

Omaha Public Power District
1623 Harney Omaha, Nebraska 68102
402/536-4000

August 30, 1983
LIC-83-219

Mr. Robert A. Clark, Chief
U. S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Division of Licensing
Operating Reactors Branch No. 3
Washington, D.C. 20555

Reference: Docket No. 50-285

Dear Mr. Clark:

Request for Exemptions from Various
Requirements of 10 CFR 50, Appendix R,
Fire Protection Program for
Nuclear Power Facilities

The Omaha Public Power District has evaluated the criteria of 10 CFR 50, Appendix R, Section III, against the presently installed fire protection systems at the Fort Calhoun Station. The District believes that the existing systems meet the intent of the criteria of Section III for all credible fires (i.e., the ability to safely shutdown the plant is preserved).

There are, however, the following areas wherein the intent of the criteria is met while specific requirements in Appendix R are not completely fulfilled. These fire areas are:

Fire Area 6:	Personnel Corridor
Fire Area 10:	Charging Pump Room
Fire Area 31:	Intake Structure
Fire Area 32:	Air Compressor Room
Fire Area 34A/B:	Electrical Penetration Area
Fire Area 36:	Switchgear Room
Fire Area 42:	Control Room

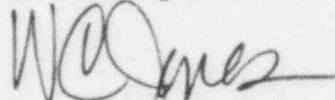
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Mr. Robert A. Clark
LIC-83-219
Page Two

Pursuant to Sections 50.12(a) and 50.48(c) of 10 CFR, the District requests exemptions to various requirements of Section III of Appendix R, as outlined in Attachment A to this letter. Attachment B contains excerpts from the original Fort Calhoun fire hazards analysis, with additions to reflect existing fire detection and suppression systems.

Sincerely,



W. C. Jones
Division Manager
Production Operations

WCJ/JCB:jmm

Attachments

cc: LeBoeuf, Lamb, Leiby & MacRae
1333 New Hampshire Avenue, N.W.
Washington, D.C. 20036

Mr. E. G. Tourigny, Project Manager
Mr. L. A. Yandell, Senior Resident
Inspector

ATTACHMENT A

Exemption Requests From 10CFR50, Appendix R For Fort Calhoun Station Unit No. 1

I. Fire Area 6

A. Description

Fire area 6, the Personnel Corridor, extends throughout the northern half of the auxiliary building on the basement level (elevation 989 ft.). This area contains two cable tray systems which serve various safe shutdown equipment in trains A, B, EA, and EB. Motor control centers 3A2 and 4C2, which are in this area, serve safe shutdown motor operated valves. Cables for the Low Pressure Safety Injection (LPSI) Pumps SI-1A and SI-1B as well as cables associated with the containment spray pumps (redundant to LPSI pumps for cold shutdown) SI-3A, SI-3B, and SI-3C are also present in this area. All cables associated with pump SI-3C in this area have been protected by a 3-hour fire barrier comprised of Pyrocrete. This particular configuration of Pyrocrete has not, however, been approved by the Commission as yet. With the exception of this item, all requirements of Appendix R are fulfilled in this fire area.

B. Exemption Request

The District requests an exemption, pursuant to Sections 50.12(a) and 50.48(c) of 10CFR, from the requirements of Section III.G of Appendix R. Specifically, exemption is requested to the extent that the District be required to perform testing on this particular configuration of Pyrocrete to document its 3-hour fire rating.

This requirement is unnecessary to assure the capability to safely shutdown the plant in the event of any credible fire in this area for the following reasons:

(1) The only cables associated with equipment necessary for cold shutdown in this fire area are power and control cables for LPSI pumps (SI-1A and SI-1B) and Containment Spray Pumps (SI-3A, SI-3B, and SI-3C). Therefore, the very short length (app. 10' vertical run) of cables associated with pump SI-3C in this area have been protected by a Pyrocrete enclosure. (These cables are: Power-ED111, ED112, ED9531, Control-ED4159, ED4189, ED4190, ED4191, ED4192, ED9384, ED9385.) The enclosure (details of which were provided to the Commission in our July 9, 1979 submittal) utilizes a fire barrier design incorporating metal lath covered with Pyrocrete which is of Standard UL construction. The necessary 3-hour fire rating is achieved by providing 2" Pyrocrete over metal lath, supported by independent testing by Johns-Manville Corporation.

I. B. Fire Area 6 Exemption Request (Con't.)

(2) Although the Commission states that the use of Pyrocrete in this particular application is not as yet approved, it is our engineering judgment these cables are adequately protected. The fire barrier design is similar to UL design X-719.

(3) As described in Attachment B, this area is provided with adequate fire detection and fire protection systems.

Based on the above, the District requests an exemption from the requirements of those portions of Section III.G of Appendix R which require that additional fire protection features be provided for fire area 6 at the Fort Calhoun Station.

II. Fire Area 10

A. Description

Fire area 10, Charging Pump Room, is located in the northwest corner of the auxiliary building on the basement level (elevation 989 ft.). This area contains all three charging pumps CH-1A, CH-1B, and CH-1C, one of which should be used for hot shutdown. The specific requirements of Section III.G.2 of Appendix R to 10CFR50 are not met in this area (i.e. the pumps and redundant cables are not separated by more than 20 feet without intervening combustible materials. One pump and related cables are not completely enclosed in a 1-hour rated fire barrier. The room is not equipped with a complete, area-wide automatic fire suppression system). With the exception of this item, all requirements of Appendix R are fulfilled in this fire area.

B. Exemption Request

The District requests an exemption, pursuant to Sections 50.12(a) and 50.48(c) of 10CFR, from the requirements of Sections III.G.2 and III.G.3 of Appendix R. Specifically, exemption is requested from the requirements that a 1-hour rated fire barrier enclosure be provided for one charging pump and related cables and that a complete area-wide automatic fire suppression system be installed in fire area 10 of the Fort Calhoun Station.

This requirement is unnecessary to assure the capability to safely shutdown the plant in the event of any credible fire in this area for the following reasons:

(1) Section 2.2 of the Fort Calhoun Technical Specifications states, in part, that, ". . . a third method [of reactivity control] will be to depressurize and use the safety injection pumps." This statement implicitly addresses the loss of all three charging pumps, and takes into account the fact that the HPSI pumps operate at a lower head. It is, therefore, the District's position that the HPSI pumps are redundant to the charging pumps in this case, not an alternate method. The HPSI pumps are, therefore, redundant to the charging pumps for both reactivity control and for reactor coolant makeup.

(2) In-situ combustible materials are limited to 16.5 gallons of lubricating oil, 8.4 gallons of hydraulic fluid, and IEEE-383 qualified cable insulation, for a maximum fire severity of approximately 11 minutes.

(3) As described in Attachment B, this area is provided with adequate fire detection and fire protection systems.

Based on the above, the District requests an exemption from the requirements of those portions of Sections III.G.2 and III.G.3 of Appendix R which require that additional fire protection features be provided for fire area 10 at the Fort Calhoun Station.

III. Fire Area 31

A. Description

Fire area 31, Intake Structure, provides river water to various safety and non-safety related components throughout the plant. The building is separate from the main body of the plant and is located on the river to the east of the turbine building. Major components located in the intake structure are three (3) circulating water pumps, four (4) raw water pumps, and two (2) fire pumps.

The redundant raw water pumps (necessary for cold shutdown only) are located in a common fire area. There is 23 feet of physical separation between pumps A and B and pumps C and D. The power cables for all four raw water pumps are contained in individual rigid conduits. These conduits are routed through a common fire barrier enclosure, located above the circulating water pump bay, such that the cables inside the barrier do not meet the specific Section III.G fire protection requirements of separation, detection, and suppression. Power cables for pumps A and C are routed through pull box 129-T and power cables for pumps B and D are routed through pull box 128-T. These pull boxes are located on the outside wall of the south end of the auxiliary building and are separated by approximately 3-1/2 feet, however, no fire detection or suppression is provided. With the exception of this item, all requirements of Appendix R are fulfilled in this fire area.

B. Exemption Request

The District requests an exemption, pursuant to Sections 50.12(a) and 50.48(c) of 10CFR, from the requirements of Sections III.G and III.L of Appendix R. Specifically, exemption is requested from the requirements that one pump and associated cables be completely enclosed in a one-hour fire rated barrier enclosure and that complete, area-wide fire detection and suppression systems be provided for fire area 31 and for the pull box area of the auxiliary building.

This requirement is unnecessary to assure the capability to safely shutdown the plant in the event of any credible fire in this fire area for the following reasons:

III. B. Fire Area 31 Exemption Request (Con't.)

(1) The components necessary for cold shutdown in this fire area are the raw water pumps AC-10A, B, C, and D. Power cables EA66, EB67, EC68, and ED69 for these pumps are located in this area. A Pyrocrete enclosure has been installed (details of which were transmitted to the Commission with our July 9, 1979 submittal) to protect the cables for pumps AC-10A and AC-10B from any credible fire.

(2) Fort Calhoun Emergency Procedure EP-22, "Loss of Raw Water," addresses the loss of all four raw water pumps. This procedure calls for the use of Auxiliary Raw Water Pump (independent of fire area 31). AC-16 supplies raw water to the water plant which subsequently provides deionized water for steam generator makeup.

(3) Section 9.3.4 of the Fort Calhoun USAR states, in part, that "The reactor can be shutdown completely without using the raw water system. Decay heat can be removed by the steam generators; the steam generator water can be replaced by any one of the available feedwater pumps."

(4) Additionally, in the extremely unlikely event of a loss of all four raw water pumps, make-up water can be supplied to the raw water system by connecting fire hoses from hose cabinets FP-7C and FP-7D to any of the 3" drain line valves RW-213, RW-214, RW-215, and RW-216 located on the inlet side of the component cooling heat exchangers. Pumping force in this configuration is supplied by either of the fire pumps (FP-1A or FP-1B) or by a fire engine connected to any of the fire hydrants located on the plant site.

(5) As described in Attachment B, this fire area is provided with adequate fire detection and fire suppression systems.

Based on the above, the District requests an exemption from the requirements of those portions of Sections III.G and III.L of Appendix R which require that additional fire protection features be provided for fire area 31 at the Fort Calhoun Station.

IV. Fire Area 32

A. Description

Fire area 32, Air Compressor Room, is located along the length of the east side of the auxiliary building on the basement level (elevation 900 ft.). This area contains two cable tray systems which serve various safe shutdown equipment in trains A, B, EA, and EB. All 480V Motor Control Center power feeder cables are located in this area. The trays containing these cables do not meet the separation criteria of Section III.G.2 of Appendix R.

B. Exemption Request

The District requests an exemption, pursuant to Sections 50.12(a) and 50.48(c) of 10CFR, from the requirements of Sections III.G.2 and III.G.3 of Appendix R. Specifically, exemption is requested from the requirement that one redundant train of cables be protected by a 1-hour fire rated enclosure and that a complete, area-wide, automatic fire suppression system be installed in fire area 32.

This requirement is unnecessary to assure the capability to safely shutdown the plant in the event of any credible fire in this fire area for the following reasons:

(1) As stated in our March 27, 1981 submittal and in our original fire hazard analysis, the principle fire hazard in this area is a cable fire in one redundant train which could affect the other.

(2) A fire barrier designed in accordance with Regulatory Guide 1.75 and IEEE-384 (1977) has been provided where these redundant cables cross each other in cable trays. This barrier, (similar to UL design X-719) comprised of metal lath and 2" of Pyrocrete of standard UL construction, meets the 3-hour rating per independent testing by Johns- Manville Corporation. Specifically, this barrier separates cable tray 7S from cable trays 19S and 20S.

A second barrier (of same design as stated above) has been provided where cable tray 18S crosses cable tray 1S. These tray systems are as tabulated below:

<u>Tray No.</u>	<u>Cable Train</u>
1S	EA, A
7S	EA
18S	B, D
19S	EB, B
20S	EB, B

IV. B. Fire Area 32 Exemption Request (Con't.)

(3) In all other cases, cable trays containing redundant trains of power cables have a minimum separation of 13'-8" horizontally. It is, therefore, the District's position, based on our engineering judgment, that no credible fire in this fire area can disable both redundant trains of shutdown equipment.

(4) As described in Attachment B, this fire area is provided with adequate fire detection and fire protection systems.

Based on the above, the District requests an exemption from the requirements of those portions of Sections III.G.2 and III.G.3 of Appendix R which require that additional fire protection features be provided for fire area 32 at the Fort Calhoun Station.

V. Fire Area 34A/B

A. Description

1. Fire Area 34A

Fire Area 34A, Lower Electrical Penetration Room, is located in the southeast end of the auxiliary building. Fire area 34A is the basement room (elevation 989 ft.), which is connected to fire area 34B by an unenclosed stairwell. A 3-hour rated fire barrier has been installed in this opening. This area contains redundant power cables for backup pressurizer heaters. The redundant cables are not separated by more than 20 feet without intervening combustible materials, nor is one division completely enclosed in a 1-hour rated fire barrier. The area is not equipped with a complete automatic fire suppression system.

2. Fire Area 34B

Fire area 34B, Upper Electrical Penetration Room, is located directly above area 34A on the ground floor (elevation 1013 ft.). This room contains safe shutdown motor control centers and associated cables. Redundant backup pressurizer heater power feeder cables are not separated by more than 20 feet without intervening combustibles. One division is not completely enclosed in a 1-hour fire rated barrier. The area is equipped with a complete smoke detection system, but is not equipped with a complete automatic fire suppression system. With the exception of the above items, all requirements of Appendix R are fulfilled in this fire area.

B. Exemption Request

The District requests an exemption, pursuant to Sections 50.12(a) and 50.48(c) of 10CFR, from the requirements of Sections III.G.2 and III.G.3 of Appendix R. Specifically, exemption is requested from the requirements that one redundant train of backup pressurizer heater cables in each of these fire areas be completely enclosed in a 1-hour fire rated enclosure and that complete, area-wide fire suppression systems be installed in fire areas 34A and 34B.

This requirement is unnecessary to assure the capability to safely shutdown the plant in the event of any credible fire in these fire areas for the following reasons:

V. B. Fire Area 34A/B Exemption Request (Con't.)

1. Fire Area 34A

(1) As stated in our March 27, 1981 submittal, a three-hour rated fire barrier has been installed at the point where cable tray 12S (containing cable EA140 which feeds MCC-3C1 for bank 2) crosses under cable tray 20S (containing cables B136 and EB144 for MCC-4C1 for banks 3 and 4 respectively). Details of this barrier were submitted to the Commission with our July 9, 1979 submittal.

2. Fire Area 34B

(1) The cables of concern in this area are A387-A390, A404, A415, A431-A436, which are power cables for bank 1 and 2 backup pressurizer heaters. Motor Control Centers MCC-4B1 and MCC-4C1 for backup pressurizer heater banks 3 and 4 are also located in this fire area. However, all cables associated with the "B" train enter the MCC's through the bottom, therefore, for all practical purposes, no "B" cables for pressurizer heaters are in this area.

(2) The QA records storage vault is being upgraded with complete 2-hour rated walls and barriers, thus eliminating all paper in the area from area 34B combustible mass. Also, this vault has been provided with an automatic Halon fire suppression system. Maximum fire severity, therefore, has been considerably reduced.

(3) A minimum separation of 16'-0" horizontal and 9'-0" vertical exists between the "B" MCC's and the "A" cable tray 50S, further supporting the District's position that at least one bank of backup pressurizer heaters will be available for shutdown in the event of any credible fire in this fire area. (See Fig. 1)

(4) As described in Attachment B, this area is provided with adequate fire detection and fire protection systems.

Based on the above, the District requests an exemption from the requirements of those portions of Sections III.G.2 and III.G.3 of Appendix R which require that additional fire protection features be provided for fire areas 34A and 34B at the Fort Calhoun Station.

VI. Fire Area 36

A. Description

Fire area 36, Switchgear Room, is located along the east wall of the auxiliary building on the ground and intermediate levels (elevation 1011 ft.). This room contains switchgear for most safe shutdown equipment as well as all three battery charges. Redundant trains of safe shutdown equipment/cables are adequately separated by a 3-hour fire rated Pyrocrete wall which splits the east and west switchgear areas into two separate rooms.

In the west half of the switchgear room, cable tray 54S contains 3A backup pressurizer heater control cables. This tray is in the same fire area as the 4B electrical transformers which provide power to the remaining two backup heater banks. A Pyrocrete barrier has been installed to protect cable tray 54S in this area. However, this application of Pyrocrete has not been approved by the NRC.

In addition, in fire area 36, 4160V bus ducts penetrate the 3-hour fire rated fire walls between the east and west portions of the switchgear room from each of the diesel generator rooms. Also, in 3 cases 480V bus ducts penetrate the wall separating the east and west half of the switchgear room. In each of these cases, the 3-hour fire rating of the wall has been degraded.

With the exception of these two items, all requirements of Appendix R are fulfilled in this fire area.

B. Exemption Request - 1

The District requests an exemption, pursuant to Sections 50.12(a) and 50.48(c) of 10CFR, from the requirements of Section III.G.2 and III.G.3 of Appendix R. Specifically, exemption is requested to the extent that the District be required to perform testing on this particular configuration of Pyrocrete to document its 3-hour fire rating.

This requirement is unnecessary to assure the capability to safely shutdown the plant in the event of any credible fire in this fire area for the following reasons:

VI. B. Fire Area 36 Exemption Request - 1 (Con't.)

(1) Although the use of Pyrocrete as a 3-hour rated fire barrier in this specific application has not as yet been approved by the Commission, it is the District's position, based on our engineering judgment, that the Pyrocrete enclosure protecting cable tray 54S effectively separates the control cables for bank 3A backup pressurizer heaters from the 4B electrical transformers, and adequately protects them from any credible fire in the area. The barrier design (similar to UL design X-719) incorporates metal lath covered with Pyrocrete which is of standard UL construction. Details of this barrier were provided with our July 9, 1979 submittal. Independent testing by Johns Manville Corporation supports the 3-hour rating.

(2) There exists a minimum separation of 12'-10" vertically and 10'-1" horizontally between the cable tray and the transformer.

(3) As described in Attachment B, this area is provided with extensive fire detection and fire protection systems.

Based on the above, the District requests an exemption from the requirements of those portions of Sections III.G.2 and III.G.3 of Appendix R which require that additional fire protection features be provided for fire area 36 at the Fort Calhoun Station.

C. Exemption Request - 2

The District requests an exemption, pursuant to Sections 50.12(a) and 50.48(c) of 10CFR, from the requirements of Sections III.G.2 and III.G.3 of Appendix R. Specifically, exemption is requested from the requirement that penetrations made through 3-hour fire rated walls by the 480V and 4160V bus ducts in fire areas 35A, 35B, and 36 be upgraded.

This requirement is unnecessary to assure the capability to safely shutdown the plant in the event of any credible fire in any of these fire areas based on the following:

The common bus ducts which penetrate fire barrier walls between the fire areas mentioned above are as follows:

- (1) 4160V bus duct connecting Diesel Generator D1 control panel (fire area 35A) with 4160V switchgear 1A3 unit 20 (fire area 36-east).
- (2) 4160V bus duct connecting Diesel Generator D2 control panel (fire area 35B) with 4160V switchgear 1A4 unit 1 (fire area 36-west).

VI. C. Fire Area 36 Exemption Request -2 (Con't.)

- (3) 4160V bus duct connecting 4160V switchgear 1A3 unit 19 (fire area 36-east) with 4160V switchgear 1A4 unit 2 (fire area 36-west).
- (4) 4160V bus duct connecting 4160V "B" switchgear (fire area 36-west) with station auxiliary transformer TIA-4 (via fire area 36-east).
- (5) 4160V bus duct connecting 4160V "B" switchgear (fire area 36-west) with station auxiliary transformer TIA-2 (via fire area 36-east).
- (6) 480V bus duct connecting 480V switchgear 1B4A unit 200 (fire area 36-west) with 1B3A-4A unit 106 (fire area 36-east).
- (7) 480V bus duct connecting 480V switchgear 1B3B-4B unit 406 (fire area 36-west) with 1B3B unit 300 (fire area 36-east).
- (8) 480V bus duct connecting 480V switchgear 1B4C unit 600 (fire area 36-west) with 1B3C-4C unit 506 (fire area 36-east).

(See Figure 2)

Ducts denoted as (1) and (2) above do not require any further fire protection features because these ducts and their associated equipment are redundant and separated. That is, any postulated fire, even if it does breach a fire barrier via one of these bus ducts, will only disable one train of electrical equipment. In the event of any postulated fire in any of these fire areas, safe shutdown capability is maintained insofar as these bus ducts are concerned.

Bus ducts denoted as (3) through (8) above are provided with a UL approved silicon foam 3-hour rated fire stop material between the bus duct and the fire barrier penetrated. The silicon foam material is designed to expand up to five times its present volume in the presence of heat due to a localized fire. A fire postulated in the vicinity of the penetration made by the duct will, therefore, cause the bus duct material to melt and the silicon fire stop to expand around the bus bars, sealing off the penetration and providing the required 3-hour fire rated barrier.

VI. C. Fire Area 36 Exemption Request - 2 (Con't.)

The only postulated fire of concern, therefore, is one which is located far enough away from the bus duct penetrations so as to not melt the duct or activate the silicon foam. Concern has been raised by the Commission that smoke and fumes from the postulated fire could travel through the ducts from one fire area to another and disrupt proper functioning of the switchgear in the unaffected area.

It is the District's position, based on our engineering judgment, that the extensive fire detection and fire suppression systems provided in these areas will adequately detect and extinguish any credible fire in these fire areas prior to disabling any of the redundant equipment needed for safe shutdown of the plant. Details of the existing fire protection systems for these are described in Appendix B.

Based on the above, the District requests an exemption from the requirements of those portions of Sections III.G.2 and III.G.3 of Appendix R which require that additional fire protection features be provided for fire areas 35A, 35B, and 36 at the Fort Calhoun Station.

VII. Fire Area 42

A. Description

Fire area 42, Control Room, is located in the northeast corner of the auxiliary building on the operating floor level (elevation 1036 ft.). The area is bounded by walls, floor and ceiling of 3-hour fire rated construction, with openings protected by either 3-hour fire rated doors, dampers, or penetration seals. The area is provided with a complete smoke detection system and a Halon fire suppression system which protects the inside of the main control console. The control room is not, however, equipped with an area-wide fixed fire suppression system. With the exception of this item, all requirements of Appendix R are fulfilled in this fire area.

B. Exemption Request

The District requests an exemption, pursuant to Sections 50.12(a) and 50.48(c) of 10CFR, from the requirements of Section III.G.3 of Appendix R. Specifically, exemption is requested from the requirement that a fixed fire suppression system be installed in the control room.

This requirement is unnecessary to assure the capability to safely shutdown the plant in the event of any credible fire in this fire area for the following reasons:

Fire Protection

The control room complex area is protected by fire detectors located as follows: seven ionization type in the control room (FA 42A), two ionization type in the computer room (42B), one ionization type and one duct type in the elevator shaft (42C), five ionization type in the personnel corridor (42E), one thermal type in the kitchen (42D), two duct-installed ionization types in the control room ventilation ducting, and one ionization type detector in the shift supervisor's office (42D). There are seven portable extinguishers located in this area. They consist of the following: a 20 lb. CO₂, 10 lb. CO₂, and a 10 lb. dry chemical in the control room (FA 42A); a 22 lb. Halon and a 10 lb. CO₂ in the computer room (42B); a 10 lb. dry chemical in the corridor (42E); and a 10 lb. dry chemical in the kitchen (42D). In addition, there are two fire hose cabinets located in the corridor to serve as a fire suppression backup.

VII. B. Fire Area 42 Exemption Request (Con't.)Fire Protection Con't.)

There are two doorways to the Control Room Complex area from the turbine building. Each of these is protected by 3-hour fire rated doors and an automatic water curtain mounted over the turbine building side of the doorway.

Additionally, there is a fixed Halon Fire Suppression System installed in the main walk-in control panels.

Postulated Fire

Fire Area 42A - Control Room: A fire is postulated in a console containing instrumentation and control circuits of safety-related cable divisions EA, EB, EC, and ED.

Fire Area 42B - Computer Room: A fire is postulated in the computer circuitry.

Fire Area 42C - Stairwell: No combustibles.

Fire Area 42D - Shift Supervisor's Area and Kitchen: A paper fire is postulated in the Shift Supervisor's office.

Fire Area 42E - Personnel Corridor and Storage Closets: A rag fire is postulated in the Janitorial Closet.

Consequences of Fire Without Active Protection

Fire Area 42A - Control Room: The cabinets in the control room form a metal enclosure with cables entering the bottom of the cabinets through conduits from the cable room below. For some plant functions the redundant control and display information is totally separated by virtue of being in adjacent cabinets. Even in the cases where redundant divisions enter the panel they are separated by metal barriers within the panels at the back of each panel where the terminal boards are located. The individual conductors are run in wiring harnesses to the front of the panel. Therefore, it is only at the front of the panel where wiring harnesses may be in close proximity that the separation criteria is not satisfied. The initiation of a fire in these cabinets is extremely unlikely since the voltage and amperage is low. The cable insulation is fire retardant and oxidation proceeds slowly. The control room is continuously manned and an overheated electrical component would be readily detected both by the personnel and by the ionization detectors. The portable fire extinguishers are available inside the control room to allow rapid extinguishment of the fire.

VII. B. Fire Area 42 Exemption Request (Con't.)Consequences of Fire Without Active Protection (Con't.)

Additionally, the fixed Halon Fire Suppression System in the main control cabinets will adequately control and extinguish any fire in the panels. There are no oil reservoirs or other significant stockpiles of combustibles to aggravate a small cable insulation fire. The control room ventilation is capable of manual control so that the once through ventilation mode can be used to rapidly clear the room of smoke. Therefore safe shutdown is not precluded by a fire in the control room.

Fire Area 42B - Computer Room: The plant computer does not perform any safety related functions. The postulated fire in the computer room will be an annoyance, but will not affect the ability of the plant to achieve safe shutdown. The maximum fire severity is estimated as 12 minutes which is based on stacks of computer printout paper. This material would be very difficult to ignite in its compact form. Therefore a fire of any severity in this room is hypothetical.

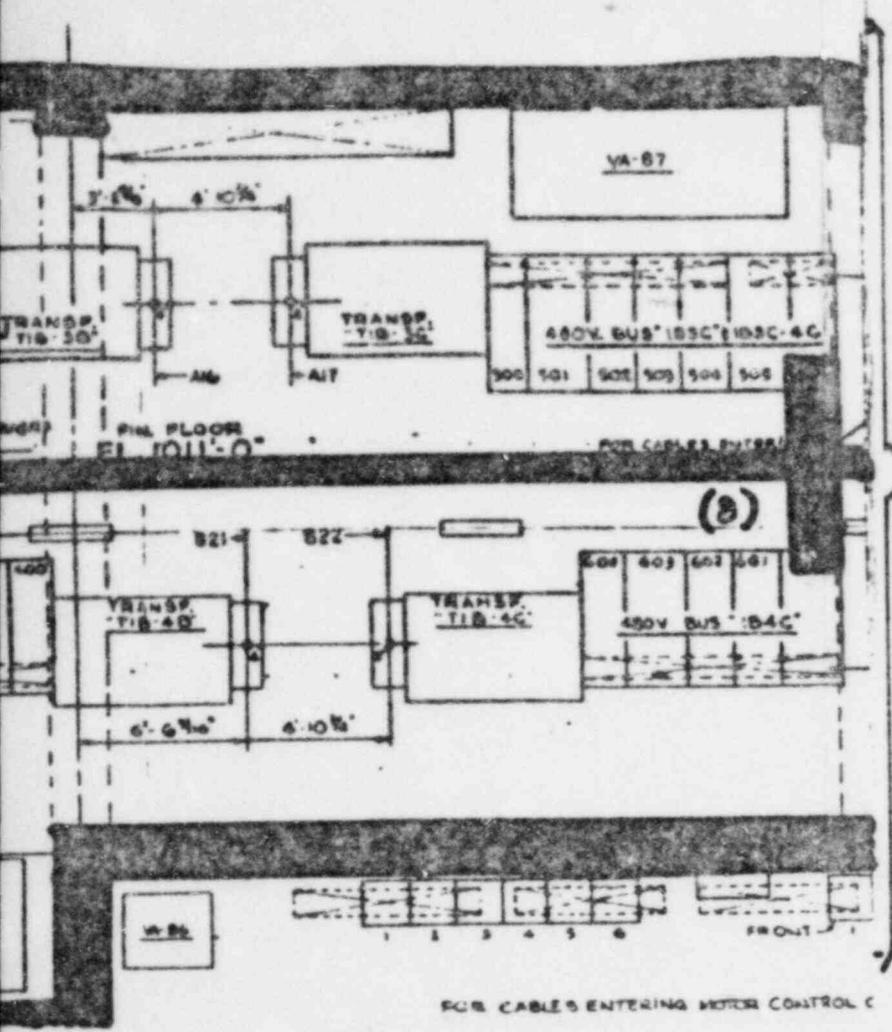
Fire Area 42C - Stairwell: No fire postulated due to lack of combustibles.

Fire Area 42D - Shift Supervisor's Office and Kitchen: The postulated fire in this area is due to the paper in files and miscellaneous flammable furniture coverings. This space does not serve any safety related functions. No safety related cables pass through this area. It can be isolated from the control room by means of the 3-hour fire rated doors and the 1-1/2-hour fire rated walls. The postulated fire would be an annoyance but would not affect the ability of the plant to achieve safe shutdown.

Fire Area 42E - Personnel Corridor and Storage Closets: The postulated fire is assumed to be rags in the janitorial closet. There are no significant combustibles in the corridor itself. No safety related cables pass through the corridor area. The ventilation ducting for the control room passes through the corridor, however, the maximum severity fire for this area could not affect this ducting. Therefore, the postulated fire does not affect the ability of the plant to achieve safe shutdown.

Alternate shutdown capability which has been provided also lessens the effect of a very unlikely control room fire.

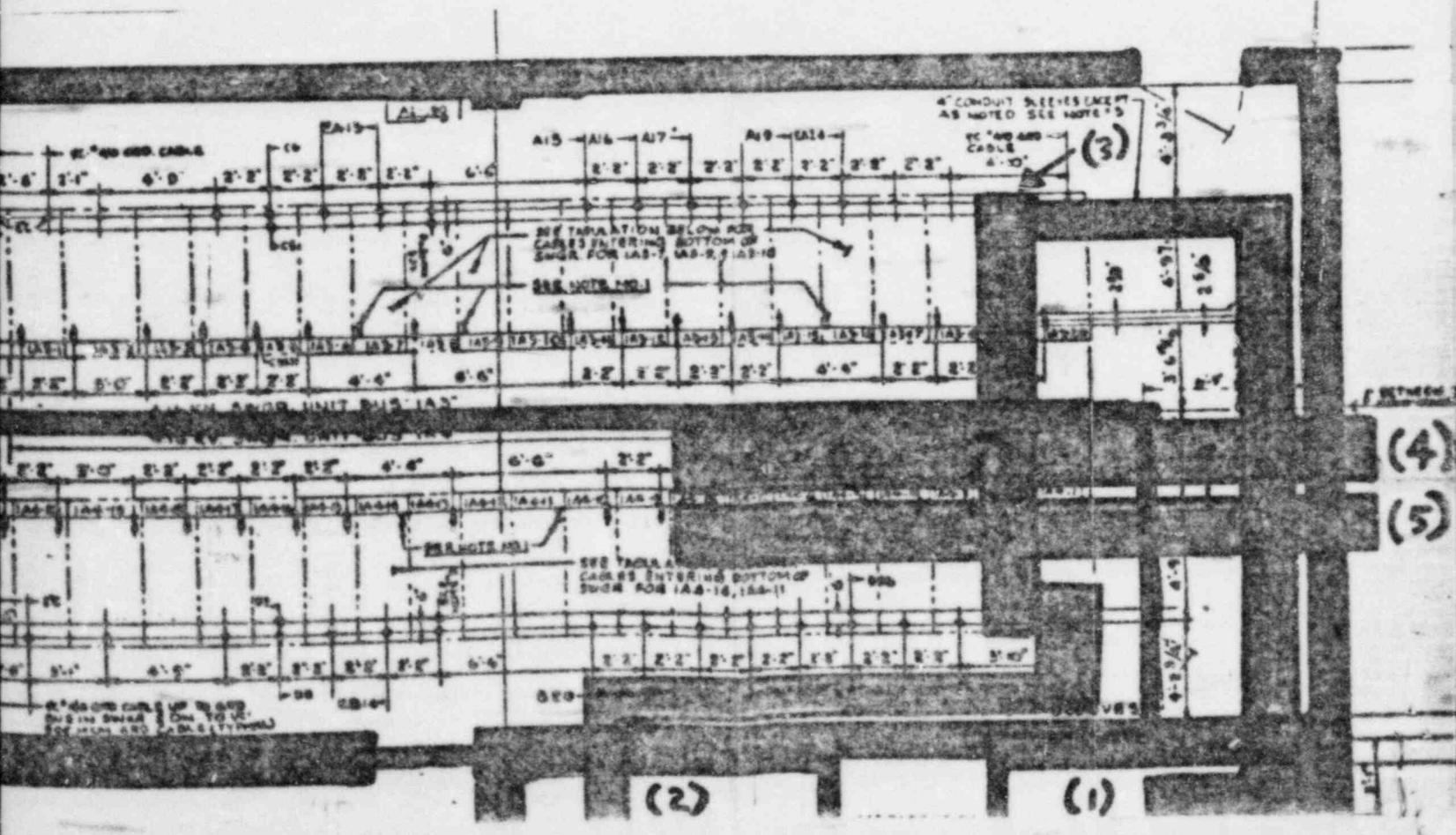
Based on the above, the District requests an exemption from the requirements of those portions of Sections III.G.3 of Appendix R which require that additional fire protection features be provided for fire area 42 of the Fort Calhoun Station.



CON'T BELOW

NOTES

- (1) NUMBERS IN PARENTHESIS REFER TO ITEMS ON PAGE 11
- (2) FROM DWG 11405-E-75



(2)

(1)

(4)

(5)

ATTACHMENT B

Excerpts from Original Fort Calhoun Fire Hazards Analysis for Fire Areas:

6, 10, 31, 32, 34A, 34B, 35A, 35B, 36, and 42

(See attached footnotes for any changes made to the fire detection/suppression systems in these fire areas since submittal of the original analysis.)

FT. CALHOUN STATION UNIT I

FIRE SAFETY EVALUATION

Fire Area 6

Elevation 989'
Controlled Access
Safety Related

Cable Tray and
Personnel Corridor
Area

Area Description

The cable tray and personnel corridor area extends throughout the northern half of the auxiliary building on the basement level. It is adjacent to the gas decay tank area, gas compressor area, radwaste monitor area, charging pump area and exterior wall on the north and to the heat exchanger areas, mechanical penetration area, HVAC equipment and fuel handling area and refueling water storage tank area on the south. The cable tray and personnel corridor area lies below the ground level personnel corridor area. All walls and floors separating this area from the adjacent areas mentioned are 3-hr fire rated barriers. The doors leading to areas containing combustible materials are 3-hr rated. Area 6 contains 2 cable tray systems which carry cables for Trains A,B,EA and EB. Safe shutdown equipment served by these cables includes charging pumps 1A and 1B, component cooling pumps 1A and 1B, and valves associated with component cooling heat exchangers A and B. These cables also serve H.P. and L.P. safety injection pumps, and Trains EA and EB of the containment spray pumps. Cables to safety injection and containment spray valves are also in this area. Liquid and gaseous waste disposal system components, some containment isolation valves located in the penetration area and auxiliary building and HVAC dampers are served by these cables. Conduits pass vertically through this area carrying cables for Train 1C H.P. safety injection pump and Train 1D containment spray pump.

Motor control centers 3A2 and 4C2, located in this area, serve waste treatment equipment, sump pumps, and miscellaneous loads. Safe shutdown loads served are the motor-operated valves between the charging pumps suction header and the refueling water storage tank and the motor-operated valve between the charging pumps suction header and the volume control tank. Flamemastic is applied to all cable trays where the separation criteria is not satisfied. All penetrations are sealed by silicon foam.

Safety Related Systems and Components

- A) Waste Disposal System
 - Waste Gas Analyzer WD-32

Fire Area 6 - (continued)

- Waste Demineralizer WD-24A
- Waste Demineralizer WD-24B
- Control Waste Disposal Control Panel AI-100

B) Safety related motor control centers 3A2 and 4C2 are located in the area along with non-safety related motor control centers 3A3 and 4B3.

<u>Combustible Material</u>	<u>Quantity</u>	<u>Fire Load</u>	<u>Maximum Fire Severity</u>
Cable Insulation	18,300 lbs	36,480 Btu/ft ²	27 Min.

Fire Protection

There are four portable fire extinguishers evenly distributed in the corridor. They consist of 10 lb dry chemical, 30 lb dry chemical, 20 lb CO₂, and 15 lb Halon. There are four fire hose cabinets evenly distributed in the corridor to serve as a backup fire suppression system. There are two ve ionization fire detectors located in the corridor. In addition, there are two manual fire alarm stations.

②
Postulated Fire

Cable insulation is the only significant combustible material in the corridor area. The separation criteria are met with the exception of three places where Train A and Train B cable trays cross perpendicularly. These intersection points are protected by Flamemastic applied to both cable trays within a five foot radius.

A fire may be postulated in one cable tray system; with the separation provided it would not be expected to propagate to the other.

Consequences of Fire Without Active Protection

Possible loss of one train of the following:

- Chemical and Volume Control
- Safety Injection (H.P. and L.P.)
- Containment Spray
- Auxiliary Building HVAC Valves and Dampers
- Containment Isolation Valves
- Auxiliary Building Sump Pumps
- Waste disposal Component Cooling Pumps

Fire Area 6 (Continued)

Safe shutdown would be unaffected, since redundant equipment would be available. Even if both trains were lost, safe shutdown would still be possible using the third charging pump or the third H. P. Safety Injection pump to maintain reactor coolant system inventory. The third component cooling pump would also be unaffected.

Consequences of Fire With Active Protection

The corridor area is protected by an automatic fire detection system to provide early alarm in the event of a fire. The early alarm and readily accessible fire suppression equipment as described above will permit rapid control of any fire and only very localized damage.

FT. CALHOUN STATION UNIT I

FIRE SAFETY EVALUATION

Fire Area 10

Charging Pump Area

Elevation 989'
Controlled Access
Safety Related

Area Description

The charging pump area is located in the northwest corner of the auxiliary building on the basement level. It is flanked on the south and east by the personnel and cable corridor, on the north by the valve area I and on the west by an exterior wall. The charging pump area is positioned below the personnel corridor area. All walls, doors, and floors separating this area from the other mentioned areas are 3-hr fire rated barriers. Cable trays containing Train EA and A cables are located at least 5 feet away from trays containing Train EB and B cables. Additional Train A and Train B cables are routed via separate conduits. Train A and EA cables to area 1 are routed through the area in trays. Train EC cables to area 1 are routed vertically through the area in conduit.

Safety Related Systems and Components

- A) Chemical and Volume Control System
- Charging Pump CH-1A
 - Charging Pump CH-1B
 - Charging Pump CH-1C

<u>Combustible Sources</u>	<u>Quantity</u>	<u>Fire Load</u>	<u>Maximum Fire Severity</u>
Lubricating Oil	16.5 gal	1795 Btu/ft ²	11 Min.
Hydraulic Fluid	8.4 gal	915 Btu/ft ²	
Cable Insulation	1334 lbs	11,360 Btu/ft ²	

Fire Protection

Two ionization detectors are located in the charging pump area. All wiring is routed in rigid conduit. A local alarm indicator lamp is located in the adjacent corridor. A 15 lb Halon portable extinguisher, a 30 lb dry chemical portable extinguisher and a fire hose cabinet are within 50 feet of the room.

Postulated Fire

Cable tray separation is such that a cable tray fire is unlikely to disable both Train A and Train B cables. A lubrication oil fire is of limited intensity and duration due to the small amount

Fire Area 10 (Continued)

of available lubrication oil (total of 25 gal lubricating oil and hydraulic fluid from all three pumps. However, the design basis fire is assumed to be a spreading lubrication oil fire that disables all three charging pumps.

Consequences of Fire Without Active Protection

The loss of all three charging pumps would not prevent safe shutdown. The high pressure safety injection pumps have a 1300 psi cutoff head and could be used to add primary system water during cooldown.

Consequences of Fire With Active Protection

The automatic fire detection system would allow prompt manual fire fighting, taking advantage of the readily accessible portable fire extinguishers and the backup fire hose cabinets. Damage would be limited to the affected pump or cable tray leaving two other redundant charging pumps in addition to the backup support available from the high pressure safety injection pumps.

FT. CALHOUN STATION UNIT I

FIRE SAFETY EVALUATION

Fire Area 20

Personnel Corridor
Area

Elevation 1007'
Controlled Access
Safety Related

Area Description

The personnel corridor area is located throughout the northern section of the auxiliary building on the ground level. It is bounded on the north by the personnel complex areas, cold chemistry area, volume control tank areas, waste evaporator area and an exterior wall and on the south by the pipe penetration area, electrical penetration area, HVAC equipment and fuel handling and exterior wall, the waste drumming area, and valve area III. The personnel corridor is situated above the cable tray and personnel corridor and below the fuel handling and ventilation equipment area and cable area. All walls separating this area from the other mentioned areas are 3-hr fire rated barriers. However, there is an unenclosed staircase in the west end of the corridor near column (6d,T) and an equipment hatch leading to the HVAC area on the intermediate floor near column (5d,T/U). There is a metal roll-up door in the west wall of the auxiliary building, leading to the outside, that is not fire rated. Train A and EA cables are located in trays which are at least 3 feet from trays carrying cables B and EB. Conduits carry some EC and ED cables in this corridor. The separation criteria is met throughout.

Safety Related Systems and Components

- A) Chemical and Volume Control System
- Boric Acid Pump CH-4A
 - Boric Acid Pump CH-4B
 - Boric Acid Storage Tank CH-11A
 - Boric Acid Storage Tank CH-11B
 - Drumming Station Control Panel AI-101
 - Charging Pump Suction Control Panel AI-160

Fire Area 20 (Continued)

<u>Combustible Materials</u>	<u>Quantity</u>	<u>Fire Load</u>	<u>Maximum Fire Severity</u>
Lubricating Oil	Negligible		
Cable Insulation	15,700 lbs	31,760 Btu/ft ²	
Vinyl	200 lbs	720 Btu/ft ²	
Paper	100 lbs	220 Btu/ft ²	
Methane	100 lbs	360 Btu/ft ²	24 Min.

Fire Protection

The portable fire extinguishers which are evenly distributed in the corridor consist of the following: four 10 lb dry chemical, four 30 lb dry chemical, two 150 lb dry chemical, and two 15 lb CO₂. There are four fire hose cabinets located at the following stations: 7a-N, 7a-Q, 5d-T/U, and 2d-T/U. The fire protection system for the corridor includes nine ionization detectors, two manual alarm stations, two station fire bells, and local alarm lamps which signal an activated detector in a space opening off this corridor. ②

Postulated Fire

Postulated Fire A: A fire is postulated in one of the cable trays in the narrow portion of the corridor outside the de-contamination area.

Postulated Fire B: A fire is postulated in the cable tray carrying division EA cables in the vicinity of the Boric Acid Pumps.

Consequences of Fire Without Active Protection

Postulated Fire A: Cable trays containing division EA cables are separated by a minimum of four horizontal feet from those containing division EB cables. The fire retardant properties of the cable insulation and the separation between the two divisions make the interruption of both divisions very unlikely. However, safe shutdown can be achieved even postulating the loss of EA and EB cables since a third charging pump and a third component cooling water pump is available.

Postulated Fire B: The possibility of fire spreading from one division of cable trays to another is remote due to the separation

Fire Area 20 (Continued)

observed. The two Boric Acid Pumps are separated by 14 ft. Therefore the disablement of both of these pumps is very unlikely. However, assuming the loss of both safety related cables of divisions A and B and the two Boric Acid Pumps it is still possible to achieve safe shutdown with redundant equipment represented by divisions C and D. The Boric Acid Pumps are not required since there is a gravity drain from the two Boric Acid Storage Tanks to the charging Pumps. The charging pumps can also take suction on the borated water from the Refueling Water Tank. No radiation release would occur.

Consequences of Fire With Active Protection

The automatic fire detection system would provide immediate alarm and permit prompt fire fighting action by the plant fire brigade. There are ample portable fire extinguishers plus the fire hose cabinets to allow effective fire suppression. This active protection will confine any damage to a localized area and protect redundant equipment.

FT. CALHOUN STATION UNIT I

FIRE SAFETY EVALUATION

Fire Area 31

Intake Structure

Uncontrolled Access
Safety Related

Area Description

The intake structure is located 60 ft east of the service building. The operating floor is at elevation 1007'-6". The circulating water pumps are located in a below grade cell at the west end of the structure. The four raw water pumps are each located in a cell to the east of the circulating water pumps. The circulating water pumps and the raw water pumps are separated by a 3-hr fire rated concrete wall. The two fire pumps are located on the operating floor on approximately the same E-W orientation as the four raw water pumps which are located below the operating floor, but which have a grating access penetration through the operating floor.

Safety Related Systems and Equipment

Raw Water Pumps - 10A, 10B, 10C, and 10D.

<u>Combustible Material</u>	<u>Quantity</u>	<u>Fire Load</u>	<u>Maximum Fire Severity</u>
<u>West Bay Housing Circulating Water Pumps</u>			
Lubrication Oil	40 gal	2090 Btu/ft ²	2 Min.
<u>Operating Floor</u>			
Diesel Fuel	1/2 in. I.D. fuel line connected to 550 gal tank outside	15,390 Btu/ft ²	12 Min.

Fire Protection

There are five photoelectric type detectors located on the (4) ceiling in the intake structure. They alarm and annunciate both locally and in the control room. There are six portable fire extinguishers. They consist of a 30 lb dry chemical and a 15 lb CO₂ in the raw water pump rooms, a 10 lb dry chemical in the basement of the circulating water pump bay, a 10 lb dry chemical on the mezzanine floor of the circulating water pump bay, a 30 lb dry chemical at the truck dock and a 15 lb CO₂ at the southwest entrance to the operating floor. There are two fire hose cabinets on the operating floor. One is in the center of the north wall and one is in the center of the south wall.

Fire Area 31 (continued)

Postulated Fire

Since this is a large area two separate locations are evaluated against a hypothetical fire.

Postulated Fire A: The lubricating oil (estimated at 10 gal) of a circulating water pump is leaked from the system and catches fire in the basement of the circulating water pump bay.

Postulated Fire B: The diesel fuel line leading from the 550 gal tank outside the building inside to the diesel fire pumps is assumed ruptured and postulated to ignite resulting in a pool fire on the operating floor.

Consequences of Fire Without Active Protection

Postulated Fire A: The limited quantity of lubricating oil would result in a fire under the affected circulating water pump. However, the water filled piping and large metal heat sinks would resist any structural damage. A fire in the circulating water pump bay would not spread to other areas of the intake structure. The circulating water pumps are not required for safe shutdown.

Postulated Fire B: A conservative calculation of the flow rate resulting from a fuel line break indicates a maximum flow rate of 8 ft³/hr. Since diesel fuel will burn at approximately 2.6 in/hr in a pool fire, the postulated fire will result in a 16 ft² pool fire on the operating floor. The electrically driven fire pump is located 50 ft from the diesel driven fire pump. Therefore, it will not be affected. Also of concern are the four raw water pumps which have grating access penetrations through the operating floor in addition to a stairwell access. Both the stairwell and the closest access grating are located approximately 11 feet from the diesel motor. Therefore it is unlikely that the pool fire will affect the closest raw water pump. In any case the access gratings for the three remaining raw water pumps are located at distances of 20, 30 and 35 ft from the diesel pump. Therefore, one or more of these will be available to achieve safe shutdown for the plant.

Consequences of Fire With Active Protection

Postulated Fire A: There is no automatic protection for a fire in the circulating water pump bay. The fire detection circuit would alarm the control room and personnel in the area and fire suppression will be manual.

Fire Area 31 (Continued)

Postulated Fire B: The automatic fire detection system will alert the control room to the postulated fire. The plant fire brigade has readily available in the area a choice of portable fire extinguishers or fire hose cabinets with which to extinguish the fire. The postulated fire with active protection is not expected to result in other than minor damage to the diesel driven fire pump.

FT. CALHOUN STATION UNIT I

FIRE SAFETY EVALUATION

Fire Area 32

Compressor Area

Elevation 989', 1007'
Uncontrolled Access
Safety Related

Area Description

The compressor area is located along the entire eastern edge of the auxiliary building at basement level. It is bordered on the north, south and east by exterior walls and on the west by the component cooling heat exchanger area, electrical penetration area and gas decay tank. The compressor area lies under the battery areas and switchgear area and includes a small corridor running alongside the battery rooms on the ground floor. All walls and floors between this area and the other mentioned areas are 3-hr fire rated barriers. The door leading to the cable penetration area on the basement level, the door leading to the turbine building on the ground level, the double door to the personnel complex on the ground level, and the door leading to the switchgear room on the ground level are 3-hr fire rated doors. The entryway to the elevator and stairwell on the ground floor are not fire-related due to their large separation from combustible materials. Approximately 350 safety related cables of Trains EA, A, EB and B are located in trays. Cables are also run in conduits.

Safety Related Systems and Components

Auxiliary Feedwater System
- Auxiliary Feedwater Pump FW-10
- Auxiliary Feedwater Pump FW-6

<u>Combustible Material</u>	<u>Quantity</u>	<u>Fire Load</u>	<u>Maximum Fire Severity</u>
Lubricating Oil	0.75 gal	20 Btu/ft ²	
Cable Insulation	20,350 lb	40,030 Btu/ft ²	30 Min.

Fire Protection

On the basement level there are located the following portable fire extinguishers: 10 lb dry chemical at column (7a, C/D), 30 lb

Fire Area 32 (continued)

dry chemical at column (4a, C), 15 lb Halon at column (4a, C/D), and 10 lb dry chemical at column (2b, D). Located in the electrical penetration area within 50 ft of the entrance to the compressor area are two portable fire extinguishers, one a 10 lb CO₂ and the second a 150 lb dry chemical. In the ground floor corridor extension of this fire area are located two 10 lb dry chemical extinguishers. There are four fire hose cabinets in this fire area. They are located at columns (2b, D), 4a, C) and (7a, C) on the basement level and at column (9/8a, E) on the ground level. (17)

The fire detection system for the compressor area is composed of nine ionization type detectors distributed throughout the area. The system provides alarm and annunciation locally and in the control room. Local alarm includes an indicator light in the adjacent corridor and in the electrical penetration area and an alarm bell and pull box at column 3d between C and D. All wiring is routed in rigid conduit. (5)

Postulated Fire

A lube oil fire in the turbine driven auxiliary feedwater pump is postulated.

Consequences of Fire Without Active Protection

The lube oil fire is postulated to disable both the turbine driven and the electrically driven auxiliary feedwater pumps. Cable trays above this equipment contains divisions EA, A, EB and B. These cables are assumed to be interrupted. Safe shutdown can still be accomplished by use of the main feedwater pumps and redundant charging pumps, component cooling pumps, etc. connected through divisions EC and ED.

Consequences of Fire With Active Protection

The automatic fire detection system will permit prompt fire fighting action by the plant fire brigade. Sufficient fire suppression equipment in the form of portable fire extinguishers and fire hose cabinets is available to control and extinguish a fire in this area. Active fire protection will localize the effects of the postulated fire.

FT. CALHOUN STATION UNIT I

FIRE SAFETY EVALUATION

Fire Area 34A

Electrical Penetration
Area - Basement.

Elevation 989'
Uncontrolled Access
Safety Related

Area Description

The electrical penetration area is located in the southeast end of the auxiliary building. Fire Area 34A is the basement room which is connected to Fire Area 34B by an unenclosed stairwell. The basement room is bounded by the compressor area and heat exchanger area on the east, the valve area II and personnel and cable corridor area on the north, containment on the west, and exterior wall on the south. All walls and floors enclosing Fire Area 34A are 3-hr fire rated barriers. Safety related cables of divisions A, EA, B and EB are routed in Fire Area 34A. The door is 3-hr fire rated. Ventilation duct work contains 1-1/2-hr fire rated dampers on each side of penetrations. (13)

Safety Related Systems and Components

None other than cables.

<u>Combustible Material</u>	<u>Quantity</u>	<u>Fire Load</u>	<u>Maximum Fire Severity</u>
Cable Insulation	6480 lbs	25,260 Btu/ft ²	19 Min.

Fire Protection

There are two portable fire extinguishers located inside the area within 25 feet of the door to the compressor area. They are a 150 lb dry chemical and a 10 lb CO₂. In addition, there is a fire hose cabinet located in the compressor area at the door to the electrical penetrations area. The fire detection consists of three ionization type detectors which alarm and annunciate in the control room. (6)

Postulated Fire

A fire is postulated to occur at a cable trays crossing. The cables in this area are protected by fire retardant coating but the fire is postulated at this point because it could affect both safety related divisions A and B.

Fire Area 34A (Continued)

Consequences of Fire Without Active Protection

The spread of a fire to other cables or other cable trays at this location is extremely unlikely as a result of the Flame-mastic covering. Assuming the postulated fire does interrupt both division EA and division EB of the safety related cables it would not prevent safe shutdown since redundant divisions are available. Radioactivity release will not occur.

Consequences of Fire with Active Protection

The automatic fire detection system will permit prompt fire fighting action by the plant fire brigade. Sufficient portable fire extinguishers and fire hose cabinets are available to allow prompt extinguishment of the fire. The active protection applied to the postulated fire would confine the damage to the cable tray where it was initiated.

FT. CALHOUN STATION UNIT I

FIRE SAFETY EVALUATION

Fire Area 34B

Elevation 1013', 1025'
Uncontrolled Access
Safety Related

Electrical Penetration
Area - Ground and
Intermediate Levels

Area Description

The electrical penetration area is located in the southeast end of the auxiliary building. Fire Area 34B consists of the ground level which extends up through the intermediate level. It is connected to Fire Area 34A in the basement by an unenclosed stairwell. Fire Area 34B is bounded on the east by the switchgear room, on the north by the switchgear room and personnel and cable corridor, on the west by the containment, and on the south by the diesel generator area. All walls and floors separating the electrical penetration area from the other mentioned areas are 3-hr fire rated barriers. The doors leading from the switchgear room into the electrical penetration area are 3-hr fire rated. Ventilation duct work contains 1-1/2-hr rated dampers on each side of penetrations. Safety related cables of divisions C and D are located in Fire Area 34B. (19)

Safety Related Systems and Components

Safety Related 480 Volt Motor Control Centers

- | | |
|-----------|---------------------------|
| - MCC 3A1 | - HPSI Control Valves |
| | - LPSI Control Valves |
| | - SI Tank Isolation Valve |
| | Feedwater Isolation Valve |
| | Feedwater Shutoff Valve |
| - MCC 3B2 | - HPSI Control Valves |
| | - LPSI Control Valves |
| | SI Tank Isolation Valve |
| - MCC 3C1 | - Battery Charger #3 |
| - MCC 4A1 | - HPSI Control Valves |
| | - LPSI Control Valves |
| | - SI Tank Isolation Valve |
| - MCC 4C1 | - HPSI Control Valves |
| | - LPSI Control Valves |
| | - SI Tank Isolation Valve |
| | Feedwater Isolation Valve |
| | Feedwater Shutoff Valve |
| | Auxiliary Feedwater Valve |

Fire Area 34B (Continued)

<u>Combustible Material</u>	<u>Quantity</u>	<u>Fire Load</u>	<u>Maximum Fire Severity</u>
Cable Insulation	8,850 lbs	34,500 Btu/ft ²	32 Min.
Styrofoam Insulation	200 lbs	1,400 Btu/ft ²	
Paper	1,500 lbs	6,250 Btu/ft ²	

Fire Protection

Three portable fire extinguishers are located on the ground floor of the electrical penetration area. They are a 15 lb CO₂, a 15 lb Halon, and a 150 lb dry chemical. They are located conveniently near the two entrances to this area. In addition, there is a fire hose cabinet located in the switchgear room adjacent to the south door to the electrical penetration area. The fire detection system consists of six ionization type detectors which alarm and annunciate both locally and in the control room. ⑦

①⑥

Postulated Fire

A fire is postulated to occur at section 52S in the cable trays carrying the safety related division C cables. This location is chosen since the fire could spread to the cable tray containing safety related division D cables which cross at right angles at this point.

Consequences of Fire Without Active Protection

The spread of a fire at this location is extremely unlikely since all cables at this intersection of cable trays will be protected by Flamemastic. Assuming however that both division C and division D safety related cables in these trays are interrupted it is still possible to achieve safe shutdown since redundant equipment and cable divisions are available. The motor control centers in this area could prevent the safety injection system from operating. However, the safety injection system is not required for safe shutdown. Should failure of the motor control centers cause the main feedwater isolation valves to close, the auxiliary feedwater pumps would be available. In conclusion, the design basis fire in this area would not preclude safe shutdown. Radioactivity release will not occur.

Consequences of Fire With Active Protection

The automatic fire detection system will permit prompt fire fighting action by the plant fire brigade. Sufficient portable

Fire Area 34B (Continued)

fire extinguishers and fire hose cabinets are available to allow prompt extinguishment of the fire. The active protection applied to the postulated fire would confine the damage to the cable tray where the fire was initiated.

FT. CALHOUN STATION UNIT 1

FIRE SAFETY EVALUATION

Fire Area 35A

Diesel Generator Room 1

Elevation 1007'
Uncontrolled Access
Safety Related

Area Description

Diesel generator room 1 is located in the south end of the uncontrolled access portion of the auxiliary building. It extends from the ground level up through the intermediate level. Diesel generator room 2 is located to the north, the switchgear area is located to the east, the equipment hatch is located to the west, and the mechanical equipment area is located on the operating floor overhead. Exterior walls and foundation form the south barrier and floor of this area. The ventilation space in the west end of the diesel generator room is designed to prevent a fire in one diesel generator room from propagating to the adjacent diesel generator room. A system of baffle walls achieves this functional separation. All walls and floors separating the diesel generator area from the other mentioned areas are 3-hr fire rated barriers. All doors are also 3-hr fire rated. Division C and EC cables are routed in cable trays and conduit.

Safety Related Systems and Components

Diesel Generating Unit 1

<u>Combustible Material</u>	<u>Quantity</u>	<u>Fire Load</u>	<u>Maximum Fire Severity</u>
Diesel Fuel Oil and Lubrication Oil	905 gal	115,690 Btu/ft ²	97 Min.
Cable Insulation	1345 lbs	13,390 Btu/ft ²	

Fire Protection

The fire suppression system for the diesel generator area consists of an automatic sprinkler system using water as a fire extinguishing medium. The system consists of ten prepositioned sprinkler heads per room with a flow rate of 80 gpm per head. Each sprinkler head operates independently and is activated by a fusible link. The sprinkler heads are fed from two parallel runs of 2" piping per room which branch from a common 4" header. This system water is

Fire Area 35A (Continued)

supplied from the fire pumps located in the Intake Structure. There are also a 20 lb CO₂ extinguisher in the vestibule at column 2a between D and F and 125 lb extinguisher at column (2b,M). In addition, two fire hose cabinets are located in the switchgear room within 25 feet of the entrance to the diesel generator rooms. (19) (3)

The fire detection system for the diesel generator area consists of two photoelectric type detectors positioned in the room. There is also an air duct type detector included in the ventilation exhaust fan. The detectors provide alarm and annunciation locally and in the main control room. All wiring is routed in rigid conduit. (9)

Postulated Fire

A leak in the day tank is postulated to result in a design basis fire for this area.

Consequences of Fire Without Active Protection

Active fire suppression is provided by the sprinkler system described above. Assuming that this system is not available and postulating the total combustion of the day tank capacity of 850 gal, the resulting fire would take place in diesel generator room 1. This would disable this division of emergency power. However, offsite power and diesel generator 2 are still available to assure safe shutdown of the plant. No radioactivity would be released.

Consequences of Fire With Active Protection

When the postulated fire produces a temperature of 135^oF in the diesel generator room the fusible link sprinkler heads will activate and provide a directed water spray that will extinguish the postulated fire in this room. Even though the equipment in this room may be damaged, offsite power or the redundant diesel generator will allow safe shutdown. (20)

FT. CALHOUN STATION UNIT 1

FIRE SAFETY EVALUATION

Fire Area 35B

Diesel Generator Room 2

Elevation 1007'
Uncontrolled Access
Safety Related

Area Description

Diesel generator room 2 is located in the south end of the uncontrolled access portion of the auxiliary building. It extends from the ground level up through the intermediate level. Diesel generator 1 is located to the south, the switchgear area is located to the east, the equipment hatch is located to the west and the electrical penetration area is located to the north. The ventilation space in the west end of the diesel generator room is designed to prevent a fire in one diesel generator room from propogating to the adjacent diesel generator room. A system of baffle walls achieves this functional separaton. All walls and floors separating the diesel generator area from the other mentioned areas are 3-hr fire rated barriers. All doors are also 3-hr fire rated. Division D and ED cables are routed in cable trays and conduit.

Safety Related Systems and Components

Diesel Generating Unit 2

<u>Combustible Material</u>	<u>Quantity</u>	<u>Fire Load</u>	<u>Maximum Fire Severity</u>
Diesel Fuel Oil and Lubricating Oil	905 gal	115,690 Btu/ft ²	97 Min.
Cable Insulation	1345 lbs	13,390 Btu/ft ²	

Fire Protection

The fire suppression system for the diesel generator area consists of an automatic sprinkler system using water as a fire extinguishing medium. The system consists of ten prepositioned sprinkler heads per room with a flow rate of 80 gpm per head. Each sprinkler head operates independently and is activated by a fusible link. The sprinkler heads are fed from two parallel runs of 2" piping per room which branch from a common 4" header. This system water is supplied from the fire pumps located in the Intake Structure. There

Fire Area 35B (Continued)

are also a 20 lb CO₂ extinguisher in the vestibule at column 2a between D and F and a 125 lb extinguisher at column (2b,M) in diesel generator room 1 which is immediately accessible. In addition, two fire hose cabinets are located in the switchgear room within 25 feet of the entrance to the diesel generator rooms. (3)

The fire detection system for the diesel generator area consists of two photoelectric type detectors positioned in the room. There is also an air duct type detector included in the ventilation exhaust fan. The detectors provide alarm and annunciation locally and in the main control room. All wiring is routed in rigid conduit. (9)

Postulated Fire

A leak in the day tank is postulated to result in a design basis fire for this area.

Consequences of Fire Without Active Protection

Active fire suppression is provided by the sprinkler system described above. Assuming that this system is not available and postulating the total combustion of the day tank capacity of 850 gal, the resulting fire would take place in diesel generator room 2. This would disable this division of emergency power. However, offsite power and diesel generator 1 are still available to assure safe shutdown of the plant. No radioactivity would be released.

Consequences of Fire With Active Protection

When the postulated fire produces a temperature of 135°F in the diesel generator room the fusible link sprinkler heads will activate and provide a directed water spray that will extinguish the postulated fire in this room. Even though the equipment in this room may be damaged, offsite power or the redundant diesel generator will allow safe shutdown. (20)

FT. CALHOUN STATION UNIT I

FIRE SAFETY EVALUATION

Fire Area 36

Switchgear Area

Elevation 1011'

Uncontrolled Access

Safety Related

Area Description

The switchgear area is located along the east wall of the auxiliary building on the ground and intermediate levels. The boundary on the south is an exterior wall. It is flanked by the electrical penetration area, diesel generator area and personnel corridor area on the west, and the battery areas, cable area, and personnel corridor area on the north. The compressor area and condensate service water tank area lie respectively below and above the switchgear area. All walls and floor between this area and the other mentioned areas are 3-hr fire rated barriers. All doors are 3-hr fire rated. Ventilation duct wall penetrations have 1-1/2-hour rated fire dampers on each side of wall opening. Safety related cables of divisions EA and EB are routed in cable trays in the compressor area below the switchgear room. They are brought up into the switchgear from penetration in the switchgear room floor. Safety related cables of divisions EC and ED are routed in cable trays overhead in the switchgear room. The 4160 Volt switchgear has EC cables entering in conduit at the center of the east bank and at the south end of the east bank. The separation distance is 30 ft. the ED cable enters the west 4160 switchgear bank in the center and in the south with, again, a separation of 30 ft. The EC and ED 4160 switchgear is separated from each other by a distance of 7 feet. The 480 volt transformers, air cooled, are separated as follows: T1B-3A to T1B-3B (30 ft), T1B-3B to T1B-3C (4 ft), T1B-4A to T1B-4B (30 ft), T1B-4B to T1B-4C (4 ft), T1B-3A to T1B-4A (8 ft), T1B-3B to T1B-4B (8 ft), and T1B-3C to T1B-4C (4 ft).

Safety Related Systems and Components

The area contains safety related 4.16-kV switchgear buses 1A3 and 1A4 serving Train EA and Train EB respectively. Train EA 480-volt buses 1B3A, 1B3B, 1B3C, 1B3A-4A and 1B3C-4C are in the area along with Train EB 480 volt buses 1B4A, 1B4B, 1B4C and 1B3B-4B.

MCC automatic load shed panels AI-109A (Train EA) and AI-109B (Train EB), six instrument bus inverters (two for each train plus both computer inverters), and all three battery chargers serving both trains are also located in the area.

Fire Area 36 (Continued)

<u>Combustible Material</u>	<u>Quantity</u>	<u>Fire Load</u>	<u>Maximum Fire Severity</u>
Cable Insulation	25,500 lbs	50,870 Btu/ft ²	39 Min.

Fire Protection

There are two fire detection zones in the switchgear room. One consists of ten ionization type detectors that both alarm and annunciate locally and in the control room. The second consists of fire photoelectric type detectors that alarm and annunciate in the control room. The two zones, each having a different type detector are used to derive a coincident signal which activates an automatic Halon 1301 system. The system will provide a 10 percent by volume concentration of Halon 1301 in the switchgear room. This is more than adequate to extinguish fire. There are also portable fire extinguishers conveniently located in the switchgear room. These are evenly distributed and consists of two 10 lb CO₂ extinguishers, two 15 lb CO₂ extinguishers, and two 15 lb Halon extinguishers. Additional CO₂ and dry chemical extinguishers are located in adjoining areas. To serve as a fire suppression backup there are four fire hose cabinets located in the switchgear room. Each of the two doorways leading from the switchgear room to the turbine building is protected by a water curtain on the turbine building side of the door. This water curtain is thermally activated. (10) (11) (12)

Postulated Fire

A fire is postulated in the switchgear room in one cable tray system (either EC and C or ED and D). Functional capability of that system is assumed to be lost, including undesignated cables in the same trays.

Consequences of Fire Without Active Protection

The postulated fire would result in loss of either Trains C and EC (and associated undesignated cables) or r of Trains D and ED (and associated undesignated cables). Trains A and EA would be lost with Trains C and EC, since their breaker might be affected and their power would also be lost. Alternatively, B and EB would be lost with C and EC. Because of the separation provided between the redundant switchgear and associated cabling, the fire-retardant properties of the cables, and the use of Flame-mastic at critical locations, the fire would not spread to involve both tray systems in the room. Thus, safe shutdown could be accomplished using the unaffected Train.

Fire Area 36 (Continued)

Consequences of Fire With Active Protection

The postulated fire will cause either the ionization or the photoelectric detectors or both to alarm locally and alarm and annunciate in the control room. Any combined signal from both an ionization and a photoelectric detector will cause isolation of the switchgear room and activate the installed Halon 1301 system. The fire will then be extinguished automatically. Damage to the affected cable tray system would be minimized.

FT. CALHOUN STATION UNIT 1

FIRE SAFETY EVALUATION

Fire Area 42

Control Room
Complex Area

Elevation 1036'
Uncontrolled Access
Safety Related

Area Description

The Control Room Complex Area is located in the northeast corner of the auxiliary building on the operating floor. The Control Room Complex Area actually consists of five separate compartments each segregated from the other by 1-1/2-hr fire rated walls and 30hr fire rated doors. These compartments are designated as follows: control room-fire area 42A; computer room-fire area 42B; stairwell and elevator shaft-fire area 42C; shift's supervisor's office, kitchen, and toilet-fire area 42D; and corridor, storage room, and janitor's closet-fire area 42E.

The Control Room Complex Area is flanked on the west by the HVAC equipment area, on the south by the condensate service water tank area, and on the north by exterior walls, and on the east by the turbine generator building. The cable area lies below the control room complex. All walls and floors separating this area from the other mentioned areas are 3-hr fire rated barriers. All doors bordering the area are 3-hr fire rated. Ventilation duct penetrations have 1-1/2 hr-fire rated dampers on each side of the walls.

Safety related cables leading to the wall mounted plant evacuation alarm and the loss of power annunciator for the fire detection system are run in conduit above the dropped ceiling. All other cables enter directly into the control room panels from the cable room below. Where different divisions of safety related cables enter the same panel, separation within the panel is accomplished by means of metal barriers or conduit.

Safety Related Systems and Components

Fire Area 42A - All safety related instrumentation and control panels.

Fire Area 42B - The plant computer is non-safety related.

Fire Area 42C - None.

Fire Area 42D - None.

Fire Area 42E - Control room air conditioning ducting.

Fire Area 42 (Continued)

<u>Combustible Material</u>	<u>Quantity</u>	<u>Fire Load</u>	<u>Maximum Fire Severity</u>
<u>Fire Area 42A - Control Room</u>			
Paper	Est. 100 lbs	* 400 Btu/ft ²	<1 Min.
Cable Insulation	Est. 100 lbs/panel	400 Btu/ft ²	

* Only combustion of one panel considered credible due to metal enclosures.

<u>Fire Area 42B - Computer Room</u>			
Paper	Est. 500 lbs	12,500 Btu/ft ²	12 Min.
Cable Insulation	Est. 100 lbs	2,500 Btu/ft ²	

Fire Area 42C - Stairwell

None.

Fire Area 42D - Shifts Supervisor Area and Kitchen

Paper	Est. 800 lbs	30,000 Btu/ft ²	
Furniture	Est. 200 lbs	7,500 Btu/ft ²	29 Min.

Fire Area 42E - Corridor

Paper and rags	Est. 100 lbs	1,450 Btu/ft ²	1 Min.
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Fire Protection

The control room complex area is protected by fire detectors located as follows: three ionization type in the control room (FA 42A), one ionization type in the computer room (42B), one ionization type in the elevator shaft (42C), five ionization type in the personnel corridor (42E), one thermal type in the kitchen (42D), and two duct-installed ionization types in the control room ventilation ducting. There are five portable extinguishers located in this area. They consist of the following: a 20 lb CO₂, 10 lb CO₂, and a 10 lb dry chemical in the control room (FA 42A); a 15 lb Halon in the computer room (42B); and a 10 lb dry chemical in the corridor (42E). In addition there are two fire hose cabinets located in the corridor to serve as a fire suppression backup.

There are two doorways to the Control Room Complex area from the turbine building. Each of these is protected by 3-hr fire rated doors and an automatic water curtain mounted over the turbine building side of the doorway.

Fire Area 42 (Continued)

Postulated Fire

Fire Area 42A - Control Room: A fire is postulated in a console containing instrumentation and control circuits of safety-related cable divisions EA, EB, EC, and ED.

Fire Area 42B - Computer Room: A fire is postulated in the computer circuitry.

Fire Area 42C - Stairwell: No combustibles.

Fire Area 42D - Shift's Supervisor's Area and Kitchen: A paper fire is postulated in the Shift Supervisor's office.

Fire Area 42E - Personnel Corridor and Storage Closets: A rag fire is postulated in the Janitorial Closet.

Consequences of Fire Without Active Protection

Fire Area 42A - Control Room: The cabinets in the control room form a metal enclosure with cables entering the bottom of the cabinets through conduits from the cable room below. For some plant functions the redundant control and display information is totally separated by virtue of being in adjacent cabinets. Even in the cases where redundant divisions enter the panel they are separated by metal barriers within the panels at the back of each panel where the terminal boards are located. The individual conductors are run in wiring harnesses to the front of the panel. Therefore it is only at the front of the panel where wiring harnesses may be in close proximity that the separation criteria is not satisfied. The initiation of a fire in these cabinets is extremely unlikely since the voltage and amperage is low. The cable insulation is fire retardant and oxidation proceeds slowly. The control room is continuously manned and an overheated electrical component would be readily detected both by the personnel and by the ionization detectors. The portable fire extinguishers are available inside the control room to allow rapid extinguishment of the fire. There are no oil reservoirs or other significant stockpiles of combustibles to aggravate a small cable insulation fire. The control room ventilation is capable of manual control so that the once through ventilation mode can be used to rapidly clear the room of smoke. Therefore safe shutdown is not precluded by a fire in the control room.

Fire Area 42 (Continued)

Fire Area 42B - Computer Room: The plant computer does not perform any safety related functions. The postulated fire in the computer room will be an annoyance, but will not affect the ability of the plant to achieve safe shutdown. The maximum fire severity is estimated as 12 minutes which is based on stacks of computer printout paper. This material would be very difficult to ignite in its compact form. Therefore a fire of any severity in this room is hypothetical.

Fire Area 42C - Stairwell: No fire postulated due to lack of combustibles.

Fire Area 42D - Shift Supervisors Office and Kitchen: The postulated fire in this area is due to the paper in files and miscellaneous flammable furniture coverings. This space does not serve any safety related functions. No safety related cables pass through this area. It can be isolated from the control room by means of the 3-hr fire rated doors and the 1-1/2-hr fire rated walls. The postulated fire would be an annoyance but would not affect the ability of the plant to achieve safe shutdown.

Fire Area 42E - Personnel Corridor and Storage Closets: The postulated fire is assumed to be rags in the janitorial closet. There are no significant combustibles in the corridor itself. No safety related cables pass through the corridor area. The ventilation ducting for the control room passes through the corridor, however, the maximum severity fire for this area could not affect this ducting. Therefore, the postulated fire does not affect the ability of the plant to achieve safe shutdown.

Consequences of Fire With Active Protection

The Control Room Complex Area is well protected by an automatic fire detection system. This area is also continuously manned. Therefore any incipient combustion would be detected early by personnel and the fire detection system. Manual fire suppression is readily available in the form of manual fire extinguishers and fire hose cabinets. Since there are no combustibles such as oil that could create a large fire in a short period of time, any other type of fire would be detected and controlled while it is still a very local event. Therefore, safe shutdown of the plant can always be carried out.

FOOTNOTES

1. There are now a total of twenty-four ionization type fire detectors located in the corridor (fire area 6).
2. Two automatic deluge fire suppression systems have been installed in the stairwell area and hatch opening area between fire areas 6 and 20.
3. There are now a total of six 10 lb. dry chemical, four 30 lb. dry chemical, two 150 lb. dry chemical, and two 15 lb. CO₂ portable fire extinguishers evenly distributed in fire area 20.
4. There are a total of four photoelectric type detectors located on the ceiling in the intake structure. There are four ionization type detectors located over the raw water pumps.
5. The fire detection system for the compressor area is composed of eleven ionization type detectors distributed throughout the area. There are only three fire hose cabinets in this area.
6. The fire detection for fire area 34A consists of ten ionization type detectors which alarm and annunciate in the control room.
7. The fire detection system for fire area 34B consists of eighteen ionization type detectors which alarm and annunciate both locally and in the control room.
8. There is also one 15 lb. CO₂ extinguisher and one 25 lb. AFFF extinguisher in the vestibule at column 2a between D and F and one 150 lb. extinguisher at column 2b,M for fire areas 35A and 35B. In addition, one fire hose cabinet is located in the entrance to the diesel generator rooms.
9. The fire detection system for the diesel generator area consists of three photo-electric type detectors positioned in the room. Additionally, one ionization type detector (two in fire area 35B) and one flame detector are located in each room.
10. There are two fire detection zones in each side of the switchgear room. One side consists of thirty ionization type detectors, and the second consists of twenty-two that both alarm and annunciate locally and in the control room. The two zones are cross-zoned to derive a coincident signal which activates the automatic Halon 1301 system.

11. The portable fire extinguishers are as follows: Two 10 lb. CO₂, two 15 lb. CO₂, one 150 lb. dry chemical, and two 15 lb. Halon.
12. There is one fire hose cabinet located in the switchgear room.
13. The control room complex area is protected by fire detectors located as follows: Seven ionization type in the control room (FA-42A), two ionization in the computer room (42B), one duct type and one ionization type in the elevator shaft (42C), five ionization type in the personnel corridor (42E), one thermal type in the kitchen (42D), two duct installed ionization types in the control room ventilation, and one ionization type detector in the shift supervisor's office (42D).
14. There are seven portable extinguishers located in this area. They are as follows: One 20 lb. CO₂, one 10 lb. CO₂, and one 10 lb. dry chemical in the control room (42A), one 22 lb. Halon and one 10 lb. CO₂ in the computer room (42B), one 10 lb. dry chemical in the corridor (42E), and one 10 lb. dry chemical in the kitchen (42D).
15. Additionally, there is an automatic Halon system installed in the Control Room walk-in cabinets.
16. Additionally, an automatic Halon system has been installed in the QA records storage area.
17. An automatic sprinkler system has been installed over auxiliary feedwater pump FW-10, set to open at 210°F.
18. This stairwell is now provided with a 3-hour fire rated barrier.
19. This system now consists of nine prepositioned sprinkler heads in fire area 35A and twelve in 35B. Each head operates independently and is automatically activated.
20. The 135°F. valve should now be 210°F. to prevent spurious sprinkler initiation when the diesel generators are running.