

**Detroit
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EF2 - 61,562

Mr. B. J. Youngblood, Chief
Licensing Branch No. 1
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Youngblood:

References: (1) Enrico Fermi Atomic Power Plant, Unit 2
NRC Docket No. 50-341
(2) Detroit Edison to NRC letter, "Fire
Protection Commitments", EF2-53791,
June 18, 1981

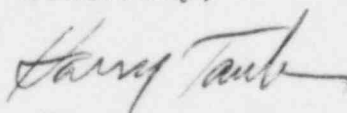
Subject: Changes in Provisions for
Plant Fire Protection

Appendix 9B of the Fermi 2 FSAR presents the Fire Protection Analysis for the Fermi 2 plant. As a consequence of the review of that section and interchanges and meetings from May, 1981 through January, 1982, you published your safety evaluation of fire protection at Fermi 2 in Appendix E of Supplement 2 to the Fermi 2 Safety Evaluation Report (NUREG-0798). We informed your Mr. Kintner subsequently that a review of the SER indicated some inconsistencies between the SER and the actual fire protection design at Fermi 2. Table 1 (attached) is provided per Mr. Kintner's request to compare pertinent parts of the SER and our current plant design. For your convenience, the table cross-references the applicable SER section. Comments and justification on any differences or changes are also given in the table and, where appropriate, in the attachment to the table.

It is also noted in Table 1 that there are some changes which must be made in the Fermi 2 FSAR to update the FSAR to the current status of the plant design. These will be done in a forthcoming amendment.

If you have any questions, please contact Mr. Larry E. Schuerman, (313) 649-7562.

Sincerely,



cc: B. Little
M. D. Lynch

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TABLE 1

APPENDIX E SSER #2 SECTION	ITEM/ZONE	COMMENT
1. II.B	Auxiliary Bldg. Cable Spreading Room Zone 7 Elevation 630'-6"	The SSER states an open head sprinkler system is provided. Actually a closed head sprinkler system is provided to minimize the risk of inadvertent actuation and reduce the water spray area to the area directly involved with the fire. This was stated in Reference 2 and is justifiable due to the general hazard of water in the cable spreading room and since an automatic halon system is also provided.
2. II.B	Reactor Bldg. Third Floor, Zone 7 Elevation 641'-6"	The SSER states that a sprinkler system is installed in this area. This is not the case nor has ever been the intent. See the Reference 2 letter and FSAR Section 9B.4.1.8.
3. II.B	Reactor Bldg. Fifth Floor, Zone 9 Elevation 684'-6"	The SSER states that a sprinkler system is installed in this area. This is not the case nor has ever been the intent. See the Reference 2 letter and FSAR Section 9B.4.1.10.
4. II.A (para.7) and II.B (para.1)	General	The SSER states that water supply valves are locked open or are under administrative controls. The FSAR states that shutoff valves controlling sprinkler and deluge systems are electrically supervised and actuate alarms in the control room. Other major valves in the water supply are locked open. See FSAR Section 9B.5.E.3.(b).

APPENDIX E SSER #2 SECTION	ITEM/ZONE	COMMENT
5. II.B	Auxiliary Bldg. Misc. Rooms Zone 11 Elevation 643'-6"	The SSER incorrectly stated this area was in the Reactor Bldg. and that sprinklers would be installed. A CO ₂ system has been accepted as being adequate (see B.1.C of Reference 2 and Section 9B.4.2.12 of the FSAR). It should be noted that the FSAR incorrectly states Halon will be used instead of CO ₂ . The FSAR will be changed in an upcoming amendment.
6. II.B	Radwaste Bldg. various locations	The SSER states sprinkler protection is provided only in the baled waste storage area in addition to the roof-mounted voltage regulator area. The actual protection is more extensive. See FSAR Section 9B.4.4 which also reflects more updated terminology.
7. II.B	Turbine Bldg.	A sprinkler system is also being added to the Turbine Bldg. first floor equipment hatch area. The FSAR will be updated to reflect this addition.
8. II.C	Auxiliary Bldg. Cable Tray area Zone 8 Elevation 631'	The SSER calls out the Cable Tray area and Zone 8, Elev. 631', as two separate areas. They are, in reality, one and the same. In addition, the SSER states Halon will be used. CO ₂ had been agreed to. See Item B.1.d of Reference 2 and Section 9B.4.2.9 of the FSAR. It should be noted that the FSAR incorrectly states Halon will be used instead of CO ₂ . The FSAR will be changed in an upcoming amendment.

APPENDIX E SSER #2 SECTION	ITEM/ZONE	COMMENT
9. II.C	Auxiliary Bldg. Cable Tunnel Zone 5 Elevation 613'-6"	The SSER calls out the Cable Tunnel and Zone 5, elevation 613'-6" as two separate areas. They are, in reality, one and the same. In addition, the SSER states Halon will be used. CO ₂ had been agreed to. It should be noted that the FSAR states Halon will be used instead of CO ₂ . The FSAR will be changed in an upcoming amendment. Also, due to other design considerations, the CO ₂ system is being changed to be manually actuated. See Item I of the attachment for justification.
10. II.C	Auxiliary Bldg. Room outside Div. II Switchgear Room Elevation 641' Misc. Room, Zone 11 Elevation 643'-6"	The SSER calls out that these two are separate rooms. In reality, they are one and the same, designated "Miscellaneous Rooms, Zone 11, Elevation 643'-6". In addition, the SSER states Halon will be used. CO ₂ had been agreed to. See Item 5 of this table.
11. II.C	Auxiliary Bldg. SGTS	The SSER states that the SGTS is located in the RHR Bldg. This is not the case. They are located in the Auxiliary Bldg., elev. 677'-6", Zone 14. They are provided with a CO ₂ fire protection system.
12. II.D	General	The SSER states fire detection systems are installed according to NFPA 72D. This is true except that no recorder is provided. This deviation is acceptable since adequate records are kept. This was documented in Section 9B.5.E.1.(a).

APPENDIX E SSER #2 SECTION	ITEM/ZONE	COMMENT
13. III.A	Auxiliary Bldg. Cable Tunnel Zone 5 Elevation 613'-6"	The SSER has two separate entries for this area. In reality, they are one and the same. In addition, the SSER and FSAR state that a 1 hour fire rated barrier will be placed on Division I and II cables. Due to design and construction changes, this is being changed. See Item 9 of this table and Item I of the attachment for further information and justification.
14. III.A	Auxiliary Bldg. Ventilation Equip. Area, Zone 13 Elevation 659'-6"	The SSER states that Edison agreed to provide a 1 hour fire rate barrier around Division I trays and reroute Div. II conduit to maintain 20' separation. The actual agreement was as stated in the first sentence of the third paragraph in Section III.A of Appendix E to SSER 2. See Section 9B.4.2.14 of the FSAR. In addition, due to the low fire loading of the area, Edison is deleting the sprinkler system from the design. See Item II of the attachment for justification. The FSAR will be changed in a forthcoming amendment to reflect the revised design.
15. III.A	Reactor Bldg. Torus Rm., Zone 1 Elevation 540'	The SSER did not list this room. For the fire barrier commitment, see FSAR Section 9B.4.1.2.
16. III.A	Reactor Bldg. HPCI and Turbine and CRD Pump Room, Zone 3 Elevation 540'	The SSER states that a 1 hour fire barrier will be provided on Division I conduit. No fire barrier was required since adequate spatial separation is maintained. See FSAR Section 9B.4.1.4.

APPENDIX E SSER #2 SECTION	ITEM/ZONE	COMMENT
17. III.A	Reactor Bldg. Corridor Area Zone 4 Elevations 562'-0" and 564'-0"	The SSER did not list this room and the FSAR stated that spatial separation was adequate (see Section 9B.4.1.5). Design evolution has necessitated routing some cables closer. As a consequence, a 1 hour barrier will be placed on Division I cables in the north/south corridor which are within 20' of Division II cables. The FSAR will be revised in a forthcoming amendment.
18. III.A	Reactor Bldg. Third Floor, Zone 7 Elevation 641'-0" and Fifth Floor, Zone 9, Elevation 684'-6"	The SSER erroneously listed these areas. These areas house no equipment or cables required for safe shutdown and thus no barriers are required. See FSAR Sections 9B.4.1.8 and 9B.4.1.10.
19. II.D	General	The SSER and FSAR state that heat sensing cable will be used as a fire detection system in several zones. These cables were part of the original plant design prior to issuance of Appendix R and have been deleted due to improvements in other areas of fire protection and construction/maintenance difficulties with them. The FSAR will be revised in a forthcoming amendment.
20. III.A	General	The SSER states that the applicant has agreed to provide cable tray and pipe penetration seals that meet specific U.L. designs. See the response to question 021.27 in Appendix E.5 and Section 9B.5.D.(d). The penetrations are qualified and tested in accordance with ANI's standard method of fire stopping.

APPENDIX E SSER #2 SECTION	ITEM/ZONE	COMMENT
21. II.C and V.B	Auxiliary Bldg. Computer Room and Cable Spreading Room	The SSER states that the Halon system for the computer and cable spreading rooms is activated by ionization and photoelectronic detectors. The system, in reality, is actuated by the ionization detectors only. FSAR Sections 9B.4.2.4 and 9B.4.2.8 will be appropriately clarified.
22. V.A	Auxiliary Bldg. Control Room Complex	The SSER stated and Detroit Edison committed to have separate ventilation inlets, each installed with a fire damper, from the control room ventilation system to each control room panel. The basic concern was a common mode fire in the ventilation system. Since that time, it has been found that the heat load and cooling requirements of the panels do not warrant individual ventilation lines. As a consequence, panels will either be cooled by natural radiative or convective processes or a small panel fan. The front louvers on the panels will remain covered by Marinite board as previously committed to. If a panel fan is used, greater than twenty feet separation is maintained between the fan inlet and any opening to a panel of the opposite division. In addition, each panel fan opening will have a fusible link fire damper installed which would prevent flame or hot gases from entering the panel. The FSAR will be modified in an upcoming amendment to reflect this change.
23. III.A	Auxiliary Bldg. Relay Room Stairwell Zone 3 Elevation 677'-6"	The SSER states and Detroit Edison committed to install a three hour fire rated barrier around one division. This has proved impractical. See Item III of the attachment. The FSAR will be updated in a forthcoming amendment.

APPENDIX E SSER #2 SECTION	ITEM/ZONE	COMMENT
24. III.A	Auxiliary Bldg. Div. II Control Room Ventilation Equip. Room Elevation 677'-6"	The SSER states and Detroit Edison committed to install a three hour fire rated barrier around Division I conduit and cable in this room. This has proved impractical. See Item IV of the attachment. The FSAR will be updated in a forthcoming amendment.

JUSTIFICATIONS FOR SIGNIFICANT
CHANGES FROM THE PREVIOUS
DOCUMENTED FIRE PROTECTION DESIGN

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Elevation 677'-6"

I. AUXILIARY BUILDING - CABLE TUNNEL, ZONE 5, ELEVATION 613'-6"

1. STATEMENT OF PROBLEM AND INTENDED CHANGE

Detroit Edison committed to install one hour fire rated barriers around Division I and II cables. Since an automatic fire suppression system was also included, this met the requirements of Section III.b.2 of Appendix R. Due to physical construction problems, Edison wishes instead to erect a three hour fire rated wall to separate the two divisions and change the fire suppression system to be manually actuated. This is equivalent protection as defined in Section III.b.2.

2. ANALYSIS

A. Area Description

This zone is described in Section 9B.4.2.6 of the Enrico Fermi Unit 2 (EF-2) FSAR.

This zone serves as a cable routing area for Division I, Division II and balance of plant cable. The Division I cables are located along the east side of the tunnel while the Division II cables are located along the west wall.

The walls, floor, and ceiling separating this zone from other areas are constructed of reinforced concrete having a fire resistance rating of three hours. Penetrations through rated walls, floor, and ceiling are sealed to provide a three hour fire resistance rating. The door openings leading from the cable tunnel are protected by Class A fire doors.

The tunnel is divided in two by a three hour fire rated gypsum wall.

Ceiling height is 8 feet at the center of the cable tunnel and 17 feet at each end. Room volume is 8,000 cu. ft.

Ventilation for this zone is provided by the reactor/auxiliary building ventilation system. Air is ducted directly to the cable tunnel and exhausted through ducts to the auxiliary building main exhaust system. Relief air flows unducted from the cable tunnel to the corridor leading to the turbine building. Air flow entering the corridor is controlled by a backdraft damper. There are three air changes per hour.

This zone is easily accessible for manual fire fighting.

B. Safe Shutdown Equipment

Shutdown equipment located in this zone consists of Division I and II control cables. Either one of the two Divisions is sufficient for hot shutdown.

C. Fire Hazard Analysis

Installed combustibles within this zone consist of cable insulating and jacketing materials. The type of cable insulation used is primarily ethylene propylene. Cables have overall fire retardant jackets of Neoprene or Hypalon. For purposes of the fire hazards analysis, all cable insulation and jacketing was assumed to be combustible and to have a heat content of 10,000 Btu/lb. Cables have been type-tested in accordance with the flame test of Detroit Edison's Company Specification 3071-80 and are certified to be of fire retardant construction. This is equivalent to the IEEE-383 test. Transient combustibles are assumed to be a container of heptane.

The total quantity of combustibles on the west side of the wall (Division II) is 3686 pounds of cable insulation while the east side contains 5926 pounds of cable insulation. The resultant fire

loading for the west side of the tunnel is 78,400 Btu/sq. ft. the east side fire loading is 190,000 Btu/sq. ft.

The fire severity for the west side of the tunnel in accordance with the NFPA handbook is less than one hour and less than two hours for the east side. Because of the fire retardant construction of the cables, a significant exposure fire is required for cable ignition. EPRI tests at Factory Mutual Laboratories have shown that cable fires will not propagate from short circuits.

The Btu releases of 78,400 Btu/sq. ft. and 190,000 Btu/sq. ft. would have an equivalent fire severity of less than three hours in accordance with the NFPA Handbook.

The inadvertent operation of the carbon dioxide suppression system will have no adverse affect on the cables.

D. Fire Protection Existing or Committed

Fire detection equipment in this zone consists of an ionization detection system. Fire suppression equipment consists of a manually actuated carbon dioxide system, hose stations, portable fire extinguishers and a CO₂ hose reel.

3. CONCLUSIONS

Equivalent protection to Section III.G.2 of Appendix R is provided based on the following:

1. The requirements of 10CFR50, Appendix R, Section III. G.2.a are that the cable and equipment of redundant Divisions be separated by a fire barrier with a three hour rating. This requirement has been met.

II. AUXILIARY BUILDING - VENTILATION EQUIPMENT AREA, ZONE 13, ELEVATION
659'-6"

1. STATEMENT OF PROBLEM AND INTENDED CHANGE

Detroit Edison committed to install sprinklers in this room in addition to maintaining a 20 ft. separation or installing a one-hour barrier as applicable between redundant divisions. Due to the extremely low fire loading of the area, Edison is deleting the sprinklers from the design. The analysis below demonstrates that even though this is a deviation from the specific criteria in Section III.b.2 of Appendix R, the action is warranted based on the fact that an adequate level of fire protection is provided to protect the public safety at an equivalent level provided by Appendix R.

A. Area Description

This zone is described in Section 9B.4.2.14 of the Enrico Fermi Unit 2 (EF-2) FSAR.

This zone houses the reactor/auxiliary building ventilation system exhaust unit.

The walls surrounding this zone are constructed of reinforced concrete having a fire resistance rating of three hours.

Penetrations through rated walls are sealed to provide three hour fire resistance ratings. The floor and ceiling are constructed of reinforced concrete and contain unprotected hatches and unsealed penetrations. Cable tray penetrations are provided with fire stops.

The ceiling height is 17 feet. Room volume is 134,000 cu. ft.

Ventilation for this building area is provided by the reactor/auxiliary building ventilation system. Supply and exhaust air are ducted to and from this area. There are 2.8 air changes per hour.

This zone is easily accessible for manual fire fighting.

B. Safe Shutdown Equipment

Shutdown equipment in this zone consists of Division I and II instrument, control, and power cables and damper T4100F038.

Either one of the two Divisions of cables is sufficient for hot shutdown.

C. Fire Hazard Analysis

Installed combustibles within this zone consist of cable insulating and jacketing materials. The type of cable insulation used is primarily ethylene propylene. Cables have overall fire retardant jackets of Neoprene or Hypalon. For purposes of the fire hazards analysis, all cable insulation and jacketing was assumed to be combustible and to have a heat content of 10,000 Btu/lb. Cables have been type-tested in accordance with the flame test of Detroit Edison's Company Specification 3071-80 and are certified to be of fire retardant construction. This is equivalent to the IEEE-383 test. Transient combustibles are assumed to be a container of heptane.

The total quantity of combustibles is 1,521 lbs. of cable insulation and jacketing material and one gallon of heptane. The total Btu/content is 15,400,000. A one hour fire barrier will be installed on all Division II cable tray, which is within 20' of Division I, resulting in a net reduction of 6,000,000 Btu; leaving 9,400,000 Btu. This results in 14,500 Btu/sq. ft. concentrated fire loading for the northeast corner of the zone containing the cable trays (approximately 650 sq. ft.). The total zone loading is 1,190 Btu/sq. ft. Because of the fire retardant construction of the cables, a significant

exposure fire is required for cable ignition. EPRI tests at Factory Mutual Laboratories have shown that cable fires will not propagate from short circuits.

The Btu release of 14,500 Btu/sq. ft. would have an equivalent fire severity of less than 30 minutes in accordance with the NFPA Handbook.

D. Fire Protection Existing or Committed

Fire detection equipment located in this zone consists of an ionization detection system. Fire suppression equipment consists of manual hoses and portable fire extinguishers.

3. CONCLUSIONS

Equivalent protection to Section III.G.2 of Appendix R is provided based on the following:

1. The zone contains a low concentration of combustibles, with a resultant fire severity of less than 30 minutes; also a one hour fire barrier is provided for the Division II cables and greater than 20' separation is provided for the Division II conduit.

2. An ionization detection system is provided throughout the zone to give an early warning of a fire. This zone is easily accessible for manual fire fighting.

Therefore, in the unlikely event a fire would occur, the installation with the proposed deviation meets the intent of the requirements of Appendix R.

III. AUXILIARY BUILDING - RELAY ROOM STAIRWELL, ZONE 3, ELEVATION 613'-6"

1. STATEMENT OF PROBLEM AND INTENDED CHANGE

Detroit Edison committed to install a three hour fire rated barrier around one division in the relay room stairwall. Due to current unavailability of a removable qualified three hour barrier, space constraints, and compatibility with current barrier design (3M). Edison wishes to install its standard 3M one hour barrier design. The analysis below demonstrates that even though this is a deviation from the specific criteria in Section III.G.2 of Appendix R, it is equivalent protection when taking into account other factors.

2. ANALYSIS

A. Area Description

This stairwell is described in Section 9B.4.2.4 of the Enrico Fermi Unit 2 (EF-2) FSAR.

This stairwell serves as a cable routing area for Division I, Division II and balance of plant cable.

The stairwell is enclosed by two hour fire rated walls with a Class B fire door. The ceiling of the stairwell is reinforced concrete.

The stairwell serves the relay room floor elevation 613'-6" to the control room floor elevation 643'-6".

The ceiling height is 37 feet. Room volume is 4,170 cu. ft.

Ventilation is not provided for this stairwell.

This stairwell provides easy access from either the relay room, cable spreading room or control room for fire fighting purposes.

B. Safe Shutdown Equipment

Shutdown equipment located in the stairwell consists of both Division I and Division II instrument cables. Either one of the two Divisions is sufficient for hot shutdown.

C. Fire Hazard Analysis

Installed combustibles within this stairwell consist of cable insulating and jacketing materials. The type of cable insulation used is primarily ethylene propylene. Cables have overall fire retardant jackets of Neoprene or Hypalon. For purposes of the fire hazards analysis, all cable insulation and jacketing was assumed to be combustible and to have a heat content of 10,000 Btu/lb. Cables have been type-tested in accordance with the flame test of Detroit Edison's Company Specification 3071-80 and are certified to be of fire retardant construction. This is equivalent to the IEEE-383 test. Transient combustibles are assumed to be a container of heptane.

The total quantity of combustibles is 3,059 pounds of cable insulation and jacketing material and one gallon of heptane. The total Btu content is 30,700,000. A one hour fire barrier will be installed on all Division I cable trays, resulting in a net reduction of 1,690,000 Btu; leaving 29,100,000 Btu. This results in 258,100 Btu/sq. ft. fire loading for this stairwell. Because of the fire retardant construction of the cables, a significant exposure fire is required for cable ignition. EPRI tests at

Factory Mutual have shown that cable fires will not propagate from short circuits. Cable trays will have metal covers for approximately six feet above the landings, which provides protection against an exposure fire.

The Btu release of 258,100 Btu/sq. ft. would have an equivalent fire severity of three hours: using conventional methodology. This is overly conservative, however, due to the geometry of the room. Being a stairwell, the base of the room is only approximately 100 ft.² The height of the room is 37', divided into three floors. The cable trays run vertically up the side of the stairwell and have fire stops at each of the two landings. Realistically, this reduces the effective fire loading by 2/3, yielding an equivalent fire severity of less than one hour.

There is no automatic suppression system provided for the stairwell.

D. Fire Protection Existing or Committed

Fire detection equipment located in this zone consists of an area ionization detection system in the stairwell. Fire suppression equipment for this zone consists of manual hose stations and portable fire extinguishers.

3. CONCLUSIONS

Equivalent protection to Section III.G.2 of Appendix R is provided based on the following:

1. The cable trays are fire stopped at each floor landing in the stairwell and where the cable tray penetrates the stairwell wall. Cable trays will have metal covers to six feet off the floor at each landing to protect against direct flame impingement. This effectively removes a portion of the cable from a fire situation as the stops will prevent propagation. This reduces the effective fire loading to less than one hour as shown in this analysis.
2. The control room personnel are adjacent to and have easy access to the stairwell for fire fighting purposes if the early warning fire detection system alarms.
3. The protection against an exposure fire, which is considered the most probable type of fire for this zone, is provided by the following administrative control procedures:
 - a. Only quantities of one gallon or less of flammable liquids are allowed in the zone. If for any reason quantities in excess

of one gallon are required, permission must be granted by the shift supervisor and a fire watch would be provided to monitor the operation.

- b. The relay room is part of the control room complex and requires a computer controlled key-operated card to gain access through any of its entrances. Entrance is limited to control room operators and personnel authorized by key supervision personnel.

Therefore, in the unlikely event a fire would occur, the installation with the proposed deviation meets the intent of the requirements of Appendix R and a one hour fire barrier is justified.

IV. AUXILIARY BUILDING - DIVISION II CONTROL ROOM VENTILATION EQUIPMENT ROOM,
ELEVATION 677'-6"

1. STATEMENT OF PROBLEM AND INTENDED CHANGE

Detroit Edison committed to install a three hour fire rated barrier around Division I cable and conduit in the room. Due to the current unavailability of a removable qualified three hour barrier and compatibility with the current barrier design (1 hr), Edison wishes to install its standard 3M one hour barrier design. The analysis below demonstrates that even though this is a deviation from the specific criteria of Section III.G.2 of Appendix R, it is equivalent protection when taking into account other factors.

2. ANALYSIS

A. The room which houses the Division II equipment in the control room ventilation equipment room is described in the write-up for Zone 14 of Section 9B.4.2.15 of the Enrico Fermi Unit 2 (EF-2) FSAR.

The walls surrounding this room are constructed of reinforced concrete and concrete block. A one hour rated fire barrier with

Class A fire doors separates Division I and II air conditioning equipment. A one hour rated fire barrier separates Division I and II cables. Penetrations through rated walls are sealed to provide a fire resistance equivalent to the walls in which they are located. The floor is constructed of reinforced concrete and provides a three hour fire rated barrier. Electrical and piping penetrations in the floor are sealed. Ducts are encased by three hour rated fire barriers. The ceiling is constructed of reinforced concrete over unprotected steel.

The ceiling height is 15 ft. The volume of the room in the control room ventilation equipment room where both Division I and Division II cables are present is 26,250 cu. ft.

Ventilation for this zone is provided by the control center air conditioning system. Conditioned air is supplied through ducts to the control room air conditioning equipment room. Exhaust air from the control room air conditioning equipment room is drawn through an exhaust duct opening to the control center air conditioning units located in the room. Additionally, local cooling and recirculation units in the control room air conditioning equipment room maintain suitable room ambient temperature when the control center air conditioning system is operating in the emergency recirculation mode.

During operation in the emergency recirculation mode, the supply and return air flows to and from the control center air conditioning equipment room are stopped. There are 1.2 air changes per hour.

This area is easily accessible for manual fire fighting.

B. Safe Shutdown Equipment

This room contains the following shutdown equipment:

1. Division II control room air conditioning equipment.
2. Division I and II control and power cables.

Either one of the two Divisions of cables is sufficient for hot shutdown.

C. Fire Hazard Analysis

Installed combustibles within this room consist of cable insulating and jacketing materials and lubricating oil in the

ventilation equipment. The type of cable insulation used is primarily ethylene propylene. Cables have overall fire retardant jackets of Neoprene or Hypalon. For purposes of the fire hazards analysis, all cable insulation and jacketing was assumed to be combustible and to have a heat content of 10,000 Btu/lb. Cables have been type-tested in accordance with the flame test of Detroit Edison's Company Specification 3071-80 and are certified to be of fire retardant construction. This is equivalent to the IEEE-383 test. Transient combustibles are assumed to be a container of heptane.

The total quantity of combustible is 1,942 pounds of cable insulation and jacketing material, five gallons of lubricating oil, and one gallon of heptane. The total Btu content is 20,300,000. A one hour fire barrier will be installed on all Division I cable tray and conduit, resulting in a net reduction of 7,000,000 Btu; leaving 13,300,000 Btu. This results in a 7,600 Btu/sq. ft. fire loading for this room. Because of the fire retardant construction of the cables, a significant exposure fire is required for cable ignition. EPRI tests at Factory Mutual Laboratories have shown that cable fires will not propagate from short circuits.

The Btu release of 7,600 Btu/sq. ft. would have an equivalent fire severity of less than 30 minutes in accordance with the NFPA Handbook.

D. Fire Protection Existing or Committed

Fire detection equipment located within this zone consists of an area ionization detection system. Fire suppression equipment located in this zone consists of manual hose and portable fire extinguishers.

3. CONCLUSIONS

Equivalent protection to Section III.G.2 of Appendix R is provided based on the following:

1. This room contains a low concentration of combustibles, with a resultant fire severity of less than 30 minutes; also a one hour fire barrier is provided for the Division I cables.
2. An ionization detection system is provided in the room to give an early warning of a fire. This room is easily accessible for manual fire fighting.

Therefore, in the unlikely event a fire would occur, the installation with the proposed deviation meets the intent of the requirements of Appendix R.