Enclosure 2

Safety Evaluation

Supporting Exemption Request

Donald C. Cook Nuclear Power Plant

Units No. 1 and 2

Docket Nos. 50-315/316

1.0 Introduction

By letters dated December 30, 1982, March 31, 1983 and August 22, 1983, the licensee requested exemptions from Section III.G and 1 exemption from Section III.O of Appendix R to 10 CFR 50.

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 combustibles or fire hazards In adition, fire detectors and an automatic fire suppression system shall be installed in the fire area; or

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

If these conditions are not met, Section III.G.3 requires alternative shutdown capability independent of the fire area of concern. It also requires a fixed suppression system in the fire area of concern if it contains a large concentration of cables or other combustibles.

These alternative requirements are not deemed to be equivalent for all configurations, however, they provide equivalent protection for those configurations in which they are accepted.

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

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

Our general criteria for accepting alternative fire protection configurations 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.

Section III.O of Appendix R to 10 CFR Part 50 requires that the reactor coolant pump shall be equipped with an oil collection system if the containment is not intended during normal operation. Section III.O also requires, among other things, that the leakage shall be collected and drained to a vented closed container that can hold the entire lube oil system inventory.

2.0 RHR/CTS Pump Area (Fire Zone 1)

2.1 Exemption Requested

An exemption is requested from Section III.G to the extent it requires an automatic suppression system for the protection of redundant equipment separated by greater than 20 feet free of intervening combustibles.

2. Discussion

Fire Zone 1 is located in the east central sub-basement floor of the Auxiliary Building at el. 573 ft. The area contains eight individual cubicles containing the redundant residual heat removal pumps and containment spray pumps for both units. Each pump cubicle has a controlled access screen mesh door which is located behind a missile shield wall.

The cubicles are separated from each other by three-hour rated walls. The Unit 1 pumps are separated from the Unit 2 pumps by approximately 23 ft between the walls forming the entrance way.

The floors and ceilings are also of three-hour construction. The access doors are screen mesh for ventilation purposes; however, the missile shield walls extend beyond the width of the doorway.

The pump cubicles are provided with curbs six inches high and floor drains. The suction valves for the pump in each cubicle are located behind part-height missile shield walls provided with an access way and curb forming part of the missile shield.

The center lines of the RHR pumps are located approximately 12 feet from the entrance ways of the cubicles and approximately 4 feet from the wall dividing the pumps for each unit.

Manual fire suppression equipment and a detection system are provided in the area. The fire load in the area is low. The licensee proposes to upgrade the walls between the redundant pumps to a 3 hour fire resistance rating by sealing all penetration openings and installing fire dampers in common HVAC duct work. One train of power cables will be enclosed in a 1-hour rated barrier.

3.0 Evaluation

This area does not comply with Section III.G becuase it does not have automatic suppression, the enclosures from the RHR pump are not fire barriers, and the unprotected pump power cables are located less than 20 feet from each other.

The combustible loading in this area is low. An early warning smoke detection system is provided. If a fire occurred in this area, it is our opinion that the 3-hour walls between the RHR pumps and 1-hour barrier on one train of cables in the corridor will provide reasonable assurance that one train of RHR pumps will be maintained free of fire damage in the interval needed for the fire brigade to respond and manually extinguish the fire.

4.0 Conclusion

Based on the above evaluation, the existing protection for the RHR pumps in conjunction with the proposed fire barrier modifications provide a level of fire protection equivalent to the technical requirements of Section III.G. The exemption should, therefore, be granted.

5.0 Unit 1 and Unit 2 Transformer Rooms (Fire Zones 14 and 20)

5.1 Exemption Requested

An exemption is requested from Section III.G to the extent it requires a fixed suppression system in an area where alternative shutdown capability is provided.

5.2 Discussion

These fire zones have three-hour-rated walls, floor and ceiling. Except for two 1-1/2-hour dampers to the Turbine Building, the barriers bounding these fire areas are entirely three-hour rated. These areas contain the pressurizer heater transformers, which are located approximately 12 feet apart and the emergency diesel test breakers. Access to the area is through an unlabeled door built to three-hour specifications, approximately 12 feet wide, which faces the Turbine Room in the West wall.

The two fire zones are separated by several hundred feet. If a fire occurred in either area, the equipment of one unit could be used to safely shut down the other unit. Manual fire suppression equipment is provided in the area. The licensee proposes to install a detection system in the area.

5.3 Evaluation

These areas do not meet Section III.G because fixed suppression systems are not provided.

Section III.G requires a fixed suppression system if the area contains a large concentration of cables or other combustibles. These two areas contain primarily electrical equipment in metal cabinets, and have a low in-situ combustible loading.

With a detection system installed as proposed, a fire in either of these areas would be of limited severity and duration. The installation of a fixed suppression system would not appreciably enhance the fire protection for safe shutdown capability.

5.4 Conclusion

Based on the above evaluation, with the proposed modification, the fire protection system for the transformer rooms of Unit 1 and 2 provides a level of protection equivalent to the technical requirements of Section III.G and therefore, the exemption should be granted.

6.0 Unit 1 and Unit 2 Essential Service Water Pumps & Motor Control Centers (Fire Zones 29 a, b, c, d, & f).

6.1 Exemption Requested

An exemption is requested from Section III.G to the extent it requires a fixed suppression system for an area where alternative shutdown capability has been provided.

6.2 Discussion

At elevation 591' 0" of the screen house, there are two rooms, separated by a 3-hour rated fire wall. Each room contains the Essential Service Water (ESW) pumps and motor control centers of their respective units. Access to the pumps is through the side access control gate from the

screen house area. The access gate is constructed of screen mesh for ventilation purposes. The pump cubicles share a common corridor with a wall separating the Units 1 and Unit 2 pumps. A missile shield perendicular to the wall partially encloses the pumps. The pumps are installed on pedestals approximately four feet off the ground. The wall separating the Unit 1 zone from the Unit 2 zone is three-hour rated. The fire load in the area is low. The ESW pumps are not separated from each other by complete 3-hour rated fire barriers. An open stairway and open vertical hatch to the room below the pumps violate the integrity of the 3-hour barriers. This exemption request is limited to the need for a fixed suppression system in the ESW pump rooms. Manual suppression equipment is provided in the area. The licensee proposes to install a detection system throughout the area.

6.3 Evaluation

This area does not comply with Section III.G because a fixed extinguishing system is not provided. The ESW pumps of one unit can be used as a backup for the other unit. Section III.G requires a fixed suppression system if the area contains a large concentration of cables or other combustibles. In this area, the only combustibles are a few cables and the 2 gallons of lubricating oil from the pump motors totally enclosed in the pump casing.

With a detection system installed, as proposed, a fire in either of these areas would be of limited severity and duration. The installation of a fixed suppression system would not appreciably enhance the fire protection for safe shutdown capability.

6.4 Conclusion

Based on the above evaluation, with the proposed modifications, the fire protection for the ESW pumps of Units 1 and 2 provides a level of protection equivalent to the technical requirements of Section III.G and therefore, the exemption should be granted.

7.0 Circulating Water Pump Motor Control Room (Fire Zone 29G)

7.1 Exemption Requested

An exemption is requested from Section III.G to the extent it requires 3-hour barriers for the boundaries of fire areas, and the installation of automatic suppression in areas where redundant trains of safe shutdown cables are routed.

7.2 Discussion

Fire zone 29G is the basement level below the essential service water pump rooms of both units and contains two non-safe shutdown motor control centers. The fire zone has an open hatch with a ladder up to the Unit 2 ESW southeast pump cubicle and a stairway which opens to the northwest Unit 1 pump cubicle.

The ceiling and walls are all three-hour rated. With the exception of the four ESW pump power cables and conduit for the Unit 1 east pump discharge valve, all the conduit comes through the wall in pull boxes near the ceiling and immediately exits up into the ceiling slab. The cabling into the ceiling runs in embedded conduit to its respective pump cubicle. All ceiling and wall penetrations are sealed with three-hour rated fire seals.

The licensee now proposes a different modification involving the open hatchway. Previously, a one-hour rated hatch was proposed. Now, a 3-hour rated hatch is proposed. The Unit 1 and Unit 2 ESW pumps will therefore be separated by a complete 3-hour barrier in compliance with Section III.G. In addition, the arrangement of the stairway and exhaust ventilation system provides a means for high-level venting of smoke, heat, and combustion products emanating from fire zone 29G. This will preclude a buildup of a hot gas layer at the ceiling level in fire zone 29G where the ESW

The walls, floors, and ceilings are of reinforced concrete construction. Excluding doors to the exterior of the area, all barriers have a minimum fire rating of one hour. Ventilation ducts are not provided with fire dampers.

The combustible loading in the area is low. Alternate shutdown capability is provided independent of the areas. The licensee proposes to install a detection system and 1-hour rated fire dampers.

8.3 Evaluation

These areas do not comply with Section III.G because a fixed suppression system is not provided. Section III.G requires a fixed suppression system if the area contains a high concentration of cables or other combustibles. These areas contain primarily cable insulation, however the amount of insulation is distributed throughout the area and in its present configuration does not pose a significant hazard. With a detection system installed, as proposed, a fire in either of these areas would be of limited severity and duration. The installation of a fixed suppression system would not appreciably enhance the fire protection for safe shutdown capability.

8.4 Conclusion

Based on the above evaluation, with the proposed modification, the fire protection system for the Unit 1 and Unit 2 main steam enclosures provides a level of fire protection equivalent to the technical requirements of Section III.G. The exemption should, therefore, be granted.

9.0 Component Cooling Water Pump Area (Fire Zone 44S)

9.1 Exemption Requested

An exemption is requested from Section III.G to the extent it requires the enclosure of one train of redundant safe shutdown cables and equipment in a 1-hour rated barrier, or separation of redundant trains by complete 3-hour rated barriers.

9.2 Discussion

This zone is the south half of el. 609' 0" of the Auxiliary Building and contains a number of Unit 2 safe shutdown cables, five component cooling water (CCW) pumps, two Unit 2 CCW heat exchangers, and associated valves. The CCW pumps are mounted on 4-inch high pedestals with 6-inch high concrete curbs completely surrounding the pedestals. Ventilation exhaust ducts are located over each motor which completely cover the pump. The Unit 1 east and Unit 2 west pumps at the motor end bearings are separated by approximately 5 ft., while the Unit 1 west pump motor, to Unit 2 west pump motor is separated by approximately 16 feet. The five CCW pumps are all located within a section of approximately 35 ft by 35 ft. The ceiling height in this area is approximately 11 feet. The Unit 2 CCW heat exchangers run north and south and are approximately 12 feet north of the Unit 1 east pump and separated from each other by approximately 7 feet. At the north end of the Unit 2 CCW heat exchangers are the heat exchanger outlet valves approximately 75 feet from the south wall.

A detection system and a partial suppression system are currently provided in the area. The licensee has proposed to extend the suppression system to cover the CCW pumps. The additional suppression will consist of ceiling-mounted sprinklers located for direct water application onto the pumps. Detection will consist of pilot head heat detectors also located directly over the pumps. The ceiling-mounted sprinklers cover approximately 65 sq ft per head and will provide a design density of 0.4 gpm/sq. ft.

Drainage capability in the vicinity of the pumps consists of drain openings on each of the five pump pedestals and a grid of 4-in. diameter drains covering the entire floor area of Fire Zone 44S. Adequate capacity is provided for drainage of suppression water resulting from a fire in this zone.

A partial height three-hour rated fire barrier will be provided to separate redundant component cooling water pumps. The barrier will be seismically qualified and constructed of insulated panels. The panels will be overlapped to provide protection for the bolts attaching the panels to the metal studs. The proposed barrier will be approximately six feet-six inches in height, and will extend 39 feet from the rear wall of the plant. The effect will be to separate the Unit 1 pumps from the Unit 2 pumps, and will separate the spare pump from all four pumps.

Two ceiling elevations exist in Fire Zone 44S. The clear floor to ceiling height over the component cooling water pumps is 10-ft 11-in., with that over the rest of the fire zone being 20-ft 4-in. Because of the change in ceiling elevations, the products of combustion from a fire in the vicinity of the pumps would tend to flow up into the 20-ft 4-in, high ceiling space, and prevent a stratified layer of hot gases from forming over the component cooling water pumps.

9.3 Evaluation

This area does not comply with Section III.G because the redundant CCW systems are not separated by 3-hour rated fire barriers.

The licensee proposes to install an increased coverage automatic suppression system over the CCW pumps and to separate the pumps by a partial height 3-hour barrier. It was our concern that due to the low ceiling, and close proximity of redundant equipment a fire in this area could damage all CCW pumps for both units prior to response of the fire brigade.

The partial height barrier will prevent a floor level exposure fire from damaging redundant CCW pumps. A stratified layer of

hot combustion gases will not form in the area immediately above the pumps due to the high level venting provided by the change in ceiling height in the area adjacent to the pumps. In addition, a high density sprinkler system will be provided over the pumps, with extended coverage heads provided at the height of the pumps, as well as the ceiling. This combination of protection provides reasonable assurance that one train of CCW pumps will remain functional until the response of the fire brigade.

9.4 Conculsion

Based on the above evaluation, the level of existing protection in conjunction with the proposed modifications provides a level of fire protection for the Component Cooling Water Pump Area (Fire Zone 44S) equivalent to the technical requirements of Section III.G. The exemption should be granted.

10.0 Unit 1 and Unit 2 Control Rooms (fire areas 53 and 54)

10.1 Exemption Requested

An exemption is requested from Section III.G to the extent it requires a fixed suppression system in an area where alternate shutdown capability has been provided.

10.2 Discussion

These fire areas are the Control Rooms for Units 1 and 2. The Control Rooms contain all the normal control panels for plant operation and most relay and instrument cabinets associated with plant control. In addition, the Unit 2 hot shutdown panel is located in the south-west corner of the Unit 1 Control Room and vice versa. The top of the panel is approximately eight inches from the false ceiling of the control room. The hot shutdown panel is of steel construction with a folding steel door at the front of the panel.

The control room area is protected from other fire zones by three-hour rated floors, ceilings and walls except for 2 ceiling and 2 floor hatches, both of which have two-hour ratings. Also, the common connecting door between the control rooms is unrated. There are ionization detectors located in each control room. Located outside the control room are water hose reels. Inside the control room are six CO_2 fire extinguishers and two 1-hour breathing apparatus. Two CO_2 hose reels are located outside the fire area. The licensee proposes to upgrade the two floor hatches and the common connecting door to a 3-hour rating.

Alternate shutdown capability is provided independent of each control room.

10.3 Evaluation

This area does not comply with Section III.G because the control room is not provided with fixed suppression.

The control room is equipped with area fire detectors and is provided with both a hose station and fire extinguishers for manual fire fighting. The fire load in the area is low. The fire protection features currently installed in the control room and the continuous manning of the control room provide adequate defense-in-depth fire fighting capability for these areas. In addition, an alternate shutdown system is provided with control capabilities for those systems necessary to maintain safe-shutdown capability which is independent of the main control room.

Plant Technical Specifications require continuous occupancy of the control room by the operators. Because the operators constitute a continuous fire watch, manual fire suppression in event of a fire would be prompt and effective and, thus, a fixed suppression system will not enhance the fire protection in this area.

10.4 Conclusion

Based on the above evaluation, the existing fire protection program for the control room provices a level of fire protection equivalent to the technical requirements of Section III.G. The exemption should, therefore, be granted.

11.0 Oil Collection System for Reactor Coolant Pumps

11.1 Exemption Requested

An exemption is requested from Section III.O to the extent it requires an oil collection tank sized to hold the lube oil inventory of all four RCP motors.

11.2 Discussion

Each unit has four reactor coolant pumps with an oil collection system which drains to a vented closed collection tank. The quantity of lubricating oil in each pump is 265 gallons. The capacity of the oil collection tank is 275 gallons. The components have been designed so that they are capable of withstanding a safe shutdown earthquake (SSE).

The collection tank is arranged such that if a failure of more than one RCP motor lube system occurred, the oil collection tank would overflow onto the lower containment floor. The lubricating oil used in the RCP motors has a flash point of approximately 480°F. There are no ignition sources at the floor level of the lower containment.

11.3 Evaluation

The RCP motor lube oil system does not comply with Section III.O because the oil collection tank is not sized to contain the entire lube oil system inventory.

The RCP motor lube oil system is capable of withstanding the safe shutdown earthquake. The oil collection tank is provided with sufficient capacity to hold the total lube oil inventory of one reactor coolant pump with margin and is designed so that any overflow will be drained to a safe location. We agree with the licensee that this combination of features is acceptable.

11.4 Conclusion

Based on the above evaluation, the existing RCP motor lube oil collection system provides a level of safety equivalent to the technical requirements of Section III.O and, therefore, the exemption should be granted.

Summary

Based on our evaluation, the following exemption requests should be granted:

RHR/CTS Pump Area (Fire Zone 1)

Unit 1 & 2 Transformer Rooms (Fire Zones 14 & 20)

Unit 1 & 2 ESW Pump Rooms (Fire Zones 29, 29a, 29b, 29c, 29d, 29f)

Unit 1 & 2 East Main Steam Enclosure (Fire Zones 33, 33A, 33B, 34, 34A, 34B)

Unit 1 & 2 Control Rooms (Fire Zones 53 & 54)

Unit 1 & 2 Oil Collection System

Circulating Water Pump MCC's (Fire Zone 29G)

CCW Pump Area (Fire Zone 44S)