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DEC 10 1982

Docket No. 50-261

Mr. E. E. Utley, Executive Vice President
Power Supply and Engineering & Construction
Carolina Power and Light Company
P. O. Box 1551
Raleigh, North Carolina 27602

Dear Mr. Utley:

SUBJECT: DRAFT SER ON APPENDIX R EXEMPTION REQUEST

We have completed our review of your Appendix R exemption requests and have enclosed our draft SER.

We request that you review this draft SER for accuracy of technical content and inform us within three weeks of any corrections you consider necessary. With respect to followup action regarding exemption denials, there are three options: (1) appeal denials to NRR management; (2) propose another alternative that requires an exemption; or (3) make modifications to meet the specific requirements of Appendix R. Please inform us within three week regarding which action you plan to take.

If an appeal meeting is requested, it should be limited to the technical review of the information on the record and should be held within six weeks.

If, for denied exemptions, you choose to propose an alternative which also requires an exemption, it should be filed under the provisions of Section 50.12 of 10 CFR Part 50. If you choose to propose such an alternative we request that you do so within 60 days.

If, for denied exemptions, you propose to make modifications which meet the specific requirements, of Section III.G of Appendix R, no additional submittal is necessary, unless the modifications are to provide alternative shutdown capability. In these cases, you will be given 6 months to provide the description of the modifications for alternative shutdown capability.

If you have any questions regarding this letter or the draft SER, please contact your Project Manager.

Sincerely,

Original signed by:
S. A. Varga

Steven A. Varga, Chief
Operating Reactors Branch No. 1
Division of Licensing

Enclosure:
Draft SER

SEE PREVIOUS NRC FORM 318 FOR CONCURRENCES*

OFFICE	cc w/enclosure:	ORB 1	ORB 5*	ORB 1			
SURNAME	See next page	GRequa/rs	TWambach	SVarga			
DATE		12/10/82	12/7/82	12/10/82			

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See next page

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SURNAME		GRequa	TWambach	SVarga			
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Mr. E. E. Utley
Carolina Power and Light Company

cc: G. F. Trowbridge, Esquire
Shaw, Pittman, Potts and Trowbridge
1800 M Street, N.W.
Washington, D. C. 20036

U. S. Nuclear Regulatory Commission
Resident Inspector's Office
H. B. Robinson Steam Electric Plant
Route 5, Box 266-1A
Hartsville, South Carolina 29550

Alan S. Rosenthal, Chairman
Atomic Safety and Licensing
Appeal Board Panel
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Richard S. Salzman
Atomic Safety and Licensing
Appeal Board Panel
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dr. W. Reed Johnson
Atomic Safety and Licensing
Appeal Board Panel
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

James P. O'Reilly
Regional Administrator - Region II
U. S. Nuclear Regulatory Commission
101 Marietta Street
Atlanta, Georgia 30303

DRAFT

H. B. ROBINSON UNIT NO. 2

SAFETY EVALUATION REPORT F...

APPENDIX R TO 10 CFR PART 50, ITEMS III.G.3 AND III.L

0 INTRODUCTION

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

Several documents were received from the licensee for fire protection review and exemption requests. The principal information is contained in the licensee's report entitled "Safe Shutdown Capability Assessment and Proposed Modifications" of March 1982. This report summarizes all of the work contained in the previous submittals and provides direct

answers to the questions contained in the NRC generic letter 81-12. While this document and the preceding correspondence is extensive and fairly complete, several questions in the areas of systems and associated circuits were answered in a telephone conference call of July 23, 1982.

The licensee has requested exemption from the requirements of Paragraph III.G.2 of Appendix R for four specific fire areas. These are as follows:

- Fire Zone 5 - Component Cooling Pump Room
- Fire Zone 27 - RHR Pump Pit
- Fire Zone 28 - Pipe Alley
- Fire Zone SWP - Service Water Pump Area

In each of these areas, the separation between equipment and cabling for redundant trains does not presently meet the requirements of III.G.2. For each area, some additional fire protection is planned, and an analysis is made which is documented by the report entitled "Detailed Justification to Support Exemption Requests for Selected Zones," transmitted by letter of April 27, 1982. This report will be reviewed by the Chemical Engineering Branch, Division of Engineering.

The licensee has provided a safe shutdown analyses for fire events, and has proposed an alternate safe shutdown system. Our analysis and evaluation of this follows.

.0 SYSTEMS USED FOR POST-FIRE SAFE SHUTDOWN

.1 Systems Required for Safe Shutdown

Safe shutdown of the reactor is initially performed by rod insertion from the control room.

Reactor coolant inventory and the reactor shutdown are maintained by one of three charging pumps taking suction from the concentrated boric acid tanks or the refueling water storage tank (RWST).

Decay heat removal is accomplished by the auxiliary feedwater (AFW) pumps supplying water to the steam generators from the condensate storage tank. The atmospheric dump system (ADS) or the steam generator safety valves will be used to remove heat from the steam generators.

Primary system pressure is maintained by the pressurizer heaters and spray or the charging pumps taking suction from the boric acid tanks combined with letdown.

For cold shutdown, shutdown is maintained by increasing primary coolant boration using one of the three charging pumps taking suction from the boric acid tanks or the RWST.

Primary system cooling is done by the use of a LPSI pump to circulate water through the shutdown cooling heat exchanger where component cooling water is used as the heat sink. The component cooling water in turn is cooled by service water in the component cooling water heat exchanger.

2.2 Areas Where Alternate Safe Shutdown is Required

The separation criteria applied in developing the original H. B. Robinson plant design were not consistent with the separation requirements of 10 CFR 50, Appendix R. Consequently, an evaluation was required to determine whether to extensively reroute existing circuits to establish separation or to provide an alternate/dedicated shutdown capability. Particular problem areas included the control room, cable spreading room/relay room, battery room, and emergency switchgear room. Virtually all existing shutdown-related control and instrumentation circuits interface with one or more of these areas, and the highly congested equipment and raceway installations make it infeasible to establish adequate train separation within the areas. Therefore, the licensee in its submittal of March 16, 1982 has committed to provide an alternative control location, using a dedicated

control panel to allow for safe shutdown operation in the event of a fire in any of the above areas. Additionally, the possibility of loss of offsite power concurrent with a fire in critical fire areas has necessitated the installation of a dedicated shutdown (DS) power generation and distribution system. The licensee's alternate safe shutdown system compliance is discussed later on in this SER.

.3 Section III.G.2 of Appendix R

The licensee has made a thorough analysis of all fire zones containing safety and shutdown related equipment and cabling. Of the total of 21 zones affected, four meet the requirements of Section III.G.2 of Appendix R. These are the two diesel rooms, the safety injection room, and the charging pump room. An additional four will not meet Section III.G.2 of Appendix R and exemptions have been requested for these areas. They include the component cooling pump room, the residual heat removal (RHR) pump pit, the pipe alley, and the service water pump (SWP) area.

The remaining 13 zones will be modified by a combination of alternate and dedicated shutdown systems as defined by 10 CFR 50, Appendix R. These modifications are listed in Section 6.D of the licensee's report entitled "Safe Shutdown Capability Assessment and Proposed Modifications" of March 1982.

2.4 Alternate Safe Shutdown System

The major addition to the plant which will enable alternate shutdown is a dedicated on site power system, including a diesel (in addition to the two existing diesel units), a new shutdown bus (DS), and new 125 volt AC and 125 volt DC systems. The routing of the power and control cables for these new power systems will insure that at least the following equipment is available for shutdown in case of fire in the areas mentioned in Paragraph 1.3 above.

- Charging Pump A
- Service Water Pump D
- Component Cooling Pump A
- Control Group of Pressurizer Heaters
- Instrument Air Compressor
- RHR Pump (Repair including power cable installation required see Section 3.3)
- Specific Valves required for shutdown
- Steam driven auxiliary feed pump lube oil pump

In addition a new control panel will be installed in the charging pump room for use if the main control room is affected by the fire. Instrumentation required for shutdown is available or will be re-added at the charging pump room panel, as follows:

- Reactor coolant temperature (both hot and cold legs)
- Nuclear instrumentation (source-range)
- Steam generator 1 level
- Steam generator 2 level
- Steam generator 3 level
- Pressurizer relief tank level (new)
- Pressurizer level
- Pressurizer pressure
- Pressurizer relief line power operated valves 455c and 456 position display
- Volume control tank level (new)
- RHR flow (new)
- RHR relief line temperature (new)
- Letdown relief line temperature monitor (New)
- Incore temperature display (new)

Additional instrumentation displays will be provided at the turbine deck control panel to enable auxiliary feedwater pump and steam dump control. Displays are as follows:

- Steam generator levels 1, 2 and 3
- Pressurizer level and pressure
- Condensate storage tank level
- Reactor coolant system temperatures (3 loops hot and cold leg) (2 loops are new)

In addition, steam generator pressure is presently available at turbine deck control panel (gauges), which will be manned during shutdown, and in communication with the operator at the charging pump room control panel.

0 EVALUATION

1 Performance Goals

The alternate shutdown systems proposed will enable the achievement of the performance goals outlined in Paragraph III.L of Appendix R as follows:

3.1.1 Subcritical reactivity conditions and reactor coolant inventory. The control rods will be inserted either manually or automatically (on loss of power). At least one charging pump (A) powered by the DS bus, or one safety injection pump (either A or C on emergency diesel(s), using water from the normal charging system or the refueling water storage tank, will insert borated water to maintain subcritical reactivity conditions.

3.1.2 Heat Removal. Heat removal will be accomplished by natural circulation to the steam generators. The manually operated dumps or the code safeties will discharge steam to the atmosphere. The steam generator inventory (level) will be maintained by the steam driven auxiliary feed pump, or the motor driven auxiliary feed pumps on the emergency diesel buses.

3.1.2 Process monitoring. The instrumentation listed in Section 2.4 will be provided and is capable of giving the direct readings required for control of the functions described in 3.1.1 and 3.1.2 above.

3.1.4 Supporting functions. At least one component cooling pump (A) and one service water pump (D) will be capable of being powered from the DS bus (dedicated power supply as described in Section 2.4). The others are on the emergency diesel buses. The lube oil pump for the steam driven auxiliary feed pump will be powered by the DS bus.

3.2 72 Hour Requirement

The licensee has requested an exemption to the requirement for achieving cold shutdown within 72 hours with loss of offsite power. The licensee's final design of achieving cold shutdown (repair to RHR Cabling) is dependent on the NRC approval or disapproval of this exemption request. The licensee objects to a requirement to place the plant in cold shutdown without off-site power. The rule does not require this. The rule requires that this capability be provided, but whether the plant is taken to cold shutdown or not after the occurrence of a fire is a decision that the operating staff at the plant would have to make based on the conditions at the time. The licensee has not established a need for this exemption. Cooldown using natural circulation, although not a preferred method, is an option that should be available to the operators. Therefore, the exemption request is denied and the licensee is required to furnish a plan for achieving and maintaining cold shutdown within 72 hours.

3.3 Repairs

In case of fire involving the RHR pumps or cables, the licensee proposes to make repairs by running a power cable from an available breaker on the DS bus to the pumps. Plans

for this repair have not been completed but the licensee has committed to provide a procedure for such repairs and to maintain material for the repairs on site. We will require the licensee to effect repairs in a time frame that will allow the plant to be brought to cold shutdown condition within 72 hours using onsite power only.

3.4 Associated Circuits and Isolation

The licensee conducted an extensive review of the present electrical installation to determine the plant's capability to meet the ccriteria as stated in Appendix R relating to safe shutdown. They concluded that the existing constraints made the necessary modifications impractical in general and impossible in some areas. Particular problem areas included the control room, cable spreading room/relay room, battery room, and emergency switchgear room. The licensee intends to provide safe shutdown capability consisting of a dedicated control panel and a dedicated DS power generation and distribution system and alternate power and control from the existing emergency buses E1 and E2.

The licensee intends to make the necessary modifications, which when completed will satisfy concerns for common bus, common enclosure and spurious signals as outlined in the clarification of generic letter of February 20, 1981.

As the result of a conference call with CP&L staff, NUS, BNL, and NRC staff which took place on July 28, 1982, it was confirmed that the licensee intends to reroute redundant or alternate trains wherever both were found to be housed in the same fire zone.

In addition to fuses and circuit breakers, switchhes are to be used to transfer loads and to isolate devices. The licensee indicated that the switches are not NEMA, and or UL rated. However, the rating of these switches is not of a lesser quality than similar electrical devices presently used in the plant.

Transfer to local control is annunciated in the control room.

The licensee has provided two sets of control fuses in control circuitry of all the safe shutdown equipment such that a single hot short in the control circuitry will not jeopardize the availability of the safe shutdown equipment.

The licensee's analysis to satisfy the associated circuit concern is as follows:

.1 Common Bus

Coordinated circuit breaker protection is provided for power and control circuits which are powered from the Dedicated Shutdown (DS) E1 and E2 buses.

4.2 Spurious Signal

To prevent inadvertent operation due to spurious signals, power and control cables to valves and safe shutdown equipment will be disabled during normal operation.

4.3 Common Enclosure

The licensee has installed a dedicated shutdown system, in which the dedicated/alternate trains are rerouted and run in physically separated conduits containing only dedicated/alternate shutdown cables and will meet III.G requirements. When the dedicated/alternate trains cannot be separated from the redundant trains, fire barrier protection is provided. Fire suppression system is provided except in the areas where exemptions have been requested.

3.5 High/Low Pressure Interface

The licensee has identified a number of high/low pressure interfaces for which modifications will be made in order to protect against uncontrolled operation.

The interfaces and modifications are as follows:

INTERFACES	MODIFICATION
RHR suction link - Valve 750	Lockout circuit break to valve
RHR suction from containment - 860 A	Lockout circuit breaker to valve
Pressurizer relief block-V535 and V536	Provide capability to transfer power supply from 480V MCC-6 to 480V MCC DS. Alternate control located at the charging pump shutdown panel.
Chemical and volume control - system letdown orifice valves V200A and letdown isolated valve 460A	Reroute critical actuation circuits for valves 200A, 460A. Provide remote control switches at charging pump room shutdown panel. Provide transfer of power from normal plant power to DS bus.
Letdown inlet to non-regen. HTX, valves 204A, 204B	Provide capability to operate manually
Letdown inlet to regen, HTX, valves 460A, 460B	Provide capability to operate manually

Reactor head vent solenoid valves 567, 568	Provide disconnect switches
Pressurizer vent solenoid valves 569, 570	Provide disconnect switches
Common Reactor head/pressurizer vent solenoid valves 571, 572	Provide disconnect switches

3.6 Safe Shutdown Procedures and Manpower

The personnel available, as outlined in the licensee's submittal of March 1982, will include three operators plus five men available for the fire brigade. This manpower commitment is considered adequate. The procedures for cold shutdown repairs have not been finalized by the licensee. The licensee will be required to provide procedures to effect RHR pumps and cables repairs in a time frame that will allow the plant to achieve cold shutdown within 72 hours.

4.0 CONCLUSION

In order to comply with the requirements of Appendix R the licensee had proposed alternative shutdown capability as discussed in Section 2.2. The alternative shutdown systems will enable the licensee to meet the performance goals of Paragraph III.L of Appendix R, 10 CFR 50, except for the requirement to achieve cold shutdpwn within 72 hours. For this requirement, the licensee has requested an exemption, but did not state a reason why the plant could not be provided with such a design capability. Therefore, the exemption is denied. In light of staff denial of the above discussed exemption request the licensee will be required to provide the capability to achieve cold shutdown within 72 hours per Section III.L requirement of Appendix R.

DRAFT

rotection Section

Exemption Request

H. B. Robinson Steam Electric Plant, Unit No. 2

Docket No. 50-261

1.0 Introduction

By letters dated January 19, 1981, March 11, 1982 and April 27, 1982 the licensee requested exemptions from Section III.G within 4 plant fire areas, Section III.M and Section III.O.

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 3-hour rating. Structural steel forming a part of or supporting such fire barriers shall be protected to provide fire resistance equivalent to that required of the barrier.

b. Separation of cables and equipment and associated non-safety circuits of redundant trains by a horizontal distance of more than 20 feet with no intervening combustible or fire hazards. In addition, fire detectors and an automatic fire suppression systems 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 1-hour rating. In addition, fire detectors and an automatic fire suppression system shall be installed in fire area.

If these conditions are not met, alternative shutdown capability is required and 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; however, they provide adequate 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 configurations must be justified by a fire hazard analysis.

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

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

- The alternative assures that fire damage to at least one train of equipment necessary to achieve cold shutdown is limited such that it can be repaired within a reasonable time (minor repairs with components stored on-site).

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

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

2.0 Analytical Method

The licensee employed an analytical method to demonstrate the inherent protection afforded to existing safe shutdown systems. The intent of this method was to provide common parameters by which individual fire areas could be judged to demonstrate that verbatim compliance with compliance with Section III.G of Appendix R would not enhance the fire protection for safe shutdown.

The method can be summarized as follows:

- The redundant cables and components of concern are identified.
- Their geometry and configuration within the fire area are described.
- The type of cable insulation and failure criteria are specified.
- The minimum quantity of flammable liquid needed to produce sufficient heat flux and heat energy to damage the cables is calculated, considering several heat transfer modes, i.e. radiation, plume impingement, and stratification.

The analysis determines the heat flux into the room needed to cause electrical failure of redundant cables. This heat flux is converted to a quantity of flammable liquid, usually acetone, in a circular pool configuration.

We and our contractor, Brookhaven National Laboratory have reviewed the analytical method. We have determined that the results of the methodology as applied do not demonstrate the equivalance of the protection provided for safe shutdown to the specific alternatives set forth in Section III.G of Appendix R. For example:

- The method does not consider the heat released to the room by secondary fires involving in-situ combustibles. The method uses an electrical failure criterion with the thermal energy release to the room by a single exposure fire; when the cables of concern are at the conditions of electrical failure, other cables within the enclosure are burning and releasing energy to the room.

- The method does not consider the increased heat release rate of a given fire when it occurs against a wall or in a corner; the method only considers the heat release of a fire as it occurs in an open area.

- The method does not consider the affects of excess pyrolyzate, resulting from the degradation of plastics, burning in the stratified layer.

- The method does not consider all of the alternatives set forth in Section III.G i.e., 3-hour fire barrier, 1-hour fire barrier with suppression system, 20-feet separation free of combustible with automatic suppression and alternate or dedicated shutdown capability

independent of the area. The method only considers separation without automatic suppression and uses a stratification model which does not include the effects of separation.

The licensee has not used the results of this analysis to compare the protection provided with that specified in Section III.G. The licensee has only stated that the accumulation of this quantity of flammable liquids in the required configuration is an unrealistic condition, and will be prevented by administrative controls. We do not deem this to be a valid argument because there is no positive means of preventing the accumulation of transient materials in individual plant areas. As documented in Inspection and Enforcement Branch Reports, recent inspections at plants such as Davis Besse (50-346/82-03, April 1, 1982), Duane Arnold (50-331/81-25, January 11, 1982), D.C. Cook (50-315/81-11, December 31, 1981), and Nine Mile Point (50-220/82-09), have demonstrated that substantial quantities of hazardous substances such as 55 gallon drums of waste oil are located in even highly restricted and controlled entry areas.

We have not relied upon the results of the licensee's analysis in our evaluation. We have evaluated each exemption request using our standard method of review:

a) Review the information submitted and that existing in the docket file to determine the configuration of the redundant components,

b) Evaluate the existing fire protection, proposed modifications, and other compensating features or mitigating factors to determine the overall level of fire protection in the area of concern, and

c) Determine if the overall level of safety is equivalent to that provided by Section III.G of Appendix R.

This method has been used for all Appendix R reviews to date, because in our opinion based on the information available today, it is not considered possible to predict the severity of or probability of fire occurrence in individual areas.

3.0 Component Cooling Pump Room (Fire Zone 5)

3.1 Exemption Requested

The licensee requests an exemption from Section III.G of Appendix R to the extent that it requires one-hour fire rated barriers or 20 feet of horizontal separation free of intervening combustibles to separate redundant divisions and an automatic fire suppression system.

3.2 Discussion

This area is located in the Auxiliary Building on elevation 226 feet. It is separated from other plant areas by non-fire-rated concrete walls. The ceiling height is 15 feet. The fire protection in the area consists of smoke detectors, standpipe hose stations and portable fire extinguishers.

This area contains two safety-related component cooling pumps, one non-safety-related alternate shutdown component cooling pump, two component cooling heat exchanges, the boric acid tanks and two boric acid transfer pumps. At least one component cooling pump and one component cooling heat exchanger is required for hot shutdown. The three component cooling pumps are installed with approximately 12 ft. of horizontal distance between the pump centerlines. A radiant heat shield in the form of a

7 ft. high, 5 in. thick 1 hr-rated fire wall has been installed between alternative shutdown component cooling pump (A) and the remaining pumps. The power supply cables for the component cooling pumps are installed in open horizontal cable trays and conduit between 8 feet and 13 feet above the floor and 2 feet to 7 feet below the ceiling. The redundant cables are separated by approximately one foot (vertically).

The in-situ combustible is cable insulation. All exposed cables in the area are not qualified to IEEE-383 flame test, however all cables have been coated with a flame retardant coating. The cable insulation comprises a fuel load of 15,600 BTU/sq. ft. which if totally consumed would correspond to a fire severity of approximately 12 minutes on the ASTM E-119 standard time temperature curve.

The licensee has conducted an analysis to determine quantity of fuel, spilled on the floor of the area, that is needed to create a fire and corresponding heat flux of enough severity to cause damage to redundant cables.

The licensee justifies this alternative on the basis of (1) All cables are coated with a flame retardant mastic, (2) the in-situ combustible loading is light, (3) smoke and heat detection is provided and (4) an analytical model was employed to show that the magnitude of an exposure fire needed to damage redundant components is significantly higher than reasonably expected.

3.2 Evaluation

This area does not comply with Section III.G because it does not have an automatic suppression system and twenty feet of separation free of intervening combustibles or one hour fire rated barriers. There is no alternative shutdown capability independent of this area.

Because of the close proximity of redundant safe shutdown equipment and cables are not protected by an automatic suppression system, an exposure fire could damage both trains prior to the response of the fire brigade. Although a detection system is provided, there will be a time lag between the ignition of the fire, detector response, and the arrival of the fire brigade. The existing level of protection does not provide reasonable assurance that redundant equipment and cables of both trains will not be damaged in this time interval.

Cables which are coated with a flame retardant mastic will have a greater resistance to flame spread, however an incident heat flux of sufficient magnitude will cause the thermal degradation and ultimate failure of the cable insulation and jacket. The analysis indicates that 9.2 gallons of acetone in a 5.9 foot diameter pool, is needed to effect this damage. However, there is no positive means of preventing the accumulation of transient materials in individual plant areas. As documented in Inspection and Enforcement Branch Reports, recent inspections at plants such as Davis Besse (50-346/82-03, April 1, 1982), Duane Arnold (50-331/81-25, January 11, 1982), D.C. Cook (50-315/81-11, December 31, 1981), and Nine Mile Point (50-220/82-09), have demonstrated that substantial quantities of hazardous substances such as 55 gallon drums of waste oil are located in even highly restricted and controlled entry areas.

Therefore, the existing protection in this fire area does not provide a level of fire protection equivalent to Section III.G. Modifications such as the installation of an automatic sprinkler system and one-hour fire rated barriers would provide the requisite level of safety.

3.4 Conclusion

Based on the above evaluation, the level of existing protection for this area does not provide a level of fire protection equivalent to the tech-

nical requirements of Section III.G of Appendix R. Therefore, the exemption for the Component Cooling Pump Room (Fire Zone 5) should be denied.

4.0 RHR Pit (Fire Zone 27)

4.1 Exemption Requested

The licensee requested an exemption from III.G.2 of Appendix R to the extent that it requires 3-hour fire rated barriers be installed to separate redundant trains.

4.2 Discussion

Fire Zone 27 is located west of the Auxiliary Building at elevation 203 feet. The area is separated from other plant areas by concrete walls. Entrance into the area is through a hatch and down a 25 foot ladder. The ceiling height in the area is 26 feet 6 in. The fire protection in the area consists of smoke and heat detectors, standpipe hose stations and portable fire extinguishers.

Fire Zone 27 contains two residual heat removal (RHR) pumps and associated piping. No equipment or circuit within this zone is required for hot shutdown, but one train of the RHR system is necessary to achieve and maintain cold shutdown. Each RHR pump is mounted on a concrete pedestal approximately 4 ft. high with the top of the pump about 10 ft. above floor elevation. The redundant pumps are separated by a 22 ft-high concrete barrier which completely bisects the RHR pit into two individual pump bays. Each pump bay has a sump approximately 3 ft. x 3 ft. x 6 in. deep with an installed sump pump. The sumps are adjacent to each other and separated by the same barrier which divides the zone. A hole approximately 4 in. in diameter joins the sumps so each sump pump can serve as a backup to the other.

The licensee indicates that a fire in the RHR pit would cause damage to both trains of the RHR control and power cables; however, the licensee also indicates that the cables could be repaired within 72 hours, the time allowed by Section III.G.1.

The combustible in Fire Zone 27 is lubricating oil contained in the RHR pumps. Each pump contains 8 gallons of oil. The oil comprises a fuel load of 6500 BTU/sq. ft. which if totally consumed, would correspond to a fire severity of about 5 minutes on the ASTM E-119 standard time temperature curve.

The licensee justifies this exemption on the following:

a) Access to the area is limited.
b) The in-situ combustible loading is light.
c) Smoke and heat detection are provided.
d) A partial height (22 feet) concrete barrier separates the RHR pumps.
e) An analytical model was employed to show that the magnitude of an exposure fire needed to ignite the in-situ lube oil is significantly higher than reasonably expected.
f) Hot surfaces necessary to cause ignition of the lube oil do not exist in the area.

4.3 Evaluation

This area does not comply with Section III.G because the redundant RHR trains are not separated by 3-hour fire rated barriers, there is no automatic suppression system, and there is no alternate cold shut-down capability independent of the area.

This area is normally locked and the pumps are not running. Even with the pumps running there are no hot surfaces in the area. The few cables for the pumps are in conduit. The only significant in-situ combustible in the fire area is the pump motor lubricating oil. The probability of ignition of the oil is low because the lubricating oil has a high flash-point (approximately 450°) and sufficiently hot surfaces do not exist in this fire area to cause the ignition of the lube oil. If a fire occurred in the RHR pit, access into the pit for nominal fire fighting would be difficult due to the smoke and hot products of combustion that would vent through the hatch entrance. We anticipate that manual fire fighting activities would be conducted from hatch entrance rather than from inside the RHR pit. This may result in water damage to both trains of RHR. However, with proper fire fighting procedures along with the concrete wall separating the pumps, such damage could easily be prevented. In addition, because the RHR pumps are only used during cold shutdown, there are emergency procedures which could be used to maintain safe conditions in the unlikely event of a fire and fire fighting activities that affect both pumps.

Because the area is normally locked, a partial height wall separates the RHR pump, the area contains few combustibles, and the pumps are only needed for cold shutdown, an automatic suppression is not necessary. The fire detectors should assure prompt detection of a fire should it occur. This arrangement would provide reasonable assurance that a fire would not damage both RHR pumps and the damage to cables would be limited so that it could be repaired within 72 hours.

4.4 Conclusion

Based on the above evaluation, the level of fire existing protection for this area does provide a level of fire protection equivalent to the technical requirements of Section III.G of Appendix R. Therefore, the exemption for the RHR pit (Fire Zone 27) should be granted.

5.0 Pipe Alley (Fire Zone 28)

5.1 Exemption Requested

The licensee requested an exemption from Section III.G.2 of Appendix R to the extent that it requires an automatic fire suppression system be installed in the area.

5.2 Discussion

Fire Zone 28 is located in the Auxiliary Building on elevation 226 feet. The area is basically a long hallway. The ceiling height is 18 feet. The fire protection in the area consist of smoke and heat detectors, standpipe hose stations and portable fire fighting equipment.

Fire Zone 28 contains redundant cables for primary system instrumentation, pressurizer heater and reactor coolant system valve operators. The cables are separated by less than 20 feet. The licensee proposes to enclose one train of cables with an ASTM E-119 one-hour-fire rated barrier.

The in-situ combustible is cable insulation. All exposed cables in the area are not qualified to IEEE-383, however, all cables have been coated with an flame retardant coating. The insulation comprises a fuel load of 15,600 BTU/sq. ft. which if totally consumed would correspond to a fire severity of about 12 minutes on the ASTM E-119 standard time temperature curve.

This area does not comply with Section III.G because an automatic fire suppression system has not been provided.

The licensee justifies this exemption on the following:

a) One train of redundant cables will be enclosed in a one-hour barrier.

b) The in-situ combustible load is light.

c) Smoke and heat detectors have been provided.

5.3 Evaluation

The licensee indicates that the existing fire protection is similar to the type of configuration illustrated in SECY 82-13 where an exemption would be granted. However, the licensee has not provided adequate information concerning the configuration of redundant cables and the location of in-situ combustibles to permit us to perform an independent review. In September 1982, the licensee was requested, by telephone, to provide this information. As of November 17, 1982, the required information has not been provided.

5.4 Conclusion

Based on the above evaluation, we conclude that the licensee has not provided justification that the level of protection afforded by the existing fire protection measures within containment are equivalent to the technical requirements of Appendix R. Therefore, the licensee's exemptions for the Pipe Alley (Fire Zone 28) should be denied.

6.0 Service Water Pump Area

6.1 Exemption Requested

The licensee requests an exemption from Section III.G.2 of Appendix R to the extent that it requires one-hour fire rated barriers or 20 feet of separation free of intervening combustibles to separate redundant

divisions and an automatic fire suppression system.

6.2 Discussion

The service water pump area is located in the Intake Structure. This structure is formed by metal walls, concrete floor and an open roof. The area contains four service water pumps. One pump is needed for safe shutdown. The pumps are aligned with two to four feet separation between pumps. The separation between A and D pumps is approximately 13 feet. Control and power cables to the pumps are routed in conduit through the concrete floor and terminate directly into the motor end of the pumps.

The in-situ combustible is 6 gallons of lubricating oil contained in each of the service water pumps. The fire protection in the area consist of manual hose stations and portable fire extinguishers. The licensee justifies this alternative on the following:

a) Manual fire fighting capability,
b) Television Camera Surveillance of the area in lieu of fire detection, and
c) An analytical model employed to show that the magnitude of an exposure fire needed to damage redundant components is significantly higher than reasonably expected.

6.3 Evaluation

This area does not comply with Section III.G because it does not have an automatic suppression system and twenty feet of separation free of intervening combustibles. There is no alternate shutdown capability independent of this area and there is no automatic fire detection system.

This area is under continuous television surveillance by security personnel. The in-situ combustible load is light. The only cables in the room are two short sections per pump that rise from the floor near each pump and terminate at the pump. The lubricating oil is contained in the pump and there are no hot surfaces in the area.

The licensee has conducted an analysis to determine quantity of fuel, spilled on the floor of the area, that is needed to create a fire and corresponding heat flux of enough severity to cause cable damage. The analysis indicates that 17 gallons of acetone in a 8 foot diameter pool, is needed to effect damage. However, as discussed in Section 3.3 there is no positive means of preventing the accumulation of transient materials in individual plant areas.

With the low combustible loading, and continuous surveillance in this area, there is reasonable assurance that a fire would be detected promptly and could be extinguished manually.

6.4 Conclusion

Based on the above evaluation, the level of existing protection for this area does provide a level of fire protection equivalent to the technical requirements of Section III.G of Appendix R. Therefore, the exemption for the Service Water Pump Area should be granted.

7.0 Fire Barrier Cable Penetration Seal Qualification

7.2 Exemption Requested

The licensee requested an exemption for certain penetration seals from Section III.M.2 of Appendix R to 10 CFR 50 to the extent that the acceptance criteria for fire barrier cable penetration seal qualification

requires that the temperature levels recorded on the unexposed side of the seal be analyzed to demonstrate that the maximum temperature be sufficiently below the cable insulation ignition temperature. Subsequently, the licensee requested that the seals in question be accepted as two hour noted seals in their installed locations.

7.2 Discussion

Our initial review of the initial exemption request from Section III.M acceptance criteria evaluated whether a selected fire barrier cable penetration seal had been properly qualified as having a three-hour rating. We concluded that it was not and that several 3-hour rated barriers contained 2-hour rated seals. By memorandum dated April 21, 1981, we denied the licensee's request for exemption.

On July 18, 1981, we met with the licensee to discuss the exemption request. At the meeting, we agreed that the fire seal had sucessfully been qualified as having a two-hour fire rating, and could be acceptable where justified that the fire barrier need only be rated at two hours. We requested that the licensee identify the fire barriers that contain this seal and the fire loading on both sides of the seal. By letter dated October 7, 1981, the licensee provided the requested information.

7.3 Evaluation

This alternative does not meet the requirements of Section III.M.2 of Appendix R, because two-hour penetration seals are installed in three-hour rated fire barriers. The penetration seals meet Section III.M.2 acceptance criteria for two hours. The fire barriers in which the penetration seals are installed have been shown to separate fire areas which have a fuel load less than two hours.

With the exemption of the North Cable Vault, the in-situ fuel loading of the fire area is equivalent to a fire severity of approximately one hour or less. Because the in-situ fuel loads have a fire severity considerably less than the fire resistive rating of the penetration shields, the probability of postulated fires propagating from one fire area to another through the 2-hour fire rated penetration seals is low.

The North Cable Vault has a fuel load equivalent to a fire severity of one hour and 59 minutes. However this area is protected by (1) early warning fire detection, (2) automatic CO_2 fire extinguishing system, and (3) manual fire fighting capability. The automatic fire suppression system and reasonable fire brigade response should be adequate to preclude failure of these seals during a fire.

Therefore, we find the use of the 2-hour fire rated penetration seals in the fire barriers specified provides a level of protection equivalent to that required by Section III.M.2 of Appendix R.

7.4 Conclusion

Based on our evaluation, we conclude that the 2-hour fire rated penetration seals in the fire barriers specified, provide a level of safety equivalent to the technical requirements of Section III.M of Appendix R and therefore, the licensee's request should be granted.

8.0 Oil Collection System

8.1 Exemption Requested

The licensee requested an exemption from Section III.O of Appendix R to the extent that it requires an oil collection system for each reactor coolant pump.

8.2 Discussion

The reactor coolant pumps are located at elevation 231.00 feet inside containment. The safety related cable/equipment in this area includes reactor coolant loop instrumentation, RHR valve in the "B" RCP bay, and the steam generator. The RHR valve is located above the reactor coolant line in the vicinity of the Steam Generator supports and is on the opposite side of the pump from the high pressure portion of the lubricating oil in the RCP and is, also, partially protected by the Steam Generator supports. The steam generator is located approximately 20 feet away from the RCP on a center line to center line basis.

The combustible loading in the area consists of cables and approximately 275 gallons of lubricating oil in each of three RCP's.

The fire protection consist of automatic sprinkler protecting each RCP, fire detectors, standipipe hose stations and portable fire extinguishers.

8.3 Evaluation

In our initial review of this exemption request we assumed a fire resulting from 10-15 gallons of oil remaining in oil soaked insulation after an RCP oil leak. The licensee's exemption request indicated that the bulk of the oil would be drained away via the sump drain. In a meeting on July 18, 1981, the licensee indicated that their analysis assumed that all the oil contained in one RCP was consumed in a fire at the pump location. The licensee also stated that their analysis had developed temperature profiles in the immediate and adjacent areas of the pump, but this information has not been provided.

In several telephone conservations with the licensee, we requested the following information be provided so we could complete our review of the exemption request:

a) Amount of oil consumed in a fire,
b) Fire duration,
c) Temperature profiles calculated,
d) Essential, data/assumptions utilized in calculations,
e) Fire effects on nearby safe shutdown cables/equipment.

The licensee has not provided the information yet.

8.4 Conclusion

Based on the above evaluation, we conclude that the licensee has not provided justification that the level of protection afforded by the existing fire protection measures for the Reactor Coolant Pumps are equivalent to the technical requirements of Appendix R. Therefore, the licensee's request for exemption for the RCP Oil Collection System should be denied.