

OPPI

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

December 3, 1984
LIC-84-411

Mr. James R. Miller, Chief
U. S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Division of Licensing
Washington, DC 20555

- References: (1) Letter from W. C. Jones to R. A. Clark
dated March 19, 1981
- (2) Letter from W. C. Jones to R. A. Clark
dated March 27, 1981
- (3) Docket No. 50-285

Dear Mr. Miller:

10 CFR 50, Appendix R

The Omaha Public Power District submitted letters, References (1) and (2), stating that the fire protection systems at Fort Calhoun in 1981 met the intent of the criteria of Section III.G of Appendix R for all credible fires. During telephone conversations with Messrs. Tourigny and Kubicki of the NRC staff on May 18, 1984 and July 13, 1984, the District was requested to remove the word "intent" from submittals discussing compliance with the criteria of Appendix R.

In order to uncategorically state that Fort Calhoun fire protection systems are in literal compliance with the provisions of Section III.G of Appendix R, the District conducted a detailed review of the cable separation analysis submitted to the Commission by letter dated September 29, 1978. The review of the analysis concluded that the provisions of Section III.G of Appendix R are met for the fire areas of Fort Calhoun except as identified in IE Inspection Report 84-12 and Fire Area 30, the containment building. The purpose of this letter is to provide descriptions of systems and components in Fire Area 30 affected by Appendix R, the District's planned corrective actions, and requests for exemption from Section III.G of Appendix R (Attachment 1).

Attachment 2 contains an excerpt from the original Fire Safety Evaluation performed for Fort Calhoun. This is provided to support the exemption requested in Attachment 1.

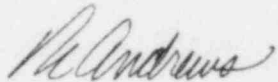
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Upon completion of the proposed corrective actions contained in Attachment 1, the District will be in full compliance with the provisions of 10 CFR 50, Appendix R for Fire Area 30, the containment building.

Pursuant to 10 CFR 170.12 and 170.21, please find attached check for \$150.00 to cover the application fee.

Sincerely,



R. L. Andrews
Division Manager
Nuclear Production

RLA/dao

Attachment

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

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

ATTACHMENT 1

A. Description of Fire Area 30

The containment structure is located in the center of the auxiliary building. It is bordered on the east by the electrical penetration area, on the west by the fuel handling area, and on the north by the mechanical and pipe penetration areas and the HVAC equipment area. All walls separating this area from the other mentioned areas are 3-hour fire rated barriers.

The containment consists of three floors, basement (989'), ground (1013'), and operating (1045'). These are connected by two unenclosed stairwells. The reactor, two steam generators, pressurizer, and four primary coolant pumps are enclosed in concrete cells running vertically through all three floors. There are four safety related divisions of cables in the containment. These are routed so that they meet the separation criteria of IEEE-384-1977 as a minimum. Much of the cabling is enclosed in conduit.

This fire area includes the entire area inside containment. The redundant trains of safe shutdown components in this area include control rod drives, pressurizer pressure controls and instrumentation, pressurizer power operated relief valves, pressurizer heaters, charging and auxiliary pressurizer spray valves, auxiliary feedwater system valves, steam generator pressure and level transmitters, reactor coolant hot and cold leg temperature instrumentation, and neutron flux indication and all associated cables. These components are discussed individually below:

- 1) Pressurizer power operated relief valves (PORV's) PCV-102-1 and PCV-102-2, are located at elevation 1047 near the pressurizer vessel. While these redundant components and their associated cables are not separated by more than 20 feet, by 3-hour rated barriers, or by radiant energy shields, their safe shutdown function cannot be compromised by any fire in containment. These are fail-closed valves upon loss of electrical power and their desired position in a shutdown situation is closed.
- 2) Auxiliary feedwater system isolation valves, HCV-1107A and HCV-1108A are separated by more than 20 feet and do have 3-hour fire rated concrete walls located between them; however, their associated cables do not meet the separation/protection requirements. These valves, however, also fail to their desired shutdown position (fail-open) upon loss of power. No credible fire in containment would prevent these valves from performing their safe shutdown function.
- 3) Control rod drive mechanisms are located atop the reactor vessel head seismic skirt. Motors and associated cables are intermixed and do not have 20-foot separation; however, these devices also fail to their desired position (i.e., control rods are inserted into the core) upon loss of power. No credible fire in containment would prevent their safe shutdown function.

- 4) Numerous redundant channels of steam generator pressure and level instrumentation exist as tabulated below:

Steam Generator RC-2A	Steam Generator RC-2B
A/L-901,A/L-911	A/L-904,A/L-912
B/L-901,B/L-911	B/L-904,B/L-912
C/L-901,C/L-911	C/L-904,C/L-912
D/L-901,D/L-911	D/L-904,D/L-912
A/P-902,A/P-913	A/P-905,A/P-914
B/P-902,B/P-913	B/P-905,B/P-914
C/P-902,C/P-913	C/P-905,C/P-914
D/P-902,D/P-913	D/P-905,D/P-914
L-903X,L-903Y	L-906X,L-906Y
P-907	P-908

Transmitters and cables are located such that at least two redundant channels are completely separated by more than 20 feet. In many cases, radiant energy shields and 3-hour fire rated barriers separate sections of redundant channels. In some cases, redundant channels are separated by no less than 40 feet. The applicable provisions of Section III.G of 10 CFR 50, Appendix R are met for this equipment.

- 5) As in item 4), above, numerous channels of RCS hot and cold leg temperature instrumentation are available. RTD's are located in separate concrete cells near the steam generators and reactor coolant pumps, and cabling is routed such that the specific requirements of 10 CFR 50, Appendix R, Section III.G.2 for containment are met.
- 6) Four independent, redundant channels of wide-range excore neutron flux detectors are located at elevation 994'. Cabling for these sensors are routed completely in rigid steel conduits from sensor to penetration. These cables are also routed such that in all places, at least one redundant channel is routed well over 20 feet from any other channel. That is, the requirements of Section III.G of 10 CFR 50, Appendix R for containment are met for this equipment.
- 7) The auxiliary pressurizer spray valves, HCV-240 and HCV-249, are located next to each other at elevation 1047 in containment. With the exception of, at the electrical penetrations, at the valves themselves, and two relatively short runs of cable (approximately 28 feet), both of which are routed in separate rigid steel conduits, redundant cables maintain separation well in excess of the required 20 feet.
- 8) Three redundant pressurizer level transmitters (LT-101X, LT-101Y, and LT-106) are located on instrument racks at elevation 1013 in containment. LT-101X and LT-106 are separated from LT-101Y by approximately 30 feet; however, the cable for LT-101Y, routed in rigid steel conduit, passes within approximately 2 feet of the redundant transmitters. Beyond this single point, cables diverge to meet the separation criteria of Appendix R. At the electrical penetrations, however, redundant cables again come within approximately 7 feet of each other.

- 9) Four independent, redundant channels of high range (1500 - 2500 psi) pressurizer pressure indication (A,B,C, and D P-102) are routed separately in containment such that the requirements of Section III.G.2 of Appendix R are fulfilled. The 20-foot minimum separation is maintained. Low range pressurizer pressure transmitter (P-118) and wide range channels (P-105 and P-115), however, do not completely meet the requirements. Wide range transmitters PT-105 and PT-115 are separated by approximately 16 feet. Electrical penetrations used for these two transmitters are separated by approximately 16 feet. The remainder of the cabling in containment for these loops meets the separation criteria of Appendix R.
- 10) Pressurizer heaters and associated power cables are located in containment. With the exceptions of the immediate vicinity of the pressurizer vessel itself, within the pressurizer bay, and at the electrical penetrations, the separation between redundant trains of these cables meets the requirements of Appendix R. There is a minimum separation of 26 feet between redundant cables throughout the rest of their respective lengths.
- 11) Charging system isolation valves HCV-238, HCV-239, HCV-247, and HCV-248 and their associated control cables are located in containment on the basement level near cold legs 1A and 2A. Separation between redundant trains is such that the provisions of Section III.G of 10 CFR 50, Appendix R for containment are met.

B. Planned Corrective Actions

The District has investigated the above mentioned areas of noncompliance with the requirements of 10 CFR 50, Appendix R, Section III.G.2 and plans to perform the following modifications to bring the Fort Calhoun Station into compliance:

1) Auxiliary Pressurizer Spray Valves (see item A.7 above)

The District plans to install a radiant energy shield between redundant auxiliary pressurizer spray valves HCV-240 and HCV-249 and (if possible) their associated junction boxes JB-103C and JB-252C. Additionally, a radiant energy shield will be installed on the existing platform at elevation 1022'-0" between column line 14 and column line 1 (see P&ID 11405-A-7) where separation is less than 20 feet and no other barrier which could serve as a thermal energy shield is provided. This will protect redundant electrical penetrations C9 (HCV-240) at elevation 1015'-9" and E9 (HCV-249) at elevation 1024'-4". An exemption from Section III.G of Appendix R is requested in Section C for the short 28-foot run of redundant cables where no additional protection is possible.

2) Pressurizer Level Indication (see item A.8 above)

The District plans to reroute cable 3473A for LT-101Y in containment. This reroute of cable will ensure that redundant trains of pressurizer level indication maintain the required 20-foot separation throughout this fire area with the exception of the location of the

electrical penetrations. At this location a radiant energy shield will be installed on the existing platform at elevation 1013'-0" between column line 1 and column line 3 (see P&ID 11405-A-6) where separation is less than 20 feet and no other barrier which could serve as a thermal energy shield is provided. This will protect redundant electrical penetrations B5 (LT-101X and LT-101Y) at elevation 1008'-0" and C4 (LT-106) at elevation 1015'-0".

3) Pressurizer Pressure Indication (see item A.9 above)

The District plans to install a radiant energy shield on the existing platform at elevation 1013'-0" (see P&ID 11405-A-6) near column line 5 beneath existing instrument rack AI-127C which holds transmitter PT-115 at approximate elevation 1015'-0". This shield will separate redundant transmitters PT-115 from PT-105 which is mounted on column line 5 (approximately 3 feet from AI-127C) at approximate elevation 1001'-0". Additionally, the radiant energy shield at elevation 1013'-0" discussed in Section B.2, above, will protect redundant electrical penetrations A4 (PT-105) at elevation 1003'-8" and D5 (PT-115) at elevation 1019'-8".

4) Pressurizer Heaters (see item A.10 above)

The radiant energy shield at elevation 1013'-0" discussed in B.2, above, will also separate redundant electrical penetrations D1 (heater groups P1 and 2) and D2 (group 1) at elevation 1019'-8" from penetrations A1 and A2 (groups P2, 3, and 4) at elevation 1003'-8". An exemption from Section III.G.2 of Appendix R is requested in Section C for the area directly beneath the pressurizer where the pressurizer heater cables converge.

It is expected that the modifications will be installed within 30 days following the end of the scheduled 1985 refueling outage. When these modifications are completed, and when the requested exemptions are granted, the Fort Calhoun Station will be in compliance with the requirements of Appendix R in Fire Area 30.

C. Exemption Requests from Section III.G of 10 CFR 50, Appendix R

The District requests an exemption, pursuant to Sections 50.12(a) and 50.48(c) of 10 CFR, from the requirements of Section III.G.2 of Appendix R. Specifically, exemption is requested from the requirements that further fire protection features be provided for Fire Area 30, Containment Building, of the Fort Calhoun Station. These requirements are unnecessary to assure the capability to safely shut down the plant in the event of any credible fire in this fire area for the following reasons:

1) The two areas of noncompliance are:

- (a) Directly beneath the pressurizer vessel at elevation 1014' where redundant trains of pressurizer heater cables converge. This area is completely inside the pressurizer bay where the only combustibles are these cables, the insulation of which is qualified to a test comparable to IEEE-383. Due to the intermixing

of the redundant cables as they lead to the individual pressurizer heaters, no possible physical means exist to provide additional physical separation or protection.

- (b) At approximate elevation 1045'-0" along the outside of the pressurizer bay wall where control cables EA3650A and ED3667B for redundant auxiliary pressurizer spray valves HCV-240 and HCV-249 are routed in close proximity to each other. These cables are routed separately in rigid steel conduits and are separated by about 4 feet for approximately 30 feet. The only combustibles at this location are a limited number of cables, all enclosed in rigid steel conduits, qualified to IEEE-384 tests or equivalent.
- 2) As described in the attached pages of the original Fort Calhoun fire hazards analysis, this fire area is provided with adequate fire detection and protection systems. Combustible loading in the two areas of concern is minimal. The three postulated fires described in the analysis are not near these two areas and do not have the capability to disable these redundant trains of safe shutdown equipment.
- 3) The containment building is a controlled access area and during power operations few containment entries are permitted, thus minimizing any introduction of transient combustibles. Due to this and the existing detection systems, a fire will be detected in its initial stages before significant damage occurs. The fire will then be suppressed manually by the plant fire brigade before it can represent a serious threat to shutdown systems. Therefore, any credible fire of sufficient magnitude to damage redundant cables or components is extremely unlikely.
- 4) It is the District's engineering judgment that the modifications planned for this fire area in conjunction with the existing fire protection features in the containment building will achieve a level of safety equivalent to that provided by Section III.G.2 of Appendix R. Any further modifications will not substantially represent a significant increase in plant safety.

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 30 at the Fort Calhoun Station.

ATTACHMENT 2

Excerpt from Original
Fire Hazards Analysis
For Fort Calhoun Station

Fire Area 30 - Containment Building

FT. CALHOUN STATION UNIT I

FIRE SAFETY EVALUATION

Fire Area 30

Containment

Controlled Access
Safety Related

Area Description

The containment structure is located in the center of the auxiliary building. It is bordered on the east by the electrical penetration area, on the west by the HVAC equipment and fuel handling area and on the north by the mechanical and pipe penetration areas and the HVAC equipment and fuel handling area. All walls separating this area from the other mentioned areas are 3-hr fire rated barriers.

The containment consists of three floors, basement (989'), ground (1013'), and operating (1045'). These are connected by two unenclosed stairwells. The reactor, two steam generators, pressurizer and four primary coolant pumps are enclosed in concrete cells running vertically through all three floors. There are four safety related divisions of cables in the containment. These are routed so that they meet the separation criteria as a minimum. Much of the cabling is enclosed in conduit.

Safety Related Systems and Components

- A) Safety Injection System
 - Safety Injection Tank SI-6A
 - Safety Injection Tank SI-6B
 - Safety Injection Tank SI-6C
 - Safety Injection Tank SI-6D
 - Safety Injection Control Panel AI-136-A,B,C,D,
 - Low Pressure Safety Injection control Panel AI-140, A,B,C,D
- B) Chemical and Volume Control System
 - Regenerative Heat Exchanger CH-6
- C) Containment HVAC system
 - Containment Air Cooling and Filtering Unit VA-15A
 - Containment Air Cooling and Filtering Unit VA-15B
 - Detector well Air Cooling Unit VA-13A
 - Detector well Air Cooling Unit VA-13B
- D) Component Cooling System
 - Component Cooling Water Cooling Control Panel AI-138, A,B,C,D
 - Component Cooling Lube Oil Cooling control Panel AI-139 A,B,C,D

Fire Area 30 (Continued)

<u>Combustible Material</u>	<u>Quantity</u>	<u>Fire Load</u>	<u>Maximum Fire Severity</u>
<u>Basement Level - Steam Generator Cell A</u>			
Lubricating Oil	300 gals	36,600 Btu/ft ²	28 Min
<u>Basement Level - Steam Generator Cell B</u>			
Lubricating Oil	300 gals	36,600 Btu/ft ²	28 Min.
<u>Basement Level</u>			
Cable Insulation	9290 lbs	16,880 Btu/ft ²	13 Min.
<u>Ground Level</u>			
Cable Insulation	13,500 lbs	24,523 Btu/ft ²	19 Min.
<u>Operating Level</u>			
Cable Insulation	1,000 lbs	1200 Btu/ft ²	13 Min.
Charcoal Filters	11,500 lbs	16,000 Btu/ft ²	

Fire Protection

The fire detection system in containment includes thirty-three ionization type detectors; thirteen on the ground level, seventeen on the intermediate level and three on the operating floor. There are four flame type detectors on the intermediate level and eight air duct detectors; six on the operating level and two on the basement level. All detectors provide alarm and annunciation locally as well as in the control room.

There are five 10 lb dry chemical extinguishers located in containment. Four of these extinguishers are on the operating level (El. 1036'-0") at column's (5b,N), (3a,N), (5b,Q) and (3a,Q). The fifth is on the basement level (El. 994'-0") at column (2c,N). There are also five 20 lb dry chemical extinguishers and two 15 lb CO₂ extinguishers in containment. Three of the dry chemical extinguishers are on the ground floor (El. 1013'-0") at columns (4a,N), (5b,N) and (2b,)P. Two others are on the basement floor (El. 994'-0") at (3a,Q) and (5b,Q) near the reactor coolant pumps and the CO₂ extinguishers are located on the intermediate level (El. 1022'-0") at (2b,L), and (5b,L). A high temperature deluge system also exists for the charcoal HVAC filters.

Fire Area 30 (Continued)

Postulated Fire

As a result of the large volume in the containment which is divided into three floors with several cell-like compartments, it is more informative to postulate three fires and examine the potential consequences of each.

Postulated Fire A: (Location Basement level) The lubrication oil for one of the primary coolant pumps is assumed to ignite as a result of a leak in the lubrication system. The location is on the basement elevation within the concrete cell that encloses two primary coolant pumps and a steam generator. The burning of 150 gal of oil in this space is equivalent to a 15 minute fire.

Postulated Fire B: (Location Ground level) A cable tray fire is assumed to occur in a cable tray at section 20c on the ground level. This location is selected because of the number of cable trays at this location.

Postulated Fire C: (Location Operating level) A fire is postulated in the central rack of filters (one half the total) located in containment ventilation equipment VA-6A and VA-6B. This is equivalent to a 7 minute fire.

Consequences of Fire Without Active Protection

Postulated Fire A: There are flame sensitive fire detector units monitoring each reactor coolant pump. Any significant combustion would also be detected by the ionization detectors in the containment. Early warning could allow the operator time to accomplish an orderly reactor shutdown and to trip off that pumps lubrication system which may serve to eliminate the source of the burning oil. The insulation on the primary coolant boundary would protect it from the maximum fire severity that could be expected in this concrete cell. The massive structural hangers of the primary coolant system would not be affected by a fire of this severity. This fire could not propagate to any of the cable trays on the basement level. The instrumentation cables attached to the primary coolant pipes near the pump are enclosed in conduit. Interruption of these cables would not prevent safe shutdown.

Postulated Fire B: All cable runs in the containment meet the separation criteria. Since the only significant combustibles on this level are the cables a fire was postulated at a high density region of cable trays along the eastern perimeter of the containment structure. Assuming total involvement of

Fire Area 30 (Continued)

the six cable trays (two of which are separated by 3 ft from the other four). The maximum consequences would be the loss of several safety related division D cables. This would not prevent safe shutdown since redundant divisions A, B and C are available.

Postulated Fire C: The primary source of combustibles on the operating level are the charcoal filters. The postulated fire may spread from the initial location to a maximum of one-half the total filters. The filter fire in itself would cause no damage to safety related equipment, other than the ventilation system. A charcoal fire is relatively isolated by the structure of the filter assembly. These are dampers, mist extractors, and absolute filters in front of the charcoal filters. After the filters there is a long section of ventilation ducting leading to the ventilation fans. These features can be expected to contain the charcoal fire in the filter assembly. A deluge system which receives containment spray water is installed in these filters. The deluge system is manually initiated.

No safety related cable trays are at this evaluation. This postulated fire would not prevent safe shutdown, nor cause radioactivity release outside the containment.

Consequences of Fire With Active Protection

Postulated fire A: Fire suppression is manual.

Postulated fire B: Fire suppression is manual.

Postulated fire C: Fire suppression is manual except in event of DBA when the charcoal filter deluge system is automatic.

The automatic fire protection system will provide prompt alarm of a fire in this area. The plant fire brigade has ample portable fire extinguishers to quickly extinguish a local fire.