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Dockets Nos. 50-313
and 50-368

Mr. John M. Griffin, Vice President
Nuclear Operations
Arkansas Power & Light Company
P. O. Box 551
Little Rock, Arkansas 72203

Dear Mr. Cavanaugh:

The Commission has issued the enclosed Exemptions to certain requirements of Appendix R to 10 CFR 50 in response to your letter of July 1, 1982, as supplemented and amended by your letter of November 11, 1982. The Exemptions pertain to fire protection for equipment important to safe shutdown.

These requests, the pertinent sections of Appendix R, and their disposition are summarized below:

Unit 1

1. III.G.2, Intake Structure, Below El. 354': Exemption request to requirement for automatic fire suppression. Granted.
2. III.G.2, Intake Structure, El. 354': Exemption request to requirement for 20-foot separation and automatic fire suppression system. Granted.
3. III.G.2, Intake Structure, El. 366': Exemption request to requirement for 20-foot separation and automatic fire suppression system. Granted.
4. III.G.2, Yard Area Manholes 1MH04 and 1MH06: Exemption request to requirements for 20-foot separation, one-hour fire barrier, detection and automatic fire suppression system. Granted.
5. III.G.2, Radwaste Processing Area, Waste Monitor Tank Room, Fire Zone 20Y: Exemption request to requirement for full coverage automatic fire suppression system. Granted.
6. III.G.2, Radwaste Processing Area, Make-up Pump Rooms and Adjacent Corridor, Fire Zone 20Y: Exemption request to requirement for automatic fire suppression system. Granted.

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- 7. III.G.2, Containment Building, Fire Zones 32K and 33K: Exemption request to requirement for 20-foot separation with no intervening combustibles or fire hazards. Granted.
- 8. III.G.2, Pipe Area, Fire Zone 34Y: Exemption request to requirement for automatic fire suppression system. Granted.
- 9. III.G.2, Pipe Area, Fire Zone 40Y: Exemption request to requirement for automatic fire suppression system. Granted.
- 10. Corridor, El. 372', Fire Zone 98J: Exemption not required.
- 11. III.G.3, Lower North Piping Penetration Area, Fire Zone 53Y: Exemption request to requirements for fixed fire suppression system and detection. Granted.
- 12. III.G.3, Yard Area Manholes 1MH09 and 1MH10: Exemption request to requirements for fixed fire suppression system and detection. Granted.

Unit 2

- 1. III.G.2, Intake Structure, Below El. 354': Exemption request to requirement for automatic fire suppression system. Granted.
- 2. III.G.2, Intake Structure, El. 354': Exemption request to requirement for automatic fire suppression system. Granted.
- 3. III.G.2, Intake Structure, El. 366': Exemption request to requirements for automatic fire suppression system and 20-foot separation. Granted.
- 4. III.G.2, Yard Area Manholes 2MH 1E, 2MH02E and 2MH03E: Exemption request to requirements for 20-foot separation, one-hour fire barrier, detection, and automatic suppression. Granted.
- 5. III.G.2, General Access Area, El. 317', Fire Zone 2006LL: Exemption request to requirement for automatic fire suppression system. System will be installed. Exemption request withdrawn.
- 6. III.G.2, East Pump Area, El. 317', Fire Zone 2007LL: Exemption request to requirement for automatic fire suppression system. System will be installed. Exemption request withdrawn.
- 7. III.G.2, Pump Room, Fire Zone 2024JJ: Exemption request to requirement for fire barrier with three-hour rating. Granted.
- 8. III.G.2, Containment Building, Fire Zones 2032K and 2033K: Exemption request to requirement for 20-foot separation with no intervening combustibles or fire hazards. Granted.

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- 9. III.G.2, Tank Rooms, Pump Rooms and Corridors, Fire Zone 2040JJ: Exemption request to requirement for automatic fire suppression system. Granted.
- 10. III.G.2, Lower South Piping Penetration Area, Fire Zone 2055JJ: Exemption request to requirement for fire barrier with three-hour rating. Granted.
- 11. III.G.2, Corridor, El. 372', Fire Zone 2109U: Exemption request to requirements for 20-foot separation or one-hour fire barrier. Granted.
- 12. III.G.3, Upper North Piping Penetration Area, Fire Zone 2081HH: Exemption request to requirement for fixed fire suppression system. Granted.
- 13. III.G.3, Motor Control Center, Fire Zone 2096M: Exemption request to requirement for fixed fire suppression system. Granted.
- 14. III.G.3, Electrical Equipment Room, El. 368'; Fire Zone 2091BB: Exemption request to requirement for fixed fire suppression system. Granted.
- 15. III.G.3, Corridor Area, Fire Zone 2107N: Exemption request to requirement for fixed fire suppression system. Granted.
- 16. III.G.3, Pipeway and Equipment Access Way, Fire Zone 2223KK: Exemption request to requirement for fixed fire suppression system. Granted.
- 17. III.G.3, Pump Room, Fire Zone 2106R: Exemption request to requirement for fixed fire suppression system. Granted.
- 18. III.G.3, Core Protection Calculator Panel, Fire Zone 2150C: Exemption request to requirement for fixed fire suppression system. Granted.
- 19. III.G.3, Health Physics Area, Fire Zone 2136I: Exemption request to requirement for fixed fire suppression system. Granted.

The bases for these exemptions are contained in the Exemptions and in the Safety Evaluations which are also enclosed.

We have not discussed in the above exemptions the disposition, relating to alternate safe shutdown capability, of: 1) your appeal of the NRC staff position relating to the source range monitoring instrumentation, and 2) your exemption request to the requirement for the capability to achieve cold shutdown within 72 hours for Unit No. 1. We will address these items in the future.

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Mr. John M. Griffin

-4-

We also have not discussed in the above exemptions your request for exemption to the schedule requirement for implementation of modifications to switchgear in Fire Zones 2100Z and 2101AA of Unit No. 2, and your appeal of the staff position regarding partial fire suppression system coverage. These, too, will be addressed in the future.

A copy of each Exemption is being forwarded to the Office of the Federal Register for publication.

Sincerely,

Original signed by

Robert A. Clark, Chief
Operating Reactors Branch #3
Division of Licensing

Original signed by

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

Enclosures:

- 1. Exemption, Unit 1
- 2. Safety Evaluation, Unit 1
- 3. Exemption, Unit 2
- 4. Safety Evaluation, Unit 2

cc w/enclosures: See next page

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

March 22, 1983

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Docket No. 50-313, 50-368

Docketing and Service Section
Office of the Secretary of the Commission

SUBJECT: ARKANSAS NUCLEAR ONE, UNITS 1 AND 2

Two signed originals of the Federal Register Notice identified below are enclosed for your transmittal to the Office of the Federal Register for publication. Additional conformed copies (12) of the Notice are enclosed for your use.

- Notice of Receipt of Application for Construction Permit(s) and Operating License(s).
- Notice of Receipt of Partial Application for Construction Permit(s) and Facility License(s): Time for Submission of Views on Antitrust Matters.
- Notice of Availability of Applicant's Environmental Report.
- Notice of Proposed Issuance of Amendment to Facility Operating License.
- Notice of Receipt of Application for Facility License(s); Notice of Availability of Applicant's Environmental Report; and Notice of Consideration of Issuance of Facility License(s) and Notice of Opportunity for Hearing.
- Notice of Availability of NRC Draft/Final Environmental Statement.
- Notice of Limited Work Authorization.
- Notice of Availability of Safety Evaluation Report.
- Notice of Issuance of Construction Permit(s).
- Notice of Issuance of Facility Operating License(s) or Amendment(s).
- Other: Exemption-Fire Protection.

Referenced documents have been provided PDRW

Division of Licensing, ORB#4
Office of Nuclear Reactor Regulation

Enclosure:
As Stated

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DATE →	3/24/83				

Arkansas Power & Light Company

cc. w/enclosure(s):

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of
ARKANSAS POWER & LIGHT COMPANY
(Arkansas Nuclear One, Unit No. 1) } Docket No. 50-313

EXEMPTION

I.

Arkansas Power and Light Company (AP&L or the licensee) is the holder of Facility Operating License No. DPR-51, which authorizes the operation of Arkansas Nuclear One, Unit 1 (the facility). The facility consists of a pressurized water reactor (PWR), located at the licensee's site in Russellville, Arkansas.

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, and separation of safety trains (III.G.2) or alternative 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. of Appendix R to 10 CFR 50 for various areas in Unit 1. By letter dated November 11, 1982, the licensee provided new proposals and additional clarifying information regarding the previous exemption requests. As a result of these letters, the requested exemptions involving Section III.G are as follows:

III.G.2 Intake Structure, Below El. 354'
Intake Structure, El. 354'
Intake Structure, El. 366'
Yard Area Manholes, 1MH04 and 1MH06
Radwaste Processing Area, Waste Monitor
Tank Room, Fire Zone 20Y
Radwaste Processing Area, Make-up Pump Rooms
and Adjacent Corridor, Fire Zone 20Y
Containment Building, Fire Zones 32K and 33K
Pipe Area, Fire Zone 34Y
Pipe Area, Fire Zone 40Y
Corridor, El. 372', Fire Zone 98J

III.G.3 Lower North Piping Penetration Area, Fire Zone 53Y
Yard Area Manholes, 1MH09 and 1MH10

The acceptability of these requests is addressed below. More details are contained in the NRC staff's related Safety Evaluation (SE) dated March 22, 1983, which is included herein by reference.

IV.

Intake Structure, Below El. 354'

The licensee requested exemption from Section III.G.2 to the extent it requires an automatic fire suppression system. This area contains circulating water piping, associated valves and power cables.

This zone consists of the service water pump intake bays; therefore the water level in the intake bays precludes the possible accumulation of transient combustible materials as anticipated in other plant areas.

Because the likelihood of an exposure fire is low, these alternative features compensate for the required suppression system and provide a level of fire protection equivalent to that required by Section III.G. of Appendix R. Therefore the exemption is granted.

Intake Structure, El. 354'

The licensee requested exemption from Section III.G.2 to the extent it requires 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 combustible or fire hazards, and also to the extent it requires an automatic fire suppression system.

This area contains redundant cable trays and conduits for the service water pumps and discharge valves. This fire area is provided with a smoke detection system. The cables for the service water pump discharge valves are separated by only 16 feet. The licensee will provide a one-hour barrier for the conduit and trays providing power for one of the two sets of three valves constituting one complete path from the swing pump.

Because of the low in-situ fire load, separation between cables, large room volumes, and detection system, there is reasonable assurance that one train of service water pumps will be maintained free of fire damage in the time interval required for fire brigade response to extinguish a fire. The level of protection which will be provided in this area in conjunction with the one-hour barriers provides a level

of fire protection equivalent to Section III.G of Appendix R. Therefore, the exemption is granted.

Intake Structure, El. 366'

The licensee requested exemption from Section III.G.2 to the extent it requires 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 combustible or fire hazards, and also to the extent it requires an automatic fire suppression system.

The uppermost level of the intake structure is at elevation 366 feet, and contains the A and B trains and swing service water pump motors, valves and cables. The pump motors are situated several feet below the ceiling. In our opinion, the hot gas layer will not extend to this level. Each pump motor contains six gallons of lubricating oil. Floor drains are installed in the vicinity of each pump to collect and drain any potential lube oil leaks. Redundant discharge valves are separated by approximately 5 feet, on opposite sides of missile barriers situated between the pumps.

Because of the low in-situ fire load, large room volumes and the partial width missile barriers installed between each pump, and the ceiling height above the pumps, there is reasonable assurance that one train of service water pumps will be maintained free of fire damage in the time interval required for fire brigade response to extinguish an exposure fire. Although the pump discharge valves are separated by approximately five feet, they are effectively shielded from an exposure fire by the intervening missile barrier. These alternative features compensate for the automatic fire suppression system required by Section III.G and provide a level of fire protection equivalent to the

technical requirements of Section III.G. of Appendix R. Therefore, the exemption is granted.

Yard Area Manholes (1MH04 and 1MH06)

The licensee requested exemption from Section III.G.2 to the extent this section requires: 1) 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 combustible or fire hazards, 2) enclosure of cable and equipment and associated non-safety circuits of one redundant train in a fire barrier having a one-hour rating, 3) fire detectors, and 4) automatic fire suppression system installed in the fire area.

This fire area consists of two manholes which are concrete bunkers approximately 5 feet by 5 feet by 5 feet, and are located remote from the remainder of the plant. The power cables for redundant trains of service water pumps are located in close proximity inside the manholes. The manholes are not ventilated and can be accessed only by lifting the concrete hatches with a crane. The licensee will fill the manholes with a non-combustible material such as sand or vermiculite.

Filling the manholes with sand or vermiculite will prevent a fire from occurring in the manholes and, therefore, an adequate level of fire protection will be provided equivalent to Section III.G of Appendix R. Therefore, the exemption is granted.

Radwaste Processing Area, Waste Monitor Tank Room

Fire Zone 20Y

The licensee has requested exemption from Section III.G.2 to the extent it requires full coverage with an automatic fire suppression system.

The treated waste monitor tank room contains both borated water storage tank (BWST) dropline valves and associated cables. The room is of reinforced concrete construction and is approximately 37 feet by 34 feet with a 17-foot ceiling, and contains no in-situ combustibles. The redundant BWST valves are located near the ceiling level and are separated by approximately four feet.

Ionization detectors, portable fire extinguishers and manual hose stations are available throughout the entire fire area. The licensee will install a one-hour rated fire barrier to protect one train of conduits associated with the BWST valves and install a partial coverage sprinkler system for the valve area. This zone also has automatic fire detection.

Because there are no in-situ combustibles in this room, an exposure fire would involve transient combustibles. Due to the limited personnel access to this area for health physics reasons, it is unlikely that a large quantity of transient combustible materials could accumulate. Therefore, any potential fires in this area would be of limited severity and duration. Due to the considerable heat sink provided by the concrete floor, walls, and steel tanks in the area, there is slight possibility that a fire could damage both redundant BWST valves before actuation of the detection and automatic suppression systems. The one-hour rated

barrier between redundant conduits will provide an added margin of safety against premature fire damage.

The alternative protective features provided for the BWST dropline valves provide a level of fire protection equivalent to Section III.G. of Appendix R. Therefore, the exemption is granted.

Radwaste Processing Area, Make-up Pump Rooms
and Adjacent Corridor, Fire Zone 20Y

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

This section of the fire area is L-shaped and consists of a corridor and the make-up pump cubicles at the end of the corridor. The make-up pumps are in three adjacent cubicles approximately 10 feet by 20 feet. The pumps are separated by less than 20 feet. Physical separation between the pumps is provided by 8-foot, partial height walls. The ceiling height in this fire area is 17 feet. One of the three pumps must be maintained free of fire damage to safely shut down the plant. Redundant cables for the pumps are routed in conduit.

Access to these areas is restricted for health physics reasons and partial height walls are provided between the pumps. One-hour fire barriers will be provided for the trays and conduits associated with power for the pump and suction valve of the swing and one other pump within each individual pump room. Portable fire extinguishers, manual hose stations and a smoke detection system are provided in the area. These features, in conjunction with one-hour barriers, will mitigate the onset of cable damage for a sufficient time period to enable the fire brigade to respond and extinguish a fire prior to damage of both trains.

The resulting protection for the make-up pump rooms and the adjacent corridor will provide a level of fire protection equivalent to Section III.G of Appendix R. Therefore, the exemption is granted.

Containment Building, Fire Zones 32K and 33K

The licensee requested exemption from Section III.G.2 to the extent it requires 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 combustible or fire hazards.

For the purpose of analysis, the licensee has subdivided the containment building into two fire areas. There is no fire barrier between the two fire areas. The separation of cables and equipment within each fire area is such that only one division of equipment is located in each fire area. Considering intervening combustibles in the form of non-safety related cable trays, which provide a potential path for the spread of flame from one fire area to another, the minimum separation distance between all redundant equipment in the two fire areas is less than 20 feet. The fire area in the north half of the containment building contains two decay heat drop line (RHR letdown) valves, in series. A spurious operation of both valves could cause breach of primary system integrity. This action could take place if a short, phase-to-phase in a specific manner involving the power cables to the valves, would occur. The power cables are routed in close proximity in this area.

Fire stops have been installed in the cable trays to prevent the spread of flames along the cables from one fire area to the other. Both fire areas are protected by a partial coverage smoke detection system. Manual hose stations and an oil collection system for the reactor

coolant pumps are also provided. Due to the restricted access to this area, the probability of an exposure fire from the accumulation of transient combustibles which could potentially bypass the cable tray fire stops is low. The fire stops installed in the intervening cable trays provide reasonable assurance that although redundant trains are not separated by the required distance free of intervening combustibles, one train will be maintained free of fire damage.

Because the amount of in-situ combustibles is low in this area and early warning detection is provided, the probability of a fire which could damage both RHR valve conduits is low. We believe that the probability that this damage would occur in such a specific manner is also low. This combination of conditions provides reasonable assurance that a spurious operation of both valves in the RHR system is not likely to occur.

Based on the above, the NRC staff concludes that the existing level of protection inside the containment provides fire protection equivalent to the technical requirements of Section III.G of Appendix R. Therefore, the exemption is granted.

Pipe Area, Fire Zone 34Y

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

This fire area is a passageway bounded by reinforced concrete walls. The ceiling height is 17 feet for a portion of the area and 11 feet for the remainder of the area. The redundant cables for the A, B, and swing service water pumps are routed within seven inches near the 11-foot ceiling level. Redundant power cables for the decay heat

pumps are also routed through this area. These cables are routed vertically and are separated from each other and from the other horizontal cables by greater than 20 feet. All cables in the area are routed inside conduits. Only one service water pump and one decay heat pump are needed for shutdown.

Smoke detectors and portable fire extinguishers are provided in the area. The licensee will enclose the cables needed for two service water pumps in one-hour rated fire barriers. The in-situ combustible loading in this fire area is negligible, therefore, any postulated fire would involve transient combustible materials. Such a fire would most likely be of limited severity in a corridor area where little maintenance activities are performed. The installed early warning detection system, in conjunction with the one-hour fire barrier for the protection of two service water pump cables, and the greater than 20 feet separation of the decay heat pump cables provides reasonable assurance that one train of components needed for safe shutdown will be maintained free of fire damage.

Based on the above, the NRC staff concludes that the level of protection in this area is equivalent to that required by Section III.G of Appendix R. Therefore, the exemption is granted.

Pipe Area, Fire Zone 40Y

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

This area is a narrow passageway approximately 12 feet by 90 feet with a 12-foot ceiling. The floor, walls, and ceiling assemblies are reinforced concrete. The redundant cables for the A, B, and swing service water pumps are routed in conduit in close proximity

at the ceiling level. The licensee will enclose the power cables for each of two service water pumps in a one-hour rated fire barrier.

There are no in-situ combustibles in the fire area. Only one service water pump is needed for shutdown. Access to this fire area is restricted and can be gained only via a locked, steel hatchway, and a vertical ladder. Smoke detection and portable fire extinguishers are provided in the area. Manual hose stations are available in adjacent areas.

Because there are no in-situ combustibles in this area, any postulated fire would involve transient combustible materials. Restricted access to this area via a vertical ladder makes the probability of a significant quantity of combustible transient materials accumulating low. A fire in this area would therefore be of limited severity and duration. The installed early warning detection system would be able to promptly detect incipient fire conditions, and the one-hour barrier will maintain the integrity of the cables until the fire brigade is able to respond and extinguish the fire. Although access to this area is restricted, the fire brigade should be capable of reaching this area within a few minutes after an alarm is received in the control room. This combination of alternative protective features provides reasonable assurance that one train of equipment necessary for safe shutdown will be maintained free of fire damage.

The level of existing protection for this pipe area, in conjunction with the one-hour barrier, will provide a level of fire protection equivalent to the technical requirements of Section III.G. of Appendix R. Therefore, the exemption is granted.

Corridor, El. 372', Fire Zone 98J

The licensee has indicated that enclosure of the corridor A-train conduits in a one-hour rated fire barrier and separation of the D.C. equipment room from the corridor by three-hour rated fire barriers will be provided. With these modifications, the area will comply with Section III.G. of Appendix R, and no exemption is needed.

Lower North Piping Penetration Area, Fire Zone 53Y

Yard Area Manholes, 1MH09 and 1MH10

The licensee has provided alternate shutdown capability for the following areas in Unit 1 and requests an exemption from providing the fixed extinguishing systems as required by III.G.3 in these areas:

- a) Lower North Piping Penetration Area, Fire Zone 53Y
- b) Manholes 1MH09 and 1MH10.

The combustible loading in these zones is negligible. The redundant equipment in these areas is primarily one system, the diesel fuel transfer pumps.

These fire zones represent a similar configuration, i.e., combustible loading is light, there is alternate shutdown capability, and manual fire suppression equipment is available. The low combustible loading in these areas ensures that safety related equipment in adjacent areas will not be threatened. The installation of a fixed fire suppression system will not significantly increase the level of fire protection in these areas.

The existing fire protection, in conjunction with alternate shutdown capability in these areas, provides a level of fire protection equivalent to the technical requirements of Section III.G.3 of Appendix R. Therefore, the exemptions are granted.

V.

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. and IV. 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.

A copy of the Safety Evaluation dated March 22, 1983 related to this action is available for public inspection at the Commission's Public Document Room, 1717 H Street, N.W., Washington, D.C. 20555 and at the Tomlinson Library, Arkansas Tech University, Russellville, Arkansas 72081. A copy may be obtained upon request addressed to the U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, Attention: Director, Division of Licensing.

This Exemption is effective upon issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



for
Robert A. Purple, Deputy Director
Division of Licensing
Office of Nuclear Reactor Regulation

Dated at Bethesda, Maryland
this 22nd day of March 1983.



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

ARKANSAS POWER & LIGHT COMPANY

ARKANSAS NUCLEAR ONE, UNIT NO. 1

DOCKET NO. 50-313

1.0 Introduction

By letter dated July 1, 1982, the Arkansas Power and Light Company (the licensee) requested exemptions from the technical requirements of Section III.G of Appendix R to 10 CFR 50 for various areas in Unit 1. By letter dated November 11, 1982, the licensee provided new proposals and additional clarifying information regarding the previous exemption requests.

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

- a. Separation of cables and equipment and associated non-safety circuits of redundant trains by a fire barrier having a 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;
- 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 combustible or fire hazards. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area; or
- c. 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 alternative shutdown capability independent of the fire area of concern. It also requires a fixed suppression system 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 for all configurations; 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 than the

measures specified in Section III.G. In such a case, the licensee must demonstrate, by means of a detailed fire hazards analysis, that existing protection or existing protection in conjunction with proposed modifications will provide a level of safety equivalent to the technical requirements of Section III.G of Appendix R.

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

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

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

The alternative assures that fire damage 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 Intake Structure

2.1.1 Discussion- Below El. 354'

The intake structure consists of three floor levels (i.e. below El. 354', El. 354' & El. 366'). The first level is below El. 354' and contains circulating water piping, associated valves and power cables. The power cables for redundant pumps are separated by less than 20 feet. This floor level is the pump intake bay for the service water pumps and is therefore partially filled with water. The licensee proposes to reroute cables to provide greater than 20 feet of separation at this level. Portable fire extinguishers, manual hose reels, and ionization detectors are provided throughout the area.

2.1.2 Evaluation - Below El. 354'

After the proposed cable rerouting, this zone will have 20' separation and automatic detection but will not have an automatic suppression system required by Section III.G.

This zone consists of the service water pump intake bays, therefore the water level in the intake bays precludes the possible accumulation of transient combustible materials as anticipated in other plant areas. Because the likelihood of an exposure fire is low, these alternative features compensate for the required suppression system and provide a level of fire protection equivalent to that required by Section III.G. of Appendix R, and therefore are acceptable.

2.1.3 Conclusion

Based on the above evaluation, the fire protection provided below El. 354', with the proposed modifications, provides a level of fire protection equivalent to the technical requirements of Section III.G of Appendix R, and therefore, the exemption should be granted.

2.2.1 Discussion - El. 354'

The second floor level is at El. 354' and contains redundant cable trays and conduits for the service water pumps and discharge valves. The redundant cables at this level are in horizontal cable trays and are separated by approximately 16 feet. The in-situ combustible loading at this elevation, consisting primarily of cable insulation, is approximately 950 BTUs/FT², which if totally consumed would correspond to an equivalent fire severity of less than one minute on the ASTM E-119 standard time-temperature curve. This fire area is provided with a smoke detection system. The licensee proposes to reroute all cables required for the service water pump motors to provide greater than 20 feet of separation. However, the cables for the service water pump discharge valves are separated by only 16 feet. The licensee proposes to provide a one-hour barrier for the conduit and trays providing power for one of the two sets of three valves constituting one complete path from the swing pump. The licensee contends that the low combustible loading in this area, combined with the proposed one-hour barrier, is justification for the lack of an automatic suppression system.

2.2.2 Evaluation - El. 354'

This area does not comply with Section III.G because there is only 16 feet of clear separation between redundant trains of cables for the discharge valves and an automatic suppression system is not provided. Redundant cables for the service water discharge valves are located approximately 10 feet above the floor level.

Because of the low in-situ fire load, separation between cables, large room volumes, and detection system, there is reasonable assurance that one train of service water pumps will be maintained free of fire damage in the time interval required for fire brigade response to extinguish a fire.

These alternative features compensate for the protective features required by Section III.G and provide an equivalent level of fire protection and are, therefore, acceptable.

2.2.3 Conclusion

The level of existing protection in this area in conjunction with the proposed rerouting of cables and one-hour barriers provides a level of fire protection equivalent to Section III.G of Appendix R; therefore, the exemption should be granted.

2.3.1 Discussion - El. 366'

The uppermost level of the intake structure is at El. 366', and contains the A and B trains and swing service water pump motors, valves and cables. The diesel driven fire pumps and day tanks are also located at this elevation but are separated from the rest of the area by three-hour rated fire barriers.

The A-train service water pump is separated from the B-train pump by 24 feet horizontally. The B-train pump is separated from the swing pump by 29 feet horizontally. Partial-width missile barriers are provided to further separate the three pumps. The pump motors are situated several feet below the ceiling. In our opinion, the hot gas layer will not extend to this level. Each pump motor contains six gallons of lubricating oil. Floor drains are installed in the vicinity of each pump to collect and drain any potential lube oil leaks. Redundant discharge valves are separated by approximately five feet, on opposite sides of the previously mentioned missile barriers.

2.3.2 Evaluation - El. 366'

This zone does not have 20 feet of separation free of intervening combustibles between redundant trains or an automatic suppression system as required by Section III.G. Because of the low in-situ fire load, large room volumes and the partial width missile barriers installed between each pump, and the ceiling height above the pumps, there is reasonable assurance that one train of service water pumps will be maintained free of fire damage in the previously discussed time interval required for fire brigade response to extinguish an exposure fire. Although the pump discharge valves are separated by approximately five feet, they are effectively shielded from an exposure fire by the intervening missile barrier. These alternative features compensate for the automatic suppression system required by Section III.G and provide an equivalent level of fire protection, and are therefore acceptable.

2.3.3 Conclusion

Based on the above evaluation, the existing fire protection for El. 366' provides a level of fire protection equivalent to the technical requirements of Section III.G of Appendix R, and therefore the exemption should be granted.

3.0 Yard Area Manholes (1MH04 and 1MH06)

3.1 Discussion

This fire area consists of two manholes which are concrete bunkers approximately 5 feet by 5 feet by 5 feet, and are located remote from the remainder of the plant. The power cables for redundant trains of service water pumps are located in close proximity inside the manholes. The manholes are not ventilated and can be accessed only by lifting the concrete hatches with a crane. The licensee proposes to fill the manholes with a non-combustible material such as sand or vermiculite.

3.2 Evaluation

The redundant service water pump cables in the manholes are neither separated by 20 feet nor enclosed in one-hour fire barriers. Smoke detection, automatic suppression, and alternate shutdown capability are not provided. Filling the manholes with sand or vermiculite will prevent a fire from occurring in the manholes and, therefore, an adequate level of fire protection has been provided.

3.3 Conclusion

The level of protection for the yard area manholes provides a level of fire protection equivalent to Section III.G of Appendix R. Therefore, the exemption should be granted.

4.0 Radwaste Processing Area - (Fire Zone 20Y)

This fire area includes two sub-areas which contain redundant trains of safe-shutdown equipment (i.e. waste monitor tank room and the make-up pump rooms and adjacent corridor).

4.1.1 Discussion - Waste Monitor Tank Room

The treated waste monitor tank room contains both borated water storage tank (BWST) dropline valves and associated cables. The room is of reinforced concrete construction and is approximately 37 feet by 34 feet with a 17-foot ceiling. There are no in-situ combustibles in this room. The redundant BWST valves are located near the ceiling level and are separated by approximately four feet.

Ionization detectors, portable fire extinguishers and manual hose stations are available throughout the entire fire area. The licensee proposes to install a one-hour rated fire barrier to protect one train of conduits associated with the BWST valves and to install a partial coverage sprinkler system for the valve area.

4.1.2 Evaluation - Waste Tank Monitor Room

This zone has automatic fire detection, separation of redundant conduits by a one-hour fire barrier, and an automatic suppression system in part of the area.

Because there are no in-situ combustibles in this room, an exposure fire would involve transient combustibles. Due to the limited personnel access to this area for health physics reasons it is unlikely that a large quantity of transient combustible materials could accumulate. Therefore, any potential fires in this area would be of limited severity and duration. Due to the considerable heat sink provided by the concrete floor, walls, and steel tanks in the area, there is slight possibility that a fire could damage both redundant BWST valves before actuation of the detection and automatic suppression systems. A one-hour rated barrier between redundant conduits will provide an added margin of safety against premature fire damage.

Based on our evaluation, we conclude that the alternative protective features provided for the BWST dropline valves provide a level of fire protection equivalent to Section III.G of Appendix R and therefore are acceptable.

4.1.3 Conclusion - Waste Monitor Tank Room

The level of existing protection for this area in conjunction with the proposed one-hour barrier and automatic suppression system provides a level of fire protection equivalent to Section III.G of Appendix R. Therefore, the exemption should be granted.

4.2.1 Discussion - Make-Up Pump Rooms and Adjacent Corridor

This section of the fire area is L-shaped and consists of a corridor and the make-up pump cubicles at the end of the corridor. The make-up pumps are in three adjacent cubicles approximately 10 feet by 20 feet. The pumps are separated by less than 20 feet. Physical separation between the pumps is provided by 8-foot, partial height walls. The ceiling height in this fire area is 17 feet. One of the three pumps must be maintained free of fire damage to safely shut down the plant. Each make-up pump contains 10 gallons of lubricating oil. Redundant cables for the pumps are routed in conduit. The cables are routed from the pumps to the ceiling level in the pump cubicles. From there the cables for the A and C train pumps are routed into the adjacent corridor, and remain at the ceiling level for the length of the corridor. The licensee proposes to reroute cabling associated with the A make-up pump suction valve to provide greater than 20' separation. Additionally, one-hour barriers will be provided for the trays and conduits associated with power for the pump and suction valve of the swing and one other pump within each individual pump room. Portable fire extinguishers, manual hose stations and a smoke detection system are provided in the area.

4.2.2 Evaluation

The licensee proposes to reroute the A train cables in the corridor area. Therefore, only the redundant cables and equipment in the make-up pump cubicles need to be protected in order to comply with Section III.G. In the make-up pump cubicles, the licensee has not provided an automatic suppression system.

Access to these areas is restricted for health physics reasons, and partial height walls are provided between the pumps. It is our opinion that these features, in conjunction with the proposed one-hour barriers, will mitigate the onset of cable damage for a sufficient time-period to enable the fire brigade to respond and extinguish a fire prior to damage of both trains.

4.2.3 Conclusion

The level of existing protection for the make-up pump rooms and the adjacent corridor, combined with the proposed modifications, provides a level of fire protection equivalent to Section III.G of Appendix R; therefore, the exemption should be granted.

5.0 Containment Building (Fire Areas 32K and 33K)

5.1 Discussion

For the purpose of analysis, the licensee has subdivided the containment building into two fire areas. There is no fire barrier between the two fire areas. The separation of cables and equipment within each fire area is such that only one division of equipment is located in each fire area. The minimum separation distance between all redundant equipment in the two fire areas considering intervening combustibles is less than 20 feet. Intervening combustibles in the form of non-safety related cable trays provide a potential path for the spread of flame from one fire area to the other. Fire stops have been installed in the cable trays to prevent the spread of flames along the cables from one fire area to the other. Both fire areas are protected by a partial coverage smoke detection system. Manual hose stations and an oil collection system for the reactor coolant pumps are also provided.

The fire area in the north half of the containment building contains two decay heat drop line (RHR letdown) valves, in series. A spurious operation of both valves could cause breach of primary system integrity. This action could take place if a short, phase-to-phase in a specific manner involving the power cables to the valves, would occur. The power cables are routed in close proximity in this area.

5.2 Evaluation

Inside non-inerted containment, Section III.G requires the 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. Cables and equipment are physically separated by more than 20 feet, however, inside containment, non-safety related cable trays pass between the two fire areas and provide a potential path for flame spread between redundant divisions. The installed fire stops in these non-safety related cable trays should prevent the spread of flames along the cables. Due to the restricted access to this area, the probability of an exposure fire from the accumulation of transient combustibles which could potentially bypass the cable tray fire stops is low. The fire stops installed in the intervening cable trays

provide reasonable assurance that although redundant trains are not separated by the required distance free of intervening combustibles, one train will be maintained free of fire damage.

Because the amount of in-situ combustibles is low in this area and early warning detection is provided, the probability of a fire which could damage both RHR valve conduits is low. We believe that the probability that this damage would occur in such a specific manner is low. This combination of conditions provides reasonable assurance that a spurious operation of both valves in the RHR system is not likely to occur.

5.3 Conclusion

Based on the above evaluation, we conclude that the existing level of protection inside containment provides a level of fire protection equivalent to the technical requirements of Section III.G of Appendix R. Therefore the exemption should be granted.

6.0 Pipe Area - (Fire Zone 34Y)

6.1 Discussion

This fire area is a passageway bounded by reinforced concrete walls. The ceiling height is 17 feet for a portion of the area and 11 feet for the remainder of the area. The redundant cables for the A, B, and swing service water pumps are routed within seven inches near the 11-foot ceiling level. Redundant power cables for the decay heat pumps are also routed through this area. These cables are routed vertically and are separated from each other and from the other horizontal cables by greater than 20 feet. All cables in the area are routed inside of conduits. There are no significant in-situ combustibles in the area. Only one service water pump and one decay heat pump are needed for shutdown.

Smoke detectors and portable fire extinguishers are provided in the area. The licensee proposes to enclose the cables needed for two service water pumps in one-hour rated fire barriers.

The licensee proposes no additional protection for the decay heat pump cables because of their separation.

6.2 Evaluation

For a configuration similar to this fire area, Section III.G requires that a one-hour rated fire barrier be provided in combination with a detection and an automatic suppression system. The licensee proposes to install the required one-hour barrier but contends that the limited fire hazard in this area does not warrant automatic suppression.

The in-situ combustible loading in this fire area is negligible, therefore, any postulated fire would involve transient combustible materials. Such a fire would most likely be of limited severity in a corridor area where little maintenance activities are performed. The installed early warning detection system in conjunction with the proposed one-hour fire barrier for the protection of two service water pump cables, and the separation of the decay heat pump cables provides reasonable assurance that one train of components needed for safe shutdown will be maintained free of fire damage.

6.3 Conclusion

Based on the above evaluation, we conclude that the level of protection in this area provides a level of fire protection equivalent to Section III.G of Appendix R. Therefore, the exemption should be granted.

7.0 Pipe Area - (Fire Zone 40Y)

7.1 Discussion

This area is a narrow passageway approximately 12 feet by 90 feet with a 12-foot ceiling. The floor, walls, and ceiling assemblies are reinforced concrete. The redundant cables for the A, B, and swing service water pumps are routed in conduit in close proximity at the ceiling level. There are no in-situ combustibles in the fire area. Only one service water pump is needed for shutdown. Access to this fire area is restricted and can be gained only via a locked steel hatchway and a vertical ladder.

Smoke detection and portable fire extinguishers are provided in the area. Manual hose stations are available in adjacent areas. The licensee proposes to enclose the power cables for each of two service water pumps in a one-hour rated fire barrier.

7.2 Evaluation

For the configuration of redundant cables in this area, Section III.G requires that a one-hour rated fire barrier be provided in combination with a detection and automatic suppression system. The licensee proposes to install the required one-hour barrier but not the required automatic suppression system.

Because there are no in-situ combustibles in this area, any postulated fire would involve transient combustible materials. Restricted access to this area via a vertical ladder makes the probability of a significant quantity of combustible transient materials accumulating low. A fire in this area would therefore be of limited severity and duration. The installed early warning detection system would be able to promptly detect incipient fire conditions, and the proposed one-hour barrier will maintain the integrity of the cables until the fire brigade is able to respond and extinguish the fire. Although access to this area is restricted, the fire brigade should be capable of reaching this area within a few minutes after an alarm is received in the control room. It is our

opinion that this combination of alternative protective features provide reasonable assurance that one train of equipment necessary for safe shutdown will be maintained free of fire damage.

7.3 Conclusion

Based on the above evaluation, we conclude that the level of existing protection for this pipe area, in conjunction with the proposed one-hour barrier, will provide a level of fire protection equivalent to the technical requirements of Section III.G of Appendix R and therefore the exemption should be granted.

8.0 Corridor, El. 372' (Fire Zone 98j)

8.1 Discussion

This fire area includes a corridor which is approximately 100 feet by 9 feet with a 12-foot ceiling. The floors, walls, and ceiling assemblies are three-hour rated reinforced concrete construction. The corridor contains primarily B-train cables, however there is one A-train conduit in the corridor. The cables are primarily in open cable trays at the ceiling level. The fire area also includes two adjoining D.C. equipment rooms which contain cables and electrical panels associated with the A-train instrumentation. This room is separated from the corridor by a three-hour rated wall, however, there are ventilation openings and an open doorway through the corridor wall to the D.C. equipment room that do not provide equivalent protection. By letter dated November 11, 1982, the licensee proposed to enclose the single A-train conduit in the corridor in a one-hour rated barrier. The combustible loading in the corridor consists of a large amount of B-train cables in open cable trays. The licensee has not quantified the combustible loading in the area. All cables have been qualified to flame test similar to those of IEEE Standard 383.

The corridor area also provides access to the diesel generator rooms. It is therefore possible that transient combustibles in the corridor could include 55 gallon drums of lubricating oil during maintenance periods. The corridor area is provided with an ionization type early warning smoke detection system, line-type heat detectors in each cable tray, an open head water spray system that can be automatically or manually activated, portable extinguishers, and manual hose stations. The licensee proposes to separate the D.C. equipment room from the corridor by three-hour barriers.

8.2 Evaluation

With the proposed enclosure of the corridor A-train conduits in a one-hour rated fire barrier, and the separation of the D.C. equipment room from the corridor by three-hour rated fire barriers, the area will comply with Section III.G. An exemption is therefore not needed.

8.3 Conclusion

The level of protection provided for the corridor area and D.C. equipment room meets Section III.G; therefore, an exemption is not needed.

9.0 Lower North Piping Penetration Area (Fire Zone 53Y) Yard Area Manholes (1MH09 and 1MH10)

9.1 Discussion

The licensee has provided alternate shutdown capability for the following areas in Unit 1:

- a) Lower North Piping Penetration Area (Fire Zone 53Y)
- b) Manholes 1MH09 and 1MH10

The combustible loading in these zones is negligible. The redundant equipment in these areas is primarily one system, the diesel fuel transfer pumps. The licensee requests an exemption from providing fixed extinguishing and detection systems in these areas.

9.2 Evaluation

These areas do not comply with Section III.G.3 of Appendix R to the extent that it requires fixed suppression and detection systems in these areas.

All of the fire zones for which exemptions have been requested represent a similar configuration, i.e., combustible loading is light, there is alternate shutdown capability, and manual fire suppression equipment is available. The low combustible loading in these areas ensures that safety related equipment in adjacent areas will not be threatened. The installation of a fixed fire suppression system will not significantly increase the level of fire protection in these areas.

9.3 Conclusion

Based on our evaluation, we find that the existing fire protection in conjunction with alternate shutdown capability in the areas for which an exemption has been requested provides a level of fire protection equivalent to the technical requirements of Section III.G.3 of Appendix R and, therefore, the exemptions should be granted.

Summary - Unit 1Exemptions Requested

- 2.1 Intake Structure, below El. 354' - granted
- 2.2 Intake Structure, El. 354' - granted
- 2.3 Intake Structure, El. 366' - granted
- 3.0 Yard Area Manholes (1MH04 and 1MH06) - granted
- 4.1 Radwaste Processing Area, Waste Monitor Tank Room - granted
- 4.2 Make-up Pumps and Adjacent Corridor - granted
- 5.0 Containment Building - granted
- 6.0 Pipe Area - Fire Zone 34Y - granted
- 7.0 Pipe Area - Fire Zone 40Y - granted
- 8.0 Corridor El. 372' - Fire Zone 98J - not needed
- 9.0 Lower Yard Piping Penetration Area (Fire Zone 53Y) and Yard Area Manholes (1MH09 and 1MH10) - granted.

Dated: March 22, 1983

Principal Contributors: R. Eberly, G. Vissing, O. D. T. Lynch, Jr.

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 of Appendix R to 10 CFR 50 for various areas in Unit 2. By letter dated November 11, 1982, the licensee provided new proposals and additional clarifying information regarding the previous exemption requests. As a result of these letters, the requested exemptions involving Section III.G are as follows:

- III.G.2 Intake Structure, Below El. 354'
Intake Structure, El. 354'
Intake Structure, El. 366'
Yard Area Manholes 2MH01E, 2MH02E, 2MH03E
General Access Area, El. 317', Fire Zone 2006LL
East Pump Area, El. 317', Fire Zone 2007LL
Pump Room, Fire Zone 2024JJ
Containment Building, Fire Zones 2032K and 2033K
Tank Rooms, Pump Rooms and Corridors, El. 355'
Fire Zone 2040JJ
Lower South Piping Penetration Area, Fire Zone 2055JJ
Corridor, El. 372', Fire Zone 2109U

- III.G.3 Upper North Piping Penetration Area, Fire Zone 2081HH
Motor Control Center, Fire Zone 2096M
Electrical Equipment Room, El. 368', Fire Zone 2091BB
Corridor Area, Fire Zone 2107N
Pipeway and Equipment Access Way, Fire Zone 2223KK
Pump Room, Fire Zone 2106R
Core Protection Calculator Panel, Fire Zone 2150C
Health Physics Area, Fire Zone 2136I

The acceptability of these requests is addressed below. More details are contained in the NRC staff's related Safety Evaluation (SE) dated March 22, 1983, which is included herein by reference.

IV.

Intake Structure, Below El. 354'

The licensee requested exemption from Section III.G.2 to the extent it requires an automatic fire suppression system. This area contains circulating water piping, associated valves and power cables.

This zone consists of the service water pump intake bays; therefore the water level in the intake bays precludes the possible accumulation of transient combustible materials as anticipated in other plant areas.

Because the likelihood of an exposure fire is low, these alternative features compensate for the required suppression system and provide a level of fire protection equivalent to that required by Section III.G. of Appendix R. Therefore, the exemption is granted.

Intake Structure, El. 354'

The licensee requested exemption from Section III.G.2 to the extent it requires an automatic fire suppression system. This area contains redundant cables in conduits for the service water pumps and discharge valves. The licensee will reroute all cables required for the service water pump motors to provide greater than 20 feet of separation, and will enclose one train of pump power cabling in a one-hour rated fire barrier.

The in-situ combustible loading at this elevation consists primarily of cable insulation. This fire area is provided with portable fire extinguishers, manual hose stations and a smoke detection system. In the event of an exposure fire involving transient combustible

materials, there will be a time lag between the ignition of the fire, detection and alarm, and the fire brigade response. The proposed configuration of cables and one-hour rated fire barrier will provide protection against the thermal flux of an exposure fire for a sufficient period of time to enable the fire brigade to respond and extinguish a fire prior to damage of both trains.

The level of existing protection, in conjunction with the modifications in the Intake Structure, El. 354', provides a level of fire protection equivalent to the technical requirements of Section III.G. of Appendix R. Therefore, the exemption is granted.

Intake Structure, El. 356'

The licensee requested exemption from Section III.G.2 to the extent it requires 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 combustible or fire hazards, and also to the extent it requires full coverage of an automatic fire suppression system. This area contains the A and B trains and swing service water pump motors, associated valves and cables and the ventilation equipment for the intake structure. Redundant trains of safe shutdown equipment are separated by less than 20 feet. Missile barriers provided between each pump also act as radiant energy shields.

The in-situ combustibles at this level consist of one non-safety related cable tray and approximately 13 1/2 gallons of lubricating oil in each service water pump motor. Floor drains are provided in the vicinity of each pump to collect and drain any potential lube oil leaks. Portable fire extinguishers, manual hose reels, and an ionization-type smoke detection system are provided throughout the area. The licensee

will install an automatic sprinkler system for the protection of the three service water pump motors.

Due to the low in-situ combustible loading in the intake structure, the partial width missile barriers in conjunction with the automatic sprinkler system will provide adequate assurance that one train of service water pumps will be maintained free of fire damage. The resulting fire protection for the Intake Structure, El. 366' provides a level of protection equivalent to the technical requirements of Section III.G. of Appendix R. Therefore, the exemption is granted.

Yard Area Manholes, 2MH01E, 2MH02E, and 2MH03E

The licensee requested exemption from Section III.G.2 to the extent this section requires: 1) 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 combustible or fire hazards, 2) enclosure of cable and equipment and associated non-safety circuits of one redundant train in a fire barrier having a one-hour rating, 3) fire detectors, and 4) automatic fire suppression system installed in the fire area.

These fire areas consist of three manholes which are concrete bunkers approximately 7 feet by 7 feet by 8 feet, and are located remote from the remainder of the plant. The power cables for redundant trains of service water pumps are located in close proximity inside the manholes. The manholes are not ventilated and can be accessed only by lifting the concrete hatches with a crane. The licensee will fill the manholes with a non-combustible material such as sand or vermiculite.

Filling the manholes with sand or vermiculite will prevent a fire from occurring in the manholes and, therefore, an adequate level of fire protection will be provided equivalent to Section III.G of Appendix R. Therefore, the exemption is granted.

General Access Area, El. 317', Fire Zone 2006LL
and East Pump Area, El. 317', Fire Zone 2007LL

By letter dated November 11, 1982, the licensee committed to install automatic fire suppression in these areas, thereby complying with Section III.G. The exemption requests were, therefore, withdrawn.

Pump Room, Fire Zone.2024JJ

The licensee requested an exemption from Section III.G.2 to the extent this section requires separation of cables and equipment and associated non-safety circuits of redundant trains by a fire barrier having a three-hour rating.

This fire area contains the steam turbine driven emergency feedwater pump. The boundary walls, floor, and ceiling assemblies are reinforced concrete with a three-hour rating. Penetrations through these walls will be upgraded to a three-hour rating, with the exception of the door to the room. Because of other safety requirements, this door is required to be a one inch thick watertight door, and is consequently non-fire-rated. The redundant motor-driven feedwater pump is located in an adjacent room of similar construction, with the same type of watertight access door.

The in-situ combustible loading in the steam-turbine driven pump room is approximately 2200 BTU/FT², which, if totally consumed, would produce an equivalent fire severity on the ASTM E-119 standard time-temperature curve of less than two minutes. The in-situ combustible

loading in the redundant motor-driven pump room is approximately 3100 BTU/FT² which, if totally consumed, would produce an equivalent fire severity on the ASTM E-119 standard time-temperature curve of less than three minutes. A smoke detection system is provided in the area. Portable fire extinguishers and manual hose stations are readily accessible in adjacent areas.

The licensee has provided a three-hour rated fire barrier for the separation of redundant trains of emergency feedwater pumps. The watertight access door installed in this fire barrier is not an approved three-hour rated fire door, and therefore, could permit the spread of fire in less than three hours.

The combustible loading in this area is substantially lower than needed for a fire of three-hours duration. An exposure fire would therefore be of limited severity and duration. The design of the watertight door provides a degree of inherent fire protection. It is our experience that typical watertight doors provide equivalent protection as three-hour rated fire doors.

This combination of features provides reasonable assurance that a fire in this area will be detected and extinguished before the redundant emergency feedwater pump is damaged. Thus, the level of existing protection for this area provides a level of fire protection equivalent to the technical requirements of Section III.G of Appendix R. Therefore, the exemption is granted.

Containment Building, Fire Zones 2032K and 2033K

The licensee requested exemption from Section III.G.2 to the extent it requires 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.

The containment building has been subdivided into two fire areas. There is no fire barrier between the two fire areas. The separation of cables and equipment within each fire area is such that only one division of equipment is located in each fire area. With the exception of the Reactor Coolant System (RCS) pressure instrumentation, the minimum separation distance between redundant equipment in the containment building is greater than 30 feet, however there are several non-safety related cable trays which pass from one fire area to the other. The licensee has provided fire stops in the cable trays to prevent the spread of flames along the cables.

The fire area in the north half of the containment building contains two shutdown cooling drop line (RHR letdown) valves, in series. Spurious operation of both valves could cause a loss of reactor coolant. The spurious signal required for this action would have to be a short, phase to phase, in a specific manner involving the power cables, which are routed in close proximity in this area.

The fire area in the south half of the containment building contains all four channels for RCS pressure indication. A junction box for each channel is situated outside the secondary shield wall near the pressurizer. The Channel 1 and Channel 4 junction boxes are separated by 17 feet. Due to the angular shape of the wall in this area, each junction box is partially shielded from a fire involving the other by a corner of the concrete barrier. From the junction boxes, the conduits for the pressure indicators are embedded in concrete and routed to the cable penetration area.

Both areas are protected by a partial coverage smoke detection system. Manual hose stations and an oil collection system for the reactor coolant pumps are provided.

Due to the restricted access to this area, the probability of an exposure fire from the accumulation of transient combustibles and which could potentially bypass the cable tray fire stops is unlikely. Therefore, the fire stops installed in the intervening cable trays will provide reasonable assurance that one train will be maintained free of fire damage. Because the amount of in-situ combustibles is low in this area and early warning detection provided, a fire in this area which could damage both RHR letdown power cable conduits is unlikely. Further, it is unlikely that fire damage would occur in the specific manner required. This combination of conditions provides reasonable assurance that a spurious operation of both valves is not likely to occur. The RCS pressure instrumentation is separated by 17 feet. A concrete missile barrier provides a partial radiant energy shield between the redundant instrumentation channels. Because of the unlikely nature of significant fire occurrence inside containment and the mitigating effects of the intervening missile barrier, there is reasonable assurance that one train will be maintained free of fire damage. The level of protection inside containment provides a level of fire protection equivalent to the technical requirements of Section III.G of Appendix R. Therefore, the exemption is granted.

Tank Rooms, Pump Rooms, and Corridors, El. 355', Fire Zone 2040JJ

The licensee has requested exemption from Section III.G.2 to the extent it requires an automatic fire suppression system. This area contains several pump and tank rooms and adjacent corridors. The redundant equipment in this area consists of the three charging pumps and associated cables.

Walls, floors, and ceiling assemblies are reinforced concrete. The ceiling height in the area is 17 feet. The charging pumps are separated by less than 20 feet and are in cubicles approximately 10 feet by 16 feet. The pump cubicles are separated by partial height concrete walls, eight feet high. The combustible loading in this area consists of 10 gallons of lubricating oil for each pump and several cable trays in an adjacent corridor. A cable tray is also located in two of the three pump cubicles. The combustible loading added by the cable trays has not been quantified by the licensee, but is described as "moderately loaded with a fill of approximately 20%." The cables are open cable trays and are routed 8 to 12 feet above the floor. Cables for the A and C trains are separated by approximately 10 feet, and cables for the B and C trains are separated by approximately 12 feet. At least one pump is required for safe shutdown.

The licensee will modify the fire protection in this area by enclosing the cables for two of the three charging pumps in a one-hour barrier and enclosing one train of the corridor area cable trays in a one-hour barrier for a sufficient length to permit 20 feet of horizontal separation between unprotected redundant cables. The configuration of cables in this area involves redundant cable trays in two corridors, perpendicular to each other. In addition to the 20 feet of separation provided by the proposed barrier, the corner of the concrete wall at the intersection provides a line-of-sight radiant energy shield between redundant cables. This area is provided with smoke detectors, portable extinguishers and manual fire hose stations.

Because of the low in-situ combustible loading in this area, intended installation of one-hour barriers and intervening walls, and the detection system, in the event of an exposure fire, redundant cables will be protected for a sufficient period to enable the fire brigade to respond and extinguish a fire prior to damage of both trains. The protection in the charging pump area in conjunction with the proposed one-hour barriers provides a level of fire protection equivalent to Section III.G. Therefore, the exemption is granted.

Lower South Piping Penetration Area, Fire Zone 2055JJ

The licensee has requested exemption from III.G.2 to the extent it requires separation of cables and equipment and associated non-safety circuits of redundant trains by a fire barrier having a three-hour rating. The piping penetration area is adjacent to the charging pump area. The fire area boundary wall separating the two areas is a concrete wall, but does not carry a fire resistance rating. The licensee notes that this wall was previously accepted, based on the low combustible loading in the area. The wall currently contains various penetrations and an open doorway. The A-train charging pump cable tray is located in the piping penetration area approximately 17 feet from the open doorway while the C-train cable tray is located in the adjacent area approximately 24 feet from the doorway. The B-train cable tray is also in this area.

The combustible loading in the piping penetration area consists of three open cable trays. The quantity of combustible cable insulation has not been provided, but is described as "moderate". Smoke detection, portable extinguishers and manual hose stations are provided in both areas.

The licensee will modify the fire protection in these areas by upgrading all penetrations through the boundary wall to provide a three-hour rating, with the exception of the doorway. For the protection of the doorway, the licensee notes that there are two doors which must be opened for passage between these areas. The first door is a fully louvered, hollow metal door. This door is equipped with a surface type intrusion alarm switch. The second door is an air tight door, which will be replaced with a three-hour rated fire door equipped with a latch to enable this door to open at an overpressure of 0.25 psig in order to limit peak pressure in that zone. This pressure is not expected to be reached by fire-caused pressures.

In this area, an open doorway would violate the three-hour barrier and would provide direct communication between two fire areas containing redundant trains of safe shutdown related cable. The three-hour rated fire door with special latch for overpressure release which will be installed, is adequate for the fire hazard in these areas. The protection provided for the piping penetration area provides a level of fire protection equivalent to the technical requirements of Section III.G of Appendix R. Therefore, the exemption is granted.

Corridor, El. 372', Fire Zone 2109U

The licensee has requested exemption from Section III.G.2 to the extent it requires 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 combustible or fire hazards, or enclosure of cables and equipment and associated non-safety circuits of one redundant train in a fire barrier having one-hour rating.

This corridor area is approximately 86 feet by 12 feet with a 12-foot ceiling. The floor, walls and ceiling assemblies are reinforced concrete with a three-hour rating. The fire area includes an access corridor to one of the diesel generator rooms. The redundant cables and equipment in this area are the electrical distribution panels 2RS3 and 2RS4 and associated cables. This equipment provides the power supply for safe shutdown instrumentation. The two redundant distribution panels are wall mounted and separated by approximately 18 feet.

Intervening combustibles between the panels include several ceiling level cable trays containing what the licensee describes as, "a large amount of cable insulation in open cable trays". Various transient combustibles could be introduced in this area during maintenance periods, including 55 gallon drums of lubricating oil. The licensee will modify the fire protection in this area by enclosing the conduits associated with one of the distribution panels in a one-hour rated fire barrier and coating all intervening cables between the panels with a flame retardant coating. A smoke detection system is provided throughout the corridor in addition to line-type heat detectors in each cable tray. An automatic, open head sprinkler system, portable fire extinguishers and manual fire hose stations are also installed in the area.

The early warning detection system and automatic water deluge system will ensure that any fires are promptly detected and suppressed. The intervening combustibles between the redundant panels are located above the panels at the ceiling level. The coating of all intervening cables with a flame retardant coating, which is not equivalent to a one-hour barrier, but which will retard the propagation of flame, and enclosing one train of conduits for the distribution panels, which rise vertically to the ceiling level, in a one-hour fire rated barrier will provide enhanced protection for the distribution panels and will reduce the probability of damage to both trains prior to activation of the corridor detection and suppression system. The intended modifications in conjunction with the existing detection and automatic deluge system will provide an alternative protection system that gives reasonable assurance that one train of distribution panels will be maintained free of fire damage.

The existing protection for this area in conjunction with the proposed one-hour fire rated barrier and flame retardant coating of intervening cable trays provides a level of fire protection equivalent to the technical requirements of Section III.G of Appendix R. Therefore, the exemption is granted.

Fixed Fire Suppression for Eight Areas

The licensee has provided alternate shutdown capability for the following areas in Unit 2:

- a) Upper North Piping Penetration Area, Fire Zone 2081HH
- b) Motor Control Center, Fire Zone 2096M
- c) Electrical Equipment Room, El. 368', Fire Zone 2091BB
- d) Corridor Area, Fire Zone 2107N

- e) Pipeway & Equipment Access Way, Fire Zone 2223KK
- f) Pump Room, Fire Zone 2106R
- g) Core Protection Calculator Panel, Fire Zone 2150C
- h) Health Physics Area, Fire Zone 2136I

The combustible loading in these zones is negligible. The redundant equipment in these areas is primarily one system, the diesel fuel transfer pumps. The licensee requests an exemption from providing fixed extinguishing systems in these areas and detection for Fire Zones 2081HH and 2136I as required by Section III.G.3.

All of the above fire zones represent a similar configuration, i.e., combustible loading is light, there is alternate shutdown capability, and manual fire suppression equipment is available. The low combustible loading in these areas ensures that safety related equipment in adjacent areas will not be threatened. The installation of a fixed fire suppression system in all these areas and detection for Fire Zones 2081HH and 2136I will not significantly increase the level of fire protection in these areas.

The existing fire protection in conjunction with alternate shutdown capability in the above areas provides a level of fire protection equivalent to the technical requirements of Section III.G.3 of Appendix R. Therefore, the exemptions are granted.

V.

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

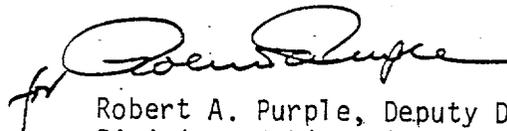
and discussed in III. and IV. above are authorized by law, will not endanger life or property or the common defense and security, are otherwise in the public interest, and are hereby granted.

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.

A copy of the Safety Evaluation dated March 22, 1983 related to this action is available for public inspection at the Commission's Public Document Room, 1717 H Street, N. W., Washington, D. C. 20555 and at the Tomlinson Library, Arkansas Tech University, Russellville, Arkansas 72081. A copy may be obtained upon request addressed to the U. S. Nuclear Regulatory Commission, Washington, D. C. 20555, Attention: Director, Division of Licensing.

This Exemption is effective upon issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



Robert A. Purple, Deputy Director
Division of Licensing
Office of Nuclear Reactor Regulation

Dated at Bethesda, Maryland
this 22nd day of March 1983.



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

ARKANSAS POWER & LIGHT COMPANY

ARKANSAS NUCLEAR ONE, UNIT NO. 2

DOCKET NO. 50-368

1.0 Introduction

By letter dated July 1, 1982, the Arkansas Power and Light Company (the licensee) requested exemptions from the technical requirements of Section III.G of Appendix R to 10 CFR 50 for various areas in Unit 2.

By letter dated November 11, 1982, the licensee provided new proposals and additional clarifying information regarding the previous exemption requests.

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

- a. Separation of cables and equipment and associated non-safety circuits of redundant trains by a fire barrier having a 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;
- 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 combustible 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 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 alternative shutdown capability independent of the fire area of concern. It also requires a fixed suppression system 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 than the measures specified in Section III.G. In such a case, the licensee must demonstrate, by means of a detailed fire hazards analysis, that existing protection or existing protection in conjunction with proposed modifications will provide a level of safety equivalent to the technical requirements of Section III.G of Appendix R.

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

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

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

2.1.1 Discussion - Below El. 354'

The intake structure consists of three floor levels (i.e. below El. 354', El. 354' & El. 366'). The first level is below El. 354' and contains circulating water piping, associated valves and power cables. The power cables for redundant pumps are separated by less than 20 feet. This floor level is the pump intake bay for the service water pumps and is therefore partially filled with water. The licensee proposes to reroute cables to provide greater than 20 feet of separation. Portable fire extinguishers, manual hose reels, and ionization detectors are provided throughout the area.

2.1.2 Evaluation - Below El. 354'

After the proposed cable rerouting, this zone will have 20' separation and automatic detection but will not have an automatic suppression system as required by Section III.G.

This zone consists of the service water pump intake bays. Therefore, the water level in the intake bays precludes the possible accumulation of transient combustible materials as expected in other plant areas. Because the likelihood of an exposure fire is low, these alternative features compensate for the required suppression system and provide a level of fire protection equivalent to that required by Section III.G of Appendix R, and therefore are acceptable.

2.1.3 Conclusion - Below El. 354'

Based on the above evaluation, the fire protection provided below El. 354', with the proposed modifications, provides a level of fire protection equivalent to the technical requirements of Section III.G of Appendix R, and therefore, the exemption should be granted.

2.2.1 Discussion - El. 354'

The second floor level of the Intake Structure is at El. 354' and contains redundant cables in conduits for the service water pumps and discharge valves. The redundant cables at this level are routed vertically and are separated by more than 20 feet. The in-situ combustible loading at this elevation consists primarily of cable insulation. This fire area is provided with portable fire extinguishers, manual hose stations and a smoke detection system. The licensee proposes to reroute all cables required for the service water pump motors to provide greater than 20 feet of separation and to enclose one train of pump power cabling in a one-hour rated fire barrier.

2.2.2 Evaluation - El. 354'

With the proposed rerouting of cables and a one-hour barrier, this area will not comply with Section III.G because an automatic suppression system is not provided. In the event of an exposure fire involving transient combustible materials, there will be a time lag between the ignition of the fire, detection and alarm, and the fire brigade response. It is our opinion that the proposed configuration of cables and one-hour barrier will provide protection against the thermal flux of an exposure fire for a sufficient period of time to enable the fire brigade to respond and extinguish a fire prior to damage of both trains.

2.2.3 Conclusion - El. 354'

The level of existing protection in conjunction with the proposed modifications in the Intake Structure, El. 354', provides a level of fire protection equivalent to the technical requirements of Section III.G of Appendix R; therefore, the exemption should be granted.

2.3.1 Discussion - El. 366'

The uppermost level of the intake structure is at El. 366' and contains the A and B trains and swing service water pump motors, associated valves and cables and the ventilation equipment for the intake structure. Redundant trains of safe shutdown equipment are separated by less than 20 feet. Missile barriers provided between each pump also act as radiant energy shields.

The in-situ combustibles at this level consist of one non-safety related cable tray and approximately 13 1/2 gallons of lubricating oil in each service water pump motor. Floor drains are provided in the vicinity of each pump to collect and drain any potential lube oil leaks. Portable fire extinguishers, manual hose reels, and an ionization-type smoke detection system are provided throughout the area. The licensee proposes to install an automatic sprinkler system for the protection of the three service water pump motors.

2.3.2 Evaluation - El. 366'

This zone does not have 20 feet of separation free of intervening combustibles or a complete automatic suppression system as required in Section III.G. The three service water pumps and valves are located at El. 366'. The separation distance between pumps is less than 20 feet. The partial width missile barriers do not completely enclose one train of components. Their effectiveness is therefore limited to acting as a thermal energy barrier to a fire exposure in a single direction. Because it is not possible to predict the conditions and locations under which exposure fires may occur, partial barriers alone do not provide reasonable assurance that both trains of redundant components will be maintained free of fire damage from any anticipated exposure fire.

Due to the low in-situ combustible loading in the intake structure, it is our opinion that the partial width missile barriers in conjunction with the proposed automatic sprinkler system will provide adequate assurance that one train of service water pumps will be maintained free of fire damage.

2.3.3 Conclusion - El. 366'

Based on the above evaluation, the existing fire protection for the Intake Structure at El. 366' provides a level of protection equivalent to the technical requirements of Section III.G of Appendix R and, therefore, the exemption should be granted.

3.0 Yard Area Manholes, 2MH01E, 2MH02E, 2MH03E

3.1 Discussion

This fire area consists of three manholes which are concrete bunkers approximately 7 feet by 7 feet by 8 feet, and are located remotely from the remainder of the plant. The manholes are not ventilated and can be accessed only by lifting the concrete hatches with a crane.

The licensee proposes to fill the manholes with a non-combustible material such as sand or vermiculite.

3.2 Evaluation

The redundant service water pump cables in the manholes are neither separated by 20 feet nor enclosed in one-hour barriers. Smoke detection, automatic suppression, and alternate shutdown capability are not provided. The licensee proposes to fill the manholes with sand or vermiculite. This will prevent a fire from occurring in the manholes and, therefore, an acceptable level of fire protection has been provided.

3.3 Conclusion

The level of protection for the yard area manholes 2MH01E, 2MH02E, and 2MH03E provides a level of fire protection equivalent to the technical requirements of Section III.G of Appendix R; therefore, the exemption should be granted.

4.0 General Access Area, El. 317' (Fire Zone 2006 LL) East Pump Area, El. 317' (Fire Zone 2007 LL)

4.1 Discussion

By letter dated November 11, 1982, the licensee committed to install automatic suppression in these areas, thereby complying with Section III.G. The exemption requests are therefore withdrawn.

5.0 Pump Room (Fire Zone 2024JJ)

5.1 Discussion

This fire area contains the steam turbine driven emergency feedwater pump. The boundary walls, floor, and ceiling assemblies are reinforced concrete with a three-hour rating. Penetrations through these walls will be upgraded to a three-hour rating, with the exception of the door to the room. Because of other safety requirements, this door is required to be a one inch thick watertight door, and is consequently non-fire-rated.

The redundant motor-driven feedwater pump is located in an adjacent room of similar construction, with the same type of watertight access door.

The in-situ combustible loading in the steam-turbine driven pump room is approximately 2200 BTU/FT², which, if totally consumed, would produce an equivalent fire severity on the ASTM E-119 standard time-temperature curve of less than two minutes.

The in-situ combustible loading in the redundant motor-driven pump room is approximately 3100 BTU/FT² which, if totally consumed, would produce an equivalent fire severity on the ASTM E-119 standard time-temperature curve of less than three minutes. A smoke detection system is provided

in the area. Portable fire extinguishers and manual hose stations are readily accessible in adjacent areas.

The licensee requests an exemption from providing a three-hour rated fire door for the emergency feedwater pump rooms on the basis of the low combustible loading in the area, the existing ability to promptly detect and manually extinguish fires, and the inherent fire resistance of the steel watertight doors.

5.2 Evaluation

The licensee has provided a three-hour rated fire barrier for the separation of redundant trains of emergency feedwater pumps. The watertight access door installed in this fire barrier is not an approved three-hour rated fire door and therefore could permit the spread of fire in less than three hours.

The combustible loading in this area is substantially lower than needed for a fire of three-hours duration. An exposure fire would therefore be of limited severity and duration. The design of the watertight door provides a degree of inherent fire protection. It is our experience that typical watertight doors provide equivalent protection as three-hour rated fire doors.

This combination of features provides reasonable assurance that a fire in this area will be detected and extinguished before the redundant emergency feedwater pump is damaged.

5.3 Conclusion

The level of existing protection for this area provides a level of fire protection equivalent to the technical requirements of Section III.G of Appendix R. Therefore, the exemption should be granted.

6.0 Containment Building (Fire Zones 2032K and 2033K)

6.1 Discussion

The containment building has been subdivided into two fire areas. There is no fire barrier between the two fire areas. The separation of cables and equipment within each fire area is such that only one division of equipment is located in each fire area. With the exception of the Reactor Coolant System (RCS) pressure instrumentation, the minimum separation distance between redundant equipment in the containment building is greater than 30 feet, however there are several non-safety related cable trays which pass from one fire area to the other. The licensee has provided fire stops in the cable trays to prevent the spread of flames among the cables.

The fire area in the north half of the containment building contains two shutdown cooling drop line (RHR letdown) valves, in series. The licensee states that a spurious operation of both valves could cause a loss of reactor coolant. The spurious signal required for this action would have to be a short, phase to phase, in a specific manner involving the

power cables, which are routed in close proximity in this area. Both areas are protected by a partial coverage smoke detection system. Manual hose stations and an oil collection system for the reactor coolant pumps are provided.

The fire area in the south half of the containment building contains all four channels for RCS pressure indication. A junction box for each channel is situated outside the secondary shield wall near the pressurizer. The Channel 1 and Channel 4 junction boxes are separated by 17 feet. Due to the angular shape of the wall in this area, each junction box is partially shielded from a fire involving the other by a corner of the concrete barrier. From the junction boxes, the conduits for the pressure indicators are embedded in concrete and routed to the cable penetration area.

6.2 Evaluation

Inside non-inerted containment, Section III.G.2 requires the 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. The arrangement of cables and equipment inside containment does not meet this requirement where the non-safety related cable trays pass between divisions. The licensee has installed fire stops in these cable trays to prevent the spread of flame along the cables. Due to the restricted access to this area, the probability of an exposure fire from the accumulation of transient combustibles and which could potentially bypass the cable tray fire stops is unlikely. Therefore, the fire stops installed in the intervening cable trays will provide reasonable assurance that one train will be maintained free of fire damage.

The spurious operation of the decay heat drop line valves could potentially cause the loss of reactor coolant from the primary system. The licensee has analyzed the conditions under which a simultaneous spurious operation of both valves could occur and found that a fire involving the power cable conduits to both valves which would cause a short, phase to phase, is necessary. Because the amount of in-situ combustibles is low in this area and early warning detection provided, a fire in this area which could damage both conduits is unlikely. Further, it is unlikely that fire damage would occur in the specific manner required. This combination of conditions provides reasonable assurance that a spurious operation of both valves is not likely to occur.

The RCS pressure instrumentation is separated by 17 feet instead of 20 feet. Additionally, a concrete missile barrier provides a partial radiant energy shield between the redundant instrumentation channels. Because of the unlikely nature of significant fire occurrence inside containment and the mitigating effects of the intervening missile barrier, there is reasonable assurance that one train will be maintained free of fire damage.

6.3 Conclusion

The level of protection inside containment provides a level of fire protection equivalent to the technical requirements of Section III.G of Appendix R. Therefore, the exemption should be granted.

7.0 Tank Rooms, Pump Rooms, and Corridors, El. 355' (Fire Zone 2040JJ)

7.1 Discussion

This area contains several pump and tank rooms and adjacent corridors. The redundant equipment in this area consists of the three charging pumps and associated cables. Walls, floors, and ceiling assemblies are reinforced concrete. The ceiling height in the area is 17 feet.

The charging pumps are separated by less than 20 feet and are in cubicles approximately 10 feet by 16 feet. The pump cubicles are separated by partial height concrete walls, eight feet high. The combustible loading in this area consists of 10 gallons of lubricating oil for each pump and several cable trays in an adjacent corridor. A cable tray is also located in two of the three pump cubicles. The combustible loading added by the cable trays has not been quantified by the licensee, but is described as "moderately loaded with a fill of approximately 20%". The cables are in open cable trays and are routed 8 to 12 feet above the floor. Cables for the A and C trains are separated by approximately 10 feet, and cables for the B and C trains are separated by approximately 12 feet. At least one pump is required for safe shutdown.

The licensee proposes to modify the fire protection in this area by enclosing the cables for two of the three charging pumps in a one-hour barrier and enclosing one train of the corridor area cable trays in a one-hour barrier for a sufficient length to permit 20 feet of horizontal separation between unprotected redundant cables. The configuration of cables in this area involves redundant cable trays in two corridors, perpendicular to each other. In addition to the 20 feet of separation provided by the proposed barrier, the corner of the concrete wall at the intersection provides a line-of-sight radiant energy shield between redundant cables. This area is provided with smoke detectors, portable extinguishers and manual fire hose stations.

7.2 Evaluation

This area does not comply with Section III.G because an automatic suppression is not provided.

Because of the low in-situ combustible loading in this area, proposed one-hour barriers and intervening walls, and detection system, it is our opinion that in the event of an exposure fire, redundant cables will be protected for a sufficient period to enable the fire brigade to respond and extinguish a fire prior to damage of both trains.

7.3 Conclusion

The level of protection in the charging pump area in conjunction with the proposed one-hour barriers provides a level of fire protection equivalent to Section III.G; therefore, the exemption should be granted.

8.0 Lower South Piping Penetration Area (Fire Zone 2055 JJ)

8.1 Discussion

The piping penetration area is adjacent to the charging pump area. The fire area boundary wall separating the two areas is a concrete wall, but does not carry a fire resistance rating. The licensee notes that this wall was previously accepted, based on the low combustible loading in the area. The wall currently contains various penetrations and an open doorway. The A-train charging pump cable tray is located in the piping penetration area approximately 17 feet from the open doorway while the C-train cable tray is located in the adjacent area approximately 24 feet from the doorway. The B-train cable tray is also in this area. The combustible loading in the piping penetration area consists of three open cable trays. The quantity of combustible cable insulation has not been provided, but is described as "moderate". Smoke detection, portable extinguishers and manual hose stations are provided in both areas.

The licensee proposes to modify the fire protection in these areas by upgrading all penetrations through the boundary wall to provide a three-hour rating, with the exception of the doorway. For the protection of the doorway, the licensee notes that there are two doors which must be opened for passage between these areas. The first door is a fully louvered, hollow metal door. This door is equipped with a surface type intrusion alarm switch. The second door is an air tight door. This door is designed such that it blows open with a pressure buildup in Zone 2055JJ of 0.25 psig to limit peak pressure within that zone. This door is normally kept closed. The licensee proposes to replace this outer metal door with a three-hour rated fire door with a modified latch in order to permit the door to open on 0.25 psig internal pressure.

8.2 Evaluation

Section III.G of Appendix R requires that individual fire areas be separated by three-hour rated fire barriers, justified fire barriers of lesser fire resistance or water curtains. In this area, an open doorway violates the three-hour barrier and provides direct communication between two fire areas containing redundant trains of safe shutdown related cable. The proposed three-hour rated fire door with a modified latch is adequate for the fire hazard in these areas. The pressures developed by a fire are typically very small. The maximum pressures

expected from a fully developed fire are in the vicinity of 100 PA*, which is approximately 1/1000 of atmospheric pressure, and much less than the .25 psig required to open this door.

8.3 Conclusion

The protection provided for the piping penetration area provides a level of fire protection equivalent to the technical requirements of Section III.G of Appendix R. Therefore, the exemption should be granted.

9.0 Corridor, El. 372' (Fire Zone 2109U)

9.1 Discussion

This corridor area is approximately 86 feet by 12 feet with a 12 foot ceiling. The floor, walls and ceiling assemblies are reinforced concrete with a three-hour rating. The fire area includes an access corridor to one of the diesel generator rooms. The redundant cables and equipment in this area are the electrical distribution panels 2RS3 and 2RS4 and associated cables. This equipment provides the power supply for safe shutdown instrumentation. The two redundant distribution panels are wall mounted and separated by approximately 18 feet. Intervening combustibles between the panels include several ceiling level cable trays containing what the licensee describes as, "a large amount of cable insulation in open cable trays". Various transient combustibles could be introduced in this area during maintenance periods, including 55 gallon drums of lubricating oil.

The licensee proposes to modify the fire protection in this area by enclosing the conduits associated with one of the distribution panels in a one-hour rated fire barrier, and coating all intervening cables between the panels with a flame retardant coating.

A smoke detection system is provided throughout the corridor in addition to line-type heat detectors in each cable tray. An automatic, open head sprinkler system, portable fire extinguishers and manual fire hose stations are also installed in the area. The licensee contends that the proposed modifications, combined with the existing fire protection, will maintain one train of distribution panels and cables free of fire damage.

* Butcher, E.G., & Parnell, A.C., "Smoke Control in Fire Safety Design", E&F.M. Spon, London, 1979, page 34.

9.2 Evaluation

The redundant components in this area are not separated by one-hour rated fire barriers or 20 feet free of intervening combustibles. The early warning detection system and automatic water deluge system will ensure that any fires are promptly detected and suppressed. The intervening combustibles between the redundant panels are located above the panels at the ceiling level. The coating of all intervening cables with a flame retardant coating, which is not equivalent to a one-hour barrier, but which will retard the propagation of flame, and enclosing one train of conduits for the distribution panels, which rise vertically to the ceiling level, in a one-hour fire rated barrier will provide enhanced protection for the distribution panels and will reduce the probability of damage to both trains prior to activation of the corridor detection and suppression system. The proposed modifications in conjunction with the existing detection and automatic deluge system will provide an alternative protection system that gives reasonable assurance that one train of distribution panels will be maintained free of fire damage.

9.3 Conclusion

The existing protection for this area in conjunction with the proposed one-hour fire rated barrier and flame retardant coating of intervening cable trays provides a level of fire protection equivalent to the technical requirements of Section III.G of Appendix R. Therefore, the exemption should be granted.

10.0 Fixed Fire Suppression for Eight Areas

10.1 Discussion

The licensee has provided alternate shutdown capability for the following areas in Unit 2:

- a) Upper North Piping Penetration Area (Fire Zone 2081HH)
- b) Motor Control Center (Fire Zone 2096M)
- c) Electrical Equipment Room, El. 368' (Fire Zone 2091BB)
- d) Corridor Area (Fire Zone 2107N)
- e) Pipeway & Equipment Access Way (Fire Zone 2223KK)
- f) Pump Room (Fire Zone 2106R)
- g) Core Protection Calculator Panel (Fire Zone 2150C)
- h) Health Physics Area (Fire Zone 2136I)

The combustible loading in these zones is negligible. The redundant equipment in these areas is primarily one system, the diesel fuel transfer pumps. The licensee requests an exemption from providing fixed extinguishing systems in these areas and detection for fire zones 2081HH and 2136I.

10.2 Evaluation

All of the fire zones for which exemptions have been requested represent a similar configuration, i.e., combustibile loading is light, there is alternate shutdown capability, and manual fire suppression equipment is available. The low combustibile loading in these areas ensures that safety related equipment in adjacent areas will not be threatened. The installation of a fixed fire suppression system in all these areas and detection for fire zones 2081HH and 2136I will not significantly increase the level of fire protection in these areas.

10.3 Conclusion

Based on our evaluation, we find that the existing fire protection in conjunction with alternate shutdown capability in the areas for which an exemption has been requested provides a level of fire protection equivalent to the technical requirements of Section III.G.3 of Appendix R and, therefore, the exemptions should be granted.

Summary - Unit 2

Based on our evaluation, we find that the protection provided for the following areas provides a level of fire protection equivalent to the technical requirements of Section III.G of Appendix R and exemptions should therefore be granted:

- 2.1 Intake Structure, Below El. 354'
- 2.2 Intake Structure, El. 354'
- 2.3 Intake Structure, El. 366'
- 3.0 Yard Area Manholes, 2MH01E, 2MH02E, 2MH03E
- 5.0 Pump Room (Fire Zone 2024JJ)
- 6.0 Containment Building (Fire Zones 2032K and 2033K)
- 7.0 Tank Rooms, Pump Rooms, and Corridors, El. 355' (Fire Zone 2040JJ)
- 8.0 Lower South Piping Penetration Area (Fire Zone 2055JJ)
- 9.0 Corridor, El. 372' (Fire Zone 2109U)
- 10.0 Fixed Fire Suppression for Eight Areas:
 - a) Upper North Piping Penetration Area (Fire Zone 2081HH)
 - b) Motor Control Center (Fire Zone 2096M)
 - c) Electrical Equipment Room, El. 368' (Fire Zone 2091BB)
 - d) Corridor Area (Fire Zone 2107N)
 - e) Pipeway and Equipment Access Way (Fire Zone 2223KK)
 - f) Pump Room (Fire Zone 2106R)
 - g) Core Protection Calculator Panel (Fire Zone 2150C)
 - h) Health Physics Area (Fire Zone 2136I)

The exemption requests for the following areas were withdrawn when the licensee committed to install automatic suppression in them to comply with Section III.G:

- a) General Access Area, El. 317' (Fire Zone 2006LL)
- b) East Pump Area, El. 317' (Fire Zone 2007LL).

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