



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

March 24, 1986

Docket No. 50-219

Mr. P. B. Fiedler
Vice President and Director
Oyster Creek Nuclear Generating Station
Post Office Box 388
Forked River, New Jersey 08731

Dear Mr. Fiedler:

SUBJECT: EXEMPTIONS FROM REQUIREMENTS OF APPENDIX R TO 10 CFR PART 50,
SECTION III.G.2 AND THE POST FIRE SAFE SHUTDOWN CAPABILITY
(TAC 56740, 56786)

Re: Oyster Creek Nuclear Generating Station

The Commission has issued the enclosed exemptions to certain requirements of Section III.G.2 of 10 CFR Part 50, Appendix R, Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979. This is in response to your letters of April 3, 1985; July 12, 1985; and October 9, 1985. The April 3, 1985, submittal superseded your previous submittal of December 16, 1983 and February 13, and May 3, 1984. In the meeting of February 11, 1986, your staff provided additional information on the need for the requested exemptions. The meeting minutes are dated February 28, 1986.

Subsection III.G specifies the separation, fire barrier and suppression requirements where both trains for redundant safe shutdown components are located within the same fire area. Your initial request for seven exemptions from the specific provisions of Section III.G was reduced by the staff to four exemptions because the staff concluded that three were not needed (Enclosure 1). The bases for these four exemptions including the bases for the licensee not needing the three are presented in the Safety Evaluation (Enclosure 2). Also included in the Safety Evaluation (Section 8) is the staff approval of the post fire safe shutdown capability for Oyster Creek.

In the enclosed Safety Evaluation supporting the exemptions from 10 CFR Part 50, Appendix R, and the post fire safe shutdown capability, there are several references to your commitments to future modifications. Your commitments are that these modifications will be made before the restart from the upcoming Cycle 11 Refueling outage scheduled to commence in April 1986. We request that appropriate technical specifications on the minimum open-close cycles for the accumulators and accessibility of local air cylinders to be provided for air-operated valves required for safe shutdown, in Section 8.1.4 of the Safety Evaluation, be submitted before restart from this outage.

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Mr. P. B. Fiedler

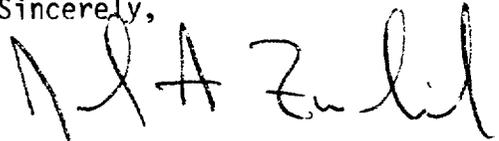
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March 24, 1986

A Notice of Environmental Assessment and Finding of No Significant Impact was published in the Federal Register on December 3, 1985 (50 FR 49633).

This exemption is being forwarded to the Office of the Federal Register for publication.

Sincerely,

A handwritten signature in black ink, appearing to read "John A. Zwolinski". The signature is written in a cursive style with a large initial "J" and "Z".

John A. Zwolinski, Director
BWR Project Directorate #1
Division of BWR Licensing

Enclosures:

1. Exemptions
2. Safety Evaluation

cc w/enclosures:

See next page

50-219

MAR 24 1986

Mr. P. B. Fiedler

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open-close cycles for the accumulators and accessibility of local air cylinders to be provided for air-operated valves required for safe shutdown, in Section 8.1.4 of the Safety Evaluation, be submitted before restart from this outage.

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Sincerely,

~~original signed by~~

John A. Zwolinski, Director
BWR Project Directorate #1
Division of BWR Licensing

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Mr. P. B. Fiedler

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Sincerely,

John A. Zwolinski, Director
BWR Project Directorate #1
Division of BWR Licensing

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Mr. P. B. Fiedler
Oyster Creek Nuclear Generating Station

Oyster Creek Nuclear
Generating Station

cc:
Ernest L. Blake, Jr.
Shaw, Pittman, Potts and Trowbridge
1800 M Street, N.W.
Washington, D.C. 20036

Resident Inspector
c/o U.S. NRC
Post Office Box 445
Forked River, New Jersey 08731

J.B. Liberman, Esquire
Bishop, Liberman, Cook, et al.
1155 Avenue of the Americas
New York, New York 10036

Commissioner
New Jersey Department of Energy
101 Commerce Street
Newark, New Jersey 07102

Regional Administrator, Region I
U.S. Nuclear Regulatory Commission
631 Park Avenue
King of Prussia, Pennsylvania 19406

Eugene Fisher, Assistant Director
Division of Environmental Quality
Department of Environmental
Protection
380 Scotch Road
Trenton, New Jersey 08628

BWR Licensing Manager
GPU Nuclear
100 Interpace Parkway
Parsippany, New Jersey 07054

Deputy Attorney General
State of New Jersey
Department of Law and Public Safety
36 West State Street - CN 112
Trenton, New Jersey 08625

Mayor
Lacey Township
818 West Lacey Road
Forked River, New Jersey 08731

D. G. Holland
Licensing Manager
Oyster Creek Nuclear Generating Station
Post Office Box 388
Forked River, New Jersey 08731

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

III.

By letter dated April 3, 1985, as supplemented by letters dated July 12 and October 9, 1985, the licensee requested seven exemptions for thirteen fire areas from the requirements of Section III.G of Appendix R, to the extent that it requires physical separation and/or fire protection systems to protect redundant trains of safe shutdown related cable and equipment. The April 3, 1985, submittal superseded the licensee's letters dated December 16, 1983, and February 13 and May 3, 1984.

In the meeting summary dated February 28, 1986, the licensee provided information relevant to the "special circumstances" finding required by revised 10 CFR 50.12(a) (See 50 Fed. Reg. 50764). The licensee stated that

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existing and proposed fire protection features at Oyster Creek accomplish the underlying purpose of the rule. Implementing additional modifications to provide additional suppression systems, detection systems, and fire barriers would require the expenditure of engineering and construction resources as well as the associated capital costs which would represent an unwarranted burden on the licensee's resources. The licensee stated that the costs to be incurred are as follows:

- ° Engineering and installation of additional piping, sprinkler heads, and supporting structures.
- ° Engineering and installation of fire barriers, supports, support protection, and ongoing maintenance.
- ° Significant rerouting of high power cabling and associated conduits, ducts, and supports.
- ° Possible need to provide additional fire pumps and/or diesel generator capacity.
- ° Increased surveillance on new or extended fire suppression and fire detection systems.
- ° Increased congestion in numerous plant locations complicating future plant modifications/operation.

The licensee stated that these costs are significantly in excess of those required to meet the underlying purpose of the rule. The staff concludes that "special circumstances" exist for the licensee's requested exemptions in that application of the regulation in these particular circumstances is not necessary to achieve the underlying purposes of Appendix R to 10 CFR Part 50. See 10 CFR 50.12(a)(2)(ii).

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The licensee's request for seven exemptions (thirteen fire areas) was reduced to four exemptions (eight fire areas) because the staff concluded that three exemptions (five areas) were not needed. The acceptability of the exemption requests for each of the eight fire areas is addressed below. Details are contained in the NRC staff's related Safety Evaluation.

The fire areas related to the four exemptions addressed herein are:

- (1) Reactor Building Elevation 51 feet (Fire Area RB-FZ-1D)
- (2) Reactor Building Elevation 23 feet (Fire Area RB-FZ-1E) (1 of 2 exemptions)
- (3) Reactor Building Elevation (-) 19 feet (Fire Area RB-FZ-1F)
- (4) Turbine Building Lube Oil Area (Fire Area TB-FZ-11B)
- (5) Turbine Building Basement Floor-South End (Fire Area TB-FZ-11D)
- (6) Turbine Building Condenser Bay (Fire Area TB-FZ-11E)
- (7) Turbine Building Basement & Mezzanine (Fire Area TB-FZ-11H)
- (8) Office Building - 480V Switchgear Room (Fire Area OB-FA-6B)
(1 of 2 exemptions)

Based on our evaluation, we concluded that the three exemptions requested for the following areas are not needed:

- (9) Reactor Building Elevation 23 feet (Fire Area RB-FZ-1E) (1 of 2 exemptions)
- (10) Office Building - 480V Switchgear Room (Fire Area OB-FA-6B) (1 of 2 exemptions)
- (11) Office Building - Motor Generator Set Room (Fire Area OB-FA-8A)
- (12/13) Office Building - Battery & Electrical Tray Room (Fire Area OB-FZ-8C)
(2 exemptions)

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Exemption 1 (Fire Areas RB-FZ-1D, 1E and 1F and Fire Area OB-FA-6B)

The licensee requested an exemption from the technical requirements of Section III.G of Appendix R in each of these areas to the extent that it requires the installation of an area-wide automatic fire suppression system.

Discussion (Fire Area RB-FZ-1D)

This area is bounded by walls, floor and ceiling of reinforced concrete. However, this portion of the Reactor Building communicates, via unprotected openings, with other plant locations which the licensee has designated as separate fire areas. These penetrations are delineated in Appendix E of the licensee's April 3, 1985 report.

This fire area contains electrical circuits for hot shutdown paths 1, 2, 3, and 4 and for cold shutdown paths 1, 2 and 3 as defined in the above-referenced report. For a fire in this area, hot shutdown is achieved using systems from path 1 and cold shutdown is achieved using path 3. All required hot shutdown path 1 systems that are located in this area are protected by a 1-hour fire-rated barrier. Cold shutdown path 3 systems in this area that would be damaged in a fire can either be repaired within 72 hours or an alternate means of achieving shutdown exists outside of this fire area via manual operation of certain valves.

The fire loading in this area has been calculated to be 12,500 BTU/sq.ft. which corresponds to a fire severity of less than 10 minutes as determined by the ASTM E-119 time-temperature curve.

Existing fire protection includes an area-wide fire detection system; two fixed, water spray deluge systems which cover cables in trays; portable fire extinguishers and manual hose stations. The licensee has committed

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to reroute certain safe shutdown-related circuits outside of this fire area and to protect others in a 1-hour fire barrier as delineated in the April 3, 1985 fire hazards analysis report.

Discussion (Fire Area RB-FZ-1E)

This area is bounded by walls, floor and ceiling of reinforced concrete, which contain unprotected openings into adjoining plant locations, that the licensee has identified as separate fire areas, as delineated in the April 3, 1985 report.

This fire area contains electrical circuits for hot shutdown paths 1, 2, 3 and 4 and for cold shutdown paths 1, 2 and 3 as defined in the above-referenced report. For a fire in this area, hot shutdown is achieved using shutdown path 1 and cold shutdown using path 3. With the exception of the reactor scram system circuitry, all required hot shutdown path 1 systems that would be damaged by a fire in this area are protected by a 1-hour fire barrier. Cold shutdown path 3 systems in this area that would be subject to fire damage can either be repaired within 72 hours or an alternate means of achieving safe shutdown exists outside of this fire area by manual operation of certain valves.

The fire loading in this area has been calculated to be 20,000 BTU/sq.ft. which corresponds to a fire severity of less than 16 minutes as determined by the ASTM E-119 time-temperature curve.

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Existing fire protection includes an area-wide fire detection system; two fixed, water spray deluge systems which cover cables in trays; portable fire extinguishers and manual hose stations. The licensee has committed to re-route certain safe-shutdown-related circuits outside of this fire area and to protect others in a 1-hour fire barrier as delineated in the April 3, 1985 report.

Discussion (Fire Area RB-FZ-1F)

This area is bounded by walls, floor and ceiling of reinforced concrete which contain unprotected openings into an adjoining plant location that the licensee has identified as a separate fire area.

This fire area contains electrical circuits for hot shutdown paths 1, 2, 3, and 4 and for cold shutdown paths 1, 2, and 3 as defined in the April 3, 1985 report. For a fire in this area, hot shutdown is achieved using shutdown path 1 and cold shutdown using path 1. All required hot shutdown systems that would be damaged by a fire in this area are protected by a 1-hour fire barrier. If cold shutdown path 3 systems were lost in a fire, an alternate means of achieving safe shutdown exists which is independent of this fire area.

The fire loading in this area has been calculated to be 1,500 BTU/sq. ft. which corresponds to a fire severity of less than 2 minutes as determined by the ASTM E-119 time-temperature curve.

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Existing fire protection includes an automatic fire detection system; portable fire extinguishers and manual hose stations. The licensee has committed to reroute certain safe shutdown circuits outside of this fire area and to protect others in a 1-hour fire barrier as delineated in the April 3, 1985 report.

Discussion (Fire Area OB-FA-6B)

This fire area is bounded by walls, floor and ceiling of 3-hour fire-rated construction except for the 1-hour rated wall common with adjacent fire area OB-FA-6A. In the event of a fire in this location, hot and cold shutdown will be achieved using shutdown path 2. The required shutdown-related cables are either protected by a 1-hour fire barrier or an alternate means for achieving safe-shutdown is available outside of this area.

The fire load has been calculated to be 71,000 BTU/sq. ft. which represents a fire severity of less than 1-hour as determined by the ASTM E-119 time-temperature curve.

Existing fire protection includes an area-wide fire detection system; an automatic halon fire suppression system for the switchgear room portion of this fire area; portable fire extinguishers and manual hose stations. In the April 3, 1985 report, the licensee proposed to make structural, ventilation system and halon system modifications to isolate this fire area from adjacent plant locations; to reroute certain shutdown related cables and to protect others in a 1-hour fire-rated barrier.

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The licensee justified the exemptions in these four areas on the basis of the low fire loading, the existing fire protection and the proposed modifications.

Evaluation

The technical requirements of Section III.G.2 are not met in these locations because of the absence of an area-wide automatic fire suppression system. In addition, Section III.G.3 is not met because of the absence of an area-wide, fixed, fire suppression system in a location where an alternate shutdown capability has been provided.

Our principal concern was that in the event of a fire the absence of an area-wide automatic fire suppression system would result in loss of all shutdown capability. However, the fire load in these areas is low, with combustible material generally dispersed. Where concentrated quantities of combustible cable insulation exists, the cables are protected by a deluge system.

All of these areas are protected by a fire detection system. If a fire should occur, the staff has determined that it will be detected in its incipient stages, before significant propagation occurred. The fire would then be put out by the plant fire brigade using the portable fire extinguishers and manual hose stations. If rapid room temperature rise occurred before the arrival of the brigade, existing fire suppression systems will actuate to limit fire spread, to protect the cables covered by the systems and to reduce room temperature. Until the arrival of the brigade and eventual fire suppression, the 1-hour fire

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barriers installed to protect one shutdown pathway provides sufficient passive fire protection to provide us with reasonable assurance that those systems would remain free of fire damage. For those redundant shutdown systems that are not similarly protected, the licensee has identified an alternate capability that is physically and electrically independent of these fire areas. For certain cold shutdown systems that might be lost in a fire, the licensee has repair procedures with materials on site, that will enable these systems to be restored to operable condition within 72 hours. Therefore, the absence of area-wide fire suppression systems is not necessary to provide reasonable assurance that safe-shutdown conditions can be achieved and maintained.

Based on our evaluation, we conclude that the licensee's alternate fire protection configuration with the proposed modifications, will achieve an acceptable level of fire protection equivalent to that required by Sections III.G.2 and III.G.3. Therefore, the licensee's request for exemption from an area-wide fire suppression system in the following areas should be granted:

- Reactor Building Elevation 51 feet (Fire Area RB-FZ-1D)
- Reactor Building Elevation 23 feet (Fire Area RB-FZ-1E)
- Reactor Building Elevation (-) 19 feet (Fire Area RB-FZ-1F)
- Office Building-480V Switchgear Room (Fire Area OB-FA-6B)

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Exemption 2 (Fire Areas TB-FZ-11B and TB-FZ-11H)

The licensee requested an exemption from the technical requirement of Section III.G.2 of Appendix R in these two areas to the extent that it requires that redundant shutdown circuits in a pit area be separated by a 3-hour fire barrier.

Discussion (Fire Area TB-FZ-11B)

This area is bounded by masonry walls, floor and ceiling. However, this portion of the Turbine Building communicates, via unprotected openings, with other plant areas that the licensee has identified as separate fire areas. These penetrations are delineated in Appendix E of the licensee's April 3, 1985 report.

This fire area contains electrical circuits for hot shutdown paths 1, 2, 3, and 4 and cold shutdown paths 1, 2, and 3 as defined in the April 3, 1985 report. For a fire in this area, hot shutdown is achieved using hot shutdown path 1, with isolation condenser system "A" instead of "B". Cold shutdown is achieved using path 1. Redundant shutdown-related circuits are located in a pit area where separation per the requirements of Section III.G.2 is not achieved.

The fire load in this area has been calculated to be approximately 586,000 BTU/sq. ft., which represents a fire severity of approximately 7 hours as determined by the ASTM E-119 time-temperature curve. The principal combustible material consists of turbine lube oil and cable insulation.

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Existing fire protection includes a fire detection system, an automatic sprinkler system over cable trays; water spray systems for the lube oil storage tank; a sprinkler system for the bearing lift pumps; portable fire extinguishers and manual hose stations. In the April 3, 1985 report, the licensee committed to reroute certain safe shutdown circuits outside of this fire area. The licensee also committed to fill the pit area where vulnerable shutdown-related cables are located with sand or with a fire-rated silicon foam.

Discussion (TB-FZ-11H)

This area is bounded by reinforced concrete walls, floor and ceiling. However, this portion of the Turbine Building communicates, via unprotected openings, with other plant locations that the licensee has identified as separate fire areas.

This fire area contains electrical circuits for hot shutdown paths 1, 2, 3, and 4 and cold shutdown paths 1, 2, and 3 as defined in the April 3, 1985 report. For a fire in this area, hot and cold shutdown will be achieved using shutdown path 2. Shutdown path 2 circuits are located in a pit area where separation per the requirements of Section III.G.2 is not achieved.

There are no in-situ fire hazards in this location. The fire load as calculated by the licensee is negligible.

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Existing fire protection includes portable fire extinguishers and manual hose stations. The licensee committed to fill the pit area where vulnerable shutdown cables are located with sand or with a fire-rated silicon foam.

The licensee justified the exemptions in these locations on the basis that the fire hazard in the pits is negligible. Also, the fire hazard in the area around the pit is either negligible or mitigated by fire suppression systems. The licensee also justified these exemptions on the ability of the sand or silicon foam to prevent fire damage to redundant cables where they are vulnerable.

Evaluation

The technical requirements of Section III.G.2 are not met in this area because redundant shutdown-related cables are not separated by a 3-hour barrier within the pit area.

Our concern was that because of the lack of adequate physical separation, the cables in these pits would be vulnerable to fire damage. However, because the pits are located in the floor and because products of combustion rise in a fire, we do not expect a fire outside the pit to have any significant affect on the cables within the pit. Also, because the pit area will be filled with sand or a fire-rated silicon foam, we have reasonable assurance that a fire will not originate within it or that a possible flammable liquid spill would affect the cables.

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Based on our evaluation, we conclude that the licensee's alternate fire protection configuration with the proposed modifications will achieve an acceptable level of fire protection equivalent to that provided by Section III.G.2. Therefore, the licensee's request for exemption from a 3-hour fire barrier in the following locations should be granted:

Turbine Building Lube Oil Area (Fire Area TB-FZ-11B)

Turbine Building Basement & Mezzanine (Fire Area TB-FZ-11H)

Exemption 3 (Fire Area TB-FZ-11D)

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

Discussion

This area is bounded by walls, floor and ceiling of reinforced concrete. However, this portion of the Turbine Building communicates, through unprotected openings, with adjoining plant locations that the licensee has identified as separate fire areas. These penetrations are delineated in the licensee's April 3, 1985 report.

This fire area contains electrical circuits for hot shutdown paths 1, 2, 3, and 4 and for cold shutdown paths 1, 2, and 3 as described in the above-referenced report.

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For a fire in this area both hot and cold shutdown is achieved using shutdown path 1. All required path 1 shutdown-related circuits are either protected by a 1-hour fire-rated barrier or the licensee has identified an alternate means which is independent of this area to safely shut down the plant.

The fire load in this location has been calculated to be 12,400 BTU/sq.ft., which represents a fire severity of less than 10 minutes.

Existing fire protection includes an automatic sprinkler system which protects cables in trays; a water spray system which covers the hydrogen seal oil unit; portable fire extinguishers and manual hose stations. In the April 3, 1985 report, the licensee committed to relocate certain shutdown-related cables and to protect others in a 1-hour fire-rated barrier.

The licensee justifies this exemption on the basis of the low fire loading, existing fire protection and proposed modifications.

Evaluation

The technical requirements of Section III.G. are not met in this area because of the absence of area-wide fire detection and suppression systems. Section III.G.3 is not met because a fixed fire detection and suppression system has not been provided for circuits for which an alternate shutdown capability has been provided.

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We were concerned that because this area was not protected by an area-wide fire detection and suppression system a fire would damage redundant shutdown systems. However, the fire load is low with combustible materials generally dispersed. Where concentrated quantities of combustible materials exist, such as in cable trays and the hydrogen seal oil unit, these combustibles are protected by an automatic fire suppression system. Where no concentrated combustibles exist, we expect a fire in those locations to be of initially limited magnitude and extent. Upon discovery by plant operators, the fire brigade would be dispatched and would put out the fire using existing manual fire fighting equipment. If the fire occurred in the cable trays or in the seal oil unit, we expect the fire suppression systems to actuate and control fire spread. Until the arrival of the fire brigade and eventual fire extinguishment, those required shutdown systems that are vulnerable to fire damage in this area are protected by a 1-hour fire barrier. Therefore, an area-wide fire detection and suppression system is not necessary to provide reasonable assurance that safe shutdown could be achieved and maintained.

Based on our evaluation, we conclude that the licensee's alternate fire protection configuration with the proposed modifications will achieve an acceptable level of fire protection equivalent to that required by Sections III.G.2 and III.G.3. Therefore, the licensee's request for exemption from an area-wide fire detection and suppression system in the Turbine Building Basement Floor-South End (Fire Area TB-FZ-11D) should be granted.

Exemption 4 (Fire Area TB-FZ-11E)

The licensee requested an exemption from the technical requirements of Section III.G.3 of Appendix R to the extent that it requires a fixed fire detection system in an area for which an alternate shutdown capability has been provided.

Discussion

The area is bounded by reinforced concrete walls, floor and ceiling. However, this portion of the Turbine Building communicates, through unprotected openings, with other plant locations that the licensee has identified as separate fire areas.

This fire area contains electrical circuits for hot shutdown paths 1, 2, 3 and 4 and for cold shutdown paths 1, 2, and 3 as defined in the licensee's April 3, 1985 report. For a fire in this area, hot and cold shutdown is achieved using shutdown path 1. For those required shutdown path 1 systems that are located in this area and may be damaged by a fire, the licensee has provided an alternate capability that is physically and electrically independent of this fire area.

The fire load in this location has been calculated to be 8,100 BTU/sq. ft., which represents a fire severity of less than 7 minutes.

Existing fire protection includes an automatic sprinkler system located throughout the condenser bay; portable fire extinguishers and manual hose stations. In the April 3, 1985 report, the licensee committed to reroute certain shutdown-related circuits outside of this fire area.

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The licensee justified the exemption on the bases of the low fire load, the existing fire protection, the proposed modifications and the ability to safely shut down the plant if a fire should occur in this area.

Evaluation

The technical requirements of Section III.G.3 are not met in this area because of the absence of a fire detection systems.

We were concerned that if a fire should occur, products of combustion would spread into adjoining fire areas and damage systems that would be necessary to safely shut down the plant. However, the fire load in this location is low. Combustible materials are dispersed throughout the area. We, therefore, expect a potential fire to develop slowly with initially low heat buildup and smoke generation. Upon discovery of the fire, the plant fire brigade would respond and extinguish it using manual fire fighting equipment. If the fire increased in intensity prior to the arrival of the brigade, we expect the automatic sprinkler system to actuate to control the fire, to limit room temperature rise and to protect the shutdown systems that may be threatened. If redundant shutdown systems were damaged within this location, an alternate shutdown capability exists that is outside this fire area. Because some of the walls and the ceiling contain unprotected openings we expect some smoke to propagate into adjoining fire areas. But because of the automatic sprinkler

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system in this area and the low fire loading, we conclude that the amount of smoke would not represent a significant threat to shutdown systems in the adjoining fire area. We, therefore, conclude that the absence of a smoke detector system in this area has no safety significance.

Based on our evaluation, we conclude that the licensee's alternate fire protection configuration with the proposed modifications, will achieve an acceptable level of fire protection equivalent to that required by Sections III.G.2 and III.G.3. Therefore, the licensee's request for exemption from a fire detection system in the Turbine Building Condenser Bay (Fire Area TB-FZ-11E) should be granted.

IV.

Accordingly, the Commission has determined pursuant to 10 CFR 50.12(a), that (1) these exemptions as described in Section III are authorized by law, will not present an undue risk to the public health and safety, and are consistent with the common defense and security, and (2) special circumstances are present for these exemptions in that application of the regulation in these particular circumstances is not necessary to achieve the underlying purposes of Appendix R to 10 CFR Part 50. Therefore, the Commission hereby grants the exemption requests identified in Section III above.

Pursuant to 10 CFR 51.32 the Commission has determined that the granting of these exemptions will not result in any significant environmental impact (50 FR 49633, December 3, 1985).

The Safety Evaluation dated March , 1986, related to this action and the above referenced submittals by the licensee are available for public inspection at the Commission's Public Document Room, 1717 H Street, N.W., Washington, D.C. 20555, and at the Ocean County Library, 101 Washington Street, Toms Rivers, New Jersey 08753.

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A copy of the Safety Evaluation may be obtained upon written request to the U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, Attention: Director, Division of BWR Licensing.

These exemptions are effective upon issuance.

Dated at Bethesda, Maryland this 24th day of March 1986.

FOR THE NUCLEAR REGULATORY COMMISSION



Robert M. Bernero, Director
Division of BWR Licensing
Office of Nuclear Reactor Regulation



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING EXEMPTION FROM 10 CFR PART 50, APPENDIX R

AND THE POST FIRE SAFE SHUTDOWN CAPABILITY

GPU NUCLEAR CORPORATION AND

JERSEY CENTRAL POWER & LIGHT COMPANY

OYSTER CREEK NUCLEAR GENERATING STATION

DOCKET NO. 50-219

1.0 INTRODUCTION

By letter dated April 3, 1985, as supplemented by letters dated July 12 and October 9, 1985, the licensee submitted a revised Fire Hazards Analysis Report and Safe Shutdown Evaluation for Oyster Creek Nuclear Generating Station (Oyster Creek). This report supersedes the previous submittal dated December 16, 1983, and February 13 and May 3, 1984. Seven exemptions to the technical requirements of Section III.G of Appendix R to 10 CFR Part 50 were requested.

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

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

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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 that a fixed suppression system 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 or existing protection in conjunction with proposed modifications will provide a level of safety equivalent to the technical requirements of Section III.G of Appendix R.

In summary, Section III.G is related to fire protection features for ensuring that systems and associated circuits used to achieve and maintain safe shutdown are free of fire damage. Fire protection configurations must either meet the specific requirements of Section III.G or an alternative fire protection configuration must be justified by a fire hazard analysis.

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

- ° The alternative assures that one train of equipment necessary to achieve hot shutdown from either the control room or emergency control stations is free of fire damage.
- ° The alternative assures that fire damage to at least one train of equipment 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.

Therefore, by letter dated April 3, 1985, as supplemented by letters dated July 12 and October 9, 1985, the licensee has requested 7 exemptions for 13 fire areas from the requirements of Section III.G of Appendix R, to the extent that it requires physical separation and/or fire protection systems to protect redundant trains of safe shutdown related cable or equipment. Based on our evaluation, we conclude that 3 exemptions for 5 fire areas are not needed. This is addressed in Section 6.0. The other 4 exemptions for 8 fire areas are addressed below in Sections 2.0 through 5.0.

2.0 EXEMPTION 1

- 2.0.1 Reactor Building Elevation 51 feet (Fire Area RB-FZ-1D)
- 2.0.2 Reactor Building Elevation 23 feet (Fire Area RB-FZ-1E)
- 2.0.3 Reactor Building Elevation (-) 19 feet (Fire Area RB-FZ-1F)
- 2.0.4 Office Building - 480V Switchgear Room (Fire Area OB-FA-6B)

2.1 Exemption Requested

The licensee requested an exemption from the technical requirements of Section III.G of Appendix R in each of these areas to the extent that it requires the installation of an area-wide automatic fire suppression system.

2.2.1 Discussion (Fire Area RB-FZ-1D)

This area is bounded by walls, floor and ceiling of reinforced concrete. However, this portion of the Reactor Building communicates, via unprotected openings, with other plant locations which the licensee has designated as separate fire areas. These penetrations are delineated in Appendix E of the licensee's April 3, 1985 report.

This fire area contains electrical circuits for hot shutdown paths 1, 2, 3, and 4 and for cold shutdown paths 1, 2 and 3 as defined in the above-referenced report. For a fire in this area, hot shutdown is achieved using systems from path 1 and cold shutdown is achieved using path 3. All required hot shutdown path 1 systems that are located in this area are protected by a 1-hour fire-rated barrier. Cold shutdown path 3 systems in this area that would be damaged in a fire can either be repaired within 72 hours or an alternate means of achieving shutdown exists outside of this fire area via manual operation of certain valves.

The fire loading in this area has been calculated to be 12,500 BTU/sq.ft. which corresponds to a fire severity of less than 10 minutes as determined by the ASTM E-119 time-temperature curve.

Existing fire protection includes an area-wide fire detection system; two fixed, water spray deluge systems which cover cables in trays; portable fire extinguishers and manual hose stations. The licensee has committed to re-route certain safe shutdown-related circuits outside of this fire area and to protect others in a 1-hour fire barrier as delineated in the April 3, 1985 fire hazards analysis report.

2.2.2 Discussion (Fire Area RB-FZ-1E)

This area is bounded by walls, floor and ceiling of reinforced concrete, which contain unprotected openings into adjoining plant locations, that the licensee has identified as separate fire areas, as delineated in the April 3, 1985 report.

This fire area contains electrical circuits for hot shutdown paths 1, 2, 3 and 4 and for cold shutdown paths 1, 2 and 3 as defined in the above-referenced report. For a fire in this area, hot shutdown is achieved using shutdown path 1 and cold shutdown using path 3. With the exception of the reactor scram system circuitry (refer to Section 6.0 of this report), all required hot shutdown path 1 systems that would be damaged by a fire in this area are protected by a 1-hour fire barrier. Cold shutdown path 3 systems in this area that would be subject to fire damage can either be required within 72 hours or an alternate means of achieving safe shutdown exists outside of this fire area by manual operation of certain valves.

The fire loading in this area has been calculated to be 20,000 BTU/sq.ft. which corresponds to a fire severity of less than 16 minutes as determined by the ASTM E-119 time temperature curve.

Existing fire protection includes an area-wide fire detection system; two fixed, water spray deluge systems which cover cables in trays; portable fire extinguishers and manual hose stations. The licensee has committed to re-route certain safe-shutdown-related circuits outside of this fire area and to protect others in a 1-hour fire barrier as delineated in the April 3, 1985 report.

2.2.3 Discussion (Fire Area RB-FZ-1F)

This area is bounded by walls, floor and ceiling of reinforced concrete which contain unprotected openings into an adjoining plant location that the licensee has identified as a separate fire area.

This fire area contains electrical circuits for hot shutdown paths 1, 2, 3, and 4 and for cold shutdown paths 1, 2, and 3 as defined in the April 3, 1985 report. For a fire in this area, hot shutdown is achieved using shutdown path 1 and cold shutdown using path 1. All required hot shutdown systems that would be damaged by a fire in this area are protected by a 1-hour fire barrier. If cold shutdown path 3 systems were lost in a fire, an alternate means of achieving safe shutdown exists which is independent of this fire area.

The fire loading in this area has been calculated to be 1,500 BTU/sq. ft. which corresponds to a fire severity of less than 2 minutes as determined by the ASTM E-119 time-temperature curve.

Existing fire protection includes an automatic fire detection system; portable fire extinguishers and manual hose stations. The licensee has committed to re-route certain safe shutdown circuits outside of this fire area and to protect others in a 1-hour fire barrier as delineated in the April 3, 1985 report.

2.2.4 Discussion (Fire Area OB-FA-6B)

This fire area is bounded by walls, floor and ceiling of 3-hour fire-rated construction except for the 1-hour rated wall common with adjacent fire area OB-FA-6A. In the event of a fire in this location, hot and cold shutdown will be achieved using shutdown path 2. The required shutdown-related cables are either protected by a 1-hour fire barrier or an alternate means for achieving safe-shutdown is available outside of this area.

The fire load has been calculated to be 71,000 BTU/sq. ft. which represents a fire severity of less than 1-hour as determined by the ASTM E-119 time-temperature curve.

Existing fire protection includes an area-wide fire detection system; an automatic halon fire suppression system for the switchgear room portion of this fire area; portable fire extinguishers and manual hose stations. In the April 3, 1985 report, the licensee proposed to make structural ventilation system and halon system modifications to isolate this fire area from adjacent plant locations; to reroute certain shutdown related cables and to protect others in a 1-hour fire-rated barrier.

The licensee justified the exemptions in these four areas on the basis of the low fire loading, the existing fire protection and the proposed modifications.

2.3 Evaluation

The technical requirements of Section III.G.2 are not met in these locations because of the absence of an area-wide automatic fire suppression system. In addition, Section III.G.3 is not met because of the absence of an area-wide, fixed, fire suppression system in a location where an alternate shutdown capability has been provided.

Our principal concern was that in the event of a fire the absence of an area-wide automatic fire suppression system would result in loss of all shutdown capability. However, the fire load in these areas is low, with combustible material generally dispersed. Where concentrated quantities of combustible cable insulation exists, the cables are protected by a deluge system.

All of these areas are protected by a fire detection system. If a fire should occur, we expect it to be detected in its formative stages, before significant propagation occurred. The fire would then be put out by the plant fire brigade using the portable fire extinguishers and manual hose stations. If rapid room temperature rise occurred before the arrival of the brigade, we expect existing fire suppression systems to actuate to limit fire spread, to protect the cables covered by the systems and to reduce room temperature. Until the arrival of the brigade and eventual fire suppression, the 1-hour fire barriers installed to protect one shutdown pathway, provides sufficient passive fire protection to provide us with reasonable assurance that those systems

would remain free of fire damage. For those redundant shutdown systems that are not similarly protected, the licensee has identified an alternate capability that is physically and electrically independent of these fire areas. For certain cold shutdown systems that might be lost in a fire, the licensee has repair procedures with materials on site, that will enable these systems to be restored to operable condition within 72 hours. Therefore, the absence of area-wide fire suppression systems is not necessary to provide reasonable assurance that safe-shutdown conditions can be achieved and maintained.

2.4 Conclusion

Based on our evaluation, we conclude that the licensee's alternate fire protection configuration with the proposed modifications, will achieve an acceptable level of fire protection equivalent to that provided by Sections III.G.2 and III.G.3. Therefore, the licensee's request for exemption from an area-wide fire suppression system in the following areas should be granted:

- Reactor Building Elevation 51 feet (Fire Area RB-FZ-1D)
- Reactor Building Elevation 23 feet (Fire Area RB-FZ-1E)
- Reactor Building Elevation (-) 19 feet (Fire Area RB-FZ-1F)
- Office Building-480V Switchgear Room (Fire Area OB-FA-6B)

3.0 EXEMPTION 2

3.0.1 Turbine Building Lube Oil Area (Fire Area TB-FZ-11B)

3.0.2 Turbine Building Basement & Mezzanine (Fire Area TB-FZ-11H)

3.1 Exemption Requested

The licensee requested an exemption from the technical requirement of Section III.G.2 of Appendix R in these two areas to the extent that it requires that redundant shutdown circuits in a pit area be separated by a 3-hour fire barrier.

3.2.1 Discussion (Fire Area TB-FZ-11B)

This area is bounded by masonry walls, floor and ceiling. However, this portion of the Turbine Building communicates, via unprotected openings, with other plant areas that the licensee has identified as separate fire areas. These penetrations are delineated in Appendix E of the licensee's April 3, 1985 report.

This fire area contains electrical circuits for hot shutdown paths 1, 2, 3, and 4 and cold shutdown paths 1, 2, and 3 as defined in the April 3, 1985 report. For a fire in this area, hot shutdown is achieved using hot shutdown path 1, with isolation condenser system "A" instead of "B". Cold shutdown is achieved using path 1. Redundant shutdown-related circuits are located in a pit area where separation per the requirements of Section III.G.2 is not achieved.

The fire load in this area has been calculated to be approximately 586,000 BTU/sq. ft., which represents a fire severity of approximately 7 hours as determined by the ASTM E-119 time-temperature curve. The principal combustible material consists of turbine lube oil and cable insulation.

Existing fire protection includes a fire detection system, an automatic sprinkler system over cable trays; water spray systems for the lube oil storage tank; a sprinkler system for the bearing lift pumps; portable fire extinguishers and manual hose stations. In the April 3, 1985 report, the licensee committed to re-route certain safe shutdown circuits outside of this fire area. The licensee also committed to fill the pit area where vulnerable shutdown-related cables are located with sand or with a fire-rated silicon foam.

3.2.2 Discussion (TB-FZ-11H)

This area is bounded by reinforced concrete walls, floor and ceiling. However, this portion of the Turbine Building communicates, via unprotected openings, with other plant locations that the licensee has identified as separate fire areas.

This fire area contains electrical circuits for hot shutdown paths 1, 2, 3, and 4 and cold shutdown paths 1, 2, and 3 as defined in the April 3, 1985 report. For a fire in this area, hot and cold shutdown will be achieved using shutdown path 2. Shutdown path 2 circuits are located in a pit area where separation per the requirements of Section III.G.2 is not achieved.

There are no in-situ fire hazards in this location. The fire load as calculated by the licensee is negligible.

Existing fire protection includes portable fire extinguishers and manual hose stations. The licensee committed to fill the pit area where vulnerable shutdown cables are located with sand or with a fire-rate silicon foam.

The licensee justified the exemptions in these locations on the basis that the fire hazard in the pits are negligible. Also, the fire hazards in the area around the pit is either negligible or mitigated by fire suppression systems. The licensee also justified these exemptions on the ability of the sand or silicon foam to prevent fire damage to redundant cables where they are vulnerable.

3.3 Evaluation

The technical requirements of Section III.G.2 are not met in these area because redundant shutdown-related cables are not separated by a 3-hour barrier within the pit area.

Our concern was that because of the lack of adequate physical separation, the cables in these pits would be vulnerable to fire damage. However, because the pits are located in the floor and because products of combustion rise in a fire, we do not expect a fire outside the pit to have any significant effect on the cables within the pit. Also, because the pit area will be filled with sand or a fire rated silicon foam, we have reasonable assurance that a fire will not originate within it or that a possible flammable liquid spill would affect the cables.

3.4 Conclusion

Based on our evaluation, we conclude that the licensee's alternate fire protection configuration with the proposed modifications will achieve an acceptable level of fire protection equivalent to that required by Section III.G.2. Therefore, the licensee's request for exemption from a 3-hour fire barrier in the following locations should be granted:

Turbine Building Lube Oil Area (Fire Area TB-FZ-11B)
Turbine Building Basement & Mezzanine (Fire Area TB-FZ-11H)

4.0 EXEMPTION 3

4.0 Turbine Building Basement Floor-South End (Fire Area TB-FZ-11D)

4.1 Exemption Requested

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

4.2 Discussion (Fire Area TB-FZ-11D)

This area is bounded by walls, floor and ceiling of reinforced concrete. However, this portion of the Turbine Building communicates through unprotected openings, with adjoining plant locations that the licensee has identified as separate fire areas. These penetrations are delineated in the licensee's April 3, 1985 report.

This fire area contains electrical circuits for hot shutdown paths 1, 2, 3, and 4 and for cold shutdown paths 1, 2, and 3 as described in the above-referenced report.

For a fire in this area both hot and cold shutdown is achieved using shutdown path 1. All required path 1 shutdown-related circuits are either protected by a 1-hour fire-rated barrier or the licensee has identified an alternate means which is independent of this area to safely shutdown the plant.

The fire load in this location has been calculated to be 12,400 BTU/sq.ft., which represents a fire severity of less than 10 minutes.

Existing fire protection includes an automatic sprinkler system which protects cables in trays; a water spray system which covers the hydrogen seal oil unit; portable fire extinguishers and manual hose stations. In the April 3, 1985 report, the licensee committed to relocate certain shutdown-related cables and to protect others in a 1-hour fire-rated barrier.

The licensee justifies this exemption on the basis of the low fire loading, existing fire protection and proposed modifications.

4.3 Evaluation

The technical requirements of Section III.G. are not met in this area because of the absence of area-wide fire detection and suppression systems. Section III.G.3 is not met because a fixed fire detection and suppression system has not been provided for circuits for which an alternate shutdown capability has been provided.

We were concerned that because this area was not protected by an area-wide fire detection and suppression system a fire would damage redundant shutdown systems. However, the fire load is low with combustibles materials generally dispersed. Where concentrated quantities of combustible materials exist, such as in cable trays and the hydrogen seal oil unit, these combustibles are protected by an automatic fire suppression system. Where no concentrated combustibles exist, we expect a fire in those locations to be of initially limited magnitude and extent. Upon discovery by plant operators, the fire brigade would be dispatched and would put out the fire using existing manual fire fighting equipment. If the fire occurred in the cable trays or in the seal oil unit, we expect the fire suppression systems to actuate and control fire spread. Until the arrival of the fire brigade and eventual fire extinguishment, those required shutdown systems that are vulnerable to fire damage in this area are protected by a 1-hour fire barrier. Therefore, an area-wide fire detection and suppression system is not necessary to provide reasonable assurance that safe shutdown could be achieved and maintained.

4.4 Conclusion

Based on our evaluation, we conclude that the licensee's alternate fire protection configuration with the proposed modifications, will achieve an acceptable level of fire protection equivalent to that required by Sections III.G.2 and III.G.3. Therefore, the licensee's request for exemption from an area-wide fire detection and suppression system in the Turbine Building Basement Floor-South End (Fire Area TB-FZ-11D) should be granted.

5.0 EXEMPTION 4

5.0 Turbine Building Condenser Bay (Fire Area TB-FZ-11E)

5.1 Exemption Requested

The licensee requested an exemption from the technical requirements of Section III.G.3 of Appendix R to the extent that it requires a fixed fire detection system in an area for which an alternate shutdown capability has been provided.

5.2 Discussion

The area is bounded by reinforced concrete walls, floor and ceiling. However, this portion of the Turbine Building communicates, through unprotected openings, with other plant locations that the licensee has identified as separate fire areas.

This fire area contains electrical circuits for hot shutdown paths 1, 2, 3 and 4 and for cold shutdown paths 1, 2, and 3 as defined in the licensee's April 3, 1985 report. For a fire in this area, hot and cold shutdown is achieved using shutdown path 1. For those required shutdown path 1 systems that are located in this area and may be damaged by a fire, the licensee has provided an alternate capability that is physically and electrically independent of this fire area.

The fire load in this location has been calculated to be 8,100 BTU/sq. ft., which represents a fire severity of less than 7 minutes.

Existing fire protection includes an automatic sprinkler system located throughout the condenser bay; portable fire extinguishers and manual hose stations. In the April 3, 1985 report, the licensee committed to reroute certain shutdown-related circuits outside of this fire area.

The licensee justified the exemption on the bases of the low fire load, the existing fire protection, the proposed modifications and the ability to safely shut down the plant if a fire should occur in this area.

5.3 Evaluation

The technical requirements of Section III.G.3 are not met in this area because of the absence of a fire detection systems.

We were concerned that if a fire should occur, products of combustion would spread into adjoining fire areas and damage systems that would be necessary to safely shut down the plant. However, the fire load in this location is low. Combustible materials are dispersed throughout the area. We, therefore, expect a potential fire to develop slowly with initially low heat buildup and smoke generation. Upon discovery of the fire, the plant fire brigade would respond and extinguish it using manual fire fighting equipment. If the fire increased in intensity prior to the arrival of the brigade, we expect the automatic sprinkler system to actuate to control the fire, to limit room temperature rise and to protect the shutdown systems that may be threatened. If redundant shutdown systems were damaged within this location, an alternate shutdown capability exists that is outside this fire area. Because some of the walls and the ceiling contain unprotected openings we expect some smoke to propagate into adjoining fire areas. But because of the automatic sprinkler system in this area and the low fire loading, we conclude that the amount of smoke would not represent a significant threat to shutdown systems in the adjoining fire area. We, therefore, conclude that the absence of a smoke detector system in this area has no safety significance.

5.4 Conclusion

Based on our evaluation, we conclude that the licensee's alternate fire protection configuration with the proposed modifications will achieve an acceptable level of fire protection equivalent to that required by Sections III.G.2 and III.G.3. Therefore, the licensee's request for exemption from a fire detection system in the Turbine Building Condenser Bay (Fire Area TB-FZ-11E) should be granted.

6.0 DISCUSSION OF EXEMPTIONS REQUESTED BUT NOT NEEDED

The licensee has requested the following exemptions from the need to protect the electrical circuitry from the technical requirements of Section III.G of Appendix R. We conclude that these exemptions are not needed as evaluated below:

1. Exemption request from the requirements to protect the reactor scram system circuitry in the Fire Zone RB-FZ-1E elevation 23 feet.

Evaluation

The licensee stated that all reactor scram circuitry is contained in conduit except for the back-up valve circuitry and that there are no electrical system circuits contained within the reactor scram conduits. The design of the reactor scram system is fail-safe, deenergize to scram. The effects of fire on the reactor scram circuits in conduit would be to interrupt power and initiate a scram. No modifications are deemed necessary because the protection of the reactor scram equipment will not enhance the safe-shutdown capability.

Based on the design of the reactor scram system, the staff agrees with the licensee that the modifications to protect the scram system circuitry in the conduits are not needed. As this is the accepted staff position, that after the reactor scram during control room evacuation, it is not required to protect the scram system circuitry from spurious operation, the above exemption is not needed.

2. Exemption request from the requirements to provide 1-hour fire barriers for electrical circuits associated with the "C" battery room ventilation system in the Fire Area OB-FA-6B.

Evaluation

The licensee stated that the ventilation of the "C" battery room is not required for a minimum of 38 hours after a loss of ventilation, and that the adequate ventilation can be achieved for this battery room by manually opening the battery room door and dampers D-1 and D-2 and D-4 in the ventilation duct-work.

Based on the above, as the ventilation of the "C" battery room is not needed for 38-hours and the alternate ventilation can be provided after this period, the staff concludes that an exemption request from the requirements to provide 1-hour barriers from the electrical circuits associated with "C" battery room is not needed.

3. Exemption request from the requirements to protect the reactor recirculation valve circuits in the Fire Zones OB-FZ-8A and 8C.

Evaluation

The licensee stated that all five reactor recirculation loops are open during normal power operation and that out of five, four are required to be open per Technical Specifications. Assuming one spurious actuation, three reactor recirculation loops will remain open. For hot shutdown, none of these valves are required. For cold shutdown, the licensee has committed to protect the circuitry of loop "E" recirculation discharge valve to prevent bypassing the reactor when using shutdown pumps. The controls of the valve are provided at the local shutdown panel.

Based on the above, as the recirculation loops are not needed during hot shutdown and that the circuitry for one valve required for cold shutdown is protected, the above exemption is not needed.

7.0 FIRE AREA BOUNDARIES

7.1 Discussion

In the April 3, 1985 report, the licensee described the non-fire-rated walls and floor/ceilings which bounded certain fire areas. The licensee stated that a number of these fire area boundaries contain unprotected openings such as stairways, hatchways and pipe penetrations. We have expressed our concerns to the licensee that, because of these openings, a fire might spread from one area to the next and damage systems that are needed to achieve and maintain safe-shutdown conditions. We stated that where a fire area was protected by an automatic fire suppression system, we did not expect fire to spread through these openings into adjoining locations. Therefore, in areas protected by an automatic fire suppression system, the presence of unprotected openings in walls and floor/ceilings and negligible safety significance. We also stated that in those areas where fire could spread into adjoining locations but safe-shutdown could still be achieved, the presence of unprotected openings had no safety significance. We defined this situation to be those areas where the adjacent fire area(s) contains no required shutdown related equipment or where the nearest shutdown related system is more than 50 feet horizontally from any unprotected opening in the walls or ceiling that define those areas.

For all other areas we recommended that the licensee protect the openings to prevent fire spread. The licensee committed to seal such unprotected openings with at least 6 inches of a fire-rated silicon foam. Where the use of such foam would not be viable, such as at open stairways or hatchways, the licensee committed to install an automatic sprinkler system to protect the opening that conforms to the appropriate sections of NFPA standard

No. 13. These commitments were by letter dated October 9, 1985. Because these commitments provide us with reasonable assurance that fire will not spread into adjoining plant fire areas, we find them acceptable.

7.3 Conclusion

Based on our evaluation, we conclude that the licensee's justification for the adequacy of fire area boundaries with proposed modifications is acceptable.

8.0 SAFE SHUTDOWN CAPABILITY

By letter dated October 26, 1983, we provided a Safety Evaluation Report (SER) concerning the proposed alternate shutdown capability at Oyster Creek in the event of a fire in the control room and cable spreading areas. In that SER, we concluded that the proposed design was acceptable and in accordance with the requirements of Appendix R to 10 CFR Part 50, Section III.G.3 and III.L.

Subsequent to the SER, Generic Letter 83-33 was issued which provided clarifications of the staff interpretation of certain requirements of Appendix R including alternate shutdown capability.

Due to the scope and complexity of the licensee's originally proposed modifications and due to the generic clarification letter, the licensee reevaluated its original conceptual design and concluded that the previous submittal regarding the alternate shutdown panel design went beyond the Appendix R requirements and that a considerable amount of the proposed work was unnecessary. The licensee, in a meeting with the staff on January 22, 1985, discussed the new proposed alternate shutdown panel design and indicated that the proposed changes would not require any additional schedular exemption to accomplish Appendix R implementation.

By letter dated April 3, 1985, the licensee submitted the revised Fire Hazard Analysis Report and Section III.G Safe Shutdown Evaluation describing the means by which safe shutdown can be achieved in the event of fire and the proposed modifications to Oyster Creek to meet the requirements of Appendix R, Items III.G.3 and III.L.

The licensee's revised safe shutdown analysis for a fire event has demonstrated that adequate redundancy and/or alternate safe shutdown methods exist for those systems required to effect hot or cold shutdown utilizing the alternate shutdown methods.

8.1 Systems Used For Post-Fire Safe Shutdown

8.1.1 Systems Required For Safe Shutdown

Safe shutdown of the reactor is initially performed by insertion of control rods from the control room. Insertion can also be accomplished by tripping the reactor protection system motor generator set from outside the control room.

Decay heat removal is accomplished by natural circulation of reactor coolant through one of the two isolation condensers. The heat is dissipated to the atmosphere by steam formed on the shell side of the isolation condenser which is supplied with water from the condensate storage tank or as a backup from the fire water system. Primary system pressure and cooldown rate is controlled by cycling the condensate return valve of the isolation condenser.

Primary coolant inventory is maintained by the Control Rod Drive (CRD) hydraulic pump which makes up for any leakage or shrinkage during reactor shutdown. Makeup water for the reactor vessel and the isolation condenser is not immediately required after reactor scram. Main Steam Isolation Valves (MSIV) are closed from the control room to avoid inventory loss. These valves can be closed from outside the control room. Reactor feedwater pumps and reactor recirculation pumps will trip upon loss of offsite power or they will be tripped from the control room to prevent flooding of the isolation condenser on high condensate flow. These pumps can also be tripped from outside the control room. The high flow trip function is blocked upon transfer of control to the remote shutdown panel.

Cold shutdown conditions can be achieved and maintained by the use of the shutdown cooling system along with its support systems: Reactor Building Closed Cooling Water (RBCCW) System and Service Water System.

8.1.2 Areas Where Alternate Safe Shutdown Is Required

The licensee has determined the need for alternate safe shutdown capability in the event of fire in the cable spreading room, control room, upper cable spreading room and cable bridge tunnel where redundant safe shutdown equipment and cabling cannot meet the requirements of Appendix R Section III.G.2. The licensee has provided alternate safe shutdown capability independent of cabling and equipment in these control and cable spreading rooms.

8.1.3 Remaining Plant Areas

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

8.1.4 Alternate Safe Shutdown System

The alternate safe shutdown system required for the control room and cable spreading areas utilizes existing plant systems and equipment of shutdown train B as outlined in Section 8.1.1 and a new remote shutdown panel located

in the switchgear room. Transfer switches permit isolation and transfer of controls and status indication of selected components from the control room to the remote shutdown and local panels. In the alternate position, the control and instrument circuits are connected to new fuses after they are isolated from the control room and cable spreading areas.

The control logic circuits of the isolation condenser valves will be modified and cables rerouted to allow control of the isolation condenser from the remote shutdown panel and to prevent spurious opening of the vent valves. Power and control logic circuits of the Electromatic Relief Valves (EMRV) and cleanup system isolation valves will also be modified and cable rerouted/protected to prevent spurious opening of these valves. Since the instrument air compressors are not loaded on the diesel, air-operated valves required for shutdown will be provided with accumulators to provide a minimum of six open-close cycles and local air cylinders will be maintained in accessible locations for any additional requirements. 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 fire.

8.2 Evaluation

8.2.1 Performance Goals

The performance goals for post fire safe shutdown for reactivity control, reactor coolant makeup, reactor coolant pressure control and decay heat will be met by using the existing mechanical systems and equipment listed in Section 8.1.1. The control of these functions can be accomplished using the new remote shutdown panel or the control room depending on the fire location.

Direct indication of process variables including the reactor vessel level, reactor pressure and isolation condenser level is provided at the remote shutdown panel. Makeup tank level indication is available at a local indicator. Diagnostic monitoring of CRD hydraulic system, shutdown cooling system, condensate transfer system, RBCCW System and Service Water System is available at local panels.

Other than the station batteries, no other support functions are immediately necessary for achieving hot shutdown. The diesel generators, RBCCW system, service water system and ventilation of switchgear room and battery rooms will be available to provide necessary support functions for the alternate shutdown system.

8.2.2 72-Hour Requirement

The licensee stated that the plant is capable of being placed in cold shutdown within 72 hours with either onsite or offsite power available.

8.2.3 Repairs

No repairs are planned by the licensee to comply with Appendix R post-fire safe shutdown requirements.

8.2.4 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.

8.2.4.1 Common Power Source

The licensee indicated that all instruments and power circuits will be provided with coordinated protection by either circuit breakers or fuses.

8.2.4.2 Common Enclosure

Associated circuits that share a common enclosure with those required for safe shutdown will be provided proper interrupting devices (breakers, fuses, etc.). Where interruption of associated circuits is not possible, shutdown circuits will be protected by physical separation or fire barrier.

8.2.4.3 Spurious Signals

The devices whose inadvertent operation by spurious signals could affect safe shutdown have been identified as shutdown circuits and are included in the separation analysis. The licensee will provide isolation and transfer switches for all shutdown circuits as needed to prevent spurious operation. The licensee has also provided for tripping of the core spray pump outside the control room to prevent flooding the steam lines of the isolation condenser. To avoid spurious operation, the breakers of the main steam line drain valves on the reactor side of the MSIV will be opened after plant startup. The only high/low pressure interface identified is the interface between the reactor coolant and shutdown coolant systems. The shutdown cooling system is designed to withstand reactor operating pressure.

8.2.5 Safe Shutdown Procedures And Manpower

The licensee will revise existing safe shutdown procedures to incorporate the above described safe shutdown method. The personnel available, as outlined in the licensee's submittal of April 3, 1985 will include ten people, five of whom are designated for plant shutdown. The remaining five are available to respond to any fire. The manpower commitment is considered adequate.

8.3 Conclusion

We have reviewed the licensee's proposed alternate safe shutdown capability for Oyster Creek 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 safe shutdown facility. Therefore, we conclude that the requirements of Appendix R, Sections III.G.3 and III.L are satisfied.

9.0 SUMMARY AND CONCLUSIONS

Based on our evaluation, the licensee's request for exemption in the following areas should be granted:

1. Reactor Building Elevation 51 feet (Fire Area RB-FZ-1D)
2. Reactor Building Elevation 23 feet (Fire Area RB-FZ-1E) (1 of 2 exemptions)
3. Reactor Building Elevation (-)19 feet (Fire Area RB-FZ-1F)
4. Turbine Building Lube Oil Area (Fire Area TB-FZ-11B)
5. Turbine Building Basement Floor South End (Fire Area TB-FZ-11D)
6. Turbine Building Condenser Bay (Fire Area TB-FZ-11E)
7. Turbine Building Basement & Mezzanine (Fire Area TB-FZ-11H)
8. Office Building -480V Switchgear Room (Fire Area OB-FA-6E) (1 of 2 exemptions)

Based on our evaluation, we conclude that the exemptions requested for the following areas are not needed:

9. Reactor Building Elevation 23 feet (Fire Area RB-FZ-1E) (1 of 2 exemptions)
10. Office Building -480V Switchgear Room (Fire Area OB-FA-6B) (1 of 2 exemptions)
11. Office Building - MG Set Room (Fire Area OB-FA-8A)
- 12/13. Office Building - Battery & Electrical Tray Room (Fire Area OB-FZ-8C) (2 exemptions)

Based on our evaluation, we also conclude that the proposed design for alternate safe shutdown capability at Oyster Creek is acceptable and that appropriate technical specifications on the minimum open-close cycles for the accumulators and accessibility of local air cylinders to be provided for air-operated valves required for safe shutdown, in Section 8.1.4 of the Safety Evaluation, be submitted before restart from this outage.

Principal Contributors: D. Kubicki, and R. Goel.

Dated: March 24, 1986