June 4, 1984

Docket No. 50-289

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Mr. Henry D. Hukill, Vice President
and Director - TMI-1
GPU Nuclear Corporation
P. O. Box 480
Middletown, Pennsylvania 17057

Dear Mr. Hukill:

By letter dated July 1, 1982, you submitted a revised fire hazards analysis which included 14 exemptions to the technical requirements of 10 CFR Part 50, Appendix R, Section III.G, which relates to fire protection for equipment important to safe shutdown. In meetings on November 5, 1982, and March 15, 1983, we discussed our concerns with your submittal, and by letters dated December 2, 1982, and April 8, 1983, you provided additional information and clarification. In the April 8, 1983 letter, you made various commitments, including the commitment to comply with Appendix R in the 4160V switchgear room, which was the subject of one of the original 14 exemptions. That exemption request was therefore withdrawn.

We have evaluated the remaining requests, and based on our review of all available information, have granted exemptions as described in the enclosed Exemption. The bases for these actions are contained in the enclosed Exemption (Enclosure 1) and the Fire Protection Exemption Safety Evaluation attached thereto. A copy of the Exemption with the Safety Evaluation is being forwarded to the Office of the Federal Register for publication.

During the course of our review, we identified instances, such as in the Reactor Building, where the requirements of Section III.G. of Appendix R may have been misinterpreted. Specifically, you do not appear to have evaluated the plant on the basis of valid fire areas, and you may have relied upon partial fire detection and suppression systems to achieve compliance with Section III.G.2. These issues are addressed in the Fire Protection Exemption Safety Evaluation. With regard to the delineation of fire areas, we have received your submittal dated November 30, 1983. We are reviewing this material, and it will be the subject of another action in the near future. With regard to the use of partial suppression and detection, you must have documented justification for the lack of complete coverage as discussed at the Regional Workshop held on April 18, 1984.

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We have also completed our review of your proposed modifications and alternate capability for achieving safe shutdown as described by your submittals referenced in the enclosed Alternate Shutdown Capability Safety Evaluation (Enclosure 2). We conclude that your proposed modifications and alternate capability comply with the requirements of Appendix R, Section III.G.3 and III.L and are therefore acceptable.

Sincerely,

/S/

John F. Stolz, Chief
Operating Reactors Branch #4
Division of Licensing

Enclosures:
As stated

cc w/enclosures:
See next page

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Do not concur in part. SE in Fr.						
ORB#4:DL	ORB#4:DL	~~ORB#4:DL~~	AD-OR:DL	OELD	D:DL	ORB#5:DL
RIngram	HSilver;ef	JFStolz	GLainas	W Shields	DEisenhut	TWambach
05/3 /84	05/3/84	04/20/84	04/10/84	04/14/84	04/30/84	5/8/84

Please see minor change in Exemption and changes on ~~Dr.~~ clipped pages of SER. incorporated

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of GENERAL PUBLIC UTILITIES NUCLEAR CORPORATION, ET AL (Three Mile Island Nuclear Station, Unit No. 1)	)	Docket No. 50-289

TEXEM

EXEMPTION

I.

The General Public Utilities Nuclear Corporation (the licensee), and three other co-owners are the holders of Facility Operating License No. DPR-50, which authorizes the operation of Three Mile Island Nuclear Station, Unit No. 1 (the facility) located in Dauphin County, Pennsylvania.

The license is subject to all rules and regulations of the Nuclear Regulatory Commission (the Commission).

II.

10 CFR 50.48, "Fire Protection," and Appendix R to 10 CFR Part 50, "Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979" set forth certain specific fire protection features required to satisfy the General Design Criterion related to fire protection (Criterion 3, Appendix A to 10 CFR 50).

Section III.G of Appendix R requires fire protection for equipment important to safe shutdown. Such fire protection is achieved by various combinations of fire barriers, fire suppression systems, fire detectors,

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and separation of safety trains (III.G.2) or alternate safe shutdown equipment free of the fire area (III.G.3). The objective of this protection is to assure that one train of equipment needed for hot shutdown would be undamaged by fire, and that systems needed for cold shutdown could be repaired within 72 hours (III.G.1).

III.

By letter dated July 1, 1982, the licensee requested exemptions from the technical requirements of Section III.G.2 of Appendix R to 10 CFR 50 for various areas of the facility. By letters dated December 2, 1982, and April 8, 1983, the licensee provided additional information regarding the exemption requests, modified certain of the requests, and withdrew one request. The remaining requested exemptions and the Commission's decision on each one are noted below.

1. III.G.2; Reactor Building Outside Secondary Shield, North; Exemption requested from requirement to install noncombustible radiant energy shield. Granted.

2. III.G.2; Heat Exchanger Vault; Exemption requested from requirement for physical separation and/or a fire suppression system. Granted.

3. III.G.2; Valve Gallery; Exemption requested from the requirement for an automatic fire suppression system. Granted.

4. III.G.2; Engineered Safeguards Motor Center B; Exemption requested from the requirement for an automatic fire suppression system. Granted.

5. III.G.2; Penetration Area; Exemption requested from the requirement for one-hour fire rated barriers. Granted.

6. III.G.2; IR Switchgear Area; Exemption requested from the requirement for one-hour fire rated barriers. Granted.

7. III.G.2; IT Switchgear Area; Exemption requested from the requirement for one-hour fire rated barriers. Granted.

8. III.G.2; Control Building Health Physics and Lab Area; Exemption requested from the requirement for an automatic fire suppression system. Granted.

9. III.G.2; General Area - Elevation 281 Feet; Exemption requested from the requirement for an automatic fire suppression system and an area-wide fire detection system. Granted.

10. III.G.2; Demineralizers and Motor Control Center A; Exemption requested from the requirement for a one-hour fire rated barrier and an automatic fire suppression system. Granted.

11. III.G.2; Valve Gallery and Penetration Room; Exemption requested from the requirement for a one-hour fire rated barrier and an automatic fire suppression system. Granted.

12. III.G.2; Motor Driven Emergency Feedwater Pump Area; Exemption requested from the requirement for a one-hour fire rated barrier and an automatic fire suppression system. Granted.

13. III.G.2; Decay Heat Removal and Nuclear Service Closed Cycle Cooling Pump Area; Exemption requested from the requirement for a one-hour fire rated barrier and an automatic fire suppression system. Granted.

Additional discussion and evaluation of each exemption request is contained in the NRC staff's Safety Evaluation (SE) which is printed in its entirety below.

The above exemptions are contingent upon the licensee's maintenance of administrative control of transient combustibles which are equivalent to those specified in Section III.K.1 through III.K.8 of Appendix R to 10 CFR 50 and any characterization of transient combustibles or design features which are specifically discussed in the NRC staff's SE.

IV.

Accordingly, the Commission has determined that, pursuant to 10 CFR 50.12, the exemptions requested by the licensee's letters as referenced

and discussed in III. above are authorized by law, will not endanger life or property or the common defense and security, are otherwise in the public interest, and are hereby granted.

The Commission has determined that the granting of these exemptions will not result in any significant environmental impact and that pursuant to 10 CFR 51.5(d)(4) an environmental impact statement or negative declaration and environmental impact appraisal need not be prepared in connection with this action.

This Exemption is effective upon issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Darrell G. Eisenhut, Director
Division of Licensing
Office of Nuclear Reactor Regulation

Dated at Bethesda, Maryland
this 4th day of June 1984

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO EXEMPTION FROM 10 CFR 50, APPENDIX R

METROPOLITAN EDISON COMPANY
JERSEY CENTRAL POWER AND LIGHT COMPANY
PENNSYLVANIA ELECTRIC COMPANY
GPU NUCLEAR CORPORATION

THREE MILE ISLAND NUCLEAR STATION, UNIT NO. 1

DOCKET NO. 50-289

1.0 Introduction

By letter dated July 1, 1982, the licensee submitted a revised fire hazards analysis which included an evaluation of all TMI-1 fire areas/zones for compliance with Section III of Appendix R to 10 CFR 50, which included 14 exemptions to the technical requirements of Section III.G. In meetings with the licensee on November 5, 1982 and March 15, 1983 and by letters dated December 2, 1982 and April 8, 1983, we received additional information and commitments for supplemental fire protection. In the April 8, 1983 letter, the licensee committed, among other things, to comply with Appendix R in the 4160V switchgear room, which was the subject of one of the original 14 exemptions. The exemption request was therefore withdrawn. Our evaluation of the remaining 13 exemptions follows.

Section III.G.2 of Appendix R requires that one train of cables and equipment necessary to achieve and maintain safe shutdown be maintained free of fire damage by one of the following means:

(1) Separation of cables and equipment and associated non-safety circuits of redundant trains by a fire barrier having a three-hour rating. Structural steel forming a part of or supporting such fire barriers shall be protected to provide fire resistance equivalent to that required of the barrier;

(2) Separation of cables and equipment and associated non-safety circuits of redundant trains by a horizontal distance of more than 20 feet with no intervening combustibles or fire hazards. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area; or

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(3) Enclosure of cable and equipment and associated non-safety circuits of one redundant train in a fire barrier having a one-hour rating. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area.

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

Because it is not possible to predict the specific conditions under which fires may occur and propagate, the design basis protective features are specified in the rule rather than the design basis fire. Plant specific features may require protection different from the measures specified in Section III.G. In such a case, the licensee must demonstrate, by means of a detailed fire hazards analysis, that existing protection 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 to at least one train of equipment necessary to achieve cold shutdown is limited such that it can be repaired within a reasonable time (minor repairs with components stored on-site).

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

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

2.0 Reactor Building Outside Secondary Shield, North (Zone RB-FZ-1a)

2.1 Exemption Requested

The licensee requested an exemption from Section III.G.2 to the extent that it requires the installation of a noncombustible radiant energy shield to protect redundant trains of safe shutdown related cable and equipment.

2.2 Discussion

The area is enclosed on three sides by walls contructed of reinforced concrete. The fourth side is open, in part, to adjoining Zones RB-FZ-1b and RB-FZ-1c. The floor and ceiling are of reinforced concrete and steel grating.

The safe shutdown equipment located in this zone consists of three redundant reactor building emergency cooling units and related cabling, one of which is necessary for safe shutdown.

The combustible materials present in the area consist of cable insulation and lube oil which represent a total fire load of 6,264 BTU/ft^2.

Existing fire protection consists of a smoke detection system, portable fire extinguishers and manual hose stations.

The licensee proposes to completely separate one train of shutdown-related cabling from its redundant counterparts by a noncombustible radiant energy shield per Section III.G.2.f. The licensee states, however, that such a barrier is not necessary between the cooling units.

The licensee's justification for the exemption was based on the low fuel load which, if ignited, would not result in a fire of significant magnitude to damage all three of the emergency cooling units.

2.3 Evaluation

The technical requirements of Appendix R are not met because of the lack of a noncombustible radiant energy shield between the cooling units. The three units are positioned, in line, such that the minimum separation between the end units is more than 40 feet. The "B" cooling unit is located between the end units "A" and "C" and, therefore, would shield either end unit from a potential exposure fire involving the other end unit.

A fire, if one should occur, would involve the combustible cable insulation and lube oil. The fuel load in the zone, if totally consumed, corresponds to a fire severity on the ASTM E-119 time-temperature curve of between five and six minutes. A fire of this duration would not occur because of the protection afforded by other features of the plant fire protection program, such as fixed and portable fire protection systems and equipment, and the actions by the fire brigade and operating technicians.

It is our opinion that because of the low fire loading, a fire in this zone would be of limited severity, duration and extent.

Considering the distance between the three units and the worst fire location being between an end unit and the middle unit, fire damage should be limited to, at most, those two units. Convective heat and smoke would rise and be dissipated throughout the large ceiling area. Radiant heat and direct flame impingement would be shielded by the "B" unit. It is our judgment, therefore, in consideration of the equipment configuration (as described above), the existing fire protection and proposed modifications, and the nature of fires in power plants, that a fire in this zone would not result in damage to more than two of the three reactor building emergency cooling units.

2.4 Conclusion

Based on our evaluation, we conclude that with the proposed modifications, the licensee's fire protection program will provide reasonable assurance that one safe shutdown division will be free of fire damage and will achieve an acceptable level of fire protection equivalent to that provided by Section III.G.2. Therefore, the licensee's request for exemption for the Reactor Building Outside Secondary Shield, North (Zone RB-FZ-1a), should be granted.

3.0 Heat Exchanger Vault (Fire Zone AB-FZ-1)

3.1 Exemption Requested

The licensee requested an exemption from Section III.G.2 to the extent that it requires physical separation and/or the installation of a fire suppression system.

3.2 Discussion

The area is enclosed with walls, floor and ceiling of reinforced concrete construction. Safe shutdown equipment located in the zone consists of 11 motor-operated valves and related cabling, associated with the nuclear service river water.

The combustible materials present in the area consist of cable insulation and transient materials which represent a fire load of 2,400 BTU/ft^2.

Existing fire protection consists of a portable fire extinguisher and a manual hose station. By letter dated April 8, 1983, the licensee proposed to install a localized smoke detection system to provide an early fire warning capability in the area where cable for redundant shutdown systems is vulnerable to fire damage.

The licensee's justification for the exemption is based on the limited fire loading in the room which, if ignited, would not result in a fire of significant magnitude. If a fire should occur, sufficient time exists to manually operate the valves to achieve safe shutdown.

3.3 Evaluation

The technical requirements of Section III.G are not met because the safety related valves and the electrical circuits to them are not protected by a one-hour fire rated barrier. In addition, the fire zone is not equipped with area-wide fire detection and fire suppression systems.

The licensee stated in the July 1, 1982 submittal that in the event a fire occurred in this area and damaged the shutdown-related cable, at least one hour would be available to manually operate the valves to achieve safe shutdown conditions. We agree with this assessment.

The smoke detection system that the licensee proposes to install in the area will provide reasonable assurance that the fire will be discovered before it results in significant damage. Although there will be an anticipated time delay of between 15 minutes and a half hour until the fire brigade arrives, sufficient time will still remain after fire extinguishment to restore flow paths, if necessary.

Because of the limited fire hazards in the zone, the available fire protection and the training of the plant fire brigade, any postulated fire in this area will not be beyond the capabilities of the brigade to extinguish within a short time span.

3.4 Conclusion

Based on our evaluation, we conclude that the licensee's proposed modifications and existing fire protection will achieve an acceptable level of fire protection equivalent to that provided by Section III.G.2. Therefore, the licensee's request for exemption for the Heat Exchanger Vault (Zone AB-FZ-1) should be granted.

4.0.1 Valve Gallery (Fire Zone AB-FZ-3)

4.0.2 Engineered Safeguards Motor Center B (Fire Zone AB-FZ-6a)

4.1 Exemption Requested

The licensee requested exemptions from Section III.G.2 to the extent that it requires the installation of an automatic fire suppression system.

4.2.1 Discussion (Zone AB-FZ-3)

The area is enclosed on three sides by walls constructed of reinforced concrete. The fourth side is open to another fire zone. The floor and ceiling are of reinforced concrete construction.

Safe shutdown equipment which is located in this room consists of redundant electrical circuits associated with makeup and purification.

The combustible materials present in the zone include cable insulation and represent a total fire load of 4,581 BTU/ft^2.

Existing fire protection consists of a fire detection system, manual hose stations and portable fire extinguishers.

The licensee proposes to protect the safety-related cabling with a one-hour fire rated barrier.

4.2.2 Discussion (Zone AB-FZ-6a)

The area is enclosed on three sides by walls constructed of reinforced concrete. The fourth side is open to another fire zone. The floor and ceiling are of reinforced concrete.

Safe shutdown equipment located in the zone consists of the engineered safeguards motor control center 1B. Its redundant counterpart is located in the adjoining fire zone.

The combustible materials present in the zone include cable insulation and transient material and represent a fire load of 54,448 BTU/ft^2.

Existing fire protction consists of a fire detection system, manual hose stations and portable fire extinguishers.

The licensee proposes to erect a one-hour fire rated barrier to separate the redundant motor control center.

The licensee justifies the exemptions for both areas on the basis that the low fuel load will limit the severity of a fire in the zones. This, coupled with the existing fire protection and proposed one-hour fire barrier, will provide assurance that one train of equipment necessary for safe shutdown will be free of fire damage.

4.3 Evaluation

The technical requirements of Section III.G are not met in these zones due to the absence of area-wide fire suppression systems.

The fire protection requirements of Appendix R represent an aggregate, comprised of active and passive components. In these zones, the licensee has provided active protection in the form of complete smoke detection systems which will provide reasonable assurance of early fire awareness and response by the plant fire brigade and operating technicians. Passive protection is achieved by the erection of complete one-hour fire rated barriers between redundant safety divisions.

The fuel load in these zones is low to moderate. If totally consumed, the combustible materials would produce a fire which corresponds to a fire severity on the ASTM E-119 time-temperature curve of less than 5 minutes and 40 minutes, respectively. A fire of this duration would not occur because of the fire protection afforded by other features of the plant fire protection program.

It is our judgment that a fire, if one should occur, would not be of significant magnitude and duration and would not breach the protection provided by the one-hour fire barriers before the fire self extinguished or was put out by the plant fire brigade.

4.4 Conclusion

Based on our evaluation, we conclude that the licensee's alternate fire protection configuration will provide reasonable assurance that one safe shutdown division will be free of fire damage and will achieve an acceptable level of fire protection equivalent to that provided by Section III.G.2. Therefore, the licensee's requests for exemptions for the Valve Gallery (Zone AB-FZ-3) and the Engineered Safeguards Motor Center B (Zone AB-FZ-6a) should be granted.

5.0.1 Penetration Area (Zone AB-FZ-4)
5.0.2 IR Switchgear Area (Zone ISPH-FZ-1)
5.0.3 IT Switchgear Area (Zone ISPH-FZ-2)

5.1 Exemption Requested

The licensee requested exemptions from Section III.G.2 to the extent that it requires the installation of a one-hour fire rated barrier.

5.2.1 Discussion (Zone AB-FZ-4)

The area is bounded on one side and part of another by walls constructed of reinforced concrete. The remaining sides are open to adjoining fire zones. The area is also open, via an unprotected stairway, with a vertically adjoining fire zone.

Safe shutdown equipment which is located within the zone consists of redundant decay heat removal and makeup and purification valves, along with safety-related cable and instrumentation.

The combustible materials present in the zone include cable insulation and transient material which represent a total fire load of 52,822 BTU/ft^2.

Existing fire protection consists of a deluge-type, water spray fire suppression system which, by letter dated April 8, 1983, the licensee proposes to convert from automatic to manual activation; a fire detection system; manual hose station and portable fire extinguishers. The licensee proposes to protect the electrical cables in the zone for safety-related equipment, excluding the valves and the associated cable, with a one-hour fire rated barrier.

5.2.2 Discussion (Zone ISPH-FZ-1)

The area is enclosed by walls, floor, and ceiling of reinforced concrete. Safe shutdown equipment which is located within the zone consists of redundant safety-related cable, the 480V 1A motor control center and 1R switchgear, decay heat river water pump A, nuclear services river water pump C, reactor building emergency cooling pump B, and six safety-related valves associated with nuclear service river water, decay heat river water and reactor building emergency cooling river water.

The combustible materials present in the zone include lube oil, cable insulation, and transient materials and represent a fire load of 15,854 BTU/ft^2.

Existing fire protection consists of an automatic wet pipe sprinkler system, manual hose station and portable fire extinguishers.

The licensee proposes the following modifications: 1) a complete area-wide fire detection system; 2) a one-hour fire rated barrier to protect all safety-related cable in the zone except for the valves and associated cables; 3) repowering the "C" train nuclear services river water pump, and 4) a three-hour rated fire door in the wall between this zone and ISPH-FZ-2.

5.2.3 Discussion (Zone ISPH-FZ-2)

The area is enclosed by walls, floor and ceiling of reinforced concrete. Safe shutdown equipment which is located within the zone consists of redundant safety-related cable, the 480V 1B motor control center and IT switchgear, decay heat river water pump B, nuclear services river water pumps A & B, reactor building emergency cooling pump A and flow safety-related valves associated with nuclear service river water, decay heat river water and reactor building emergency cooling river water.

The combustible materials present in the zone include lube oil, cable insulation and transient material and represent a fire load of 16,020 BTU/ft^2.

Existing fire protection consists of an automatic wet pipe sprinkler system, manual hose station and portable fire extinguishers.

The licensee proposes the following modifications: 1) a complete area-wide fire detection system will be installed, 2) a one-hour fire rated barrier will be installed to protect safety-related cable, except for the valves and the associated cable, 3) the "A" train nuclear services river water pump will be repowered and 4) the installation of a three hour fire rated door in the wall separating this zone from ISPH-FZ-1.

The licensee justifies the exemptions on the basis that, although the circuits to the subject valves will be damaged in a fire, the valves themselves will not, and sufficient time exists for operating technicians to operate the valves manually to achieve safe shutdown.

5.3 Evaluation

For all three areas, the technical requirements of Section III.G are not met because of the absence of a one-hour fire rated barrier to protect shutdown-related valves and their associated cabling. In addition, the Penetration Area will no longer be protected by an automatic fire suppression system.

Active fire protection for these areas will consist of a complete smoke detection system which provides reasonable assurance of early fire awareness and response by operating personnel and the plant brigade. Additional protection for the switchgear areas consists of automatic fire suppression systems which will prevent any fire from reaching significant levels before being extinguished. Due to the concern for damage resulting from inadvertent actuation of the deluge system in the penetration area, the system will be converted to manual actuation. This modification will not significantly lower the level of safety because the system can still be manually activated in sufficient time to prevent serious damage, and is therefore acceptable.

Passive protection for the valves and related circuits, by either a one-hour rated barrier or 20 feet separation without intervening combustibles, will not be provided. Nevertheless, the licensee has demonstrated that at least two hours are available after a fire to manually operate the valves to achieve safe shutdown. It is our judgment, based on the proposed modifications, the limited fuel load and existing fire protection, that a fire, if one should occur in these areas, will not prevent re-entry into the room and access to the valves for more than one hour.

A sufficient time buffer exists, therefore, to enable the flow paths to be reestablished, if necessary, by operating personnel so as to achieve safe shutdown.

5.4 Conclusion

Based on our evaluation, we conclude that the licensee's alternate fire protection configuration will achieve an acceptable level of fire protection equivalent to that provided by Section III.G.2. Therefore, the licensee's request for exemption for the following areas should be granted:

Penetration Area,
IR Switchgear Area,
IT Switchgear Area.

6.0 Control Building Health Physics and Lab Area (Zone CB-FA-1)

6.1 Exemption Requested

The licensee requested an exemption from Section III.G.2 to the extent that it requires the installation of an automatic fire suppression system.

6.2 Discussion

The area is bounded by walls, floor, and ceiling of reinforced concrete construction. Safe shutdown components located within this zone consist of electrical circuits for both divisions located above the suspended ceiling.

The combustible materials present in the zone include cable insulation as well as stored and transient materials, and represent a fire load of 52,578 BTU/ft^2.

Existing fire protection consists of an automatic wet pipe sprinkler system, located below the suspended ceiling, and portable fire extinguishers.

The licensee proposes to install a smoke detection system above the suspended ceiling and to protect one train of the safety-related circuits in a one-hour fire rated barrier.

The licensee states that the one-hour barrier, coupled with the proposed fire detection system and existing fire protection, is sufficient to achieve an acceptable level of safety without the installation of a fire suppression system above the suspended ceiling.

6.3 Evaluation

The technical requirements of Section III.G are not met because of the absence of a fire suppression system to protect the redundant safety circuits above the suspended ceiling.

In this area, the licensee has provided active fire protection in the form of a complete smoke detection system above the ceiling. This will provide reasonable assurance of early fire awareness and response by operating technicians and the plant fire brigade. Additional protection is afforded by the sprinkler system below the ceiling. Passive protection is achieved by the installation of a rated fire barrier to protect one train of the safe shutdown circuits.

The fire loading in the zone is moderate. If all combustibles were totally consumed, they would produce a fire which corresponds to a fire severity on the ASTM time-temperature curve of less than 40 minutes. A fire of this duration would not occur because of the protection afforded by other existing and proposed features of the fire protection program.

It is our judgment that a fire, if one should occur, would not be of significant magnitude and duration and would not breach the protection provided by the one-hour fire barrier before the fire self extinguished or was put out by the plant fire brigade or the sprinkler system.

6.4 Conclusion

Based on our evaluation, we conclude that the licensee's alternate fire protection configuration will provide reasonable assurance that one safe shutdown division will be free of fire damage and will achieve an acceptable level of fire protection equivalent to that provided by Section III.G.2. Therefore, the licensee's request for exemption for the Control Building Health Physics and Lab Area (Zone CB-FA-1) should be granted.

7.0 General Area - Elevation 281 Feet (Zone AB-FZ-5)

7.1 Exemption Requested

The licensee requested an exemption from Section III.G.2 to the extent that it requires the installation of an automatic fire suppression system and an area-wide fire detection system.

7.2 Discussion

The area is bounded on three sides by walls constructed of reinforced concrete. The fourth side is open to another zone. Floor and ceiling are of reinforced concrete. Safe shutdown equipment which is located in this zone consists of redundant safety-related electrical circuits.

The combustible materials present in the zone include pump lube oil, cable isulation and transient material and represent a fire load of 20,062 BTU/ft^2.

Existing fire protection consists of manual hose stations and portable fire extinguishers.

By letter dated April 8, 1982, the licensee proposed to install a localized fire detection system to provide an early fire warning capability in the area where cables for redundant shutdown systems are vulnerable to fire damage. The licensee also proposes to protect one train of the safe shutdown cable in a one-hour fire rated barrier.

7.3 Evaluation

The technical requirements of Section III.G are not met because of the absence of both an area-wide fire detection and automatic fire suppression systems.

Our concern is that a fire of significant magnitude, if one should occur in this area, would damage redundant shutdown cables before being suppressed by the plant fire brigade. The fire detection system, which the licensee proposes to install 20 feet on either side and above the safe shutdown circuits, will provide reasonable assurance that a fire will be discovered at an early stage, before significant damage results. Because of the low fire load, available manual fire fighting equipment, and fire brigade training, it is our judgment that any postulated fire in the area would not be beyond the capabilities of the fire brigade to extinguish within a short time span.

Although a time delay of between 15 minutes and a half hour is anticipated between the receipt of the initial fire alarm and the arrival of the fire brigade, the one-hour fire rated barrier that the licensee proposes to install around the shutdown-related cable will provide sufficient passive fire protection until the fire is extinguished.

7.4 Conclusion

Based on our evaluation, we conclude that the licensee's proposed modifications with the existing fire protection provide reasonable assurance that one safe shutdown division will be free of fire damage and will achieve an acceptable level of fire protection equivalent to that provided by Section III.G.2. Therefore, the licensee's request for exemption for the General Area - Elevation 281 feet (Zone AB-FZ-5) should be granted.

8.0.1 Demineralizers and MCC A (Zone AB-FZ-6)

8.0.2 Valve Gallery and Penetration Room (Zone 1B-FZ-1)

8.0.3 Motor Driven Emergency Feedwater Pump Area (Zone 1B-FZ-3)

8.1 Exemption Requested

The licensee requested exemptions from Section III.G.2 to the extent that it requires the installation of a one-hour barrier and an automatic fire suppression system.

8.2.1 Discussion (Zone AB-FZ-6)

The area is enclosed on three sides by walls constructed of reinforced concrete. The fourth side is open to an adjoining fire zone. The floor and ceiling are of reinforced concrete.

Safe shutdown equipment which is present in the zone consists of the engineered safeguards MCC 1A (its redundant counterpart is located in the adjoining zone), and redundant makeup and purification valves with related cabling.

The combustible materials present in the zone include cable insulation and transient material and represent a fire load of 30,404 BTU/ft^2.

Existing fire protection consists of a smoke detection system in the motor control center area, manual hose stations, and portable fire extinguishers.

The licensee proposes to erect a one-hour rated fire wall at the common boundary between this zone and AB-FZ-6a to separate the redundant MCCs.

8.2.2 Discussion (Zone 1B-FZ-1)

The area is enclosed by walls, floor and roof of reinforced concrete. Safe shutdown equipment which is located within the zone consists of 14 reactor building emergency cooling valves and related cabling.

The combustible material present in the zone is cable insulation, which represents a fire load of 8,925 BTU/ft^2.

Existing fire protection consists of a smoke detection system, manual hose stations and portable fire extinguishers.

8.2.3 Discussion (Zone 1B-FZ-3)

The area is enclosed by walls, floor and ceiling of reinforced concrete. Safe shutdown equipment which is located in the zone consists of four emergency feedwater valves, Division A and B emergency feedwater pumps and related cabling.

The combustible material located in the zone includes lube oil and cable insulation and respresents a fire load of 5,659 BTU/ft^2.

Existing fire protection consists of a smoke detection system, portable fire extinguishers and manual hose stations.

For all three fire areas, the licensee justifies the exemptions on the basis that, although the circuit to the valves will be damaged in a fire, the valves will not, and sufficient time exists for operating technicians to operate the valves manually to achieve safe shutdown.

8.3 Evaluation

In all three fire areas, the technical requirements of Section III.G are not met because the safety-related valves and circuits are not protected by one-hour rated fire barriers. In addition, the zones are not equipped with area-wide fire suppression systems.

The fire load in the zones is low. The combustibles, if totally consumed, would result in a fire which corresponds to a fire severity on the ASTM E-119 time-temperature curve of approximately 23 minutes, 7 minutes and 4 minutes in the three zones. The duration of these fires ignores the protection afforded by other features of the plant fire protection program. It is our opinion that fires of significant magnitude would not occur in these rooms.

The areas are also equipped with fire detection systems which provide reasonable assurance of early fire awareness and response by operating personnel and the plant fire brigade.

The licensee has demonstrated that, should a fire occur in these rooms, 12 hours exist to manually operate the valves to achieve safe shutdown. It is our judgment, based on the limited fire load and existing fire protection, that a fire in these rooms would not prevent re-entry into the areas and access to the valves for more than one hour. Thus, a sufficient time buffer exists to enable the flow paths to be reestablished, if necessary, so as to achieve safe shutdown.

8.4 Conclusion

Based on our evaluation, we conclude that the licensee's alternate fire protection configuration will achieve an acceptable level of fire protection equivalent to that provided by Section III.G.2. Therefore, the licensee's request for exemption for the following areas should be granted:

Demineralizers and MCC A,
Valve Gallery and Penetration Room,
Motor Driven Emergency Feedwater Area:

9.0 Decay Heat Removal and Nuclear Service Closed Cycle Cooling Pump Area (Zone AB-FZ-7)

9.1 Exemption Requested

The licensee requested an exemption from Section III.G.2 to the extent that it requires the installation of a one-hour fire rated barrier and an automatic fire suppression system.

9.2 Discussion

The area is bounded by walls, floor and ceiling of reinforced concrete construction. Safe shutdown equipment which is located within the zone consists of redundant decay heat closed cycle cooling pumps, nuclear service closed cycle cooling pumps, and intermediate closed cycle cooling pumps and related cabling.

The combustible material present in the zone includes lube oil, cable insulation and transient materials and represent a fire load of 7,626 BTU/ft^2.

Existing fire protection consists of a fire detection system, manual hose station and portable fire extinguishers. Partial, reinforced concrete barriers exist between each nuclear services closed cycle cooling pump and the decay heat closed cycle cooling pumps.

The licensee proposes to protect Division A cabling with a complete one-hour fire rated barrier.

The licensee justifies the exemption on the basis that, because of the low fuel load, a fire of significant magnitude will not occur.

9.3 Evaluation

The technical requirements of Section III.G are not met because of the absence of an automatic fire suppression system and complete one-hour fire rated barriers between redundant pumps that are needed for safe shutdown.

The fire load in this zone is low. The combustibles, if totally consumed, would produce a fire which corresponds to a fire severity on the ASTM E-119 time-temperatue curve of approximately 5 minutes. It is our opinion that a fire of significant magnitude and duration would not occur in this room because of the protection afforded by other features of the plant fire protection program.

The area is equipped with a fire detection system which provides reasonable assurance of early fire awareness and response by operating personnel and the plant fire brigade.

Passive protection exists in the form of a complete one-hour fire rated barrier which the licensee committed to provide for one shutdown division of cabling. Passive protection for the safety-related pumps is represented by the partial height reinforced concrete walls. These walls will

provide protection from radiant heat and direct flame impingement to assure that at least one division is available for shutdown.

9.4 Conclusion

Based on our evaluation, we conclude that the licensee's alternate fire protection configuration will provide reasonable assurance that one safe shutdown division will be free of fire damage and will achieve an acceptable level of fire protection equivalent to that provided by Section III.G.2.

Therefore, the licensee's request for exemption for the Decay Heat Removal and Nuclear Service Closed Cycle Cooling Pump Area should be granted.

10.0 Clarification of Appendix R Issues

10.1 Introduction

Our review of the licensee's Appendix R evaluation revealed instances, such as in the Reactor Building, where the requirements of Section III.G may have been misinterpreted. Specifically, the licensee does not appear to have evaluated the plant for compliance with Section III.G on the basis of valid fire areas.

In addition, the licensee appears to have relied upon partial fire detection and suppression systems to achieve compliance with Section III.G.2 without complete justification. We deem it prudent to state our position in this matter to avoid any misunderstandings.

10.2 Fire Areas

Section III.G of Appendix R identifies acceptable methods to provide fire protection for shutdown systems when redundant trains are located "within

the same area." A fire area is generally bounded by construction having a fire resistance of at least three hours or by equivalent protection, such as a justified fire barrier of less fire resistance or a water curtain. Fire hazard analyses conducted prior to Appendix R to satisfy NRC Supplementary Guidance for Fire Protection Program Evaluation (September 1976) evaluated plant conditions from the perspective of both fire areas and fire zones (locations within a fire area that are not bounded by fire barriers). However, Section III.G of Appendix R sets forth the requirement for fire protection for safe shutdown capability only on the basis of fire areas.

The term "fire area" was defined in page 2 of BTP APCSB 9.5-1 "Guidelines for Fire Protection for Nuclear Power Plants" dated May 1, 1976. This definition also applied to Appendix A to BTP APCSB 9.5-1. A fire area was defined as "that portion of a building or plant that is separated from other areas by boundary fire barriers (walls, floors and roofs) with any openings or penetrations protected with seals or closures having a fire resistance rating equal to that of the barrier." Because this definition appeared to be well understood and accepted by licensees and because Appendix R uses the same definition as Appendix A to BTP APCSB 9.5-1, the definition was not repeated in Appendix R.

If previous evaluations by the licensee and the NRC staff were based on fire areas which comply with the above definition, they are in compliance with Appendix R. If previous evaluations were not based on fire areas, and the separation between fire zones does not meet the requirements of Section III.G of Appendix R, the technical requirements of Appendix R may not have been met.

The fire protection requirements of Section III.G of Appendix R are intended to provide reasonable assurance that at least one safe shutdown division is free of fire damage after a postulated fire in any area. Licensees, in their effort to assess compliance with Section III.G, are required to identify all those redundant shutdown systems that may be affected by a single fire within the plant. Because it is not possible to predict occurrence, locality or severity of fires, the area of potential fire influence needs to be defined by boundaries that can reasonably be expected to contain the flame, heat, and hot gases that will result from a fire. This definition of "fire areas" is predicated on sound fire protection engineering principles as they relate to the risk of fire damage to redundant shutdown equipment and cables; with due consideration to the propagation of fire and smoke through structures. Fire area boundaries defined by non-substantive, non-physical, logical divisions or equipment groupings cannot be expected to restrict fire and smoke spread.

Therefore, any Appendix R compliance analysis that was not based on fire areas defined by three-hour fire rated walls, or by equivalent protection such as a justified fire barrier of less fire resistance, or an adequate water curtain, may not adequately demonstrate compliance with Appendix R separation requirements.

10.3 Area Fire Detectors and Fire Suppression System

Sections III.G.2.B; III.G.2.C; III.G.2.D; and III.G.3 of Appendix R necessitate that a fire detection and fire suppression system be installed "in the area." This protection should be provided in conformance with appropriate industry standards (such as National Fire Protection Association Standards Nos. 13 and 72E) on the basis of sound fire protection principles. General industry practice, as exemplified by the following references from the National Fire Protection Association (NFPA), Fire Protection Handbook and NFPA Standards, is to install fire protection throughout an area:

"...complete installation of sprinklers throughout a building is necessary for complete protection of life and property. No areas should be left unprotected. It is risky to omit sprinklers from any single area because it is judged that the hazard is not sufficient to warrant them."[1]

"The basic principles for providing proper protection are namely: (1) Sprinklers installed throughout the premises..."[2]

"When complete coverage is required, (Fire) detection devices should be installed throughout all parts of the building."[3]

There may be instances where the installation of a fire suppression system in an individual fire area may be detrimental to overall plant safety. In some instances the provision of a fire detection and a fire suppression system throughout the fire area may not significantly increase the level of fire safety afforded by partial coverage. Where it can be clearly demonstrated, by a fire protection engineering analysis, that the installation of a fire detection and fire suppression system in only select locations within a valid fire area will provide an equivalent level of protection, such partial coverage achieves compliance with Appendix R.

11.0 Summary

Based on our evaluation, the licensee's request for exemptions for the following areas should be granted.

(1) Reactor Building Outside Secondary Shield, North (Zone RB-FZ-1a)
(2) Valve Gallery (Zone AB-FZ-3)
(3) Engineered Safeguards Motor Center B (Zone AB-FZ-6a)
(4) Control Building Health Physics and Lab Area (Zone CB-FA-1)
(5) Penetration Area (Zone AB-FZ-4)
(6) IR Switchgear Area (Zone ISPH-FZ-1)
(7) IT Switchgear Area (Zone ISPH-FZ-2)
(8) Demineralizers and MCC A (Zone AB-FZ-6)
(9) Valve Gallery and Penetration Room (Zone 1B-FZ-1)
(10) Motor Driven Emergency Feedwater Pump Area (Zone 1B-FZ-3)
(11) Decay Heat Removal and Nuclear Service Closed Cycle Cooling Pump Area (Zone AB-FZ-7)
(12) Heat Exchanger Vault (Zone AB-FZ-1)
(13) General Area - Elevation 281 feet (Zone AB-FZ-5)

References

1. "Fire Protection Handbook," Fourteenth Edition, National Fire Protection Association, Quincy, Massachusetts, 1976, p. 14-10.

2. "Standard for the Installation of Sprinkler Systems," NFPA 13-1978, page 13-67, paragraph 4-1.1.1.

3. "Fire Protection Handbook," Fourteenth Edition, National Fire Protection Association, Quincy, Massachusetts, 1976, p. 12-20.

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

Enclosure 2

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION RELATED TO ALTERNATE SHUTDOWN CAPABILITY PURSUANT TO 10 CFR 50, APPENDIX R

METROPOLITAN EDISON COMPANY
JERSEY CENTRAL POWER AND LIGHT COMPANY
PENNSYLVANIA ELECTRIC COMPANY
GPU NUCLEAR CORPORATION

THREE MILE ISLAND NUCLEAR STATION, UNIT NO. 1

DOCKET NO. 50-289

1.0 INTRODUCTION

On February 17, 1981, the fire protection rule for nuclear power plants, 10 CFR 50.48 and Appendix R to 10 CFR Part 50, became effective. This rule required all licensees of plants licensed prior to January 1, 1979, to submit by March 19, 1981: (1) plans and schedules for meeting the applicable requirements of Appendix R, (2) a design description of any modifications proposed to provide alternative safe shutdown capability pursuant to Paragraph III.G.3 of Appendix R, and (3) exemption requests for which the tolling provision of Section 50.48(c)(6) was to be invoked. Section III.G of Appendix R is a retrofit item to all pre-1979 plants regardless of previous SER positions and resolutions. The criteria contained in Section III.L of Appendix R is used for those cases where licensees are incorporating alternate or dedicated shutdown capability.

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The NRC staff's previous fire protection Safety Evaluation Report (SER) dated September 1978, noted that increased capability for safe shutdown from outside the control room for fires in the control room and relay room was required. The SER further noted that the licensee had committed to provide necessary modifications to attain this capability. This SE addresses these modifications.

By submittals dated July 1, 1982, October 1, 1982, November 15, 1982, and December 2, 1982, the licensee described proposed modifications to Three Mile Island, Unit 1 to meet the requirements of Appendix R to 10 CFR Part 50, Items III.G.3 and III.L. The licensee also responded to an earlier staff request for additional information transmitted to the licensee by letter dated May 10, 1982. Additional information and clarification was obtained during a meeting held on November 5, 1982. The licensee's report entitled "Three Mile Island, Unit 1 Fire Hazards Analysis Report and Appendix R Section III.G Safe Shutdown Evaluation" enclosed with the July 1, 1982 letter contained the majority of the information on the safe shutdown capability.

The licensee has provided a safe shutdown analysis for a fire event and has demonstrated that adequate redundancy exists and/or alternative safe shutdown capability is available. Our evaluation of this follows.

2.0 POST-FIRE SAFE SHUTDOWN CAPABILITY

2.1 Systems Required for Safe Shutdown

Shutdown of the reactor and reactivity control is initially performed by rod insertion from the control room. Reactor coolant inventory and long term reactivity control is maintained by one of the makeup pumps. Primary system pressure control is maintained by the pressurizer heaters, letdown flow, makeup pump, and pressurizer spray (cold shutdown only). Decay heat removal during hot shutdown is accomplished by the emergency feedwater system and atmospheric dump valves or main steam safety valves. Decay heat removal during cold shutdown is accomplished by the decay heat removal system, decay heat closed cooling water system, and decay heat river water system.

2.2 Areas Where Alternate Safe Shutdown is Required

The NRC staff, in its fire protection SER, requested that the licensee install alternative shutdown capability independent of the cabling and equipment in the control room and relay room (cable spreading room) where redundant cabling/equipment required for safe shutdown cannot meet the requirements of Appendix R, Section III.G.2. The licensee has provided alternative safe shutdown capability for the above areas.

2.3 Section III.G.2 of Appendix R

The licensee also stated that all other areas of the plant not required to have an alternate safe shutdown system will comply with the requirements of Section III.G.2 of Appendix R, unless an exemption request has been approved by the staff.

2.4 Alternate Safe Shutdown System

The alternate safe shutdown system required for the control room and relay room utilizes existing plant systems and equipment as identified in Section 2.1, and a remote shutdown station. The remote shutdown stationconsists of the two existing electrically

independent remote shutdown panels plus new electrically isolated panels in the same area which will provide additional equipment control capability independent of the control and relay room. Transfer switches provide the electrical isolation capability for these controls. Existing controls are provided at the remote shutdown panels for the atmospheric dump valves and emergency feedwater flow control valves. Safe shutdown instrumentation is also provided at the existing remote shutdown panels, and at local locations. The instrumentation is provided with separate power cables independent of those for control room indication. Modifications are required, however, to provide electrical isolation for the source range neutron flux monitor at the remote shutdown panels. Additional controls will be provided at the new panels for one train of various safe shutdown and support system equipment including makeup system pump and valves, decay heat closed cooling water pump, decay heat river water pump, intermediate closed cycle cooling water pump, nuclear services closed cycle cooling water pump, and letdown line valves. Electrically isolated local control stations at the associated switchgears are or will be provided for a diesel generator, emergency feedwater pump, pressurizer heaters, decay heat removal pump, instrument air compressor, nuclear river water pump, reactor river water pump, and reactor building fan.

Some valves in the above systems will be manually operated at the valve as necessary. The isolation design for the remote shutdown station is such that a fire at the panels will not result in loss of necessary control and indication within the control room. "Cut and jumper" repairs are also required for certain automatic signal bypassing and to provide control of other equipment not immediately required for hot shutdown and required for cold shutdown. This is discussed further in Section 3.3. The existing plant design and modifications assure availability of equipment essential for achieving safe shutdown assuming loss of offsite power in the event of a control room or relay room fire.

3.0 EVALUATION

3.1 Performance Goals

The alternate shutdown system described in Section 2.4 will enable the achievement of the performance goals outlined in Section III.L of Appendix R as follows:

3.1.1 Reactivity Control

Safe shutdown of the reactor is performed by manual

scram of the control rods from the control room. Power can also be removed at the breaker location to achieve scram. The makeup pumps provide boron injection for subsequent reactivity control during cooldown and cold shutdown by taking suction from the makeup tank or borated water storage tank.

3.1.2 Reactor Coolant Inventory

Reactor coolant makeup is also provided by the makeup pumps which inject borated water from the makeup tank or borated water storage tank. Control of the makeup pumps and valves is available at the new remote shutdown station panels. Cooling water to the makeup pumps is provided from the decay heat closed cycle cooling water system and decay heat river water system.

3.1.3 Reactor Coolant Pressure Control

Reactor coolant pressure control is provided by the makeup pumps, pressurizer heaters, letdown line, and pressurizer spray (cold shutdown only). Normal primary depressurization utilizing the pressurizer spray is not available as it requires operation of a reactor coolant pump which is not possible with loss of offsite power. Pressurizer spray is available

after decay heat removal cut-in through the decay heat removal pump connection to the spray valve.

3.1.4 Reactor Decay Heat Removal

Decay heat removal in hot shutdown is accomplished by natural circulation through the use of the emergency feedwater pumps supplying water to the steam generators from the condensate storage tanks and rejecting heat from the steam generators to the atmosphere through the atmospheric dump valves or main steam safety valves as a backup. Long term emergency feedwater supply is provided by the river water system. The emergency feedwater flow control valves and atmospheric dump valves are controllable from the remote shutdown panels. The emergency feedwater pump is controlled at a local panel.

Decay heat removal in cold shutdown is provided by the decay heat removal system through the decay heat cooler. The decay heat closed cycle cooling water system provides cooling to the decay heat cooler, and is in turn cooled by the decay heat river water system. Pumps in these systems are controlled at the new remote shutdown station.

3.1.5 Process Monitoring

Direct indication of process variables including reactor coolant temperature (T_H and Tc), reactor coolant pressure, pressurizer level, steam generator level, steam generator pressure, makeup tank level, borated water storage tank level, source range neutron flux, and decay heat removal system flow and temperature are provided at the remote shutdown panels. Condensate storage tank level indication is available at the local tank indicators. Diagnostic indications available at local locations include makeup system pressure, emergency feedwater system pressure, decay heat, nuclear services and intermediate closed cycle cooling systems pressure, and decay heat and nuclear services river water system pressure.

3.1.6 Support Functions

The diesel generators, decay heat closed cycle cooling water system, nuclear services closed cycle cooling water system, intermediate closed cycle cooling water system, decay heat river water system, nuclear services river water system, reactor river water system, essential ventilation systems, instrument air system

and plant communication system are available to provide necessary support functions for the alternate shutdown system. Control and monitoring capability for these support systems is provided at the new remote shutdown station or local locations.

3.2 72-Hour Requirement

The licensee has stated that the capability exists to achieve cold shutdown within 72 hours after a fire event assuming no offsite power is available.

3.3 Repairs

The licensee has identified the need for certain repairs in order to achieve cold shutdown within 72 hours. A "cut and jumper" of various circuits is required in order to prevent inadvertent signals and equipment operation and provide other equipment control. These actions are not required for a number of hours after shutdown begins and are not required for achieving hot shutdown. These specific "cut and jumper" actions are required to start the control building emergency recirculation ventilation fans, and intermediate building fan and to bypass the automatic high

pressure injection signal on low reactor coolant pressure and the automatic low pressure injection signal, and to isolate the core flood tanks. In addition, "cut and jumper" repairs are necessary for achieving cold shutdown. This action is required specifically in order to open the decay heat removal pressurizer spray valve. The licensee stated that the necessary repair procedures for the above actions will be developed and that the required materials will be stored on site.

3.4 Associated Circuits and Isolation

The licensee conducted a review of the present electrical systems to determine the plant's capability to meet the associated circuit criteria as stated in Appendix R relating to safe shutdown and concluded that the existing electrical installation with some additional equipment modifications would satisfy these criteria. Modifications including isolation devices are necessary to the circuitry for a diesel generator, pumps and valves as previously discussed in order to assure their operability in case of fire in the control room or relay room. The licensee has addressed associated circuits of concern as discussed below.

3.4.1 Common Power Source

The licensee stated that all instrumentation and power circuits are protected or will be provided with coordinated protection by either circuit breakers or fuses.

3.4.2 Common Enclosure

As in the common power source case, the licensee stated that associated circuits that share a common enclosure with those required for safe shutdown are provided with isolation devices.

3.4.3 Spurious Signals

The licensee stated that fires in the control room or relay room can cause spurious signals which could impair safe shutdown. Therefore, the isolated remote shutdown station and local control stations for safe shutdown equipment will be provided as previously discussed to assure proper equipment operation. Circuits to equipment whose spurious operation can cause an unacceptable condition will be de-energized at the new remote shutdown station panels, local switchgear or motor control centers. Further, in

order to prevent spurious opening of the high/low pressure interface valves between the reactor coolant system and decay heat removal system, one of the motor operated valves will have its power supply breaker normally open at all times when the system is not in operation.

3.5 Safe Shutdown Procedures and Manpower

The licensee will revise existing safe shutdown procedures to incorporate the above described alternate shutdown method. The licensee further states that the revisions will be made to assure that the necessary shutdown functions can be performed at all times by manpower available.

4.0 CONCLUSION

We have reviewed the licensee's proposed alternate shutdown capability for Three Mile Island Unit 1 in accordance with Appendix R criteria. Based on that review, we conclude that the performance goals for accomplishing safe shutdown in the event of a fire, i.e., reactivity control, inventory control, decay heat removal, pressure control, process monitoring

and support functions are met by the proposed alternate. Therefore, we conclude that the requirements of Appendix R, Sections III.G.3 and III.L are satisfied for fires in the control room and relay room (2.2).