1418 and MOV-4-749A (Area 30) and HCV-3-121, 3-1417, 3-1418 and MOV-3-749A (Area 40).
4. Provide the equivalent of a 1-hour fire rated barrier for the electrical conduit associated with valves HCV-4-121, -4-1417, 4-1418 and MOV-4-749A (Area 30) and HCV-3-121, 3-1417, 3-1418 and MOV-3-749A (Area 40).
5. Protect one train of conduit utilizing a thermal insulating material to provide the equivalent protection of a 1-hour rated barrier.

5.3 Evaluation

This area does not comply with Section III.G because redundant components are not separated by 20 feet free of intervening combustibles or provided with a complete 1-hour rated fire barrier. No suppression or detection systems are installed in the area.



The licensee has not quantified the fuel load in the area due to the use of flame retardant coatings. As previously discussed in Section 3.3 of this report, such coatings along do not provide adequate assurance that one train of equipment needed for safe shutdown will be maintained free of fire damage.

If a fire occurred in this area, it is our concern that there is no means to promptly detect the fire, and no installed suppression system to extinguish the fire.

In our opinion, the proposed partial fire barriers do not provide adequate protection in such a case.

5.4 Conclusion

Based upon our evaluation, the level of protection provided for the pipe and valve rooms (fire areas 30 and 40) does not provide a level of protection equivalent to the technical requirements of Section III.G therefore the exemption should be denied.

6.0 Fire Area 47 - Unit 4 Component Cooling Water Area

6.1 Exemption Requested

The licensee requests an exemption from Section III.G to the extent that it requires 1-hour rated fire barriers for the protection of redundant safe shutdown cable and the installation of fire detection and automatic fire suppression capability throughout the area.

6.2 Discussion

Fire Area 47 is the Component Cooling Water area for Unit 4. It is located at the 18-foot elevation in the Auxiliary Building, has a floor of about 3,000 sq. ft. and a ceiling height of 16 ft.



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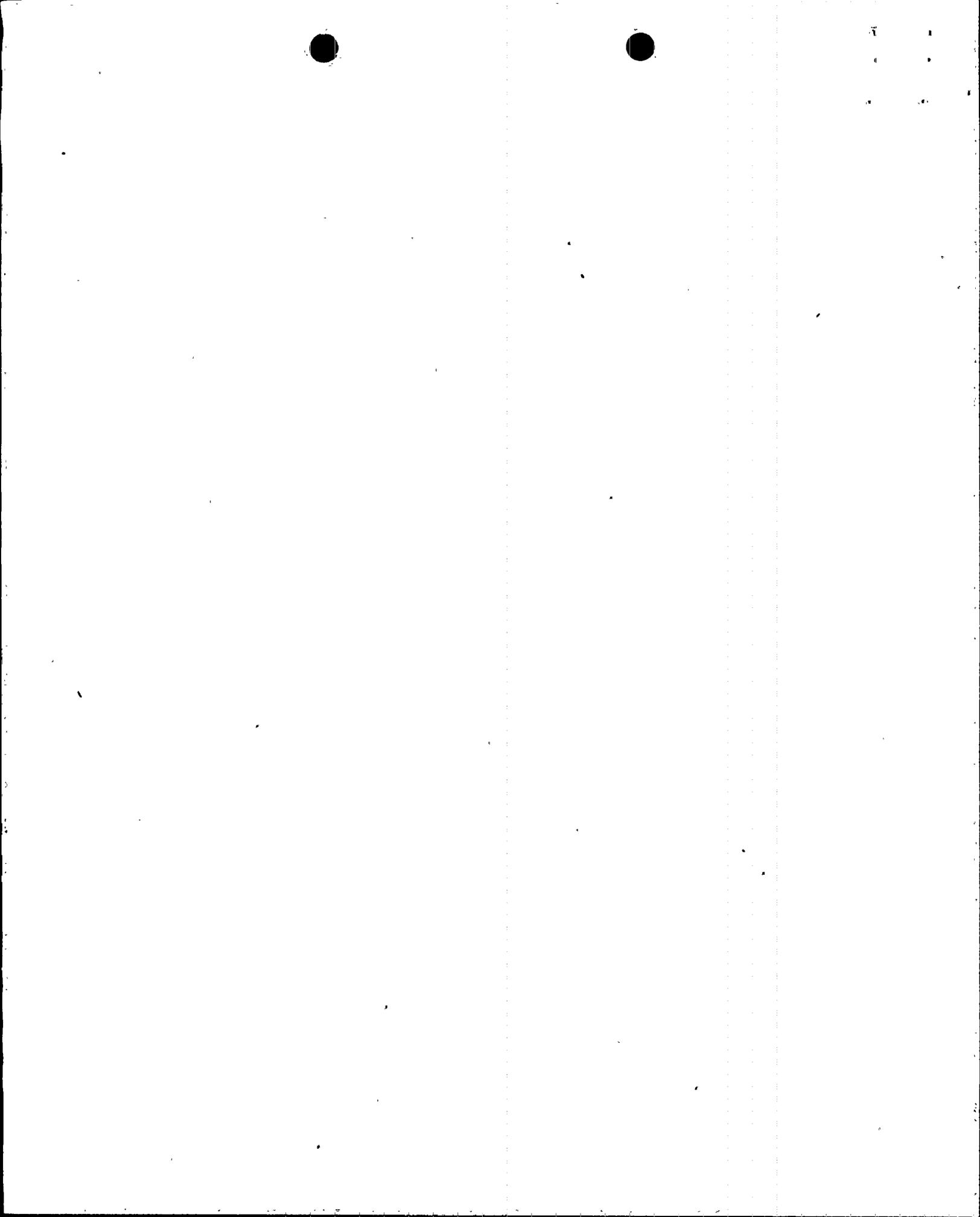
This area contains equipment associated with the component cooling water system. In addition, other safe shutdown cables pass through the area in cable trays approximately $8\frac{1}{2}$ and $9\frac{1}{2}$ ft. above the floor ($7\frac{1}{2}$ and $6\frac{1}{2}$ ft. below the ceiling) and then drop vertically to enter manholes in the floor. The licensee has not described the separation or configuration of redundant cables. All cables are coated with fire retardant mastic. Standpipe and hose stations and fire extinguishers are available for use by the fire brigade throughout the area. No automatic fire detection or suppression capability is provided in the area.

The licensee proposes the following fire protection modifications:

1. Protect electrical cable trays by installation of fire resistant baffles under these trays. Baffles are to span the width of the lowest cable tray in a stack and are to be located within 4 in. of the bottom of the lowest tray.
2. Protect all vertical cable trays penetrating the floor by the installation of a fire resistant partial enclosure or heat shield around the trays extending from the floor up to the lowest horizontal tray in a stack.
3. Protect one component cooling water pump with a 3-hour fire rated wall (no roof).

6.3 Evaluation

This area does not comply with Section III.G because redundant cables are not separated by 1-hour barriers. There is no suppression or detection capability in the area.

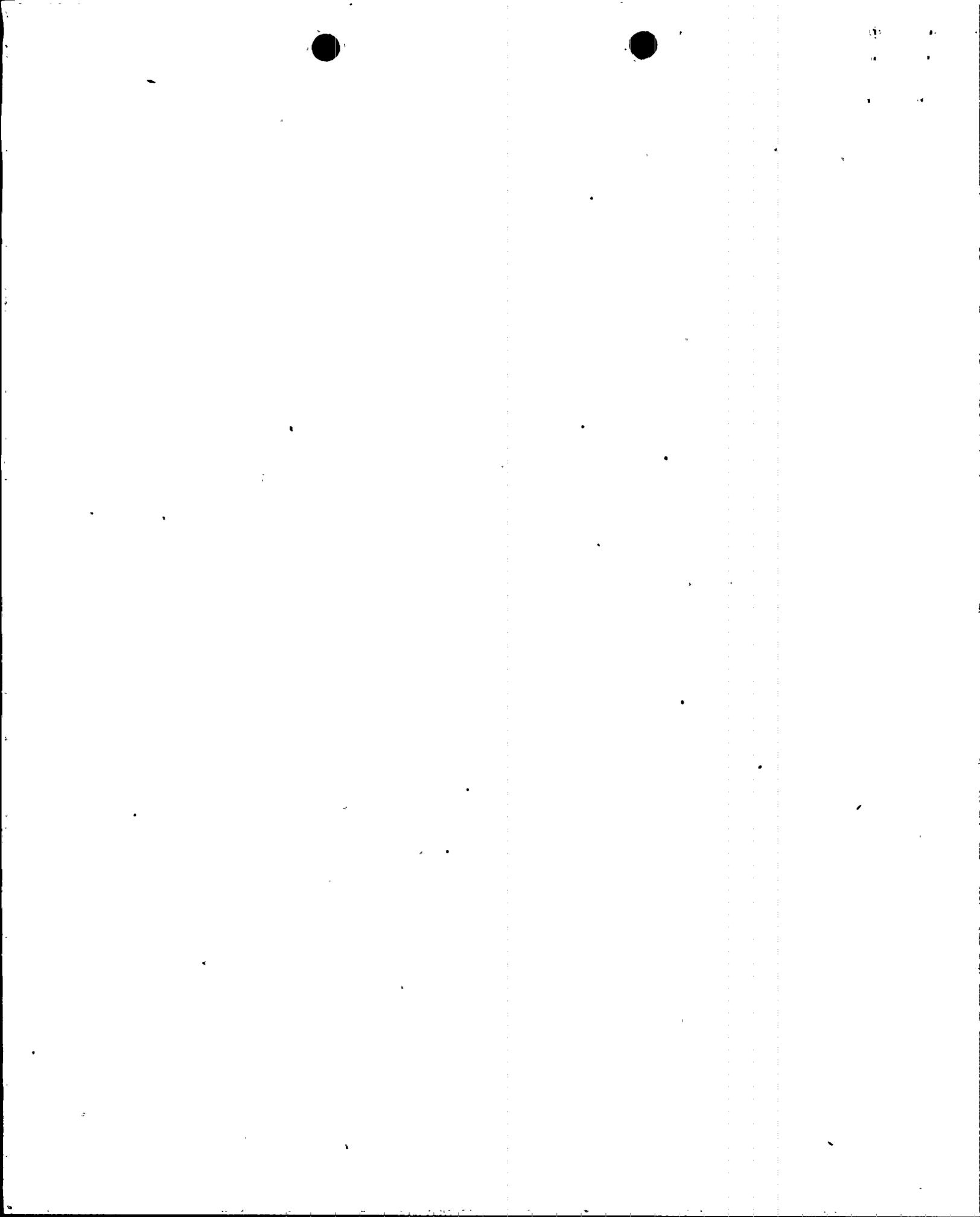


The licensee states that the flame retardant coatings in conjunction with plant administrative controls and proposed baffles will preclude damage to both trains of CCW pumps and associated equipment. As previously discussed in Section 3.3, this combination of features is not equivalent to the technical requirements of Section III.G particularly when the separation of redundant cables is not known. If a fire occurred in this area, we do not have reasonable assurance that redundant cables will not be damaged in the time interval before the fire is discovered and extinguishment attempted. While the licensee has proposed to provide partial passive fire protection no active protection is available, such as a fire detection or suppression system. Both forms of protection are necessary to provide reasonable assurance that a single train of safe shutdown systems is free of fire damage. The active and passive fire protection achieve a synergistic effect: the barrier provides sufficient protection until the fire is discovered and extinguished by the fire brigade or suppressed by the fire suppression system. Detection and suppression systems alone are not sufficient because of the time delay associated with their operation.

The lack of both a fire detection and fire suppression system in the zone could result in a fire of significant magnitude burning unnoticed for some time. In such a case, redundant safety divisions could be affected. Consequently, the licensee's proposed modifications do not provide reasonable assurance that one train of safe shutdown systems will be free of fire damage.

6.3 Conclusion

Based upon our evaluation, the protection provided for the component cooling water area does not provide a level of protection equivalent to Section III.G therefore the exemption should be denied.



7.0 Fire Area 58 - Main Auxiliary Building Hallway of the 18 ft. Elevation

7.1 Exemption Requested

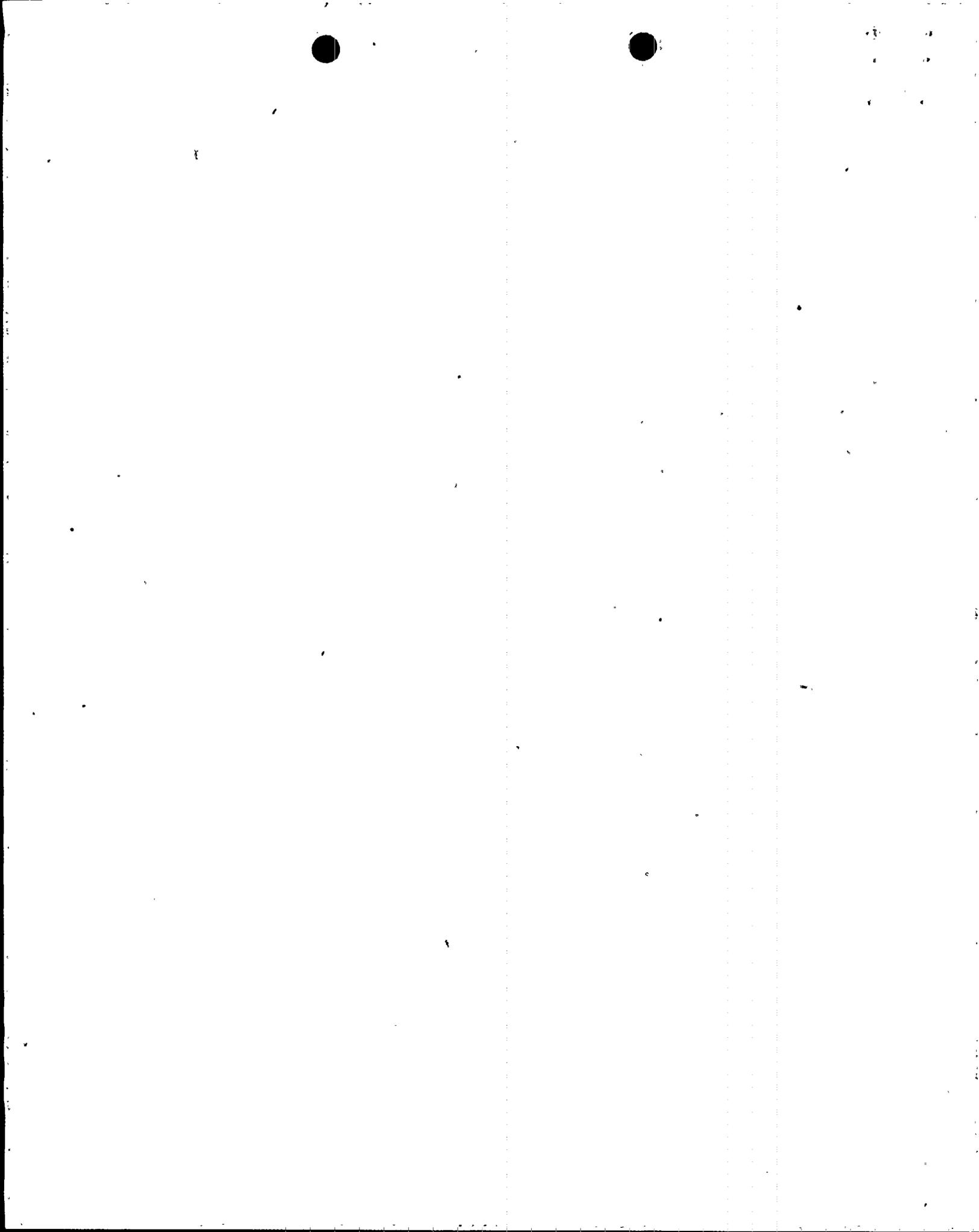
The licensee requests an exemptions from Section III.G and III.L to the extent that they require alternative shutdown capability that is independent of this fire and the installation of automatic fire suppression capability throughout the area.

7.2 Discussion

This fire area has a floor area of 2100 sq. ft. and a ceiling height of 11 ft. Redundant shutdown power and control cabling passes through the area in cable trays located within 2½ ft. of the ceiling. All cables are coated with a fire retardant mastic. The major potential combustible sources in the 18' Main Auxiliary Building hallway are the motor control centers, lighting panels and heat tracing transformers, and the numerous cable trays routed throughout the area. These cable trays are sprayed with a flame retardant coating. The licensee has not quantified the combustible loading. Standpipe and hose stations and fire extinguishers are available for fire brigade use in the area. Automatic fire detection capability is installed throughout the area. An automatic fire suppression system is installed in the area.

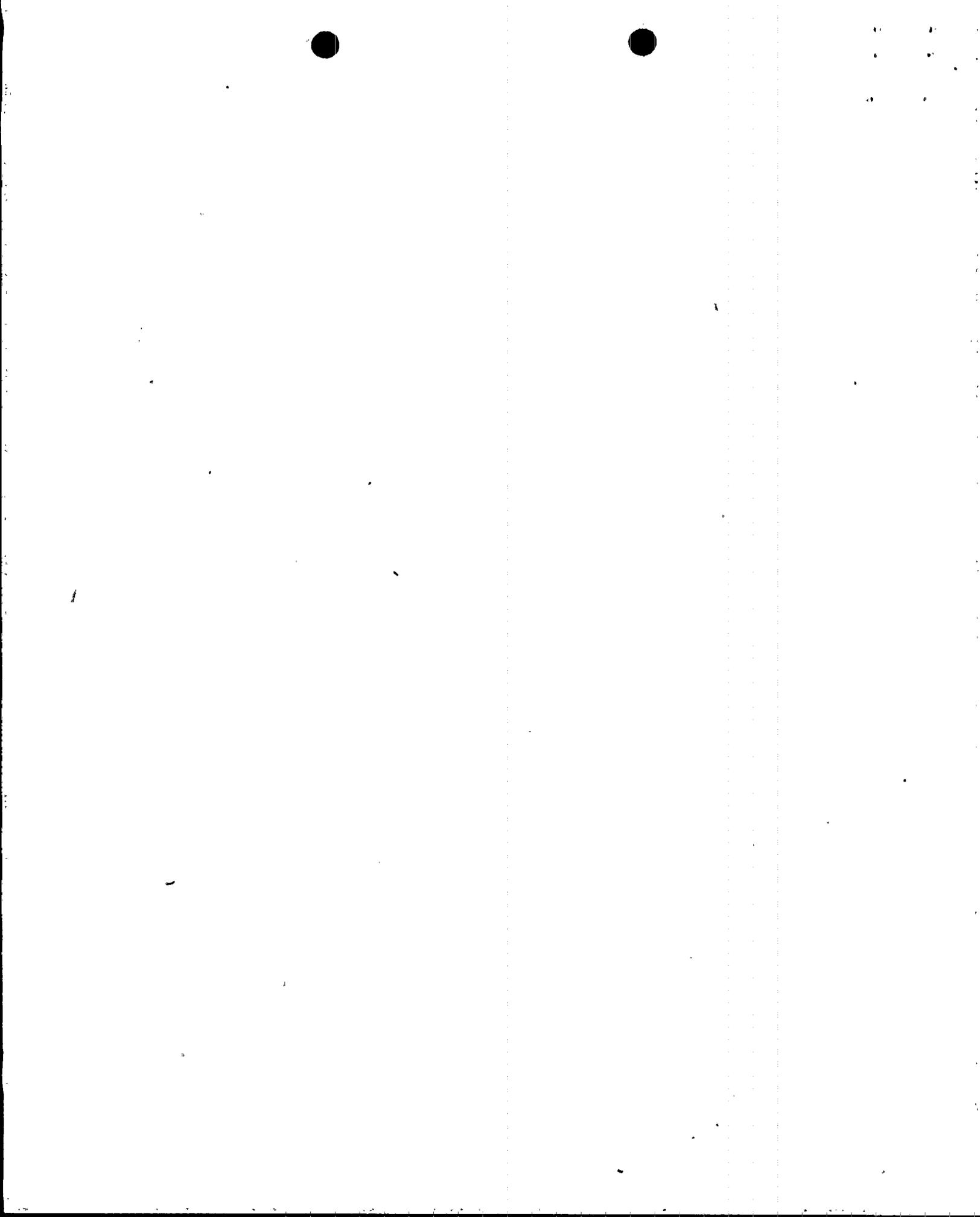
The licensee proposes the following fire protection modifications:

1. Protect all electrical cable trays by installation of fire resistant baffles under these trays. Baffles are to span the width of the lowest cable tray in a stack and are to be located within 4 inches of the bottom of the lowest tray.



2. Protect one train of conduit with a 1-hour rated barrier.
3. Protect one train of wireways with a 1-hour rated barrier.
4. Rewire the power supplies to one Auxiliary Building exhaust fan and one boric acid transfer pump to motor control center outside of Area 58.
5. Upgrade perimeter walls for combined areas 31, 32, 33, 34, 35, 36, 37, 38, 39, 48, 49, 50, 51 and 58 to 3-hour rated barriers by sealing all piping and other penetrations and installation of 3-hour rated fire dampers and doors on all ventilation duct penetrations and doorways.
6. Provide emergency operating procedures for a fire to ensure that the following off-normal operator actions needed for cold shutdown are conducted if required:
 - a) Manual operation of the RWST isolation (From RHR header) valves, MOV-4-863A and MOV-3-863A.
 - b) Manual operation of the RHR inlet isolation (from RCS) valves, MOV-4-751 and MOV-3-751.
 - c) Manual operation of the accumulator stop valves, MOV-3-865C and MOV-4-865A.
7. Provide self-contained emergency lighting units in the Unit 3 and 4 RHR Heat Exchanger Rooms (Fire Areas 11 and 14) to facilitate the manual operation of MOV-3-863A and MOV-4-863A.

The licensee is depending primarily upon a combination of fire retardant coatings of cables and flame impingement barriers below cable trays, and administrative controls for protection of redundant safe shutdown equipment and cabling.



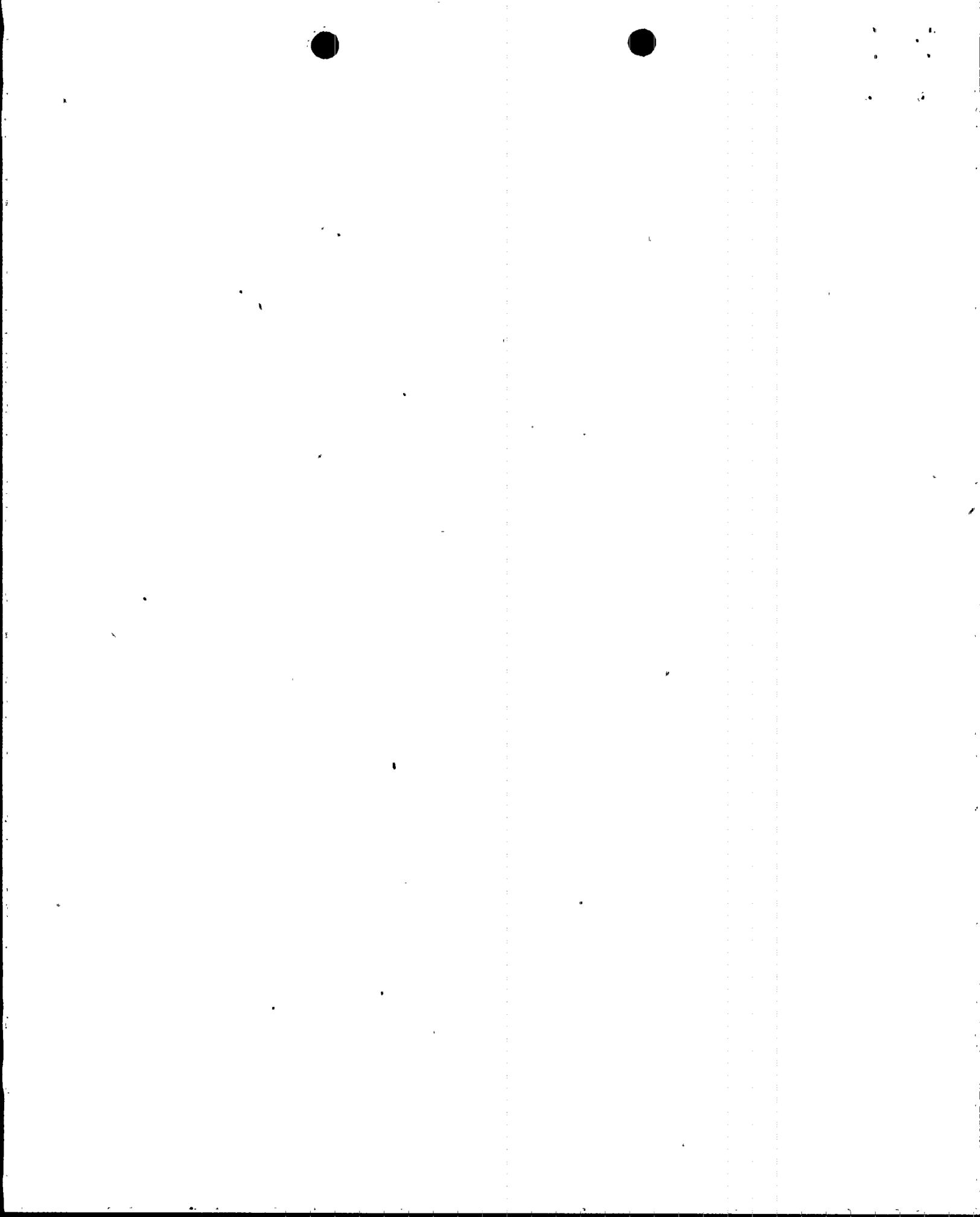
7.3 Evaluation

This area does not comply with Section III.G because redundant cables are not separated by 1-hour rated fire barriers. The licensee states that the flame retardant coatings in conjunction with plant administrative controls and proposed baffles will preclude damage to redundant trains of safe shutdown equipment. As previously discussed in Section 3.3, this combination of features is not equivalent to the technical requirements of Section III.G.

It is also our concern that the three trays of safe shutdown cables located 6 inches, 18 inches, and 30 inches below an 11 ft. high ceiling are subject to failure by virtue of being immersed in a hot gas layer that forms at the ceiling level from an exposure fire.

There are generally two mechanisms by which fire damage is propagated; either an exposure fire in close proximity to the redundant equipment or an exposure fire at any point at the ceiling in the room of sufficient magnitude to form a layer of hot gases at the ceiling level that descends to the floor level at a rate correlated to the room volume, the burning time and fuel quantity. In the case of a fire which produces a stratified layer of hot gases at the ceiling level, the most severe damage will occur to cables and equipment located within several feet of the ceiling. Recent tests (8) conducted at Underwriters Laboratories for the NRC showed that in a configuration similar to that in this area, the heat flux from an exposure fire could cause fire damage to cables in horizontal cable trays, located twenty feet from the fire source.

The level of protection provided does not present adequate assurance that redundant cables will not be damaged in the time interval needed for a fire to be detected.



7.4 Conclusion

Based upon the above evaluation, the level of protection provided for the main Auxiliary Building hallway, elev. 18' does not provide a level of fire protection equivalent to the technical requirements of Section III.G therefore the exemption should be denied.

8.0.1 Fire Area 59 - Containment Building - Unit 4

8.0.2 Fire Area 60 - Containment Building - Unit 3

8.1 Exemption Requested

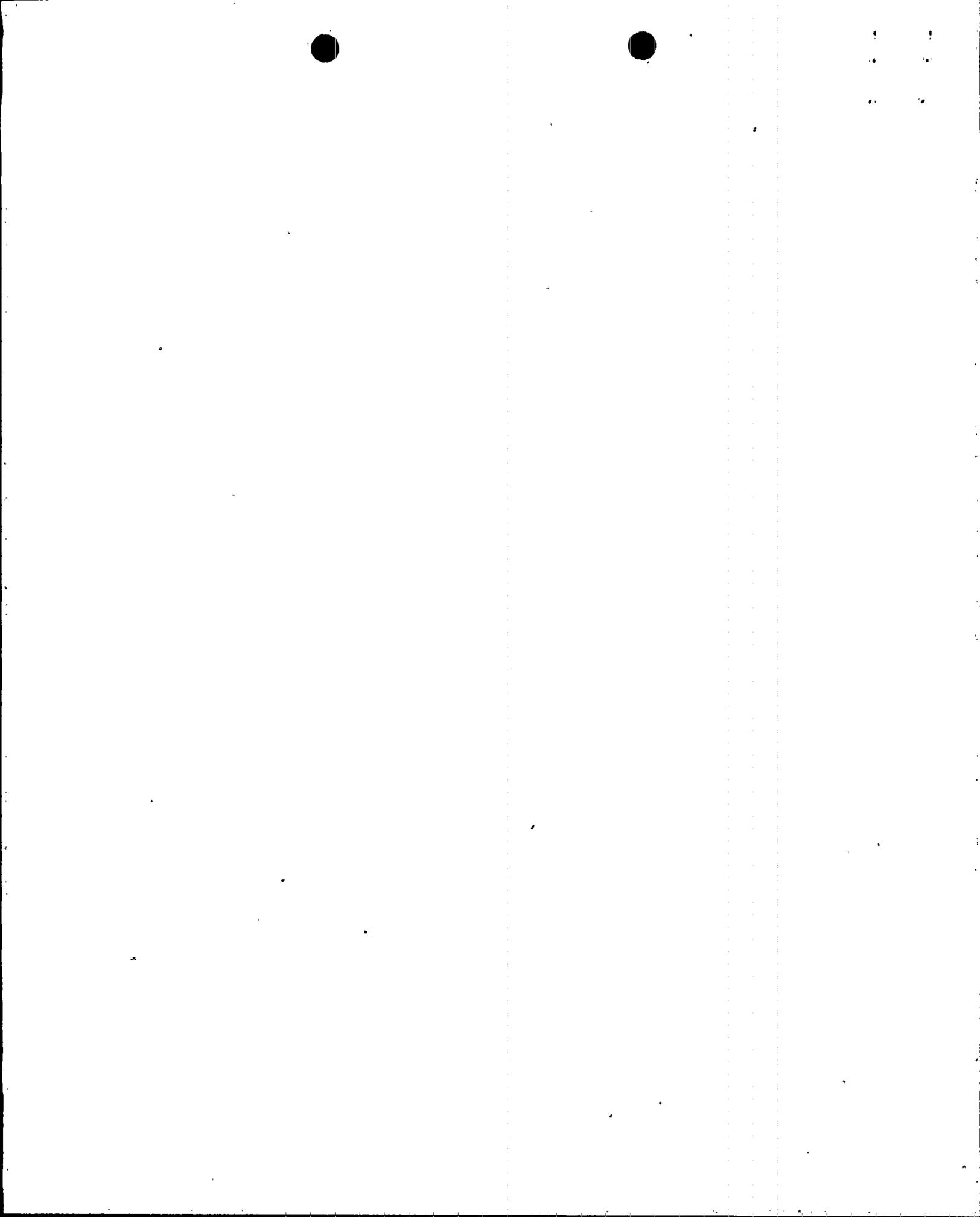
The licensee requests exemptions from Section III.G to the extent that it requires the installation of a noncombustible radiant energy shield between redundant safe shutdown equipment and cables separated by a distance of less than 20 feet.

8.2.1 Discussion Fire Area 59 (Containment Building - Unit 4)

8.2.2 Discussion Fire Area 60 (Containment Building - Unit 3)

The Containment Building is essentially open and considered to be one fire area. There are three intermediate floor levels at the 14 ft., 30 ft., and 58 ft. elevations. Normal access is through the personnel air lock, however, access for fire fighting is also available through the emergency air lock and the access hatch.

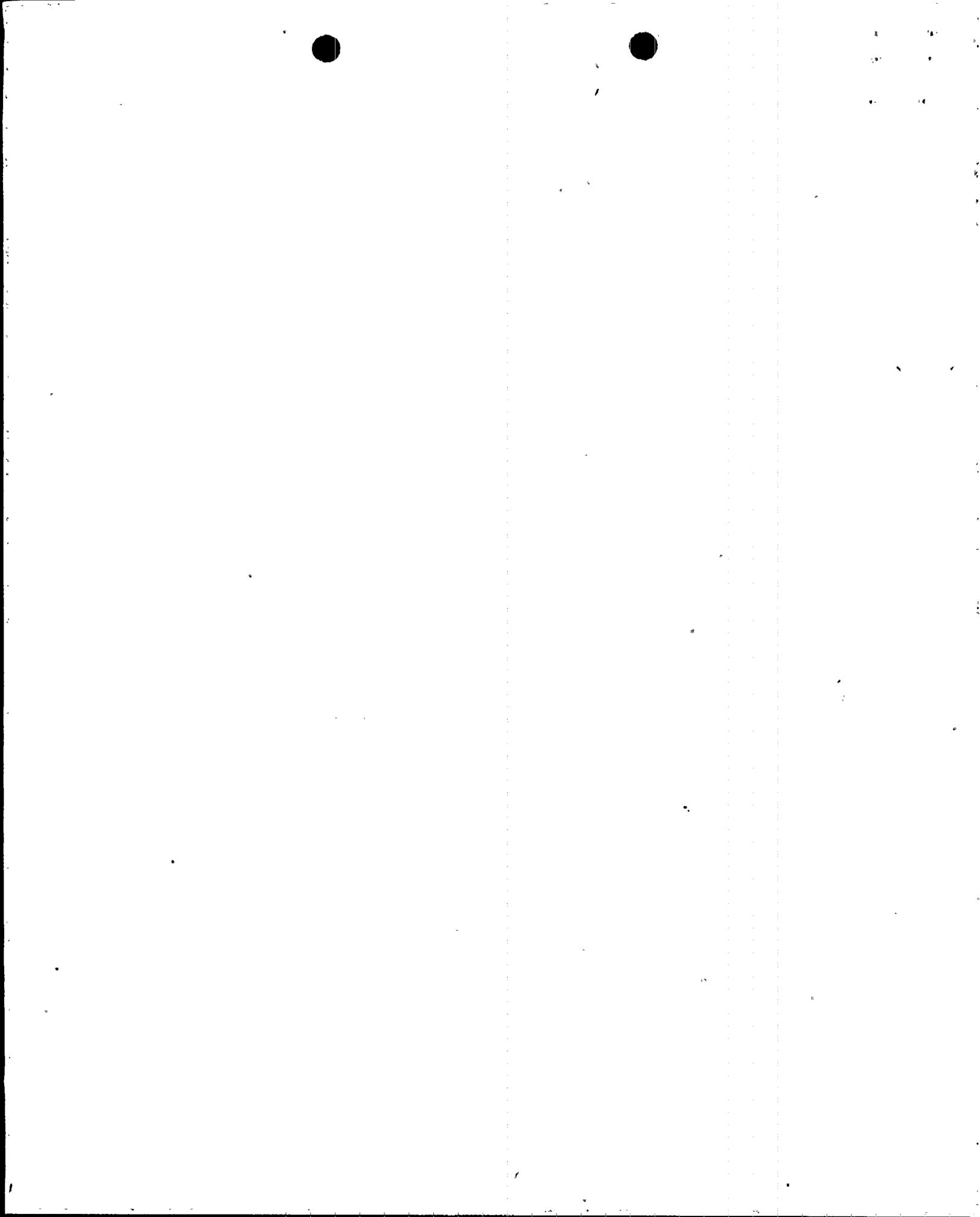
No hose stations are located inside containment, however, four portable fire extinguishers are available inside containment for use by the fire brigade. Ionization type fire detectors are in selected locations throughout containment. No automatic suppression is provided inside containment.



Redundant shutdown equipment inside containment includes both Normal and Emergency Containment Coolers, Accumulator Discharge Valves, Letdown Isolation Valves and Excess Letdown Isolation Valves, RHR Inlet Isolation Valves, Pressurizer Heater and Sprays, and various Motor Operator Valves and instrumentation transmitters. Safe shutdown cable trays are generally located outside the secondary shield wall and run from about 5 ft. to 65 ft. above the floor. Barrier separation of redundant trains is not provided, however, all cables are covered with a fire retardant mastic material. Redundant cable trays are separated from each other by minimum horizontal and vertical distances of 1½ ft. and 4 ft., respectively.

Combustible material in the area consists of lubricating oil contained in various components, and fire retardant coated cables. Since access into containment is controlled and limited, the possibility of introducing transient combustibles is substantially reduced.

The licensee justifies the exemptions for these areas on the basis that the low fire loading in the zones, if ignited, will not result in a fire of significant magnitude. In addition, the physical configuration of the zones (open spaces, high ceiling) coupled with the fire retardant coatings on the cables and their program of administrative controls provide assurance that one safe shutdown pathway will be free of fire damage. The licensee states that the installation of noncombustible radiant energy shields between redundant safe shutdown equipment and cables separated from each other by less than 20 ft. will not significantly enhance fire safety.



8.3 Evaluation

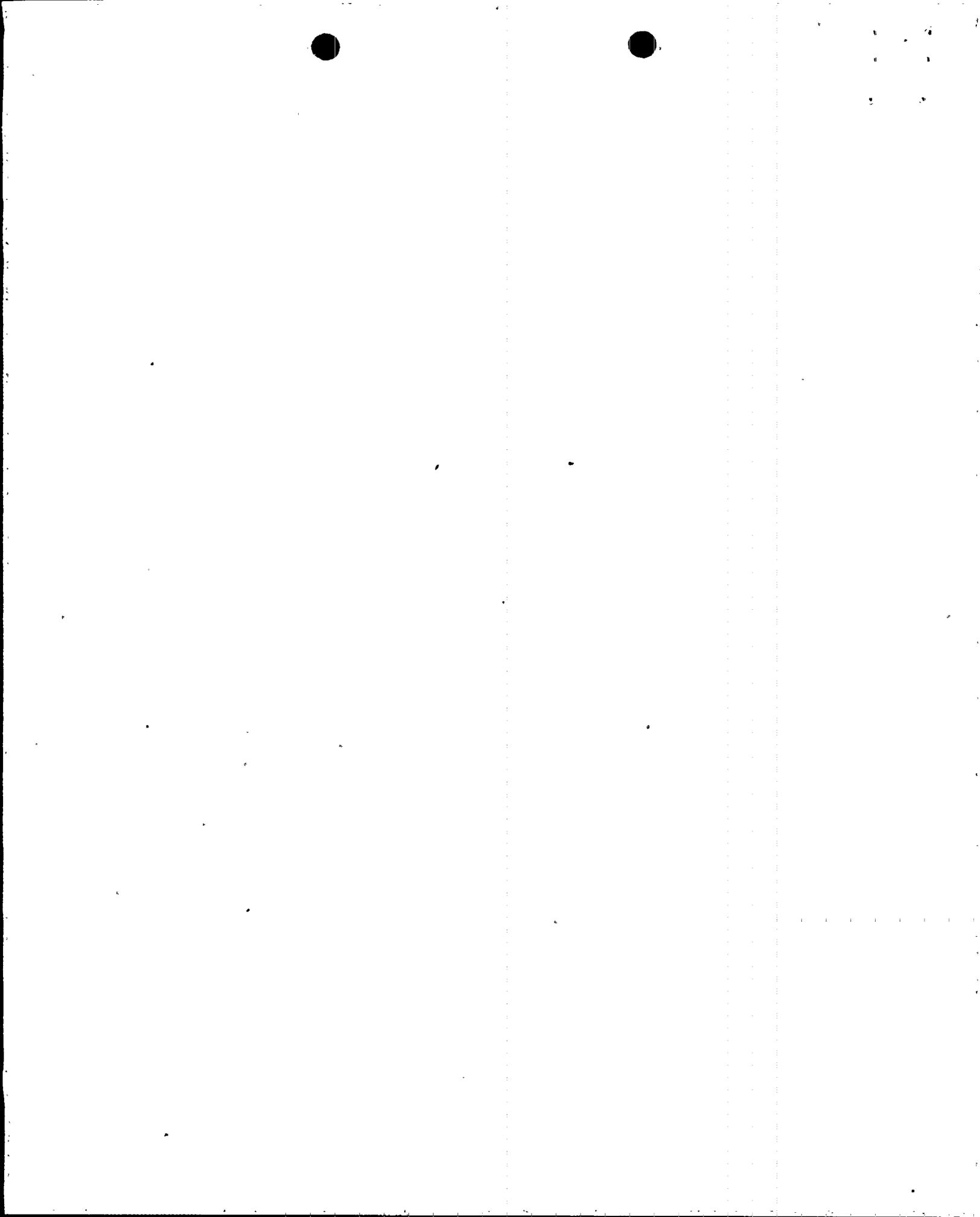
The technical requirements of Section III.G are not met because radiant energy barriers are not provided for redundant trains of safe shutdown equipment and cabling separated by less than 20 feet.

Section III.G calls for installation of a radiant energy shield between redundant safe shutdown equipment and cables that are closer to each other than 20 ft. horizontal distance. Redundant cables are within 1½ ft. horizontally and 4 ft. vertically of each other. Although all cables in containment are coated with a fire retardant mastic, they are still subject to damage by either direct flame impingement or being immersed in hot gases from an exposure fire.

We do agree with the licensee that the chance of introduction of transient combustibles inside containment is diminished significantly by the fact of controlled access to containment and/or a result of their administrative controls program.

The licensee states that the flame retardant coatings in conjunction with plant administrative controls and proposed baffles will preclude damage to redundant safe shutdown equipment. As previously discussed in Section 3.3, this combination of features is not equivalent to the technical requirements of Section III.G.

In case a fire occurred inside containment, we do not have adequate assurance that the fire brigade could respond and extinguish a fire before the loss of redundant equipment. This is due to the lack of manual hose stations within containment.



8.4 Conclusion

Based on the above evaluation, the protection provided inside Fire Areas 59 (Containment for Unit 4) and Fire Area 5 (Containment for Unit 3) does not provide a level of fire protection equivalent to the technical requirements of Section III.G, therefore the exemption should be denied.

9.0.1 Fire Areas 82 87 - Auxiliary Transformer Areas for Units 4 and 3, Respectively

9.0.2 Fire Areas 77 and 89 - Laydown and Condensate Storage Areas for Units 4 and 3, Respectively

9.0.3 Fire Areas 79 and 88 - 18 Ft. Elevation Vestibules to Units 3 and 4 Turbine Building

9.0.4 Fire Area 105 - 30 Ft. Elevation Turbine Building Mezzanine Deck

9.0.5 Fire Area 84 - Auxiliary Feedwater Pump Area

9.1 Exemption Requested

The licensee requests exemptions from Section III.G to the extent that it requires 1-hour rated fire barriers for protection of redundant safe shutdown cables and motor operated valves, and the installation of additional fire detection and fire suppression systems for these areas.



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9.2 Discussion - General

These are all outside areas, typically with no walls and either no ceiling or partial concrete ceiling.

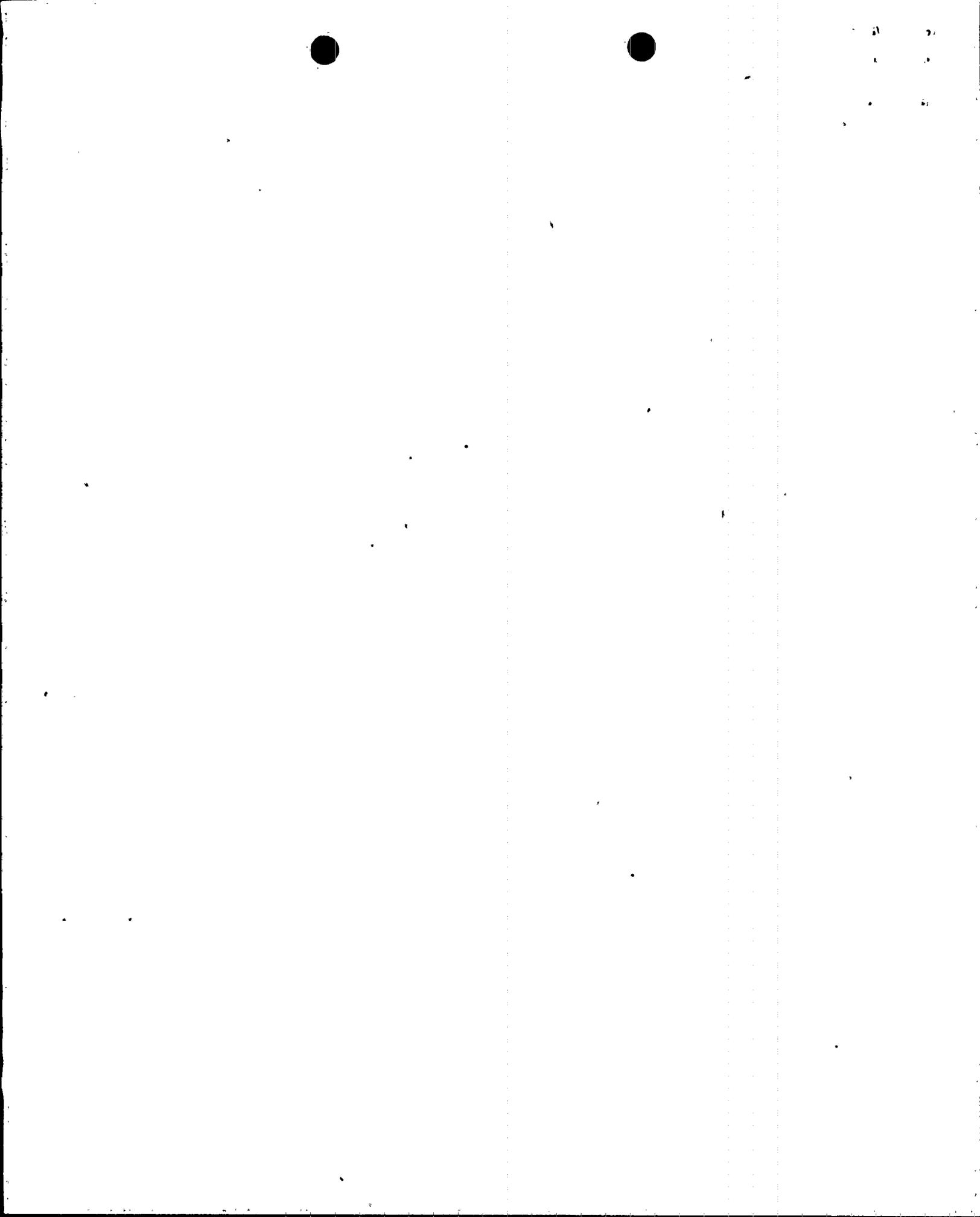
9.2.1 Discussion, Fire Areas 82 and 87 - Auxiliary Transformer Areas for Units 4 and 3

These two areas are located at the 18 ft. elevation and contain the turbine-generator auxiliaries for each unit. Neither area contains safe shutdown related mechanical equipment although each area contains a safe shutdown related motor control center. Redundant safe shutdown power and control cables are routed through each of the areas in cable trays located approximately 12½ and 13½ feet above the floor, and are coated with a fire retardant mastic material. The areas are bounded on their four sides by the 4160 V switchgear rooms on the north and their respective condensers on the south, by each unit's three condensate pumps on the east and on the west by the main transformers. The main transformers are separated from these areas by a 2-ft. high partial height wall. Where ceilings are located in these areas they are at a height of 22½ ft. above the floor.

In addition, these areas house the turbine generator hydrogen monitoring systems located in the southwest corner of each fire area. Thermal type fire detection and automatic deluge (water) fire suppression systems are installed in each area.

9.2.2 Discussion, Fire Areas 77 and 89 - Laydown and Condensate Storage Areas for Units 4 and 3

Both of these areas are on the 18 ft. elevation and contain the condensate storage tank and condensate transfer pump for their respective units. Safe shutdown related equipment in these areas consists of both condensate storage tanks, the Unit 3 steam supply



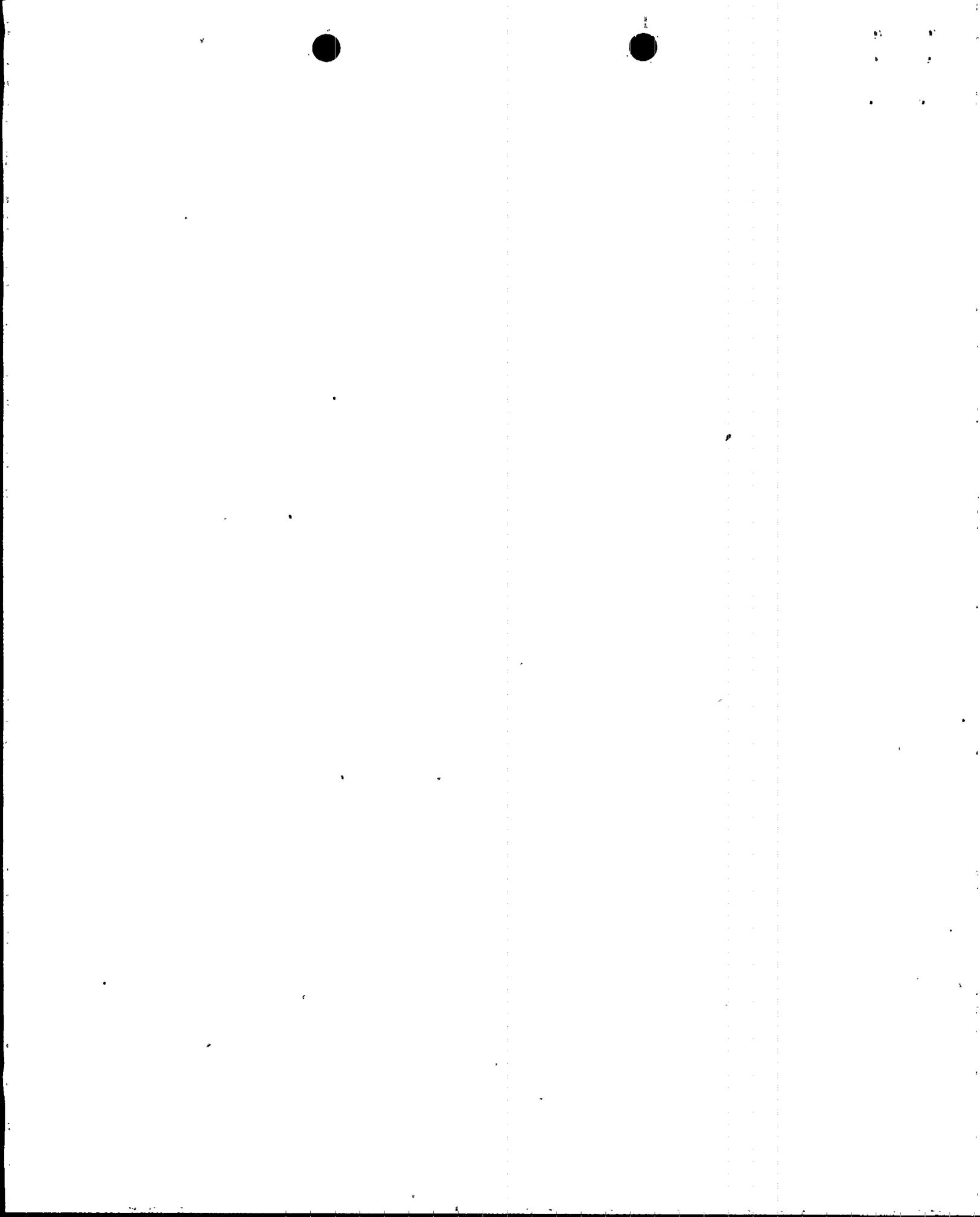
valves for the auxiliary feedwater pumps, the Unit 3 pneumatic steam generator pressure transmitters and the steam generator blowdown isolation valves for both Units 3 and 4. In addition, redundant safe shutdown power and control cables are routed through each area. All cables are coated with a fire retardant mastic material. These areas are not enclosed and have no ceilings. No fire detection and no automatic fire suppression capability is installed in either of these areas. Portable fire extinguishers and standpipe and hose stations are available for use throughout both areas. Combustibles in these areas are limited to lubricants contained in the various pumps and motors.

9.2.3 Discussion, Fire Areas 79 and 88 - Ft. Elevation Vestibules to Units 3 and 4 Turbine Building

Both of these areas, are located on the 18 ft. (ground floor) elevation. There are no walls in either area and each area has partly open roof. Ceiling height, where one is installed, is 10½ ft. above the floor. Safety related equipment in Area 79 consists of steam supply valves for the auxiliary feedwater pumps and the pneumatic steam generator pressure transmitters for Unit 4. Redundant safe shutdown cables are routed through each area. All cables in the area are covered with a fire retardant mastic. No fire detection and no automatic fire suppression capability is installed in either area. Portable fire extinguishers and standpipe and hose stations are available for use throughout both areas.

9.2.4 Discussion, Fire Area 105 - Turbine Building Mezzanine Deck, 30 Ft. Elevation

This area of 42,000 sq. ft. floor area has ceiling height of 10½ ft. and no walls. Redundant safe shutdown cables are routed through the area in cable trays 6½ to 7 ft. and 7½ to 8 ft. above the floor.



All trays are covered with a fire retardant mastic material. No fire detection or automatic fire suppression capability is provided in the area. Portable fire extinguishers and standpipe and hose stations are available for use in the area.

9.2.5 Discussion. Fire Area 84 - Auxiliary Feedwater (AFW) Pump Area

This is an open area enclosed on the east by Unit 3 Containment and on the other three sides and top by chain link fencing. The area houses all three auxiliary feedwater pumps. No fire detection and no automatic fire suppression capability is installed in the area. Portable fire extinguishers and standpipe and hose stations are available for use in the area. Redundant safe shutdown cables are routed through the area at least 13 ft. above grade level. The A and B auxiliary feedwater pumps are about 8½ ft. apart and the B and C pumps are about 10 ft. apart.

The following modifications are proposed for this area:

1. Install two standby steam generator feedwater pumps capable of providing auxiliary feedwater to Units 3 and 4. These pumps and their associated cables will be installed in an area far removed from Area 84 and capable of operation assuming loss of offsite power. Additionally an emergency operating procedure will be developed for loss of the AFW pumps after installation.

The licensee justifies the exemptions for these areas on the basis that the low fire loading in the zones, if ignited, will not result in a fire of significant magnitude. In addition, the physical configuration of the zones (open spaces, high ceiling) coupled with the proposed modifications and existing protection, provide assurance that one safe shutdown pathway will be free of fire damage.



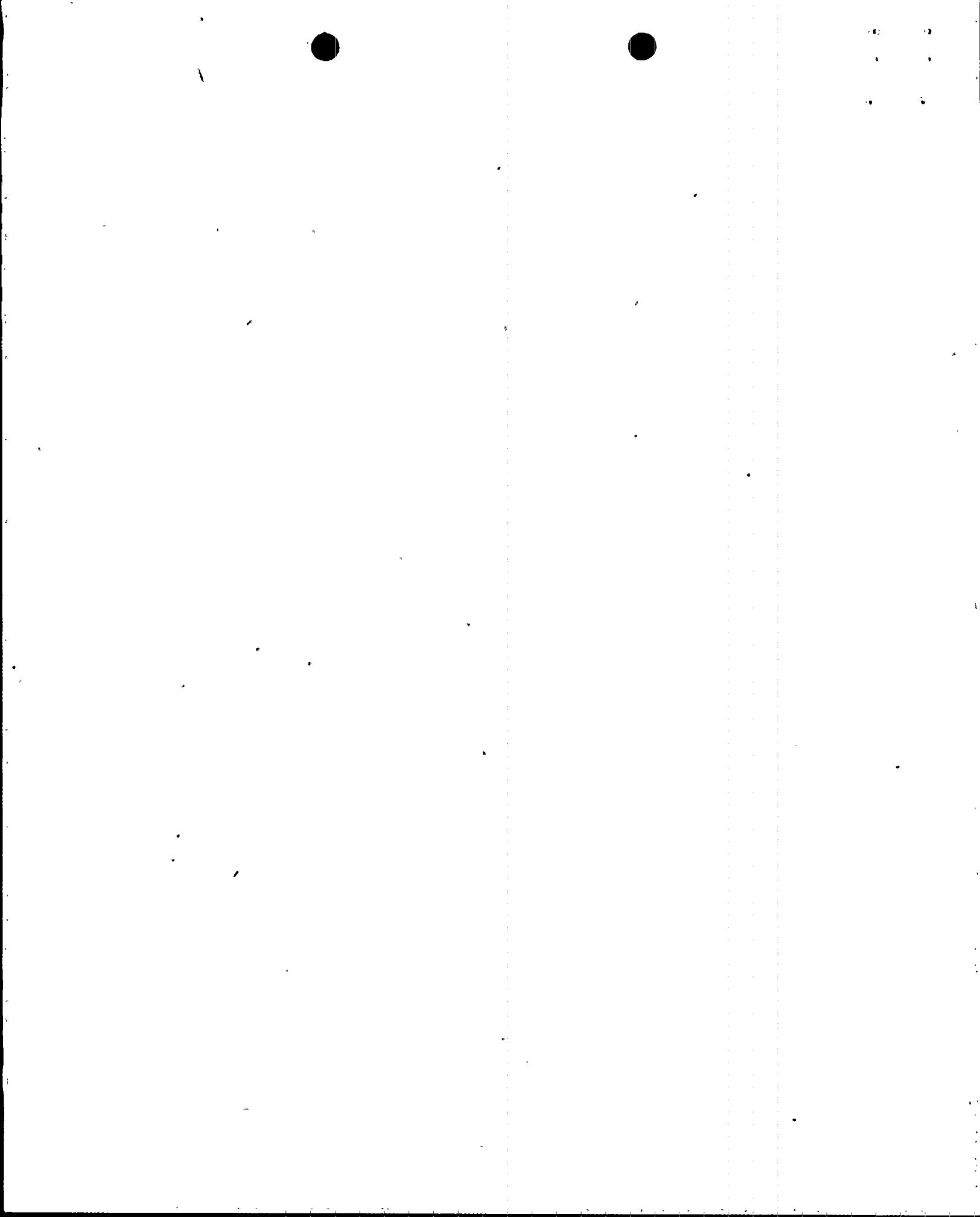
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9.3 Evaluation

These areas do not comply with section III.G because redundant cables are not separated by 20 feet free of intervening combustibles or 1-hour barriers. Automatic suppression and detection are not provided, except for the protection of the auxiliary transformers.

The fire protection requirements of Section III.G represent an aggregate, comprised of passive fire protection in the form of a fire rated barrier and active protection such as a fire detection or suppression system. Both forms of protection are necessary to provide reasonable assurance that a single train of safe shutdown systems is free of fire damage. The active and passive fire protection achieve a synergistic effect: the barrier provides sufficient protection until the fire is discovered and extinguished by the fire brigade or suppressed by the fire suppression system. Detection and suppression systems alone are not sufficient because of the time delay associated with their operation. The lack of both, a fire detection and fire suppression system in the zone could result in a fire of significant magnitude burning unnoticed for some time. In such a case, redundant safety divisions could be affected. Consequently, the licensee's proposed modifications do not provide reasonable assurance that one train of safe shutdown systems will be free of fire damage.

With the exception of thermal detectors and automatic deluge fire suppression protection for the transformers in Fire Areas 82 and 87, these areas have no active fire protection. In areas other than those protected or immediately adjacent to those areas protected by the detection or suppression systems, a fire could occur and propagate for a significant period of time until discovered and manual fire suppression efforts begun.

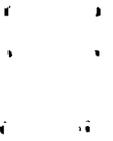


The licensee states that the flame retardant coatings in conjunction with plant administrative controls and proposed baffles will preclude damage to redundant trains of safe-shutdown equipment. As previously discussed in Section 3.3, this combination of features is not equivalent to the technical requirements of Section III.G.

For the AFW pumps, a detection system, and fixed suppression system as required by Section III.G(3)b are not provided. We have evaluated the combustible loading in the area and find that a fixed extinguishing system is not necessary because of the lack of in-situ combustibles. A detection system, however, should be provided to enable early warning of fire conditions.

9.4 Conclusion

Based on the above evaluation the protection provided for fire areas 82 (aux. transformer area), 84 (AFW Pumps), 87 (aux. transformers Unit 4), 77 (laydown area Unit 3), 89 laydown area Unit 4, and 79 and 88 (18' elev. vestibules) does not provide a level of fire protection equivalent to the technical requirements of Section III.G, therefore the exemptions should be denied.



10.0.1 Fire Areas 91 and 92 - Condensate Pump Areas for Units 4 and 3. Respectively

10.0.2 Fire Area 117 - 42 Ft. Elevation Turbine Building Deck

10.1 Exemption Requested

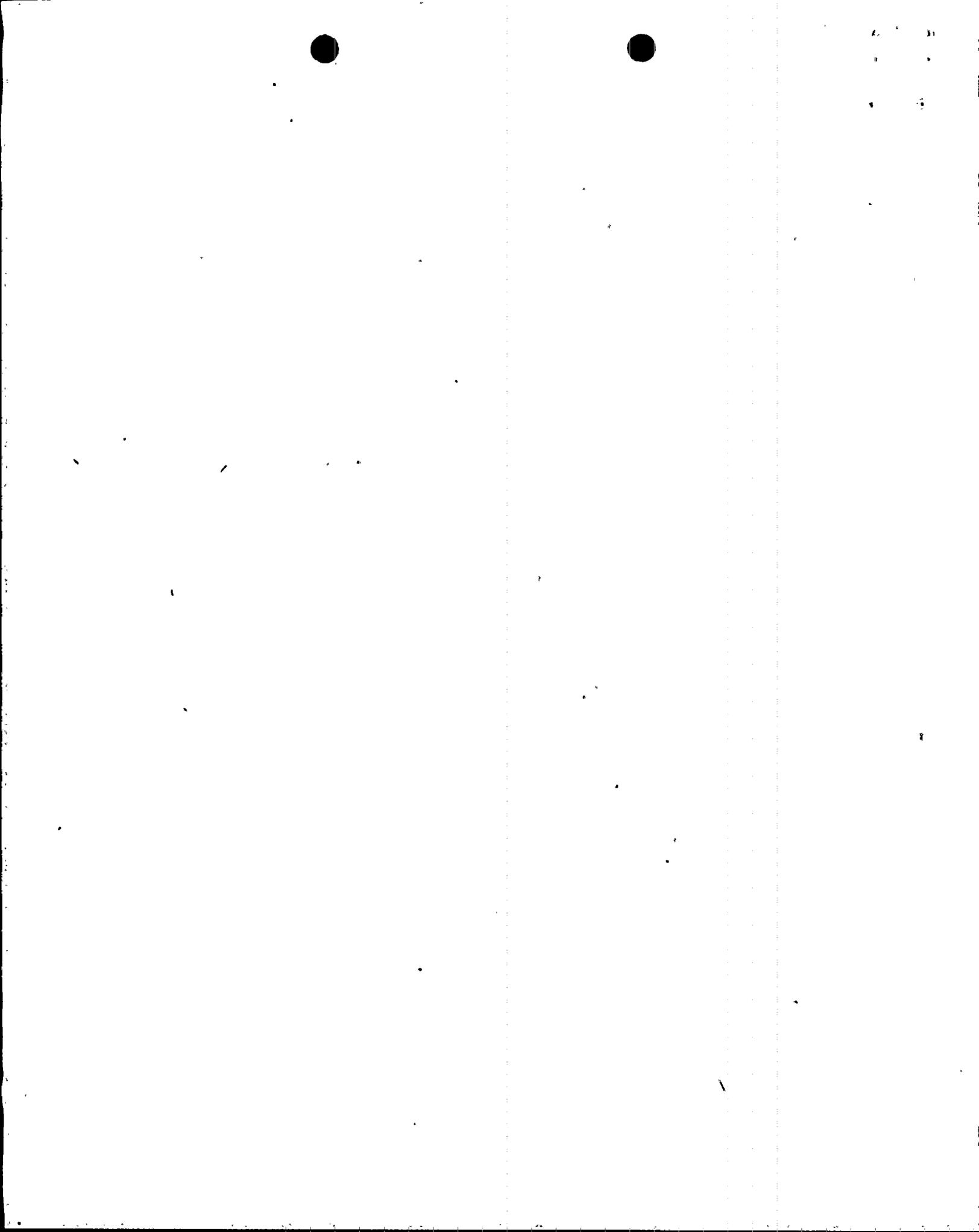
The licensee requests exemptions from the Section III.G to the extent that it requires 1-hour rated fire barriers for protection of redundant safe shutdown cables and motor operated valves, and the installation of additional fire detection and fire suppression systems for these areas.

10.2 Discussion - General

These are all outside areas, typically with no walls and either no ceiling or partial concrete ceiling.

10.2.1 Discussion, Fire Areas 91 and 92 - Condensate Pump Areas for Unit 4 and Unit 3.

These two areas are located approximately 15 ft. below grade elevation and have ground floor area of 960 sq. ft. There are no enclosing walls and no ceiling. Each area contains three condensate pumps located on 12 ft. centers. Redundant safe shutdown cables are routed through each area in cable trays approximately 24 ft. and 25 ft. above the floor. All cable trays are covered with a fire retardant mastic material. No fire detection or automatic fire suppression capability is installed in either area. Standpipe and hose stations and portable fire extinguishers are available for use in each area.



10.2.2 Discussion, Fire Area 117 - Turbine Deck, 42 Ft. Elevation

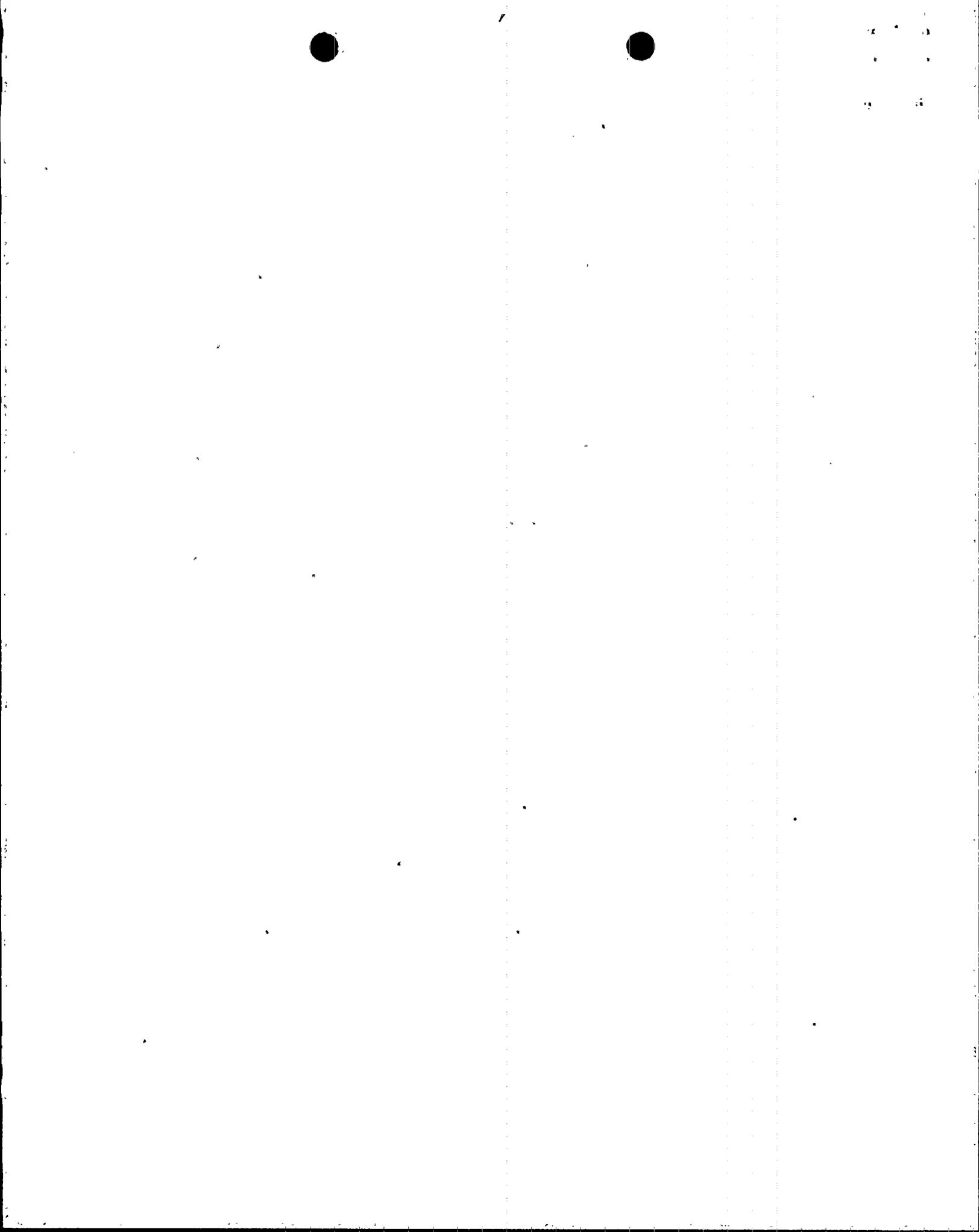
This area is open at the sides and top with no walls or ceiling. It contains the safety related steam generator pressure transmitters for both units 3 and 4. Redundant safe shutdown system cables are also routed through the area in conduits. No fire detection or automatic fire suppression capability is provided in the area. Portable extinguishers and standpipe and hose stations are available for use in the area.

The licensee justifies the exemptions for these areas on the basis that the low fire loading in the zones, if ignited, will not result in a fire of significant magnitude. In addition, the physical configuration of the zones (open spaces, high ceiling) coupled with the proposed modifications and existing protection, provide assurance that one safe shutdown pathway will be free of fire damage.

10.3 Evaluation

These areas do not comply with Section III.G because redundant cables are not separated by 20 feet free of intervening combustibles and automatic suppression and detection system are not installed in the areas.

Fire areas 91 and 92 are open areas without ceilings. Redundant cables in these areas are located approximately 24 ft. above the floor level. It is our opinion that due to the open area and height of cables above the floor, the possibility of a fire of sufficient magnitude to affect these cables is slight, and therefore we have reasonable assurance that one train will be maintained free of fire damage.



Fire area 117 is the 42' elevation of the turbine building. It contains redundant trains of safety-related steam generator pressure transmitters. Additional, non-safety pressure transmitters are located in a different fire area. Because a fire in this area will not damage all trains of pressure transmitters, compliance with Section III.G is not deemed necessary.

10.4 Conclusion

Based on the above evaluation, the protection for fire areas 91 and 92 (condensate pumps) and 117 (turbine building deck) provide a level of fire protection equivalent to the technical requirements of Section III.G therefore the exemptions should be granted.

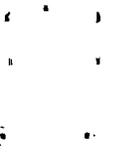
11.0 Fire Area 98 and 132, Units 3 and 4 Shared Cable Spreading Room and Control Building Stairwell

11.1. Exemption Requested

The licensee requests an exemption from Section III.G to the extent that it requires alternative shutdown capability independent of this entire area.

11.2.1 Discussion

These two areas constitute one fire area. Area 98 is located at the 30 ft. elevation and houses the plant computer equipment, reactor protection instrumentation racks, and general relay panels in addition to power control cables for numerous redundant safe shutdown systems for both Units 3 and 4.

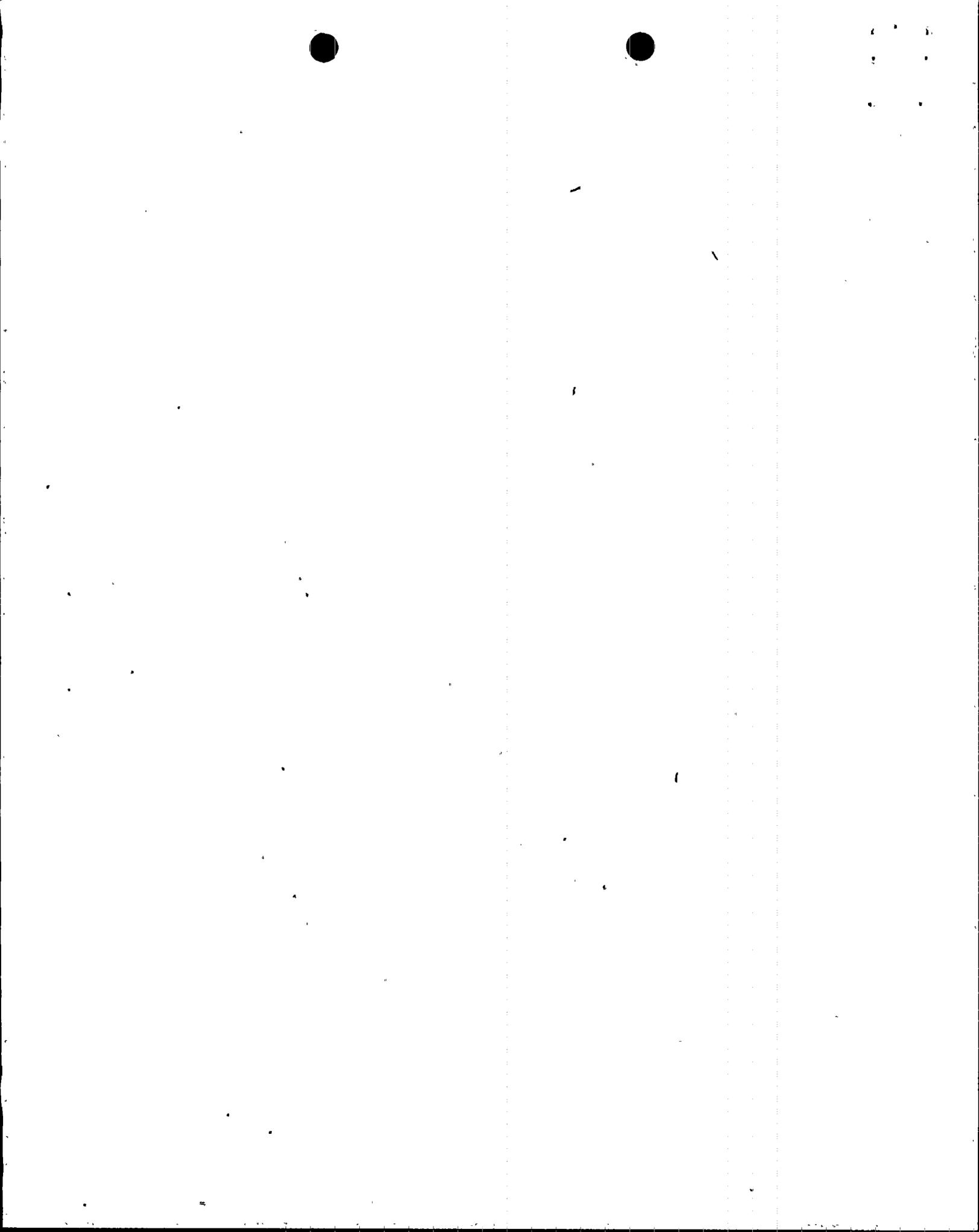


There is 1-foot vertical separation between trays. Cables enter and exit the trays in conduits with many cross areas throughout the area. The Central Building stairwell is part of this fire area. Redundant safe shutdown cables pass through the stairwell from the cable spreading room. All cable trays throughout the area are coated with a fire retardant mastic material.

Ionization type detectors are located throughout the entire area, but no automatic fire suppression capability is provided.

The licensee proposes the following fire protection modifications:

1. Upgrade perimeter walls, floor, and ceiling to 3-hour rated barriers by sealing all piping and other penetrations, and installation of 3-hour rated fire dampers and doors on all ventilation duct penetrations and doorways.
2. Protect one train of raceways with a one-hour rated barrier.
3. Protect all electrical cable trays by installation of fire resistant baffles under these trays.
4. Protect one train of conduit with a one-hour rated barrier.
5. Protect all vertical cable trays penetrating the floor by the installation of a fire resistant partial enclosure or heat shield around the trays.
6. Protect proposed cable trays and one train of essential equipment power supplies by the installation of partial enclosures (no roof) or heat shields.



7. Install an automatically actuated fire suppression system in Fire Area 92.

11.2.2 Justification

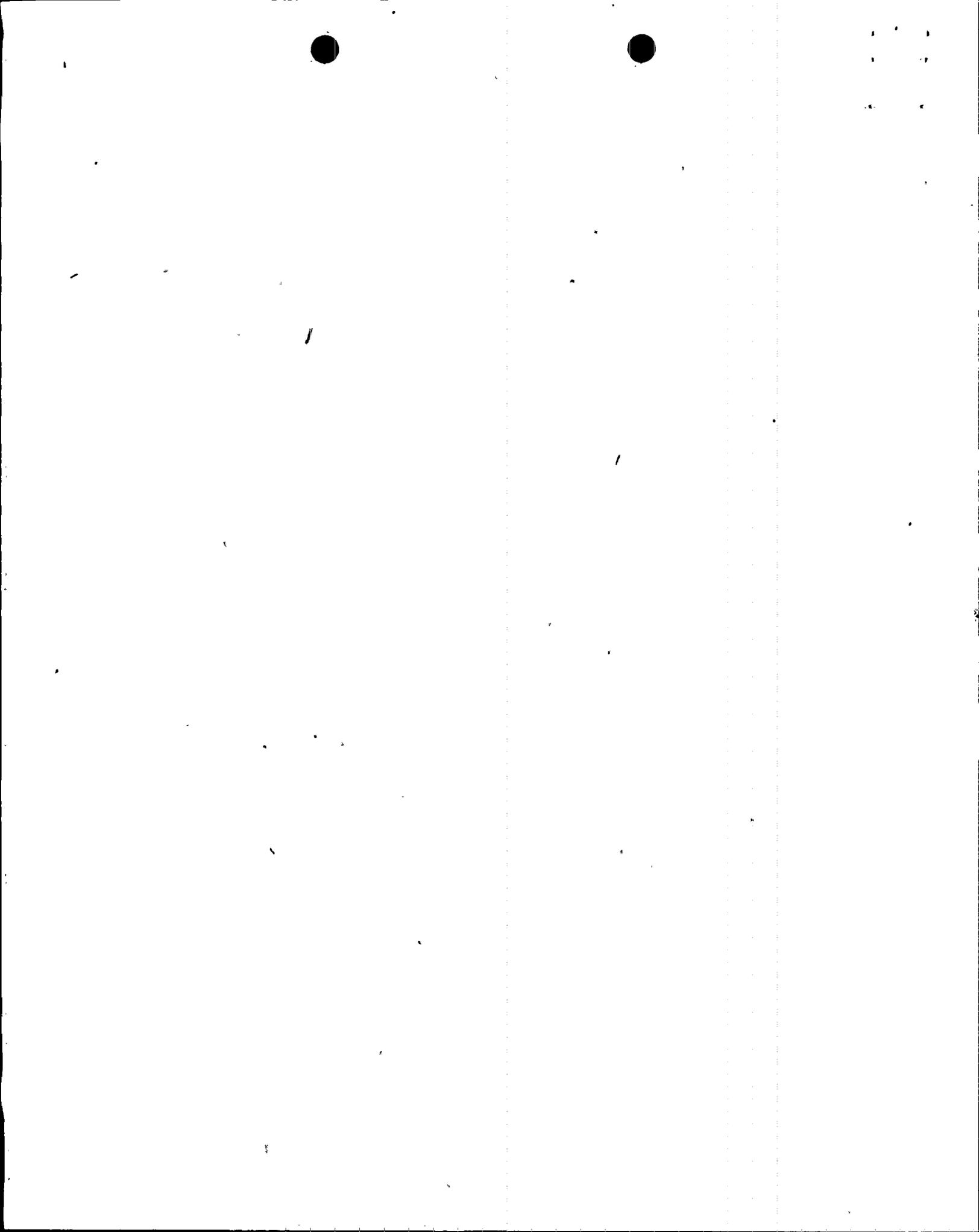
The licensee justifies the requests for exemption in this combined fire area on the following basis:

1. The strict administrative control program will prevent any exposure fire of consequence from occurring and damaging redundant trains of safe shutdown equipment.
2. The fire detection system already installed will promptly alert plant personnel of any fire that should occur,
3. The automatic fire suppression system to be installed will control any fire so as to prevent damage to redundant safe shutdown trains, and
4. The fire retardant baffles and partial enclosures will provide adequate protection for the redundant cables and equipment to assure safe shutdown capability from any fire that might occur.

11.3 Evaluation

These areas are not in compliance with Section III.G because the minimum separation distance free of intervening combustibles between redundant trains of cables is 1-foot and there is no alternate shutdown capability independent of this room.

The compensatory features provided are the fire propagation retardants in the form of baffle boards and partial enclosures on vertical trays, and a partial suppression system. Except for the above compensatory



features, the configuration of the rooms, the quantity of in-situ combustibles, the type of cable insulation, the potential for the accumulation of combustible materials, and the installed fire protection systems are what is typically found in cable spreading rooms. Because most if not all safety and shutdown systems could be affected by a single fire in this area, it is our opinion that the compensatory features do not provide equivalent protection to an alternate shutdown system independent of these areas.

The licensee states that the flame retardant coatings in conjunction with plant administrative controls and proposed baffles will preclude damage to both trains of CCW pumps and associated equipment.

As previously discussed in Section 3.3, this combination of features is not equivalent to the technical requirements of Section III.G. Because of the close proximity of redundant cables, we do not have reasonable assurance that partial protection will prevent damage to redundant trains before the fire is extinguished.

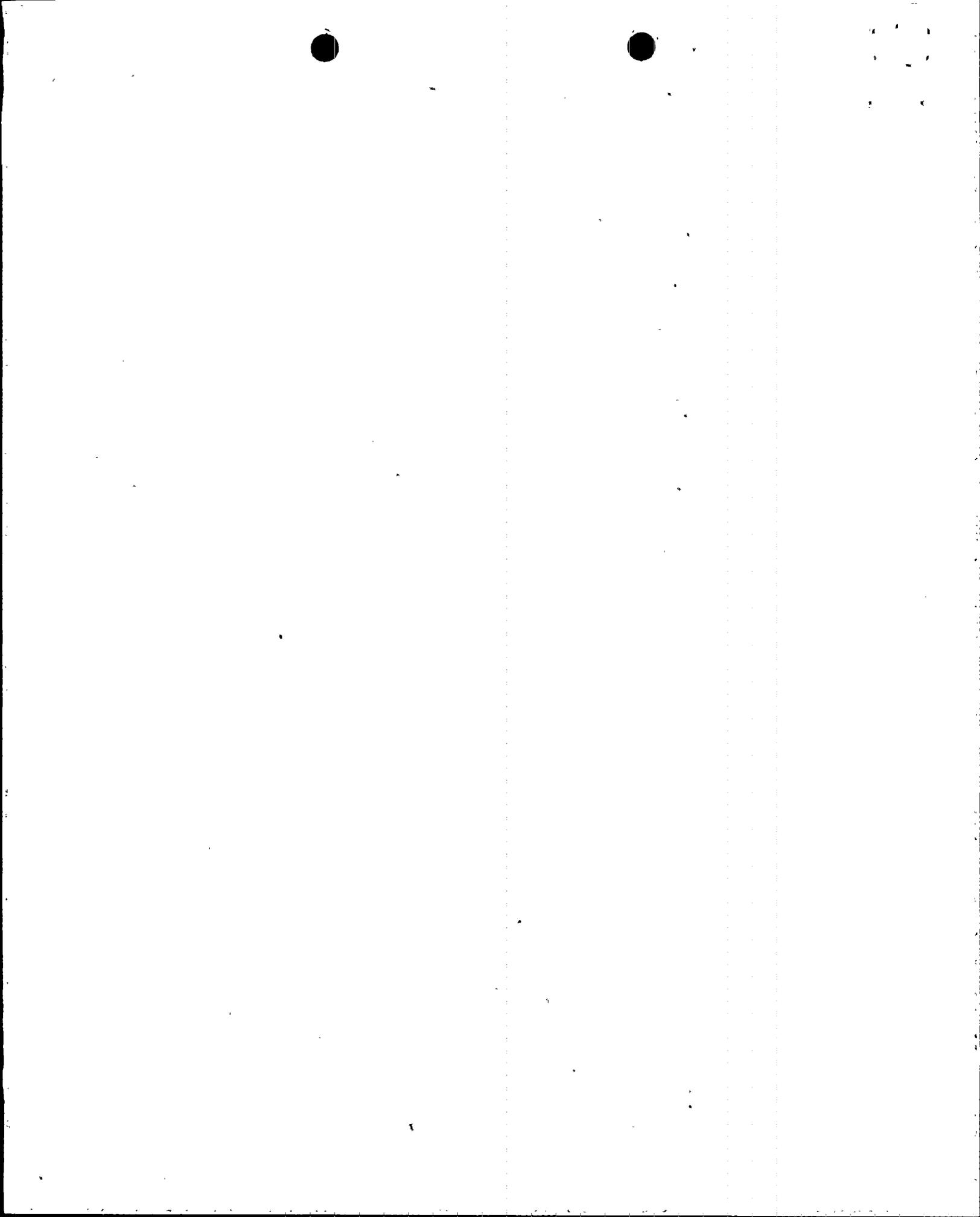
11.4 Conclusion

Based on our evaluation the level of existing protection for the cable spreading room does not provide a level of fire protection equivalent to the technical requirements of Section III.G of Appendix R, and therefore, the exemption should be denied.

12.0 Fire Area 106 Shared Control Room for Units 3 and 4

12.1 Exemption Requested

The licensee requests an exemption from Section III.G to the extent that it requires installation of automatic fire suppression capability and an alternative shutdown capability that is independent of the control room.



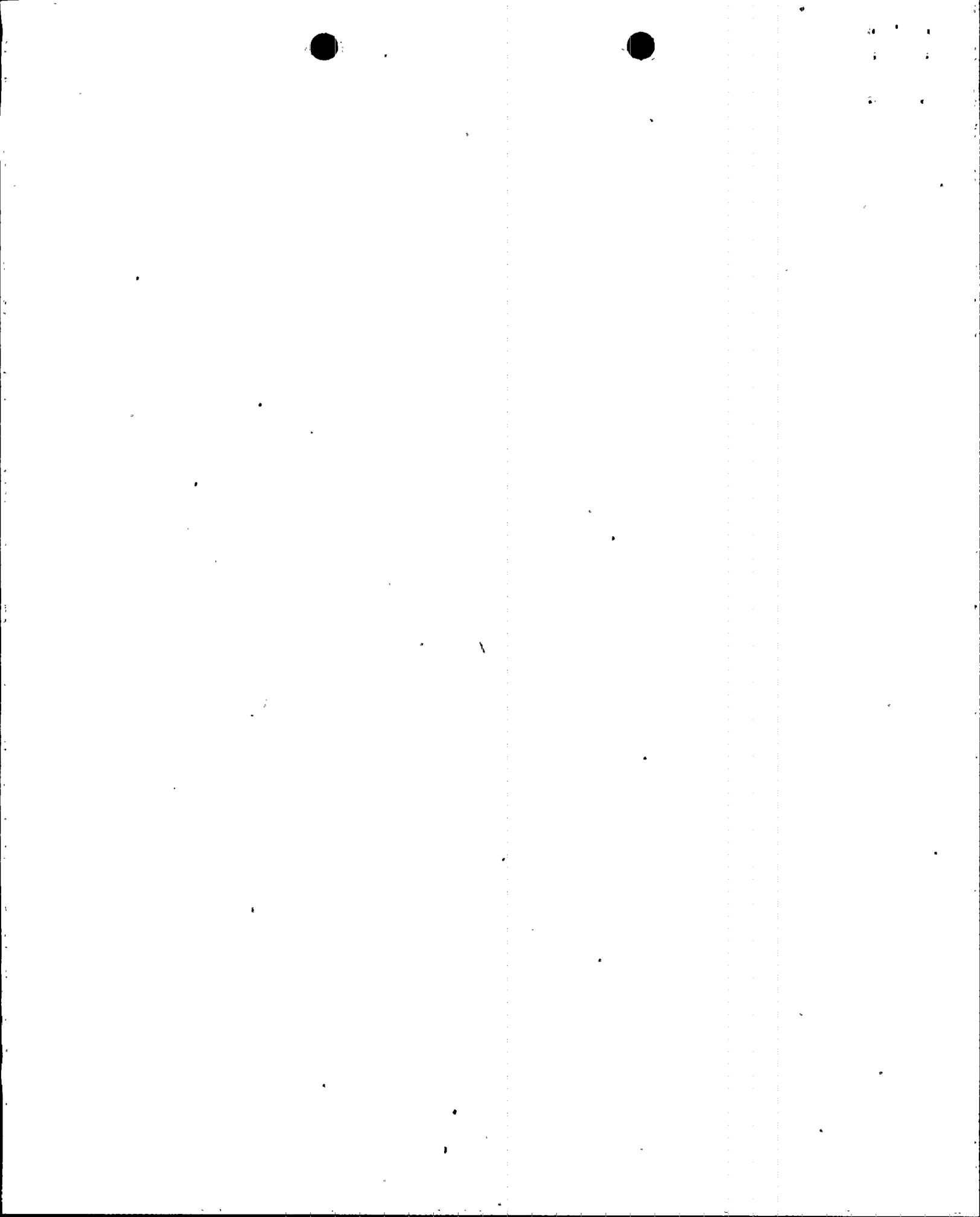
12.2 Discussion

The control room in a continuously occupied space that houses controls and instruments necessary to remotely operate valves, pumps, motors, etc. required for plant operation. Most of these controls and instruments are mounted on centrally located panels. Redundant safe shutdown related cables are routed in the area to various control panels.

Ionization type fire detectors are located throughout the control room. No automatic fire suppression capability is provided. However, portable fire extinguishers and standpipe and hose stations are available for use throughout the control room.

The fire protection modification that the licensee proposes is to upgrade the perimeter walls and floor to 3-hour fire rating by sealing piping and other penetration openings and installing 3-hour rated fire door and dampers on doorways and ventilation duct penetrations. The licensee's basis for this request is as follows:

1. The small in situ fuel load,
2. Limited access to the control room,
3. Tight administrative controls to limit transient combustibles that are brought in,
4. Separation of redundant cables in individual control cabinets, and
5. Constant attendance by control room personnel all mitigate the need for automatic fire suppression and alternative shutdown capability for the control room.

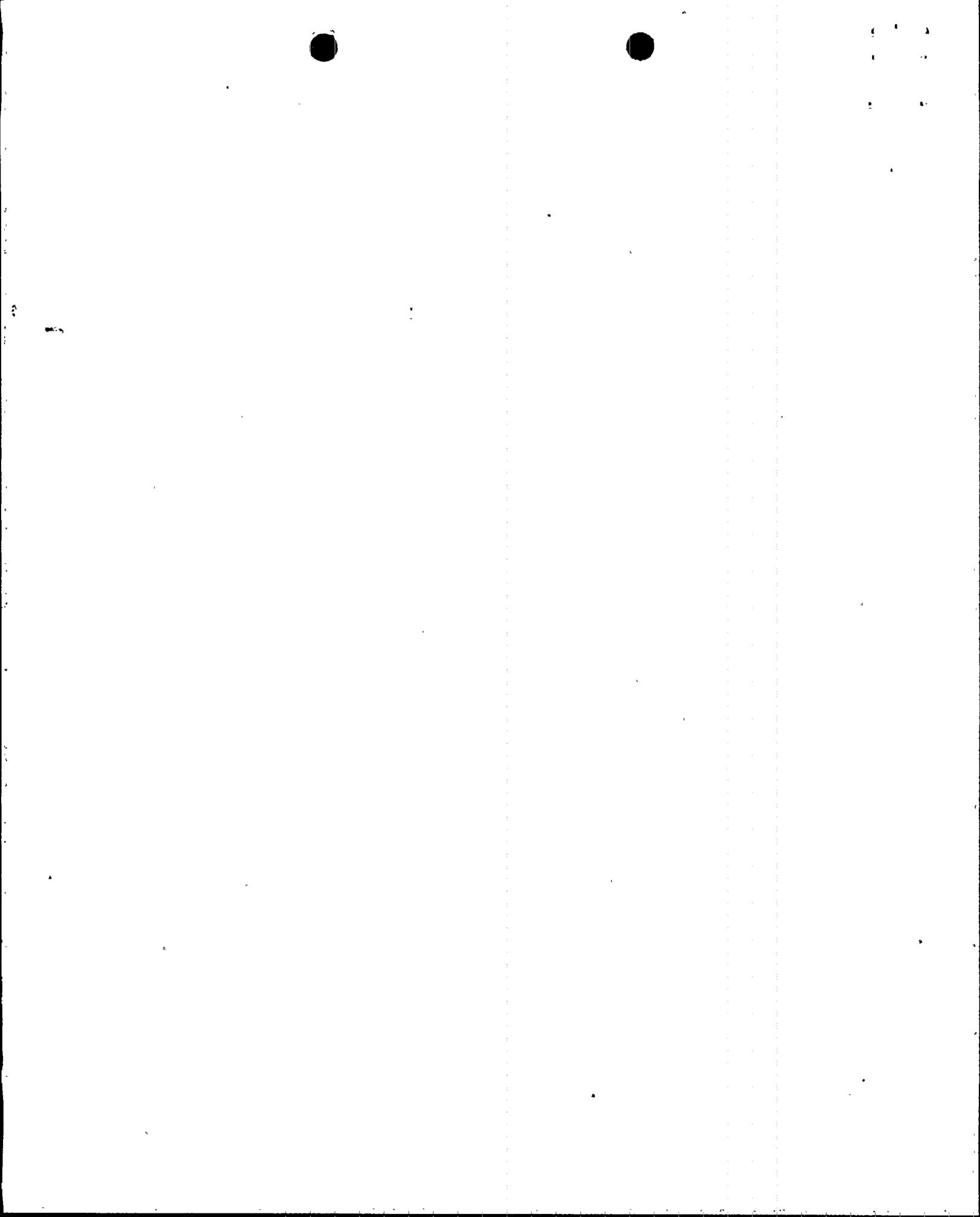


12.3 Evaluation

The control room is not in compliance with Section III.G because of the absence of a complete area wide fixed fire suppression system, the lack of adequate physical separation between redundant shutdown divisions, and the lack of an alternate shutdown capability independent of the control room.

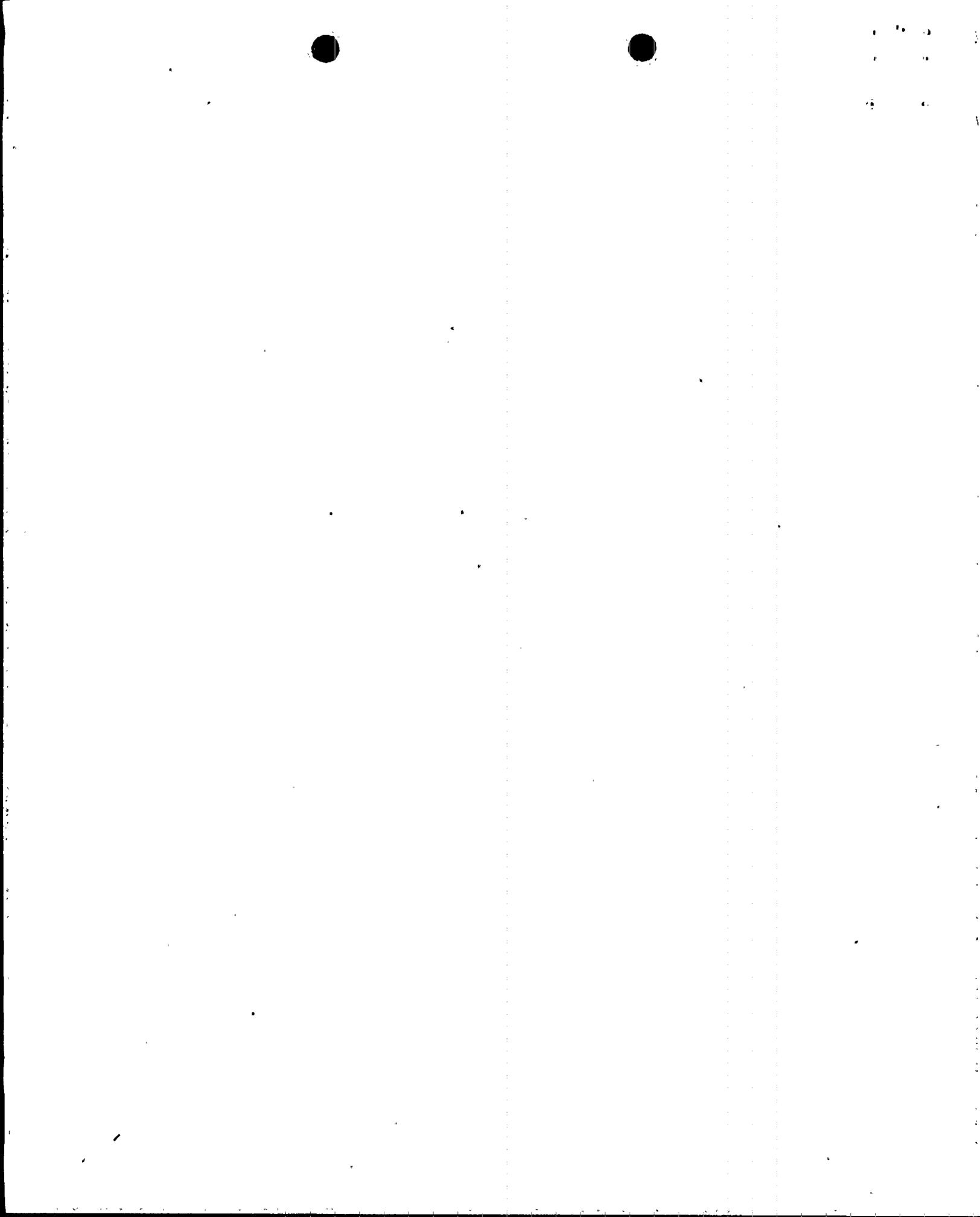
The control room contains the majority of the controls essential for station operation and for shutdown of the plant under all operating conditions. Redundant systems necessary for safe shutdown are located in close proximity within the control console and, without adequate protection, would be damaged by a single fire of significant magnitude. With the present design, if such a fire occurred, there is no capability to achieve safe shutdown independent of the control room.

Administrative controls, even if they are included into the plant Technical Specifications, do not provide reasonable assurance that hazardous accumulations of flammable liquids and combustible materials will not be present in individual plant areas. As documented in recent Inspection and Enforcement Branch Reports, recent inspections at plants such as Davis Besse (50-346/82-03, April 1, 1982), Duane Arnold (50-331/81-25, January 11, 1982), D. C. Cook (50-315/81-11, December 31, 1981), and Nine Mile Point (50-220/82-09), have demonstrated that substantial quantities of hazardous substances, such as computer printout paper are located in even highly restricted and controlled entry areas. Consequently, they do not preclude the need for other fire protection design features.



With regard to the control room being constantly manned, we do not have reasonable assurance that prompt fire discovery and fire fighting activities by control room operators would assure that no damage would be sustained by redundant safety related cable and equipment. The uncertainties concerning the location of the fire, the degree of physical separation of redundant trains, fire propagation speed, the fire damageability of cable and equipment, the timeliness and effectiveness of operator actions and extinguishing efforts, prevent the prediction of damage from fire or fire suppressants. Consequently, the continuous presence of control room operators and the availability of portable fire extinguishers by themselves, would not assure that redundant trains would be free of significant fire damage. However, these considerations, coupled with the provision of an alternate shutdown capability, have been determined to be sufficient justification for granting an exemption from the requirement for a fixed fire suppression system in control rooms.

Although the licensee has provided capability to take local control for essential systems, the control room is not electrically isolated from the emergency control stations. We find that a fire in the control room or in the area of any emergency control station could affect both areas, thus resulting in the inability to safely shutdown the plant. Because the nature of the electrical panels in this area make protection in accordance with Section III.G.2 of Appendix R impractical, the licensee should provide an alternate shutdown system for the area in accordance with Section III.G.3 of Appendix R. The alternate shutdown system should meet the requirements of Section III.L of Appendix R. The alternate shutdown capability should be electrically isolated from the control room so that a fire in the control room or in the area of alternate shutdown capability which destroys redundant circuits will not affect the ability to safely shut down the plant from the other area. With the alternate shutdown capability installed, a suppression system is not required in the area.



12.4 Conclusion

The level of existing protection in the control room does not provide a level of fire protection equivalent to the technical requirements of Section III.G, therefore, the exemption should be denied.

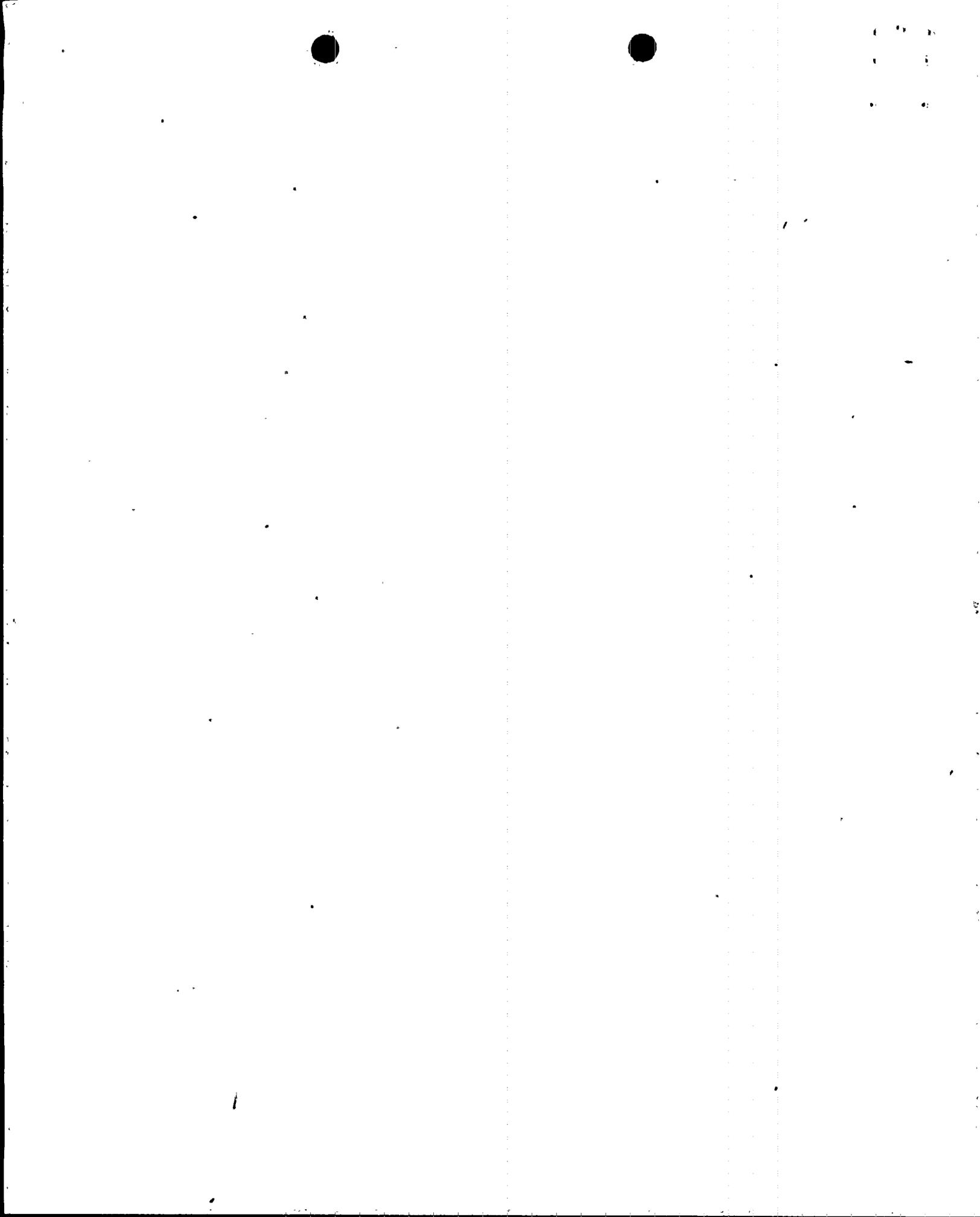
13.0 Fire Area 113 and 116 - Unit 4 and Unit 3 Respectively Feedwater Platform

13.1 Exemption Requested

The licensee requests an exemption from Section III.G to the extent that it requires separation of redundant safe shutdown equipment by a 1-hour rated fire barrier, and the installation of fire detection and automatic fire suppression capability in the area.

13.2 Discussion

Fire Area 113 is the feedwater platform for Unit 4. The feedwater platform contains the piping and associated valves for the feedwater and auxiliary feedwater systems which penetrate into the Reactor Containment Building. The area is bounded on two sides, north and west, by concrete walls. The east side is bounded by the Unit 4 Reactor Containment Building. The remaining south side is open. The ceiling is concrete and the floor is checker plate. Safe shutdown equipment in the area consists of 6 auxiliary feedwater valves and their associated cables. The valves are located at an approximate elevation of 40' with a separation distance of 8 ft. (center to center) between the A and B auxiliary feedwater lines, and a separation distance of 3 ft. between the B and C auxiliary feedwater lines.



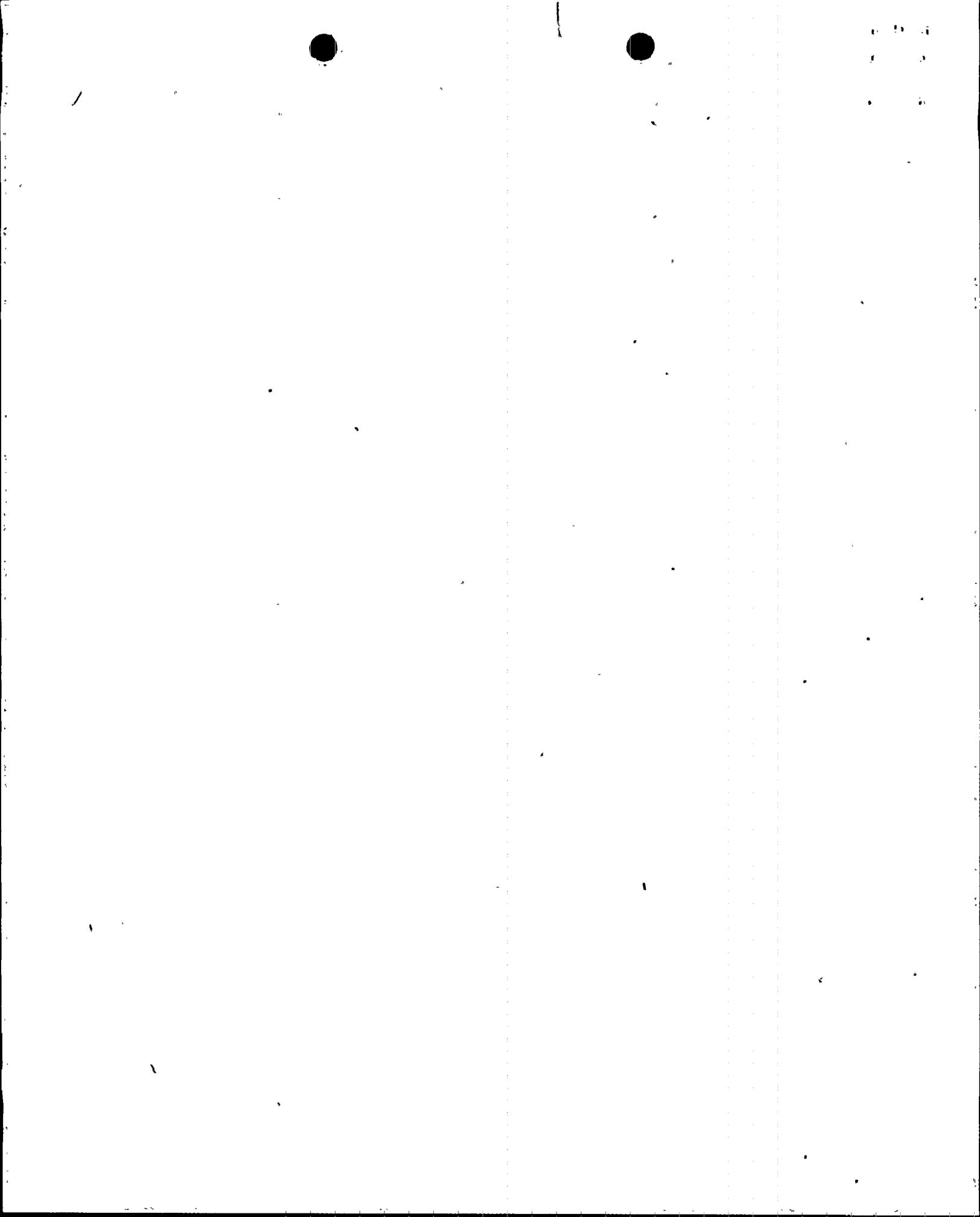
Fire Area 116 is the feedwater platform for Unit 3. The feedwater platform contains the piping and associated valves for the feedwater and auxiliary feedwater systems which penetrate into the Reactor Containment Building. This area is bounded on two sides, south and west, by concrete walls. The east side is bounded by the Unit 3 Reactor Containment Building. The remaining north side is open. The area has a concrete ceiling and a checker plate floor. Safe shutdown equipment in the area consists of 6 auxiliary feedwater valves and their associated cables. The valves are located at an approximate elevation of 42' with a separation distance of 12 ft. (center to center) between the A and B auxiliary feedwater lines, and a separation distance of 10 ft. between the B and C auxiliary feedwater lines. No fire detection or automatic fire suppression capability is provided in the areas. Portable fire extinguishers and standpipe and hose stations are provided throughout the area.

The licensee proposes to install the following fire protection modifications:

1. Provide a fire barrier or enclosure (not 1-hour rated) around certain auxiliary feedwater valve operators.
2. Install a 1-hour fire rated barrier around the electrical conduits associated with the same valve operators.

The licensee's basis for the exemption request is as follows:

1. The area is open on one side and readily available for manual fire fighting;
2. In situ fire loading is low;
3. The administrative controls program is adequate to assure that a fire sufficiently large to cause damage to redundant safe shutdown equipment will not occur.



13.3 Evaluation

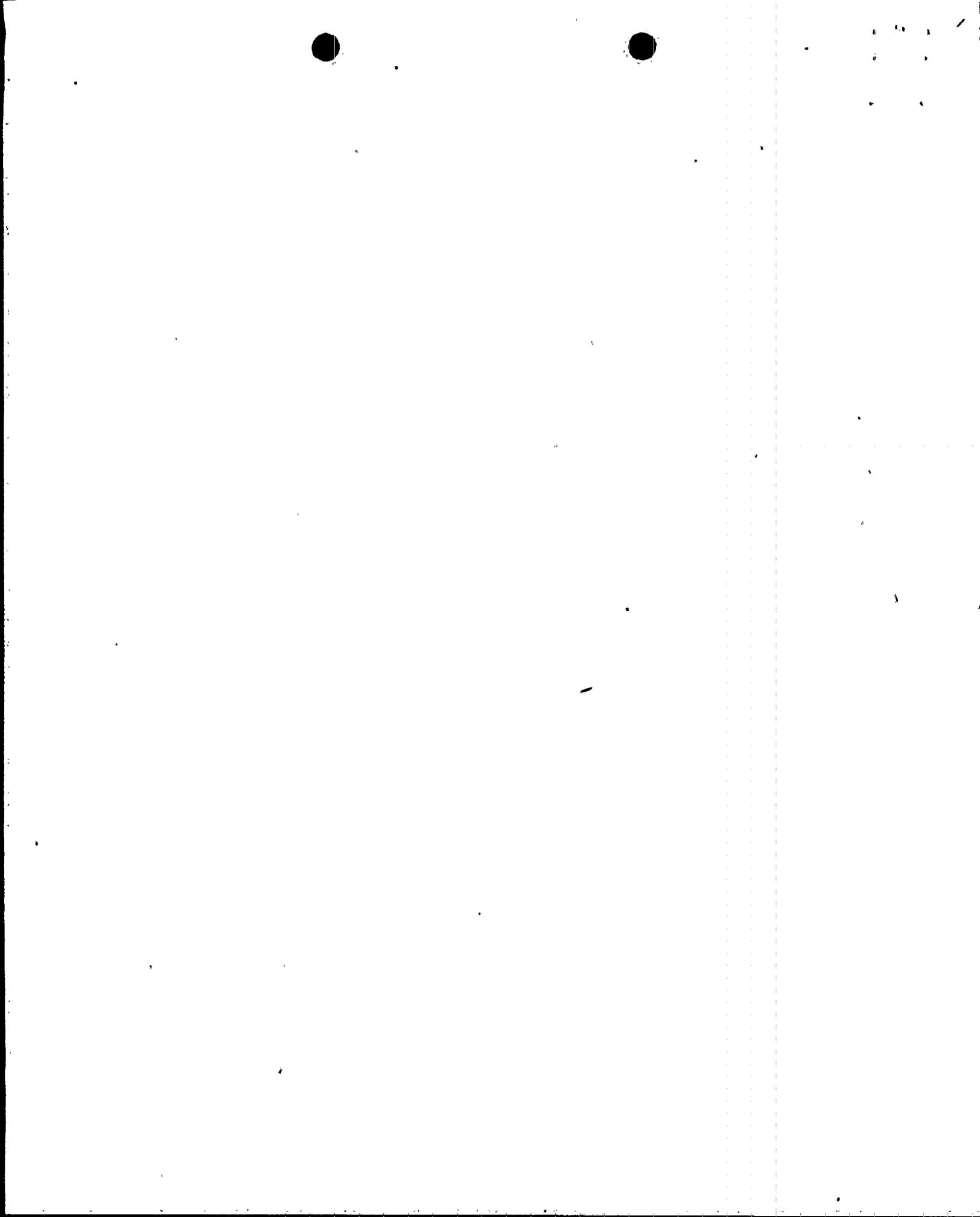
This area does not comply with Section III.G because redundant AFW components are not separated by 1-hour fire barriers. No detection or suppression is provided. While the licensee has proposed to provide passive fire protection no active protection is available, such as a fire detection or suppression system. Both forms of protection are necessary to provide reasonable assurance that a single train of safe shutdown systems is free of fire damage. The active and passive fire protection achieve a synergistic effect: the barrier provides sufficient protection until the fire is discovered and extinguished by the fire brigade or suppressed by the fire suppression system. Detection and suppression systems alone are not sufficient because of the time delay associated with their operation.

The lack of both, a fire detection and fire suppression system in the zone could result in a fire of significant magnitude burning unnoticed for some time. In such a case, redundant safety divisions could be affected. Consequently, the licensee's proposed modifications do not provide reasonable assurance that one train of safe shutdown systems will be free of fire damage.

The licensee states that the flame retardant coatings in conjunction with plant administrative controls and proposed baffles will preclude damage to redundant safe shutdown equipment. As previously discussed in Section 3.3, this combination of features is not equivalent to the technical requirements of Section III.G.

13.4 Conclusion

Based on the above evaluation the redundant auxiliary feedwater valves in Area 113 and Area 116 does not provide a level of fire protection equivalent to the technical requirements of Section III.G therefore the exemption should be denied.



14.0 Fire Areas 114 and 115 Unit 4 and Unit 3 (Respectively)
Main Steam Platform

14.1 Exemption Requested

The licensee requests an exemption from the provisions of Section III.G to the extent that they require the separation of redundant safe shutdown equipment by a 1-hour rated fire barrier, and the installation of fire detection and automatic fire suppression capability.

14.2 Discussion

These are two outside areas of on the 53½-ft. elevation. They contain the main steam isolation valves and the atmospheric dump valves. These redundant valves are separated from each other by about 28-ft. center to center. Safe shutdown cables enter the area in conduit through penetration in the reinforced concrete platform. No fire detection or automatic fire suppression capability is installed in the area. Portable extinguishers and standpipe and hose stations are available for use throughout the area.

The licensee's basis for their exemption request is as follows:

1. the very small amount of in-situ combustibles,
2. separation of the redundant valves and operators,
3. the open arrangement of the area (no walls or ceiling), and
4. administrative controls to limit accumulation of transient combustible materials, and easy access for fire fighting operation should a fire occur.



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The licensee proposes the following fire protection modifications:

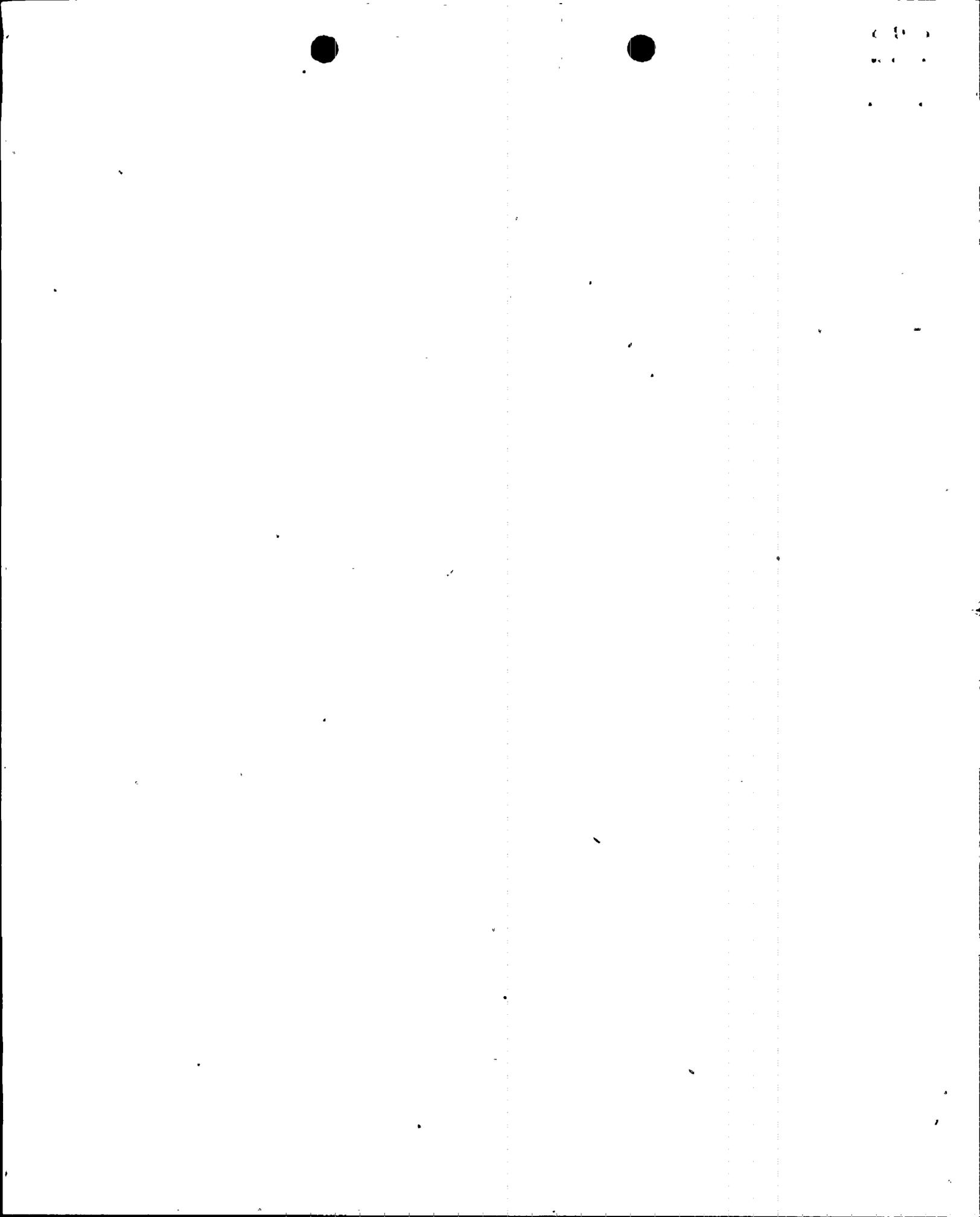
1. Provide a fire barrier or enclosure (not a 1-hour barrier) of non-combustible material around valve operators for valves CV-4-1606 and 1607.
2. Provide a 1-hour fire rated barrier for the electrical conduit associated with valves POV-4-2604 and 2605.
3. Install horizontal flame impingement shields under the valve operators for POV-4-2604 and 2605.

14.3 Evaluation

We agree with the licensee's conclusion that the fire protection modifications proposed along with the physical arrangement of Fire Areas 114 and 115 will provide sufficient protection for the redundant safe shutdown equipment in this area and full compliance with the specific provisions of Section III.G would not add significantly to overall fire protection of the plant. Because of the open area and separation of valves by 28 feet, the possibility of a fire of sufficient magnitude to damage redundant equipment is considered slight.

14.4 Conclusion

Based on the above evaluation, the existing protection combined with the proposed modifications provides a level of fire protection equivalent to the technical requirements of Section III.G, therefore the exemption should be granted.



15.0 Fire Area 122 - Outside Water Pump and Storage Tank Area

15.1 Exemption Requested

The licensee request exemptions from specific provision of Section III.G to the extent that they require installation of fire detection and automatic fire suppression capability in the fire area.

15.2 Discussion

This is an outside area at grade level having a gravel base, floor, and no walls or roof. The area contains one 500,000-gallon raw water grade level storage tank, are 150,000-gallon elevated storage tank, for raw water pumps and are raw water booster pump, and the electric driven fire pumps. Safe shutdown related cables are routed through the area in underground duct banks. Fire pump cables are routed in underground conduits to one fire pump and in cable trays about 17 ft. above grade to the other fire pump. In our SER we reported that the licensee's fire water supply did not meet our guidelines in Section III.A. The licensee proposes to install a new 750,000-gallon raw water storage tank and diesel driven fire pump to comply with provisions of Section III.A. This new installation will conform to the requirements of NFPA 20 - Standard for the Installation of Centrifugal Fire Pumps.

All pumps are located approximately 70 feet from each other. In situ fire loading is low and the plant administration controls will limit the amount of transient combustibles that are brought in for the area.

15.3 Evaluation

This area does not comply with Section III.G because redundant cables are not provided with 1-hour fire barriers, automatic suppression and detection. The redundant cables in the area are cables for the three

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intake cooling water pumps. These cables are routed underground in conduit, and are therefore, not subject to fire damage. The installation of an extinguishing system and detection system would not significantly enhance safety.

15.4 Conclusion

Based on the above evaluation, the existing protection provided in Fire Area 122 (outside water pump & storage tank area) provides a level of fire protection equivalent to the technical requirements of Section III.G therefore the exemption should be granted.

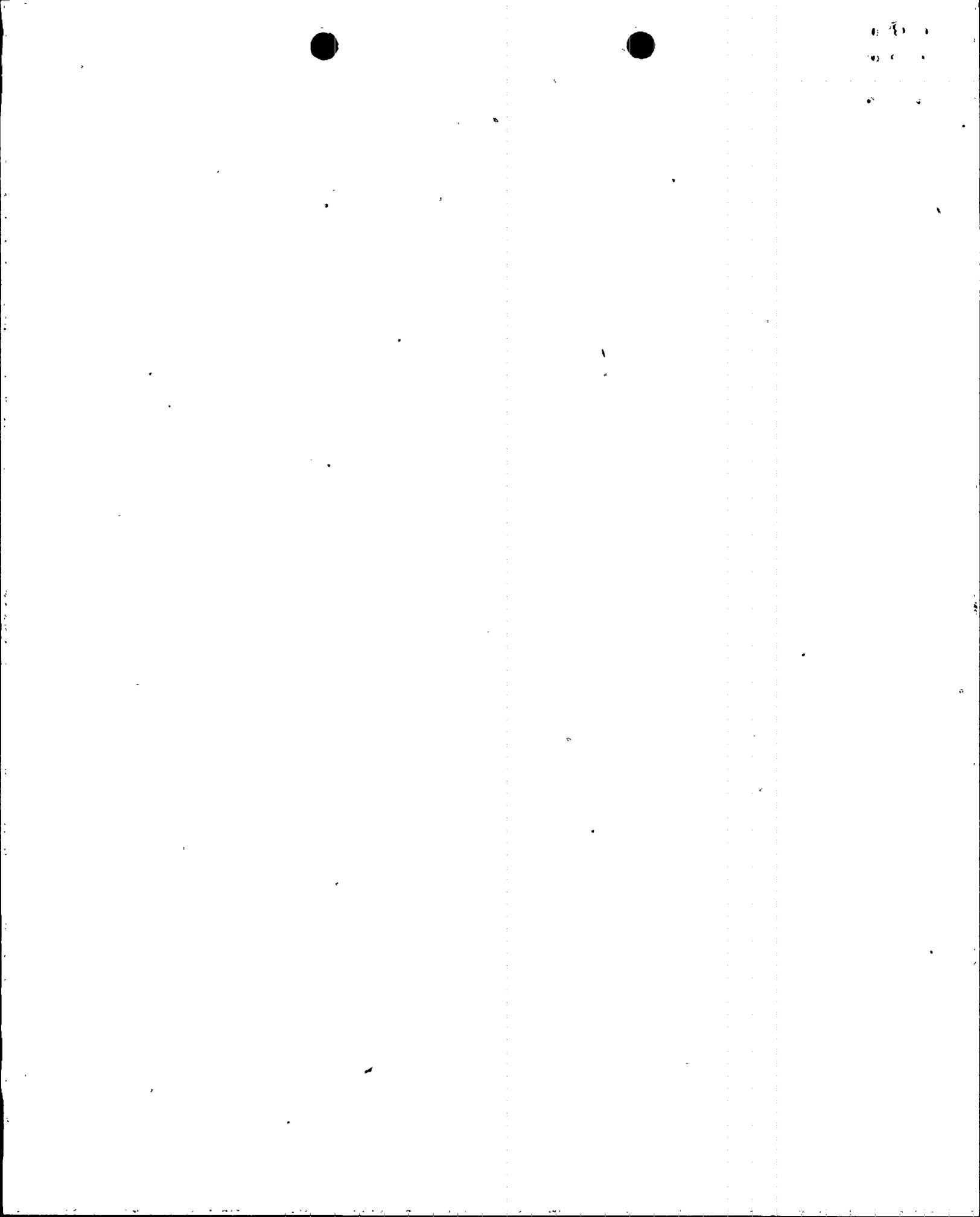
16.0 Fire Area 131 - Diesel Radiation Room

16.1 Exemption Requested

The licensee requests an exemption from Section III.G to the extent that they require the total enclosure of one Diesel Radiation Room by 3-hour rated fire barriers.

16.2 Discussion

This area houses radiation and cooling fans for both the Unit 3 and 4 diesel generators. The area is bounded on three sides by a metal grating missile barrier. The fourth (east) side consists of a reinforced concrete wall, and the concrete ceiling is 19 ft above the floor. There is no fire detection or automatic fire suppression capability in the area. Portable fire extinguisher and standpipe and hose stations are available for use in the area. Safe shutdown related cable in the area are routed in underground duct banks.



The in situ fuel load is insignificant. The licensee states that their administrative control program will effectively limit the introduction of miscellaneous transient combustibles into the area. However, the licensee considered the effect of fire involving 5 gallons of acetone or heptane and 10 gallons of lubricating oil. The licensee calculated that both the acetone and heptane would spread out over an area of 926 sq. ft., spilling out into other spaces through the metal grating missile barrier, and would burn for 4.4 and 2.1 seconds respectively. The licensee calculated that the lubricating oil would spread out over an area of 543 sq. ft. and would burn for 14.9 seconds.

As presently arranged, any fire inside this area or a flammable liquid spill outside the area which could flow into the area and result in a fire exposing both redundant diesel radiation and cooling fans. To provide further protection for the equipment the licensee proposes to make the following fire protection modifications.

1. Install a 3-hour fire rated barrier between the radiators for the #3 and #4 diesel generators.
2. Provide curbing 2" high directly against the west side of the diesel generator radiators.

16.3 Evaluation

This area does not comply with Section III.G because redundant diesel radiator rooms are not enclosed by complete 3-hour rated barriers. The licensee proposes to install a partial height 3-hour rated barrier between the redundant cooling fans, and provide a curb to prevent liquid spills in adjacent areas from entering the radiation rooms.

There are no in situ combustibles in this area. Any exposure fires would therefore be of limited severity and duration. The proposed three-hour barrier between the redundant cooling fans will protect one unit from a floor level fire in the redundant unit. Because the west wall of the area is open to the atmosphere, rising hot gases will be vented and dissipated before redundant equipment is damaged. This combination of features compensates for the lack of a complete 3-hour fire barrier.

16.4 Conclusion

Based on the above evaluation, the protection provided for the diesel generator radiator area provides a level of fire protection equivalent to the technical requirements of Section III.G therefore the exemption should be granted.

Summary

Based on our evaluation, the following exemptions should be granted:

1. Condensate Pump Area (Fire Areas 91 & 92)
2. Turbine Building Deck (Fire Areas 117)
3. Main Steam Platform (Fire Areas 114 & 115)
4. Water Pump & Tank Area (Fire Area 122)
5. Diesel Radiator Room (Fire Area 131)

Based on our evaluation the following exemptions should be denied:

1. Auxiliary building corridor (Fire Areas 4, 5, 9 and 10)
2. CCW area, Unit 4 (Fire Area 47)
3. Auxiliary building Hallway (Fire Area 58)
4. Containment Unit 3 and 4 (Fire Areas 59 & 60)
5. Auxiliary Transformer Areas, Unit 3 and 4 (Fire Areas 82 & 87)

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6. Laydown & Condensate Areas, Unit 3 and 4 (Fire Areas 77 & 89)
7. AFT. Elevation Vestibules, Unit 3 and 4 (Fire Areas 79 & 88)
8. Turbine Building Mezzanine Deck (Fire Area 105)
9. Cable Spreading Rooms (Fire Areas 98 and 132)
10. Control Room (Fire Areas 106)
11. Feedwater Platform (Fire Areas 113 & 116)
12. Pipe & Valves Room (Fire Areas 30 & 40)
13. AFW Pump Areas (Fire Area 84)
14. RHR Area, Unit 3 (Fire Areas 11, 12 and 13)
15. RHR Area, Unit 4 (Fire Areas 14, 15 and 16)

References

- (1) McKinnon, G. P. editor, Fire Protection Handbook, 14th edition National Fire Protection Association, Boston, Mass., 1976, pp. 5-67.
- (2) Klamerus, L. J., "A Preliminary Report on Fire Protection Research Program Fire Retardant Coatings Tests," Sand 78-0518, Sandia Laboratories, Albuquerque, New Mexico, 1968, pp. 35-46.
- (3) "Burn Mode Analysis of Horizontal Cable Tray Fires" SAND 81-0079 NUREG/CR-2431 February 1982. Summary: This test series was conducted to investigate the burning of cables in cable trays in rooms where adequate ventilation for combustion is not available. The test results show that a reduction in flames and the occurrence of deep-seated fires is more likely in a descending smoke layer. The tests also showed that reignition may occur upon readmission of fresh air.

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- (4) "Fire Research on Grouped Electrical Cables" SAND 79-0031 January 1979. Summary: This paper summarizes the activities of Sandia National Laboratories research through January 1979 in regard to nuclear power plant cable testing criteria. Both a small scale and full scale tests are described for use in evaluating cable fire retardancy.
- (5) "Categorization of Cable Flammability - Part 1: Laboratory Evaluation of Cable Flammability Parameters" EPRI NP-1200 October 1979. Summary: This study was a laboratory scale investigation of flammability parameters such as rate of heat release sensitivity to external heat flux of 22 types of electrical cables. The results of this study were used to select cables for full scale cable tray fire test.
- (6) "Assessment of Exposure Fire Hazards to Cable Trays" EPRI-NP-1675 January 1981. Summary: This study evaluated the potential hazard to cable trays from external heat flux sources. The results show that damageability can be predicted based on the ceiling height and floor area of the room, the height of cables above the floor, the ventilation rate, and the heat release rate of the combustible.
- (7) "A study of Damageability of Electrical Cables in Simulated Fire Environments" EPRI-NP-1767 March 1981. Summary: This study investigates how electrical cables may melt, expand, disintegrate, or short circuit in a heated environment, even before ignition occurs. Critical heat flux and radiant energy parameters are derived for expressing the degree of cable damage potential.

(8) Several tests conducted for the NRC fire protection research program, which as of this date final test reports have not yet been issued. These tests are:

1. "Replication Experiments for Fire Protection System"
Conducted July 1981 at Underwriters Laboratories, Northbrook, IL.
2. "Evaluation of twenty-foot Separation as a Fire Protection System" May 1982, Underwriters Laboratories, Northbrook, IL.

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