Docket

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

October 26, 1988

Docket No. 50-368

Mr. T. Gene Campbell
Vice President, Nuclear
Operations
Arkansas Power and Light Company
P.O. Box 551
Little Rock, Arkansas 72203

Dear Mr. Campbell:

SUBJECT: EVALUATION OF EXEMPTIONS FROM THE TECHNICAL REQUIREMENTS OF APPENDIX R TO 10 CFR PART 50 - ARKANSAS NUCLEAR ONE, UNIT 2 (TAC NO. 55668)

By letter dated August 15, 1984, the licensee requested approval of a number of exemptions from the technical requirements of Section III.G., III.J., and III.O of Appendix R to 10 CFR Part 50. By letters dated August 30, 1985 and October 29, 1987 the licensee requested approval of a number of additional exemptions from Appendix R. Supplemental information was provided by the licensee in letters to the staff dated October 20, 1986, April 22 and June 24, 1987, and September 13, 1988.

We have completed our review. Based on our evaluation of the AP&L submittals, AP&L's proposed fire protection configuration provides and equivalent level of safety to that achieved by compliance with Appendix R. Therefore the exemption requests as described in the enclosed Exemption are granted. Our Safety Evaluation is also enclosed.

The exemption from Section III.J requested in your August 30, 1985 letter regarding the lack of 8-hour battery powered emergency lighting in the yard area access paths to the diesel fuel storage vault and the Unit 2 intake structure involves the same locations discussed in the corresponding exemption granted for Unit 1. The granting of the Unit 1 exemption obviates the need for an exemption for Unit 2.

A copy of the "Environmental Assessment and Finding of No Significant Impact" was sent to you by our letter dated June 9, 1988, and published in the Federal Register on August 4, 1988 (53 FR 29398).

A copy of the Exemption is being file with the Office of the Federal Register for publication.

DFO1
1/1

In addition to the above, we have determined that AP&L's fire hazards analysis of certain non-fire-rated features in fire area bondaries conforms with the guidance issued in Generic Letter 86-10. Therefore, an exemption for these conditions, as described in above-referenced generic letter, is not necessary.

Sincerely

/S/

Jose A. Calvo, Director
Project Directorate IV
Division of Reactor Projects - III,
IV, V and Special Projects

Enclosures:
As stated

cc w/enclosures:
See next page

DISTRIBUTION

Docket File	NRC PDR	Local PDR	PD4 Reading	ACRS (10)
T. Murley/J. Sniezek	F. Miraglia	C. Rossi	D. Crutchfield	L. Rubenstein
J. Calvo	P. Noonan	C. Harbuck	OGC-Rockville	E. Jordan
B. Grimes	GPA/PA	D. Kubicki	ARM/LFMB	PD4 Plant File
T. Barnhart (4)				

PDIV:LA	PDIV:PM	PDIV:D	OGC	ARDIV	(A)D:DRSP
PNoonan	CHarbuck:kb	JCalvo		LRubenstein	GHolahan
09/12/88	09/16/88	09/24/88	09/ /88	09/25/88	09/26/88
		10		10	10

CEB
DKubicki
09/5/88
10

In addition to the above, we have determined that AP&L's fire hazards analysis of certain non-fire-rated features in fire area bondaries conforms with the guidance issued in Generic Letter 86-10. Therefore, an exemption for these conditions, as described in above-referenced generic letter, is not necessary.

Sincerely

José A. Calvo

Jose A. Calvo, Director
Project Directorate IV
Division of Reactor Projects - III,
IV, V and Special Projects

Enclosures:
As stated

cc w/enclosures:
See next page

cc:
Mr. Dan R. Howard, Manager
Licensing
Arkansas Nuclear One
P. O. Box 608
Russellville, Arkansas 72801

Mr. James M. Levine, Executive Director
Site Nuclear Operations
Arkansas Nuclear One
P. O. Box 608
Russellville, Arkansas 72801

Mr. Nicholas S. Reynolds
Bishop, Cook, Percell & Reynolds
1400 L Street, N.W.
Washington, D.C. 20005-3502

Regional Administrator, Region IV
U.S. Nuclear Regulatory Commission
Office of Executive Director for
Operations
611 Ryan Plaza Drive, Suite 1000
Arlington, Texas 76011

Senior Resident Inspector
U.S. Nuclear Regulatory Commission
1 Nuclear Plant Road
Russellville, Arkansas 72801

Ms. Greta Dicus, Director
Division of Environmental Health
Protection
Arkansas Department of Health
4815 West Markam Street
Little Rock, Arkansas 72201

Mr. Robert B. Borsum
Babcock & Wilcox
Nuclear Power Generation Division
1700 Rockville Pike, Suite 525
Rockville, Maryland 20852

Mr. Charles B. Brinkman, Manager
Washington Nuclear Operations
C-E Power Systems
7910 Woodmont Avenue
Suite 1310
Bethesda, Maryland 20814

Honorable William Abernathy
County Judge of Pope County
Pope County Courthouse
Russellville, Arkansas 72801

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

In the matter of ARKANSAS POWER & LIGHT COMPANY (Arkansas Nuclear One Unit 2)	)	Docket No. 50-368

EXEMPTION

I

Arkansas Power & Light Company (AP&L or the licensee) is the holder of Facility Operating License No. NPF-6 which authorizes the operation of Arkansas Nuclear One, Unit 2 (the facility) at a steady state power level not in excess of 2815 megawatts thermal. This license provides, among other things, that the facility is subject to all rules, regulations, and Orders of the Nuclear Regulatory Commission (the Commission or the staff) now or hereafter in effect. The facility is a pressurized water reactor (PWR) located at the licensee's site in Pope County, Arkansas.

II

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

Section III. G of Appendix R requires fire protection for equipment important to post-fire 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 alternate post-fire 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).

Section III.J of Appendix R requires that emergency lighting units with at least an 8-hour battery power supply be provided in all areas needed for operation of safe shutdown equipment and in access and egress routes thereto.

Section III.O of Appendix R requires that facilities have a reactor coolant pump oil collection system if the containment is not inerted during normal operation. This system must be so designed, engineered, and installed that failure during normal or design basis accident conditions will not lead to fire, and that there is reasonable assurance that the system will withstand the Safe Shutdown Earthquake. Additionally the system must drain to a vented closed container that can hold the entire lube oil system inventory.

III

By letter dated August 15, 1984, the licensee provided details of their fire protection program and requested approval of a number of exemptions from the technical requirements of Sections III.G, III.J, and III.O of Appendix R to 10 CFR Part 50. By letters dated August 30, 1985 and October 29, 1987 the licensee requested approval of a number of additional exemptions from Appendix R.

Supplemental information was provided by the licensee in letters dated October 20, 1986 and April 22 and June 24, 1987, and September 13, 1988. A description of the exemptions requested and a summary of the Commission's evaluation follow.

Exemption Requested

The licensee requested exemption from Section III.G.2.b due to a lack of 20 feet of separation free of intervening combustible materials between the redundant diesel generator exhaust fan outlets (Fire Area B, Fire Zone 2114-I).

The staff's principle concerns were that a pathway existed which could allow fire to spread and damage the redundant systems, and that the lack of fixed suppression systems and fire detectors throughout this fire area could permit a fire to spread and result in the loss of safe shutdown capability. However, because of the light combustible loading in these fire zones, it is not expected that a fire of significant duration or magnitude will occur. There are no intervening combustibles between the redundant safe shutdown systems.

If a fire were to occur in or near one of the exhaust fans, it would be expected to develop slowly with initial low heat release and slow temperature rise. The lack of a roof over Fire Zone 2114-I would preclude any accumulation of hot gases over this equipment. Further, in order for the fire to seriously affect the redundant equipment, it would have to spread over and down into the room below, which is not considered credible. Additionally the licensee has completed the installation of 3-hour rated fire doors between redundant trains of

equipment. Therefore, the possibility of a single fire in one of these fire zones damaging redundant equipment becomes extremely unlikely, despite the horizontal separation distance of less than 20 feet between redundant trains. On this basis, the staff concludes that the licensee's alternative fire protection configuration provides an equivalent level of fire safety to that achieved by compliance with Section III.G.2.b.

The special circumstances of 10 CFR 50.12 apply in that application of the regulation in the particular circumstances is not necessary to achieve the underlying purpose of the rule. In this case, the light combustible loading, the non-credible path necessary for the fire to spread to the redundant safe shutdown equipment, and the installation of 3-hour fire rated doors committed to by the licensee, all provide assurance that the redundant train will be adequately protected. Thus the underlying purpose of the rule would be satisfied without requiring spatial separation of the exhaust fan outlets.

Exemption Requested

The licensee requested exemption from Section III.G.3 due to a lack of a fixed fire suppression system in the control room and printer room (Fire Area G, Zone 2199-G), which are rooms for which an alternate shutdown capability has been provided.

The combustible loading in these rooms is moderate, consisting of paper, clothing, and electrical cable insulation. If a fire were to occur, it is expected that it would develop at a slow to moderate rate. Ionization smoke

detectors are provided in the safety-related control cabinets and the rooms are continually occupied. The separation between adjacent control panels limits the spread of fire. The alarms for the detectors annunciate in the control room. If a fire occurs, it is expected to be promptly detected. The control room operators will alert the plant fire brigade to extinguish the fire manually if the operators have not. Separation of adjacent control panels, smoke detectors, continual occupancy of the control rooms, portable extinguishers, and alternate shutdown capability for this fire area all provide reasonable assurance that a fire in Fire Zone 2199-G will not prevent a safe plant shutdown. On this basis, the staff concludes that the licensee's alternative fire protection configuration provides an equivalent level of fire safety to that achieved by compliance with Section III.G.3.

The special circumstances of 10 CFR 50.12 apply in that application of the regulation in the particular circumstances in not necessary to achieve the underlying purpose of the rule. The rule is meant to ensure that a fire in the control room or printer room would not prevent a safe plant shutdown. The existing fire protection features provide reasonable assurance that the ability to achieve safe shutdown of the plant is maintained. Thus the underlying purpose of the rule would be satisfied without requiring a fixed fire suppression system.

Exemption Requested

The licensee requested exemption from Section III.G.2.b due to the lack of an automatic fire suppression system in the upper and lower south piping penetration rooms (Fire Area EE, Zone 2084-DD and 2055-JJ). These rooms

contain cables, equipment, and associated non-safety circuits of redundant trains which are separated by a horizontal distance of at least 20 feet free of intervening combustible material or fire hazards and are protected by fire detection systems.

The staff's principle concern was that a lack of an automatic suppression system could permit a fire to spread and result in the loss of safe shutdown capability. However, because of the moderate combustible loading in these fire zones and the arrangement of cables in trays a fire of significant magnitude is not expected to occur. Also because the cable trays are located at least 4 feet above the redundant safe shutdown related valves, the cables in them are not considered to be an intervening combustible. The redundant valves are greater than 20 feet apart, so it is very unlikely that they would all be damaged by a single fire. If a fire were to occur it would be detected by the fire detection system, which would annunciate an alarm in the control room. The fire brigade would arrive shortly and extinguish the fire using existing fire fighting equipment. If fire damage occurred to the electrical circuits supplying the valve motor operators, the valves could still be operated manually locally. Also, only one of the redundant valves is needed for safe shutdown and is not required until at least 1½ hours after a fire. On this basis the staff concludes that the licensee's alternative fire protection configuration provides an equivalent level of fire safety to that achieved by compliance with Section III.G.2.b.

The special circumstances of 10 CFR 50.12 apply in that application of the regulation in the particular circumstances is not necessary to achieve the underlying purpose of the rule. In this case the moderate fire loading,

the spatial separation free of intervening combustibles between redundant safe shutdown related valves, the capability of the fire brigade to respond quickly once a fire is detected by the automatic fire detection system all provide assurance that redundant safe shutdown components will be adequately protected. Thus the underlying purpose of the rule would be satisfied without requiring automatic suppression systems in the upper and lower south piping penetration rooms.

Exemption Requested

The licensee requested an exemption from Section III.G.2.a due to a lack of a complete 3-hour fire-rated barrier between redundant level transmitters for the safety grade condensate storage tank (QCST) (Yard Area).

The staff's principle concern was that a fire could result in damage to redundant components or cables associated with the QCST level indication. However, there are no significant unmitigated in-situ fire hazards which would represent a risk to these components. In addition, the introduction of significant quantities of transient combustibles is precluded by the difficult access to the location of the components. Should a fire occur it would probably be of limited magnitude, and the resulting smoke and hot gases would tend to be dissipated in the open air, away from the subject components. The physical configuration of the areas where the QCST level indication components are located will provide sufficient protection to assure that at least one safe shutdown train will remain free of fire damage until the fire brigade arrives to extinguish the fire, utilizing existing fire fighting equipment. On this

basis the staff concludes that the licensee's alternate fire protection configuration provides an equivalent level of fire safety to that achieved by compliance with Section III.G.2.a.

The special circumstances of 10 CFR 50.12 apply in that application of the regulation in the particular circumstances is not necessary to achieve the underlying purpose of the rule. In this case the absence of significant in-situ fire hazards, and the physical location and arrangement of the equipment provide assurance that the redundant level indication equipment would be adequately protected until the fire was brought under control by the fire brigade. Thus the underlying purpose of the rule would be satisfied without requiring a 3-hour fire-rated barrier between the redundant QCST level transmitters.

Exemption Requested

The licensee requested an exemption from Section III.O due to a lack of a reactor coolant pump oil collection system that is designed to withstand a safe shutdown earthquake (SSE) and sized to hold the oil from all reactor coolant pumps, (RCPs).

The licensee stated in a letter dated August 15, 1984 that the reactor coolant pump lube oil systems are qualified to remain functional during and after an SSE. Therefore the following guidance of Generic Letter 86-10, "Implementation of Fire Protection Requirements," applies:

> Where the RCP lube oil system is capable of withstanding the safe shutdown earthquake (SSE), the analysis should assume that only random oil leaks from the joints could occur during the lifetime of the plant. The oil collection system, therefore, should be designed to safely channel the

quantity of oil from one pump to a vented closed container. Under this set of circumstances, the oil collection system would not have to be seismically designed.

The existing oil collection system is designed to safely channel the quantity of oil from one pump to a vented closed container, and so conforms with the above staff guidance. On this basis the staff concludes that the licensee's alternate design of the oil collection system provides an equivalent level of fire safety to that achieved by compliance with Section III.O.

The special circumstances of 10 CFR 50.12 apply in that application of the regulation in the particular circumstances is not necessary to achieve the underlying purpose of the rule. In this case the design of the reactor coolant pump lubricating systems and the oil collection systems meets certain criteria previously determined by the staff to be acceptable for assuring adequate fire safety. Thus the underlying purpose of the rule would be satisfied without requiring the oil collection system to be seismically qualified and capable of holding the oil contained in all of the reactor coolant pumps.

Exemption Requested

The licensee requested an exemption from Section III.J due to a lack of 8-hour battery powered emergency lighting units in the access paths to the intake structure, and diesel fuel storage vaults which are areas required to be manned for safe shutdown. Because these locations are essentially identical to locations involved in an exemption from Section III.J granted for Unit 1, there is no need for an exemption for Unit 2.

IV.

Accordingly, the Commission has determined that, pursuant to 10 CFR 50.12, this Exemption is authorized by law, will not present an undue risk to the

public health and safety, and is consistent with the common defense and security. The Commission has further determined that special circumstances, as set forth in 10 CFR 50.12(a)(2)(ii), are present justifying the Exemption, namely that the application of the regulation in the particular circumstances is not necessary to achieve the underlying purpose of the rule. Specifics are discussed in each exemption request, but in general the underlying purpose of the rule is to accomplish safe shutdown in the event of a single fire and maintain the plant in a safe condition. This is accomplished by assuring that sufficient undamaged equipment is available to support safe shutdown, assuming a fire within the area of concern. In the areas for which an exemption is being requested, passive as well as active fire protection features assure that any single fire will not result in the loss of safe shutdown capability. These features include separation distance, fire barriers, water spray systems to preclude propagation, and manual actions. The fire protection features, in conjunction with low combustible loading and in some cases physical location and configuration, provide a high degree of assurance that a single fire will not result in loss of post-fire shutdown capability.

Accordingly, the Commission hereby grants the exemptions from the requirements of 10 CFR Part 50, Appendix R as described in Section III above.

Pursuant to 10 CFR 51.32, the Commission has determined that the granting of this Exemption will have no significant impact on the environment (53 FR 29398).

The Safety Evaluation concurrently issued and related to this action and the above referenced submittals by the licensee are available for public

inspection at the Commission's Public Document Room, 2120 L Street, N.W., Washington, D.C., and at the local public document room located at the Tomlinson Library, Arkansas Technical University, Russellville, Arkansas 72801.

This Exemption is effective upon issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Gary M. Holahan

Gary M. Holahan, Acting Director
Division of Reactor Projects - III,
IV, V and Special Projects
Office of Nuclear Reactor Regulation

Dated at Rockville, Maryland
this 26th day of October, 1988

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

EVALUATION OF FIRE PROTECTION EXEMPTIONS

FACILITY OPERATING LICENSE NO. NPF-6

ARKANSAS POWER AND LIGHT COMPANY

ARKANSAS NUCLEAR ONE, UNIT NO. 2

DOCKET NO. 50-368

1.0 INTRODUCTION

By letter dated August 15, 1984 the licensee requested approval of a number of exemptions from the technical requirements of Sections III.G., III.J., and III.O., of Appendix R to 10 CFR Part 50. By letters dated August 30, 1985 and October 29, 1987, the licensee requested approval of a number of additional exemptions from Appendix R. Supplemental information was provided by the licensee in letters to the staff dated October 20, 1986, April 22 and June 24, 1987, and September 13, 1988. The staff's evaluation of this information is contained in this report as follows: Sections 2.0 through 6.0 consist of the evaluation of specific exemption requests, and Section 7.0 consists of an evaluation of the licensee's fire hazards analysis concerning non-fire-rated features in fire area boundaries.

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

1. Separation of cables and equipment and associated non-safety circuits of redundant trains by a fire barrier having a 3-hour rating. Structural steel forming a part of or supporting such fire barriers shall be protected to provide fire resistance equivalent to that required of the barrier;

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

3. Enclosure of cables and equipment and associated non-safety circuits of one redundant train in a fire barrier having a 1-hour rating. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area.

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

Because it is not possible to predict the specific conditions under which fires may occur and propagate, the design basis protective features are specified in the rule rather than a design basis fire. Plant specific features may require protection different from the measures specified in Section III.G. In such a case, the licensee must demonstrate, by fire hazards analysis, that existing protection in conjunction with proposed modifications will provide a level of safety equivalent to the technical requirements of Section III.G of Appendix R.

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

The staff's general criteria for accepting a different 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 will be limited such that it can be repaired within a reasonable time (minor repairs with components stored onsite).

- 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 DIESEL GENERATOR ROOM, EXHAUST FAN OUTLETS (FIRE AREA B, FIRE ZONE 2114-I)

2.1 Exemption Requested

The licensee requested approval of an exemption from the technical requirements of Section III.G of Appendix R to 10 CFR Part 50 to the extent that it requires that redundant, shutdown-related systems be separated by a horizontal distance of at least 20 feet free of intervening combustibles and be protected by automatic fire suppression and detection systems.

2.2. Discussion

In Fire Zone 2114-I of Unit 2, redundant diesel generator exhaust fan outlets are separated from each other by less than 20 feet of horizontal distance, and a fixed automatic fire suppression system is not installed.

Fire Zone 2114-I is on elevation 386 feet of Unit 2, which is located as follows:

- North of the Unit 1/Unit 2 fire wall boundary
- West of Fire Zone 2115-I (boric acid makeup tank room) and Fire Area G, from which it is separated by a rated fire wall
- South of Fire Area G
- Above the Unit 2 north and south emergency diesel generator rooms (Fire Zones 2094-Q and 2093-P in Fire Areas JJ and KK, respectively).

Redundant diesel generator exhaust fan outlets are adjacent to each other and are separated by a horizontal distance of less than 20 feet. Fire Zone 2114-I is not roofed.

The combustible loading in this zone is approximately 275 Btu per square foot, which produces an equivalent severity of less than 1 minute on the ASTM E-119 time-temperature curve.

The licensee committed to install a 3-hour rated door in the opening of the reinforced concrete wall separating the redundant fan outlets.

2.3 Evaluation

The technical requirements of Section III.G of Appendix R are not met in this area because redundant diesel generator exhaust fan outlets are not separated by at least 20 feet free of intervening combustibles. The lack of area-wide fire detection and suppression systems in Fire Area B does not require an exemption per the guidance issued in Generic Letter (GL) 86-10. The staff was concerned that because of the absence of at least 20 feet of separation between the exhaust fan outlets, a pathway existed which could allow fire to spread and damage the redundant systems. Also, the lack of fixed suppression systems and fire detectors throughout this fire area could permit a fire to spread and result in the loss of safe shutdown capability. However, because of the light combustible loading in these fire zones, it is not expected that a fire of significant duration or magnitude will occur. There are no intervening combustibles between the redundant safe shutdown systems.

If a fire were to occur in or near one of the exhaust fans, it would be expected to develop slowly with initial low heat release and slow temperature rise. The lack of a roof over Fire Zone 2114-I would preclude any accumulation of hot gases

over this equipment. Further, in order for the fire to seriously affect the redundant equipment, it would have to spread over and down into the room below, which is not considered credible. The licensee has fulfilled their commitment to install 3-hour rated fire doors between redundant trains of equipment; thus the possibility of a single fire in one of these fire zones damaging redundant equipment is extremely unlikely, despite the horizontal separation distance of less than 20 feet between redundant trains.

2.4 Conclusion

Based on the above evaluation, the staff concludes that the licensee's alternative fire protection configuration provides an equivalent level of safety to that achieved by compliance with Section III.G Appendix R. Therefore, the licensee's request for exemption from the requirements for 20 feet of separation, free of intervening combustibles between the diesel generator exhaust fan outlets should be approved. The licensee's fire hazards evaluation concerning the absence of area-wide fire detectors and a fire suppression system in Fire Area B conforms with the guidance in GL 86-10. No exemption for this condition is, therefore required.

3.0 UNIT 2 CONTROL ROOM AND PRINTER ROOM (FIRE AREA G, FIRE ZONE 2199-G)

3.1 Exemption Requested

The licensee requested approval of an exemption from the technical requirements of Section III.G.3. of Appendix R to 10 CFR Part 50 to the extent that it requires the installation of a fixed fire suppression system in an area, room or zone for which an alternate shutdown capability has been provided.

3.2 Discussion

Fire Area G includes portions of elevations 372, 386, and 404 feet. It is comprised of the ANO-1 control room and cable spreading room and the ANO-2 control room, cable spreading room, health physics area, upper south electrical penetration room, core protection calculator panel room, and the printer room adjacent to the ANO-2 control room. The control rooms are separated from each other by a wall containing laminated glass doors and common ventilation louvers. Alternate shutdown is provided for this fire area.

Combustibles include paper, clothing, and cable insulation. The control rooms are continually occupied. The combustible loading in the ANO-2 control room/ printer room (Fire Zone 2199-G) is approximately 34,180 Btu per square foot, which produces an equivalent fire severity of 26 minutes on the ASTM E-119 time-temperature curve.

Fire protection in Fire Zone 2199-G consists of smoke detectors in each safety-related cabinet and portable fire extinguishers. In addition, physical separation is provided between adjacent control panels.

3.3 Evaluation

The fire protection in this fire area does not comply with the technical requirements of Section III.G.3 because a fixed fire suppression system is not installed throughout the control room and printer room.

The combustible loading in these rooms is moderate, consisting of paper, clothing, and electrical cable insulation. If a fire were to occur, it is expected that it would develop at a slow to moderate rate.

Ionization smoke detectors are provided in the safety-related control cabinets and the rooms are continually occupied. The separation between adjacent control panels limits the spread of fire. The alarms for the detectors annunciate in the control room. If a fire occurs, it is expected to be promptly detected. The control room operators will alert the plant fire brigade to extinguish the fire manually if the operators have not.

Separation of adjacent control panels, smoke detectors, continual occupancy of the control rooms, portable extinguishers, and alternate shutdown capability for this fire area all provide reasonable assurance that a fire in Fire Zone 2199-G will not prevent a safe plant shutdown.

3.4 Conclusion

Based on the above evaluation, it is concluded that the existing fire protection features provide a level of fire protection equivalent to the technical requirements of Section III.G.3 of Appendix R. Therefore, the exemption request for providing fixed fire suppression in Fire Zone 2199-G should be approved.

4.0 UPPER AND LOWER SOUTH PIPING PENETRATION ROOMS (FIRE AREA EE, FIRE ZONE 2084-DD AND 2055-JJ)

4.1 Exemption Requested

The licensee requested approval of an exemption from the technical requirements of Section III.G.2.b. of Appendix R to the extent it requires the installation of an automatic fire suppression system in an area where redundant shutdown systems are separated by more than 20 feet, free of intervening combustibles, and protected by an automatic fire detection system.

4.2 Discussion

Fire Zone 2084-DD:

The upper south piping penetration room is a high-radiation area on elevation 354 feet. It is south of the reactor containment, north of Fire Area HH, east of the plant exterior, and includes rooms 2082 and 2083. It is above the lower south piping penetration room (Fire Zone 2055-JJ) and below the electrical penetration room (Fire Zone 2137-I of Fire Area G). The relevant safe shutdown components located in Fire Zone 2084-DD are two of the four high

pressure safety injection (HPSI) outlet valves for HPSI header number 1, and the charging pump discharge header isolation valve for normal reactor coolant system (RCS) makeup. Other safety and non-safety related valves, including the other two HPSI header number 1 outlet valves, are also located in this Zone, but are not relevant to this exemption request. HPSI header number 1 is designed to function as an alternate RCS makeup path from the charging pumps. However, only two of the four HPSI Outlet valves are at least 20 feet horizontal distance away from the charging header outlet valve. Therefore, the other two HPSI outlet valves are not relevant to this exemption request. The relevant HPSI valves are 2CV5015-1 (34 feet away) and 2CV5055-1 (20 feet away). Either only one of these two HPSI outlet valves or the charging outlet valve is required to be open for safe shutdown. The charging valve is powered from the emergency electrical train opposite to that which supplies the HPSI valves. So these valves are both physically and electrically redundant to the charging valve. The charging valve is a normally open motor-operated valve, which would not be spuriously closed because of fire damage in this Fire Zone. All three valves can be manually operated locally.

The combustible contents in this fire zone consist of electrical cable insulation (cables in trays). The combustible loading is approximately 32,770 Btu per square foot, which produces an equivalent fire severity of 25 minutes on the ASTM E-119 time-temperature curve. Intervening combustibles are not present between the redundant valves.

The associated pumps are not required for safe shutdown until at least 1½ hours after a fire.

Fire protection in this fire zone consists of fire detectors and hose reels.

Fire Zone 2055-JJ:

The lower south piping penetration room is a high-radiation area located on elevation 355 feet. It is south of the reactor containment, north and west of Fire Area DD. It is above Fire Area B and below Fire Zone 2084-DD.

The licensee stated that the fire protection features and characteristics of Fire Zone 2055-JJ are similar to those previously described in Fire Zone 2084-DD.

The combustible loading in Fire Zone 2055-JJ is approximately 50,000 Btu per square foot, which produces an equivalent fire severity of 38 minutes on the ASTM E-119 time-temperature curve.

4.3 Evaluation

The fire protection in fire Zones 2084-DD and 2055-JJ does not comply with the technical requirements of Section III.G.2.b of Appendix R to 10 CFR Part 50 because automatic fire suppression systems are not installed in these zones which contain cables, equipment, and associated nonsafety circuits of redundant trains separated by a horizontal distance of more than 20 feet free of intervening combustibles or fire hazards, and are protected by fire detectors.

The staff was originally concerned that the lack of automatic suppression systems may permit a fire to spread and result in the loss of safe shutdown capability. However, because of the moderate combustible loading in these fire zones and the arrangement of the cables in trays, a fire of significant magnitude is not expected to occur.

The cables in trays are not considered an intervening combustible for the safe shutdown-related valves because the trays are at least 4 feet above the valves. In addition, the valves are distributed along a distance of more than 34 feet, limiting the likelihood that all three valves could be damaged by a single fire.

Further, the valves can be manually operated locally. If a fire were to occur in these fire zones, it would be detected by the fire detection system, which would annunciate in the control room. The control room operators would then dispatch the plant fire brigade to extinguish the fire.

Despite the moderate combustible loading in these fire zones and the lack of a fixed suppression system, there is reasonable assurance that a fire will not result in the loss of safe shutdown capability. Therefore, it is found that the installation of a fixed suppression system in Fire Zones 2084-DD and 2055-JJ would not significantly increase the level of fire protection.

4.4 Conclusion

Based on the above evaluation, the staff concludes that the licensee's alternate fire protection configuration provides an equivalent level of fire protection to that achieved by conformance with Section III.G.3 of Appendix R. Therefore, the licensee's requests for exemption in the above-referenced location should be approved.

5.0 LEVEL TRANSMITTERS FOR THE SAFETY-GRADE CONDENSATE STORAGE TANK (YARD AREA-UNITS 1 AND 2)

5.1 Exemption Requested

The licensee requested approval of exemptions from the technical requirements of Section III.G.2, of Appendix R to 10 CFR Part 50 to the extent that it requires a 3-hour fire barrier between redundant safe shutdown systems.

5.2 Discussion

The Safety-Grade Condensate Storage Tank (QCST) for each unit is located in the yard approximately 142 feet west of the Auxiliary Building (to the centerline of the tank), and is surrounded by an 18 inch thick concrete wall approximately five feet high. There is a valve pit adjacent to the north side of the tank and outside the wall. The pit measures 11'6" by 12'6" and is connected to the Auxiliary Building by a pipe chase. The chase is separated from the Auxiliary Building by a 3-hour fire barrier. The walls of the chase and pit are reinforced concrete and below grade. The roof of the chase and a portion

of the roof of the pit is made of removable, concrete slabs. The remainder of the roof of the pit is reinforced concrete. Access to the pit is through an adjacent open hatchway.

At least one train of QCST level indication is required for safe shutdown in order to provide information to the operators so that appropriate manual actions may be initiated to align EFW suction to an alternate water supply before the condensate inventory in the QCST is exhausted. Several hours are available before QCST level indication is required. One level transmitter is located inside the pit and the other transmitter is located next to the tank, inside the wall, and under a tornado missile shield. Cabling for the transmitter located in the pit is enclosed in conduit and is routed through the pipe chase to the Auxiliary Building. Cabling for the other transmitter is routed in concrete-encased conduit embedded in the ground adjacent to the pipe chase. At the tank, the conduit emerges inside the wall and under the missile shield.

At the Auxiliary Building it emerges from the ground and is routed up the side of the building, where it penetrates the building about 25 feet above the ground. This portion of the conduit is enclosed by steel missile barrier.

The valve pit, the pipe chase and the area inside the wall contain no in situ combustibles. All cabling is enclosed in conduit. Fire suppression capability consists of a fire hydrant and hose house located in the immediate vicinity at the south side of the tank.

There are no external fire hazards that could compromise the operability of both level transmitters. The warehouse and office are each located greater than 50 feet west of the tank, and each is equipped with an automatic fire suppression system. The emergency diesel fuel tanks are located in a below-grade vault approximately 200 feet to the north. The above-ground bulk diesel fuel storage tank is located about 300 feet to the north and is enclosed by a earthen dike sized to contain the entire volume of fuel in the tank.

The licensee justifies the exemption on the basis that there are no unmitigated fire hazards in the vicinity of the transmitters and that the physical configuration, as described above, is sufficient to assure that at least one transmitter and its associated cabling will remain free of fire damage.

5.3 Evaluation

The technical requirements of Section III.G.2 are not met in the above referenced locations because redundant QCST level transmitters and their associated cabling are not completely separated by a 3-hour fire-rated barrier.

The staff was originally concerned that a fire could result in damage to the redundant components or cables. But, as described by the licensee, there are no significant unmitigated in-situ fire hazards which would represent a risk to these systems. In addition, access to these locations is difficult which

would preclude the introduction of significant quantities of transient combustibles.

If a fire did occur under these circumstances it would be expected to be of limited magnitude. The smoke and hot gases produced by the fire would tend to be dissipated in the open air, away from the subject systems. The fire would be able to be extinguished by the plant fire brigade using the existing normal fire fighting equipment. Pending arrival of the brigade, the physical configuration of the areas, including the wall and tornado missile shield, will provide sufficient protection to assure that at least one safe shutdown diversion will remain free of fire damage. Therefore, the provision of additional fire protection to conform with the criteria of Section III.G.2 will not significantly increase fire safety.

5.4 Conclusion

Based on the above evaluation the staff concludes that the licensee's alternate fire protection configuration provides an equivalent level of safety to that achieved by compliance with Appendix R. Therefore, the licensee's request for exemption from the requirements of Section III.G.2 for the QCST level transmitters and their related cabling should be granted.

6.0 REACTOR COOLANT PUMP OIL COLLECTION SYSTEM

6.1 Exemptions Requested

The licensee requested approval of exemptions from the technical requirements of Section III.O of Appendix R to 10 CFR Part 50 to the extent that it requires the reactor coolant pump (RCP) oil collection system to be sized to hold the contents of the entire lube oil system for all pumps and to be designed to withstand a safe shutdown earthquake (SSE).

6.2 Discussion

The RCP Oil Collection Systems at each unit contains two tanks. These tanks are each designed to hold the contents of one reactor coolant pump's lube oil inventory with margin. Oil leakage from the remaining pump in each RCS loop will be drained into the appropriate tank, until the tank capacity is reached, and then to an open curbing where it can be safely contained. The system is located above the floor of the Containment Building. Safe shutdown circuitry is routed approximately forty feet above the elevation outside the primary shield walls containing the reactor, RCPs, and other primary system components. The shield wall separates the heavy concentrations of safe shutdown circuitry in the electrical penetration areas from the RCPs and the Oil Collection System itself. Additionally, that circuitry is protected by localized automatic fire suppression and detection capability. The Reactor Coolant Pump motor lube oil systems are integral with the pump motors. The licensee stated in the August 15, 1984 submittal, that the lube oil systems are qualified to remain functional during and after an SSE.

6.3 Evaluation

The technical requirements of Section III.O of Appendix R have not been met because the oil collection system for the RCPs has not been sized to hold the oil from all of the pumps and is not seismically designed.

Generic Letter 86-10 states:

"Where the RCP lube oil system is capable of withstanding the safe shutdown earthquake (SSE), the analysis should assume that only random oil leaks from the joints could occur during the lifetime of the plant. The oil collection system, therefore, should be designed to safely channel the quantity of oil from one pump to a vented closed container. Under this set of circumstances, the oil collection system would not have to be seismically designed."

On the basis that the lube oil system at ANO-2 is capable of withstanding the SSE without rupture and that the existing oil collection system will channel random leaks to a vented and closed container, the existing design conforms with the above staff guidance.

6.4 Conclusion

Based on the above evaluation, the licensee's alternate design of the oil collection system provides an equivalent level of safety to that achieved by compliance with Section III.O of Appendix R. Therefore, the licensee's request for exemption should be approved.

7.0 NON-FIRE-RATED FEATURES IN CERTAIN FIRE AREA BOUNDARIES:

ANO-2 tank rooms, pump rooms, and corridors; lack of fire barrier and structural steel protection; elevation 335 feet (fire area DD, fire zone 2040-JJ)

ANO-2 lower south electrical penetration room, structural steel protection (fire area EE, fire zone 2111-T)

ANO-2 upper and lower north piping penetration area, door latch (fire area GG, fire zone 2081-HH)

ANO-2 upper north piping penetration area, unprotected structural steel (fire area GG, fire zone 2081-HH)

ANO-2 corridor and motor control center, unprotected structural steel, elevations 372 and 374 feet, 6 inches (fire area JJ, fire zone 2109-U)

7.1 Exemptions Requested

The licensee requested approval of exemptions from the technical requirements of Section III.G of Appendix R to 10 CFR Part 50 to the extent it requires that redundant shutdown-related systems be separated by a 3-hour fire-rated barrier.

7.2 Discussion

Tank Rooms, Pump Rooms and Corridors

The opening in the fire barrier between Fire Zone 2040-JJ of Fire Area DD and in Fire Zone 2073-DD of Fire Area HH is not protected by fire-resistive construction. The structural steel supporting the fire barrier between Fire Zone 2040-JJ in Fire Area DD on elevation 335 feet and Fire Zones 2082 and 2083 in Fire Area EE on elevation 354 feet is not protected to provide a 3-hour fire resistance rating.

The combustible contents in Fire Area DD include lube oil in the charging pumps located in cubicles in Fire Zone 2040-JJ and electrical cable insulation in cable trays and MCCs. The licensee stated that the combustible loading in this fire zone is approximately 15,600 Btu per square foot, which produces an equivalent fire severity of 11 minutes on the ASTM E-119 time-temperature curve. The combustible loading for the entire fire area is approximately 14,000 Btu per square foot, which produces an equivalent fire severity of 10 minutes on the ASTM E-119 time-temperature curve. Fire detection is provided in Fire Zone 2040-JJ.

The opening in the ceiling along the west wall of Fire Zone 2040-JJ provides a path between the "red" charging pump MCC on elevation 335 feet, which is 58 feet away from the opening, and the "green" charging pump MCC on elevation 354 feet, which is approximately 80 feet from the ceiling. The licensee also installed a sprinkler system on elevation 354 feet at the west end of Fire Zone 2073-DD of Fire Area HH to protect the above-described floor opening and the service water supply control valves to the diesel-jacket cooling water heat exchangers for both emergency diesel generators.

The licensee performed an analysis to further evaluate the need for structural steel fire proofing. The analysis concluded that the only potential problem in this zone was due to localized heating of the structural steel. To mitigate this problem, the licensee committed, in the June 24, 1987 letter, to implement one or a combination of the following modifications:

1. Metal tray covers will be installed to provide continuous coverage of the portion of cabling which represents a localized heating problem to the steel.

2. At least a one hour fire-rated cable wrap will be used to encompass the portion of cabling which represents a localized heating problem to the steel.

3. A fire-rated structural steel coating of at least a one hour fire-rating will be applied over the applicable portions of the steel members susceptible to localized heating.

4. A partial sprinkler system will be installed over the specific area which represents a localized heating problem to the steel. The system would be installed per the guidelines of NFPA 13.

Lower South Electrical Penetration Room

Structural steel supporting the ceiling of Fire Zone 2111-T is not protected to provide a 3-hour fire resistance rating. The ceiling of Fire Zone 2111-T is a fire area boundary located between Fire Area EE (elevation 374 feet, 6 inches) and Fire Area G on elevation 386 feet. The combustible loading in Fire Zone 2111-T is approximately 24,900 Btu per square foot, which produces an equivalent fire severity of 19 minutes on the ASTM E-119 time-temperature curve. The combustible loading in Fire Area EE is approximately 35,300 Btu per square foot, which produces an equivalent fire severity of 26 minutes on the ASTM E-119 time-temperature curve.

Fire Zone 2111-T is provided with a fixed automatic fire suppression system.

The licensee stated that re-evaluation of the structural steel for the effects of localized heating indicated that either two beams or one column would have to fail due to heating before the supported slab would fail. The failure of either two beams or one column is unlikely in a fully sprinklered room.

Upper and Lower North Piping Penetration Area

The door latch was omitted from the 3-hour rated fire door that separates Fire Zone 2081-HH of Fire Area GG from Fire Zone 2040-JJ in Fire Area DD on elevation 335 feet. Fire Zone 2081-HH is part of a high-energy line break-vent path. Therefore, door 223 must open when the pressure in the room reaches 0.25 psig. Since the typical fire door latch would not permit the door to open, the latch was removed.

Fire Area GG includes Fire Zones 2081-HH and 2076-HH (the electrical equipment room). The combustible loading is approximately 83 Btu per square foot in Fire Zone 2081-HH and 5,033 Btu per square foot in Fire Area GG, which produces an equivalent fire severity of less than 1 minute and 4 minutes, respectively, on the ASTM E-119 time-temperature curve.

The combustible loading in Fire Zone 2040-JJ is approximately 15,200 Btu per square foot, which produces an equivalent fire severity of 11 minutes on the ASTM E-119 time-temperature curve.

Fire Area GG is protected throughout by a fire detection system which annunciates in the control room. Fire Zone 2040-JJ is similarly protected.

Upper North Piping Penetration Area

The structural steel supporting the ceiling of Fire Zone 2081-HH is not protected to provide a 3-hour fire resistance rating. The ceiling is a fire area boundary between Fire Areas GG and B on elevation 368 feet.

The combustible loading and fire protection in Fire Area GG and Fire Zone 2081-HH is described above.

Corridor and Motor Control Center

The structural steel supporting the ceiling of Fire Zone 2109-U is not protected to provide a 3-hour fire resistance rating. The ceiling is part of the boundary between Fire Area JJ on elevation 372 feet and Fire Area G on elevation 386 feet.

The combustible loading in Fire Area JJ is approximately 53,300 Btu per square foot, which produces an equivalent fire severity of 40 minutes on the ASTM E-119 time-temperature curve. The combustible contents of Fire Zone 2109-U are cable insulation in multi-level cable trays, conduit, and safety-related electrical equipment.

Fire protection in the fire zone consists of fire detectors throughout the zone, a deluge sprinkler system actuated by smoke, and line-type heat detectors.

7.3 Evaluation

The above-referenced features exist in the boundary construction of individual fire areas and, as such, come within the guidance issued in GL 86-10. No exemptions for these conditions are therefore necessary. The staff considers the licensee's submittals as constituting the required fire hazards analysis. The staff's principal concern was that a fire of significant magnitude would propagate from the area of fire origin into the adjoining fire area and damage redundant systems required for safe shutdown. If a fire were to occur in the subject locations, it would be detected in its formative stages by the existing fire detection systems. The fire brigade would be dispatched and would suppress the fire before significant damage occurred. Pending arrival of the brigade, the existing construction is adequate to confine the effects of the fire to the area of origin. Therefore, the lack of a complete fire-rated barrier at these locations is not significant from a fire-safety standpoint.

7.4 Conclusion

The licensee's analysis of the non-fire-rated features in the perimeter of the subject fire areas conforms with the guidance in GL 86-10 and is, therefore, acceptable.

8.0 ENVIRONMENTAL CONSIDERATIONS

The NRC staff has previously concluded, pursuant to 10 CFR 51.32, that the issuance of these exemptions will not have a significant impact on the quality of the human environment (53 FR 29398, August 4, 1988).

9.0 SUMMARY

Based on its evaluation, the staff concludes that the licensee's alternate fire protection configuration in the identified areas provides an equivalent

level of safety to that achieved by compliance with Appendix R. Therefore, the licensee's request for exemption for the following conditions should be approved:

1. Lack of 20 feet of separation free of intervening combustible materials between redundant shutdown-related systems in the diesel generator room exhaust fan outlets area (Fire Area B, Zone 2114-I).

2. Lack of a fixed fire suppression system in the control room and printer room (Fire Area G, Zone 2199 G).

3. Lack of an automatic fire suppression system in the upper and lower south piping penetration rooms (Fire Area EE, Zones 2084-DD and 2055-JJ).

4. Lack of a complete 3-hour fire-rated barrier between redundant level transmitters for the safety grade condensate storage tank (Yard Area).

5. Lack of a reactor coolant pump oil collection system that is designed to withstand a safe shutdown earthquake and sized to hold the oil from all four reactor coolant pumps.

In addition, based on its evaluation of the licensee's submittals, the staff concludes that the licensee's analysis of the non-fire-rated features in certain fire area boundaries, as described above, conform with the guidance issued in GL 86-10 and are, therefore, acceptable.

Dated: October 26, 1988

Principal Contributor: D. Kubicki