Florida
Power
CORPORATION
Crystal River Unit 3
Docket No. 50-302

November 22, 1996
3F1196-03

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555-0001

Subject: Response to Request for Additional Information on Exemptions from 10 CFR 50 Appendix R, Sections III.G and III.J

Reference: NRC to FPC letter, 3N0996-17, dated September 24, 1996

Dear Sir:

Florida Power Corporation (FPC) is herewith submitting responses to the questions in the above referenced letter as Attachment A. FPC remains committed to obtaining the subject exemptions for Crystal River Unit 3. These exemptions are an integral part of our Thermo-Lag Resolution Strategy which interlock with other activities that are either already completed (Mecatiss installation), or are nearing completion (Appendix R Re-analysis). Pending approval of the exemption requests, FPC will proceed with detailed design of modifications (cable re-routes), including additional sprinkler installations which constitute the final phase of our Thermo-Lag Resolution Strategy.

Please contact W. L. Rossfeld at (352) 563-4374 if you have any questions concerning this submittal.

Sincerely,

P. M. Beard, Jr.
Senior Vice President
Nuclear Operations

PMB/SCP:ff 260008

Attachment

xc: Regional Administrator, Region II
Senior Resident Inspector
NRR Project Manager

A006/1

ATTACHMENT A
FLORIDA POWER CORPORATION CRYSTAL RIVER UNIT 3
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION ON
EXEMPTIONS FROM 10 CFR 50 APPENDIX R, SECTIONS III.G AND III.J

NRC questions are shown below in bold print. FPC responses follow each question.

APPENDIX R SECTION III.G.2.c EXEMPTION REQUEST

1. General

(a) Please verify that both the automatic fire detection and automatic sprinkler systems provided in the fire areas that are the subject of this request are designed and installed in accordance with the applicable National Fire Protection Association (NFPA) codes and standards. Provide a technical justification for any significant deviations from the applicable NFPA codes and standards.

FPC installed sprinkler systems within the areas that are the subject(s) of the exemption request under MAR 82-10-19-04 dated 1/15/85, "Appendix "R" FS Sprinkler System Installation". The system(s) were installed to meet the requirements of NFPA Code Number 13, 1983 Edition titled "Installation of Sprinkler Systems". These systems are located in the following areas:

Intermediate Building Industrial Cooler Room Fire Zone 119-201A
Intermediate Building Personnel Hatch Fire Zone 119-201B
Auxiliary Building North Hallway Fire Zone 95-3A
Auxiliary Building Central Hallway Fire Zone 95-3G
Auxiliary Building North Hallway Fire Zone 119-6A

Since installation, the sprinkler systems have been subjected to two code conformance type inspections, an NRC follow-up inspection, and a system walkdown done in preparation for this response.

The code conformance inspections, our recent walkdown, and an examination of the related documentation identified no significant deviations from the applicable codes and standards. The installed systems meet or exceed the intent of NFPA 13, Chapter 4, "Spacing, Location and Position of Sprinklers" for hazards within these plant fire areas. Additional sprinklers were provided beneath the lowest cable trays in these areas for transient protection. These systems were designed as pipe schedule systems, and as such, are more likely to deliver greater flow density than hydraulically calculated systems. Further, FPC proposes to enhance the automatic sprinkler systems installed by providing additional coverage beyond the requirements of Section III.G.2.c as described in Generic Letter 86-10 and NFPA 13. The purpose of the proposed addition of heads will be to specifically protect Thermo-Lag protected raceway "targets" from plausible in-situ and transient fire sources. (Pg. 3 Section 1.0 of FPC Exemption Request).

FPC installed fire detection systems within the areas that are the subject(s) of the exemption request under MAR 80-09-04 dated 4-23-81 "Fire

Detection System for Auxiliary, Intermediate and Reactor Buildings". The systems were installed to meet or exceed the listing requirements of NFPA Code Number 72D, 1967 Edition titled "Proprietary Protective Signaling Systems". These systems are located in the following areas:

Intermediate Building Industrial Cooler Room Fire Zone 119-201A
Intermediate Building Personnel Hatch Fire Zone 119-201B
Auxiliary Building North Hallway Fire Zone 95-3A
Auxiliary Building Central Hallway Fire Zone 95-3G
Auxiliary Building North Hallway Fire Zone 119-6A

Since installation, the fire detection systems have been subjected to two code conformance type inspections, an NRC follow-up inspection, and a system walkdown done in preparation for this response.

The code conformance inspections, our recent walkdown, and an examination of the related documentation identified no significant deviations from the applicable codes and standards. The installed systems meet the intent of NFPA 72D, Section 3530, "Location of Detectors" for hazards within these plant fire areas. No upgrades are planned for these systems at this time.

The fire suppression and dete- :n systems discussed above are maintained and tested in accordance with the implementing procedures described in Section 1.6 of the Crystal River Unit 3 (CR-3) Fire Prote tion Plan, Revision 12, dated February 1996. Operability requirements, mpensatory measures, and special reporting requirements for these systems are found in Tables 6.1A through 6.10B of the Fire Protection Plan.

(b) For the fire endurance tests referenced in your request, which were sponsored by the Nuclear Energy Institute (NEI), and where the hose stream test method performance deviated from the staff guidance specified in Generic Letter 86-10 and Supplement 1 to Generic Letter 86-10, please provide a technical justification for this deviating condition that addresses the cooling, impact, and erosion effects on the fire barrier assembly resulting from the hose stream test, and the protection of cables and equipment by these barriers from falling debris and fire fighting activities.

In our exemption request FPC based estimated time to fire barrier failure of Thermo-Lag covered raceway on data obtained by the Nuclear Energy Institute (NEI) Thermo-Lag Fire Barrier Test Program. We recognized that the fire test program sponsored by NEI had deviated from guidance on hose stream testing provided by your Generic Letter Supplement dated March 25, 1994. However, the information derived by the NEI testing program represented the largest body of verified data available at that time to licensees using Thermo-Lag as a raceway fire barrier. Recognizing the inherent deviation in the hose stream portion of the NEI program, we attempted to compensate for this deviation by conservatively estimating or de-rating the expected fire barrier performance. This was done by not crediting our use of a thicker grade of Thermo-Lag and our use of mechanical fasteners spaced closer than that specified in the TSI installation manual. Finally, we made no attempt to credit our cable tray fill percentages, which are generally much greater than that used in the NEI tested cable trays. To address your specific concerns the following

is provided:

Effects of hose stream <u>cooling, impact and erosion</u> on barrier performance.

Analysis of Thermo-Lag by pyrolysis gas chromatography shows that constituent compounds of Thermo-Lag are from the pyridine, (a type of coal tar) ester, and tris phosphate family. Taken together they are non-crystalline and require a steel wire mesh for mechanical stability. Under fire conditions the fire barrier material softens, then chars, and is finally consumed. <u>Cooling</u> by hose stream has no real effect on this material because the soft underlying material will not fracture. The underlying steel mesh can accommodate a rapid temperature decrease (Δt) because it is not rigidly secured and has favorable heat transfer characteristics (surface area to mass ratio). Failure of a raceway fire barrier would be first by thermal Δt excess, and not by hose stream cooling. Mechanical <u>impact</u> of a high velocity water stream similarly appears to have no appreciable impact on Thermo-Lag barriers that have not yet failed thermally. As mentioned above, one of the main constituent parts is pyridine, which is from the coal tar family. As the material heats up it forms a sticky underlying mass not easily broken apart by any form of mechanical intrusion such as cutting tools or, in this case, hose streams. The underlying steel mesh would not be affected in any way by the hose stream. Finally, the <u>erosion</u> caused by a hose stream is limited to the outer portion of the char layer of the Thermo-Lag. The hose stream can cause some erosion of the outer char layer, but does not dislodge the remaining uncharred mass against the inner raceway. Actual failures from hose stream erosion were limited to very localized areas during hose stream application in the NEI tests.

Effects of <u>falling debris</u> and <u>fire fighting activity</u> on barrier performance.

Evaluation of these concerns is dependent on parameters that are highly unpredictable. Quantifying the amount of debris, the force it applies at the point of impact on the raceway fire barrier and the condition of the barrier at the time of impact are speculative. While fire fighting activity has long been a concern of the ASTM E-119 Committee it is not the concern it once was due to advances in fire fighting using self contained breathing apparatus (SCBA) and personnel protective equipment. Before this equipment was available, a hose team might make an entry into a building and apply a hose stream to a rated barrier, such as a wall. Rapid cooling of the barrier could crack the barrier and might result in a large amount of steam and smoke descending on the hose team, forcing them to exit the fire area, having now breached the wall by cooling it too rapidly. This action would allow the fire to pass through the barrier while the fire fighter had abandoned the area. Todays fire fighters have a distinct advantage in equipment that allows them to press-on with the initial attack even as tenability deteriorates. The likelihood of abandoning an attack after having breached a barrier is much less than when this portion of the standard first recognized the problem.

It should also be recognized that the majority of the raceway addressed by this exemption request is conduit (conduit 60%, tray 40%). Damage to

conductors within conduit from falling external objects during fire fighting activities is considered remote due to the inherent protection provided by the conduit to the conductors inside. We also feel that the stresses induced by the hose stream portion of the fire test (Section VI of Supplement 1 to GL 86-10) are overly conservative compared to expected fire fighting activity within the fire zones covered by our exemption request. This is because most cable trays and conduits are high in the overhead and usually obstructed by other plant components from ground floor fire fighting activity. Direct hose stream application from a distance of 5′ or less is unlikely. Suppression activity by hose stream would probably be by indirect impingement and at distances greater than 5′ from Thermo-Lag barriers. For these reasons we feel that the likelihood of mechanical fire barrier failure by hose streams and fire fighting activity is diminished.

Finally, it should be noted that the exemption requested by CR-3 is for barriers all having a demonstrated thermal performance of <u>less than</u> one hour. NFPA Code 251-1995, "Conduct of Fire Tests", Section 4-2.1, and ASTM E119-1988, "Fire Tests of Building Construction and Materials", Section 10 state that "The hose stream test shall not be required in the case of construction having a resistance period, as specified in the fire endurance test, of less than one hour".

For the above mentioned reasons we believe the data obtained by the NEI test program and referenced in the exemption request is technically valid and justifiable for inclusion in the exemption request.

(c) Please describe the types and locations of significant fire hazards and combustibles (e.g. cable trays, electrical panels, etc.) relative to the Thermo-Lag protected circuits and the redundant non-Thermo-Lag protected circuits in each fire area that is the subject of this exemption request.

Using data obtained from a variety of sources (FIVE/IPEEE Data Base, Pre-Fire Plans, and CR-3 Fire Hazards Analysis) a walkdown list was developed to confirm the types and locations of fire hazards and combustibles within each fire area. Due to limited access and the danger of working at heights only some of the unprotected circuits could be identified and walked down for comparison to the redundant Thermo-Lag protected circuits. A brief discussion of each zone is provided:

<u>Auxiliary Building Hallway AB-95-3B</u> Fire Area AB-95-3B is the main east/west corridor for this elevation. The corridor is long and narrow with a 26′ high ceiling. The layout and contents of the room were previously described in Section 4.2 of the exemption request. The walkdown showed that each Thermo-Lag protected circuit has a redundant non-protected counterpart within 20′. The single area where redundant raceways pass near a significant ignition source is where Tray 516 passes approximately 5′ across from Tray 523. These trays are both approximately 6′ above a motor control center (MTCR-22). No significant in-situ or transient combustibles are located at ground level. IEEE 383 qualified cable and Armorflex cable in ladderback trays is located near protected trays at elevations 10-15′ from the floor.

Auxiliary Building Hallway AB-95-3G Fire Area AB-95-3G is a north/south corridor connecting to one end of the make-up pump access way. The layout and contents of the room were previously described in Section 4.2 of the exemption request. The walkdown showed that each Thermo-Lag protected circuit has a redundant non-protected counterpart within 20′. Conduits MUE1 and MUE7 pass within one foot of their non-protected counterparts located in Tray 523. There are no significant ignition sources or transient loads within this fire zone. IEEE 383 qualified cable in ladderback trays is located adjacent to and above the protected trays at elevations 10-15′ from the floor.

Auxiliary Building Hallway AB-119-6A Fire Area AB-119-6A is the main east/west corridor for this elevation. The layout and contents of the room were previously described in Section 4.3 of the exemption request. The walkdown showed that each Thermo-Lag protected circuit has a redundant non-protected counterpart within 20′. Thermo-Lag protected conduit MUR84 and the non-protected counterpart, MUR81 run parallel along common unistrut supports on the north side of the corridor. There are no major ignition sources in this area. Thermo-Lag protected Tray 107 is within 25′ of unprotected Trays 105, 551 and 552. Although the distances between the trays is greater than 20′, intervening combustibles in the form of electrical cables are present. No significant in-situ or transient combustibles are located at ground level within the corridor. Protective clothing required for dress-out is stored in a sprinklered area adjacent to the west end of the corridor. IEEE 383 qualified cable in ladderback trays is located near protected trays at elevations 10-28′ from the floor.

Intermediate Building Industrial Cooler Room IB-119-201A Fire Zone IB-119-201A connects the Industrial Cooler Room to the Auxiliary Building by a long narrow hallway with a 26′ high ceiling. The layout and contents of the room were previously described in Section 4.4 of the exemption request. The walkdown showed that each Thermo-Lag protected circuit has a redundant non-protected counterpart within 20′. These redundant circuits were closest together at Reactor Building penetrations and within the narrowest part of the corridor. The single area where redundant raceways pass near a significant ignition source is where Tray 369 passes approximately 5′ above conduits CDR44 and MSS46. Each of these conduits is, in turn, approximately 5′ above MTCR8, MTCR10, and MTCR11. Two 6900V current limiting reactors are located along the south wall of the zone, 8′ below and 3-10′ horizontally across from the protected conduits. No significant in-situ or transient combustibles are located at ground level within the corridor. IEEE 383 qualified cable in ladderback trays is located near protected trays at elevations 10-22′ from the floor. One cable tray (364) containing IEEE 383 cable is located below the protected circuits, and one tray (375) is located above the circuits.

Intermediate Building Personnel Hatch IB-119 201B Fire Area IB-119-201B connects the Industrial Cooler Room with the Auxiliary Building at Elevation 119′. It is also a staging area for Reactor Building access via the personnel hatch. The room is only 1100 ft² in area but has a high ceiling similar to the ceiling of Industrial Cooler Room. The layout and contents of the room were previously described in Section 4.4 of the exemption request. The walkdown showed that each Thermo-Lag protected

circuit has a redundant non-protected counterpart within 20'. This area differs from IB-119-201A in that there are no significant ignition sources in the area. Protective clothing required for dress-out is stored in a sprinklered area adjacent to the personnel hatch. IEEE 383 qualified cable in ladderback trays is located near protected trays at elevations 10-22' from the floor.

These examples represent the closest Thermo-Lag protected circuit/non-protected circuits identified by ground floor walkdown.

2. FIRE AREA AB-95-3

(a) Please verify that Figure 1A depicts Fire Zone AB-95-3B

The caption under the area layout in Figure 1A should be "AB-95-3B." The title block for this figure is correct.

(b) Please describe the fire protection features provided in the fire zones (AB-143-6X and AB-162-AD) which are adjacent to Fire Area AB-95-3, where rated fire barrier separation from Fire Area AB-95-3 is not provided.

In researching the response to this question we have determined that the statement regarding the lack of rated separation between fire areas AB-95-3 and fire zones AB-143-6X and AB-162-AD is incorrect. The fire area to be referenced is AB-119-6 and not AB-95-3.

The floor/ceiling assembly which separates Fire Area AB-119-6 from Fire Zone AB-143-6X and Fire Zone AB-162-AD is not classified as a fire rated barrier. Therefore, fire dampers are not provided in the HVAC ducts which penetrate the floor/ceiling. The two HVAC ducts which penetrate the floor/ceiling separating Fire Zones AB-95-3B and AB-119-6A are provided with 3-hour rated dampers since this boundary is classified as a 3-hour barrier.

Concerning your request for information related to the fire protection equipment installed in Fire Zones AB-143-6X and AB-162-AD, the following response is provided. Fire protection features for the two fire zones consists of a Class II standpipe system equipped with 100 feet of 1-1/2 inch hose and an adjustable spray nozzle. The standpipes and hose stations were installed in accordance with the requirements of the 1971 edition of NFPA 14, "Standpipes and Hose Systems". In addition, there are several ABC dry chemical and CO_2 portable fire extinguishers provided in both of these fire zones. There are no fixed suppression or ceiling mounted fire detection systems in either fire zone. However, heat detectors and temperature elements are provided to monitor the return air flow in the ventilation system which serves these fire zones. As stated in the exemption request, there are no appreciable combustible materials or redundant safe shutdown cables or equipment in either Fire Zone AB-143-6X or AB-162-AD.

(c) Please specify the positions of the redundant non-Thermo-Lag protected circuits relative to the Thermo-Lag protected circuits routed in conduits MUE-1 and MUE-7, and cable trays 100, 110, 500, 516, DPC7-T, DPC8-T and DPC9-T.

A ground level walkdown was performed in an attempt to verify and document the positions of Thermo-Lag protected circuits listed above to their non-protected redundant counterparts. As discussed in our September 26, 1996 telecon, due to the congested nature of the overhead and the need for scaffolding, as well as radiological restrictions, only a limited walkdown could be performed. The walkdown showed that some Thermo-Lag protected circuits have a redundant non-protected counterpart within 20'. In other cases the counterpart was greater that 20' but there were intervening combustibles present, usually in the form of open cable trays. Examples of the proximity between redundant circuits are:

Tray 516 passes approximately 5' horizontally across from a redundant tray.

A redundant conduit passes approximately 18' horizontally from Tray 516.

Conduits MUE1 and MUE7 pass within one foot of their non-protected counterparts located in Tray 523.

Conduit MUE1 is greater than 20' from a redundant conduit but intervening combustibles exist in the form of unprotected cables.

(d) The request states on page 14 that the sprinkler heads located below the cable trays are capable of extinguishing fires resulting from transient combustibles. On page 15, the request states that the sprinkler heads located below the cable trays are capable of suppressing and containing, if not extinguishing the fires. Automatic sprinkler systems designed and installed in accordance with the applicable NFPA standards are typically intended to control a fire, with extinguishment being accomplished by manual actions. Please clarify the apparent discrepancy, and provide a technical basis for the statement on page 14, if it is the position of Florida Power Corporation that the sprinkler heads located below the cable trays are intended to extinguish not merely control fires in this zone.

FPC places strong reliance on the proven track record of automatic sprinkler protection installed in accordance with NFPA standards. In the July 1970 Fire Journal the article titled "Automatic Sprinkler Performance Tables 1970 Edition," the first sentence states that "Automatic sprinklers have achieved an overall record of 96.2 per cent satisfactory performance during the 45 years since 1925..." With rare exceptions where sprinklers fail to control fire growth these failures can be attributed to people rather than the sprinkler systems for such reasons as shut valves, pipe obstructions, inadequate maintenance, frozen pipes, and other reasons as outlined in table 4 of the article. In the December 1993 Fire Journal, the NFPA provides editorial comments on "Why we stopped tracking sprinkler performance." In general the NFPA realized its data collection system had a built in bias that was causing some people to believe that system performance was declining. In fact, the NFPA went on to say that sprinkler

protection success was so dramatic that facility managers were not reporting their successes, rather they were only reporting cases where fire department intervention had occurred or insurance company attention had focused on claims. The chances of successful sprinkler operation at CR-3 in the areas addressed by the exemptions are even greater than the 96.2% discussed above. Our maintenance and surveillance programs, control of plant modifications, and changes to configurations are designed to address those known failure mechanisms referenced in Table 4 of the July 1970 article.

The plant fire service system is capable of delivering water at a stated volume and pressure of 2000 gpm @ 125 psi. With this water supply system, the sprinkler(s) initially operating in the areas covered by the exemption request (ASCOA Model F, 1/2" orifice) would provide flow of approximately 50 to 60 gallons/minute/head, and at pressures that would disperse water droplets as fine as 0.015" in diameter. Water at this volume and droplets of this size are ideal in wetting fuel surfaces ahead of the fire and absorbing heat in the fire plume such that a negative heat balance will occur. In addition the geometry of the hazard in narrow corridors would allow most water droplets to be evaporated by contact with enclosed wall surfaces that would aid in the production of steam for fire control.

Because transient combustibles are limited due to radiological and fire protection controls within the radiation controlled area (RCA), and the floors, walls, and ceilings are of noncombustible construction, any fire would tend to be small and localized. Because of the design of the sprinkler system and associated water supply, the expected water spray density would be on the order of 0.40 gpm/ft². Any fire that did start from wood, paper, plastic or protective clothing type transient combustibles would be quickly controlled and extinguished. Therefore, we consider the statement quoted on page 14 concerning the extinguishment of fires to be valid.

(e) The Thermo-Lag barriers in this zone are credited with having an equivalent fire endurance value of 23-48 minutes based, in part, on the NEI sponsored testing. Please provide the detailed engineering evaluation for the determination of the equivalent fire endurance value for the tee section of cable trays 100 and 500 in this fire area.

As stated in the exemption request, NEI Test 2-7 was used by FPC on a limited basis for comparison of the Thermo-Lag protected 24" x 6" ladder back cable trays used at CR-3. We stated that tee sections and radial bends in trays 100 and 500 represented the "longest free spans and greatest tensile stresses of the fire barriers" and that "no baseline testing was available for direct comparison" of these configurations. However, using engineering judgement based on a review of the extensive amount of data available from these tests, a reasonable estimate of "time to failure" was given in our exemption request submittal. Results from the extensive fire testing program performed by NEI confirmed that the most vulnerable portion of the Thermo-Lag configurations consisted of the structural failure of the bottom tray panel to side rail panel seam, as was seen in NEI test 2-7. We based our estimate of 23-25 minutes on the following. In NEI test 2-7, Tray A failed in 21 minutes at TC 36. Tray A was constructed using the

"butt joint" method. The failure at TC 36 was a very localized failure at the outer circumference of the vertical tee section. This section was installed using "panels ... miter cut into individual horizontal slats 4 1/2" wide" and held in place with banding. In NEI test 2-7 tray D failed in 23 minutes at TC 81. This too was a localized failure of the outer circumference of the vertical tee section. Tray D was constructed using a "score and fold" method, but it also had slats for the bottom radial section of the tray. Tray radial bend "tee sections" at CR-3 were constructed of "green" Thermo-lag that was bent form a single piece and fastened to conform to the tray side rails and bottom rungs in lieu of the slat method seen in NEI test 2-7. This allowed a more continuous run of panel through the radial bend section of the "tee section" (The section that failed first in both test specimens). Because CR-3 Thermo-Lag fire barriers have less jointed segments or slats in the radial region than was seen in NEI test 2-7 we conclude that the localized failures seen NEI in test 2-7 would not occur as quickly at CR-3.

The installation of the Thermo-Lag at CR-3 included some enhancements above and beyond what was specified in the TSI Installation Manual. To provide additional mechanical support for larger configurations such as the tee section at the intersection of tray 100 and tray 500, enhancements to the Thermo-Lag barrier system were made during the original installation. As stated on Page 13 of the exemption request, both tie wires and banding straps were used in lieu of banding straps only. These mechanical fasteners for trays and tees were installed at closer centerline distances than called for in the TSI installation manual. For these installations the banding and tie wires were installed around the four sides of the Thermo-Lag enclosure and across the diagonal chords. Taken together this conservative installation technique enhanced the overall structural integrity of the Thermo-Lag installation at CR-3. By maintaining structural integrity, the Thermo-Lag is expected to remain intact for the estimated 23 - 25 minutes as stated in the exemption request.

A second enhancement to the CR-3 Thermo-Lag installation included fabrication and installation with greater board and clamshell thicknesses than specified for both 1-hour and 3-hour rated configurations. For those Thermo-Lag installations which required a 1-hour rating, such as the "tee section" at the intersection of tray 100 and tray 500, a minimum of 0.625" of Thermo-Lag material was installed. Various inspections of the CR-3 Thermo-Lag installations have shown that the actual thickness of the Thermo-Lag may be as great as 0.875".

Due to the large amount of Thermo-Lag installed at the Comanche Peak Station prior to the discovery of the problems associated with the material, TU Electric subsequently performed numerous full scale fire tests. These tests were designed to develop new and/or enhanced configurations which met the necessary fire endurance requirements required for the plant. One of these fire tests (Report No. 12340-94367h) utilized a 24" wide tray (both tray 100 and 500 are 24" wide trays) with a tee section installed. The Thermo-Lag installation for the test consisted of 0.5" thick 330-1 flat and V-ribbed panels with 330-1 subliming trowel grade material installed at the joints and seams of the panels, at the sweeping bends (i.e., tee sections), and to provide a skim coat where the external

stress skin was installed. Additional upgrade techniques were employed on this configuration. These upgrades included the installation of trowel grade material (approximately 3/16" thick) applied extending 5" toward the middle of the tray on the top, bottom, and side exterior panel surfaces where the stress skin sections were provided. Then stress skin was applied in a U-shaped configuration. The inside and outside joints between the panels and on the radial bends were "stitched" with stainless steel tie wire. Finally, a skim coat of trowel grade (1/16" thick) was applied over the tie wires. Therefore, the total thickness of the Thermo-Lag material for this particular configuration was 0.75". This particular configuration with the tee section successfully passed the 1-hour fire test. With the exception of the stress skins which were provided for TU Electric configuration, the FPC assemblies are constructed with many similarities.

In conclusion, the Thermo-Lag assembly provided for the tray 100 and tray 500 intersection has been installed with several enhanced features. These enhanced features such as the use of tie wires in addition to banding straps and the increased thickness of the Thermo-Lag materials will provide additional protection for the vulnerable portions of the assembly. Therefore, we believe the estimate of an equivalent rating of 23 - 25 minutes is accurate. In addition, automatic wet pipe sprinkler protection is currently provided directly above the tee intersection. Additional sprinklers will be installed to further enhance the protection of the Thermo-Lag in the event of a fire.

3. FIRE AREA AB-119-6

(a) Please specify the position of the redundant non-Thermo-Lag protected circuits relative to the Thermo-Lag protected circuits routed in conduits AHC972, AHC973, MUR84, RCR251, and RCR235 and cable trays 107, 108, 121, 148, 511, and 567.

A ground level walkdown was performed in an attempt to verify and document the positions of Thermo-Lag protected circuits listed above to their non-protected redundant counterparts. As discussed in our September 26, 1996 telecon, due to the congested nature of the overhead and the need for scaffolding, as well as radiological restrictions, only a limited walkdown could be performed. The walkdown showed that some Thermo-Lag protected circuits have a redundant non-protected counterpart within 20'. In other cases the counterpart was greater that 20' but there were intervening combustibles present, usually in the form of open cable trays. Examples of the proximity between redundant circuits are as follows:

Thermo-Lag protected conduit MUR84 and its non-protected counterpart, conduit RCR251, run parallel along common unistrut supports, vertically near each other on the north side of the corridor.

Thermo-Lag protected trays 107/108 are within 25' of unprotected redundant trays. Although the distances between the trays is greater than 20' intervening combustibles in the form of electrical cables are present.

Thermo-Lag protected trays 121/511 are separated approximately 20' to 22' horizontally from their non-protected counterpart trays 105, 551 and 562.

Thermo-Lag protected trays 148/567 are separated greater than 20' horizontally from their non-protected counterpart trays 105 and 551. Although the distances are greater than 20' intervening combustibles in the form of electrical cables are present.

(b) The Thermo-Lag barriers in this zone are credited with having an equivalent fire endurance value of 23-39 minutes based, in part, on the NEI sponsored testing. Please provide the detailed engineering evaluation for the determination of the equivalent fire endurance value for the tee section and horizontal radial bends in cable trays 148 and 567 in this fire area.

As stated in the exemption request, NEI Test 2-7 was used by FPC on a limited basis for comparison of the Thermo-Lag protected 24" x 6" ladder back cable trays used at CR-3. We stated that tee sections and radial bends in trays 148 and 567 represented the "longest free spans and greatest tensile stresses of the fire barriers" and that "no baseline testing was available for direct comparison" of these configurations. However, using engineering judgement based on a review of the extensive amount of data available from these tests, a reasonable estimate of "time to failure" was given in our exemption request submittal. Results from the extensive fire testing program performed by NEI confirmed that the most vulnerable portion of the Thermo-Lag configurations consisted of the structural failure of the bottom tray panel to side rail panel seam, as was seen in NEI test 2-7. We based our estimate of 23-25 minutes on the following. In NEI test 2-7, Tray A failed in 21 minutes at TC 36. Tray A was constructed using the "butt joint" method. The failure at TC 36 was a very localized failure of the outer circumference of the vertical tee section. This section was installed using "panels ... miter cut into individual horizontal slats 4 1/2" wide" and held in place with banding. In NEI test 2-7 tray D failed in 23 minutes at TC 81. This too was a localized failure of the outer circumference of the vertical tee section. Tray D was constructed using a "score and fold" method but it also had slats for the bottom radial section of the tray. Tray radial bend "tee sections" at CR-3 were constructed of "green" Thermo-lag that was bent and fastened to conform to the tray side rails and bottom rungs in lieu of the slat method seen in NEI test 2-7. This allowed a more continuous run of panel through the radial bend section of the "tee section" (The section that failed first in both test specimens). Because CR-3 Thermo-Lag fire barriers have less jointed segments or slats in the radial region than was seen in NEI test 2-7, we conclude that the localized failures seen NEI test 2-7 would not occur as quickly at CR-3.

The installation of the Thermo-Lag at CR-3 included some enhancements above and beyond what was specified in the TSI Installation Manual. To provide additional mechanical support for larger type configurations such as the tee section at the tray 148 and tray 567 cable tray intersection, enhancements to the Thermo-Lag barrier system were made during the original installation. As stated on Page 17 of the exemption request, both tie wires and banding straps were used in lieu of banding straps only. These

mechanical fasteners for trays and tees were installed at closer centerline distances than called for in the TSI installation manual. For these installations the banding and tie wires were installed around the four sides of the Thermo-Lag enclosure and across the diagonal chords. Taken together this conservative installation technique enhanced the overall structural integrity of the Thermo-Lag installation at CR-3. By maintaining structural integrity, the Thermo-Lag is expected to remain intact for the estimated 23 - 25 minutes as stated in the exemption request.

A second enhancement to the CR-3 Thermo-Lag installation included fabrication and installation with greater board and clamshell thicknesses than specified for both 1-hour and 3-hour rated configurations. For those Thermo-Lag installations which required a 1-hour rating, such as for the tray 148 and tray 567 intersection, a minimum of 0.625" of Thermo-Lag material was installed. Various inspections of the CR-3 Thermo-Lag installations have shown that the actual thickness of the Thermo-Lag may be as great as 0.875".

Due to the large amount of Thermo-Lag installed at the Comanche Peak Station prior to the discovery of the problems associated with the material, TU Electric subsequently performed numerous full scale fire tests. These tests were designed to develop new and/or enhanced configurations which met the necessary fire endurance requirements required for the plant. One of these fire tests (Report No. 12340-94367h) utilized a 24" wide tray (both tray 148 and 567 are 24" wide trays) with a tee section installed. The Thermo-Lag installation for the test consisted of 0.5" thick 330-1 flat and V-ribbed panels with 330-1 subliming trowel grade material installed at the joints and seams of the panels, at the sweeping bends (i.e., tee sections), and to provide a skim coat where the external stress skin was installed. Additional upgrade techniques were employed on this configuration. These upgrades included the installation of trowel grade material (approximately 3/16" thick) applied extending 5" toward the middle of the tray on the top, bottom and side exterior panel surfaces where the stress skin sections were provided. Then stress skin was applied in a U-shaped configuration. The inside and outside joints between the panels and on the radial bends were "stitched" with stainless steel tie wire. Finally, a skim coat of trowel grade (1/16" thick) was applied over the tie wires. Therefore, the total thickness of the Thermo-Lag material for this particular configuration was 0.75". This particular configuration with the tee section successfully passed the 1-hour fire test. With the exception of the stress skins which were provided for TU Electric configuration, the FPC assemblies are similarly constructed.

In conclusion, the Thermo-Lag assembly provided for the 148/567 tee section has been installed with several enhanced features. These enhanced features such as the use of tie wires in addition to banding straps and the increased thickness of the Thermo-Lag materials provide additional protection for the vulnerable portions of the assembly. Therefore, we believe the estimate of a equivalent rating of 23 - 25 minutes is accurate. In addition, automatic wet pipe sprinkler protection is currently provided directly above the tee section. Additional sprinklers will be installed to further enhance the protection of the Thermo-Lag in the event of a fire.

4. FIRE AREA IB-119-201

(a) Please specify the position of the redundant non-Thermo-Lag protected circuits relative to the Thermo-Lag protected circuits routed in conduits CDR44, MSS44, RCR251, SPS128 and SPS160.

A ground level walkdown was performed in an attempt to verify and document the positions of Thermo-Lag protected circuits listed above to their non-protected redundant counterparts. As discussed in our September 26, 1996 telecon, due to the congested nature of the overhead and the need for scaffolding, as well as radiological restrictions, only a limited walkdown could be performed. The walkdown showed that some Thermo-Lag protected circuits have a redundant non-protected counterpart within 20'. In other cases the counterpart was greater that 20' but there were intervening combustibles present, usually in the form of open cable trays. Examples of the proximity between redundant circuits are as follows :

A redundant tray passes approximately 5' above conduits CDR44 and MSS46.

Conduit MSS44 comes within 2' of a redundant conduit near Reactor Building penetration 130.

Conduit SPS160 is approximately 15' below and diagonal from a redundant tray.

Conduit CDR44 and MSS44 also pass below and diagonal to redundant trays approximately 12' and 10' away, respectively.

(b) The Thermo-Lag barriers in this zone are credited with having an equivalent fire endurance value of 22-36 minutes based, in part, on the NEI sponsored testing. Please provide the detailed engineering evaluation for the determination of the equivalent fire endurance value for CDR44.

Conduit CDR44 passes through two fire zone, IB-119-201A (Industrial Cooler Room) and IB-119-201B, (Personnel Hatch). Traveling from east to west (IB-119-201B to IB-110-201A) the conduit, CDR44 is continuously protected with a one-hour configuration of Thermo-Lag 330 fire barrier material. CDR-44 begins at a penetration seal exiting the Control Complex west wall and then travels west on steel angle supports until termination at Junction Box MS-32. As CDR44 exits the Control Complex penetration seal it is supported on steel angle supports that, in turn, support two or more non-essential raceways that are protected with Thermo-Lag 330 in accordance with the "TSI 18 inch rule". That is, each of these non-essentials is protected from the measured point of attachment on the support in its own Thermo-Lag clamshell for 18" in accordance with the TSI Installation Manual. A total of nine structural members (CSI-119-225 to AI-119-124A) used to support CDR44 and the other non-essential conduits are protected in this manner. Continuing west, as CRD44 reaches support AI-119-127A, a change in barrier design occurs. Four remaining steel angle supports and the non-essential raceways attached to these four supports are "boxed" in common enclosures until CDR44 terminates at Junction Box MS-32.

By analysis of FPC/UL test article #9, non-essentials attached to supports that contain the essential raceway are adequately protected where each individual conduit is protected with its own TSI clamshell. Between the penetration seal and the right edge of the boxed enclosure for AI-119-127A, CDR44 will fail by conductive thermal failure of the TSI clamshell only. We estimated this failure to occur at 22-36 minutes using NEI test number 2-1. Where CDR44 enters the boxed enclosures on the four remaining supports before Junction Box MS-32, an untested Thermo-Lag configuration exists. Based on observations of bare aluminum conductors in FPC tests at Underwriters Laboratory, the unprotected aluminum (the non-essential conduits) may begin to oxidize and crumble just outside the TSI barrier at around 22 minutes. By our visual observations at UL, the bare aluminum would not fail through the barrier and open a conductive heat path into the boxed enclosure for CDR44. What would happen is the unprotected aluminum would act as a conductive heat source for the dead air space within the box. However, the heat transfer would be limited to the sum of the cross sectional area of the non-essential conduits times the expected duration of the fire. Therefore, the limiting factor in estimating the fire barrier duration for CDR44 is strictly due to Thermo-Lag thermal failure for a 1-1/2" conduit. In accordance with our estimates, this occurs between 22-36 minutes.

APPENDIX R SECTION III.J EXEMPTION REQUEST

1. General

(a) Provide information on the availability of the normal and essential AC-powered lighting immediately following a plant trip in the fire areas that are the subject of this request.

The fire areas requiring the use of normal or essential plant lighting are located in the Auxiliary Building, Intermediate Building, Turbine Building and the Control Complex. For the Auxiliary Building, Intermediate Building and the Turbine Building, the normal plant lighting is fed from the Balance of Plant electrical distribution system via the 4kV Unit Buses which are powered from either the Startup Transformer or the Unit Auxiliary Transformer. The Startup Transformer is powered from the 230kV Substation. With the Balance of Plant electrical distribution system aligned to the Startup Transformer, there would be no disruption of normal lighting in the event of a plant trip.

The Unit Auxiliary Transformer is powered from the Unit 3 Main Generator. The loss of the Unit Auxiliary Transformer due to a plant trip results in an automatic transfer of the 4kV Unit Buses to the Startup Transformer in about 0.3 seconds. If the Unit Auxiliary Transformer is powering the Balance of Plant electrical distribution system at the time of a plant trip, a momentary dip in the normal lighting would occur. However, no detectable period of darkness would result.

For the Control Complex, the essential lighting is fed from the emergency diesel generator backed Class 1E power distribution system. The normal source of power for the Class 1E power distribution system is either the

Offsite Power Transformer or the Backup ES Transformer. Both of these transformers are fed from the 230kV Switchyard. Therefore, a plant trip would have no impact on the lighting for the Control Complex fire areas. For fires which could result in a loss of offsite power, at least one diesel generator is available, assuming a failure of the other due to fire damage, to power one of the redundant Class 1E buses and thus provide lighting. The circuits for auto-start of the diesel generators have been separated or protected and the power sources for the lighting auto-load with the diesel generator coming on-line.

(b) For each fire area that is the subject of this request, with the exception of Fire Area AB-95-3, specify the number of additional battery powered lights that would be required to achieve compliance with Section III.J of Appendix R to 10 CFR 50.

Our request for exemption was not based on economic considerations. The current design of normal, essential, and emergency lighting achieves the underlying purpose of the rule as described in the Federal Register notification of Appendix R, Supplemental Information, and is consistent with SECY-83-269 and previously accepted positions and exemptions. As described in our request for exemption, existing AC-powered lighting would be available during and after the fire to support safe shutdown activities since their power supplies and circuits would not be damaged. The AC-powered lighting is the normal lighting in these areas; as such, additional 8-hour battery emergency lighting is unnecessary. However, as requested, an estimate for additional battery powered lighting has been prepared. An additional 32 battery-pack lighting units would be needed to provide DC-powered lighting. This estimated quantity was based on a preliminary walkdown and a drawing review. Additional lighting may be required for obstructions along the access routes and for charging power and seismic considerations. The breakdown by fire areas is as follows:

Fire Area	Lighting Units
AB-119-6	9
CC-124-111	2
CC-145-118B	2
IB-119-201	14
TB-95-400	4
TB-119-400	1

(c) For each operator action, in each fire area that is the subject of the exemption request, specify the maximum allowable time to perform the operator action, and if the action is required to achieve hot standby or cold shutdown.

The need for the operator actions depends upon the extent and type of fire damage and when the fire damage occurs. To determine the lighting requirements for post-fire safe shutdown, it was conservatively assumed that actions described below would be performed, if needed, within 1 hour following a reactor trip, except as noted.

Fire Area AB-95-3 - The operator actions in this fire area consist of manually aligning valves for the makeup system. These valves (depending upon the extent and type of fire damage) may require verification of

position or re-alignment within approximately 4 hours following a reactor trip and reactor coolant system isolation. These actions, if needed, would be performed to maintain hot standby and for cooldown to cold shutdown.

Fire Area AB-119-6 - The operator actions in this fire area consist of manually aligning valves of the makeup system. These valves (depending upon the extent and type of fire damage) would be used to isolate the letdown line. For lighting considerations, it was conservatively assumed that the letdown line would be isolated following a reactor trip. These actions, if needed, would be performed to maintain hot standby and possibly again to achieve cold shutdown (opened for cooldown).

Fire Area CC-124-111 - The operator action in this area consists of positioning one switch on a DC distribution panel. This action is used to de-energize the pressurizer pilot-operated relief valve (PORV) should fire damage result in spurious opening of the PORV and a loss of control or power to the PORV block valve. This action is used to mitigate a fire-induced spurious actuation and is not required to achieve either hot standby or cold shutdown. For lighting considerations, it was assumed that this action would be performed following a reactor trip.

Fire Area CC-145-118B - This fire area is the Main Control Room. The main control board is provided with 8-hour battery-pack lighting. The operator actions on the panels not covered by the battery lighting, located behind the Main Control Board, consist of positioning various switches. These actions may be required depending upon the extent and type of fire damage, to achieve hot standby. For lighting considerations, it was assumed that these actions would be performed following a reactor trip.

Fire Area IB-119-201 - The operator actions in this area consist of manually aligning valves for the emergency feedwater system and auxiliary feedwater pump discharge. The auxiliary feedwater pump would be used to achieve hot standby and for further cooldown. The auxiliary feedwater pump is manually initiated, and opening auxiliary feedwater valves in this area is part of the normal (non-fire related) actions to initiate this function. The maximum time to initiate auxiliary feedwater is dependent upon the failure of the main feedwater system and emergency feedwater system. For lighting considerations, it was assumed that the auxiliary feedwater pump would be initiated following a reactor trip.

The operator actions associated with the emergency feedwater system are not required for either hot standby or cold shutdown. These actions are used to isolate equipment that may not be controllable from the control room due to fire damage. These actions are not required but are included as a prudent response to possible fire damage.

Fire Area TB-95-400 - The operator action in this area consists of positioning one switch on a DC distribution panel. This action is used to de-energize the PORV should fire damage result in spurious opening of the PORV and result in loss of control or power to the PORV block valve. This action is used to mitigate a fire-induced spurious actuation and is not required to achieve either hot standby or cold shutdown. For lighting considerations, it was assumed that this action would be performed following a reactor trip.

Fire Area TB-119-400 - The operator action in this area consists of positioning one switch for the auxiliary feedwater pump. Auxiliary feedwater would be used to achieve hot standby and for cooldown. The auxiliary feedwater pump is manually initiated, and operating the switch in this area is part of the normal (non-fire related) actions to initiate this function. The maximum time to initiate auxiliary feedwater is dependent upon the failure of the main feedwater system and emergency feedwater system. For lighting considerations, it was assumed that the auxiliary feedwater pump would be initiated following a reactor trip.

(d) For each fire area that is the subject of this request, discuss the potential for smoke obscuration of the AC-powered lighting that is being relied upon in lieu of battery operated lighting including the access routes to these areas.

It should be expected that smoke would not necessarily be contained in the immediate vicinity of the fire. Smoke would spread throughout the area and to some extent could spread to adjacent fire areas and areas served by the same ventilation system. However, whether a particular light is AC-powered or DC-powered appears to have little significance. In general, the AC-powered lighting should perform better under smoke conditions because normal lighting illumination levels are higher than the illumination levels provided by the 8-hour emergency lighting units.

Fire Area AB-95-3 - With the exception of a fire in this area, the fires that could result in the need for operator action in this fire area are located in the Control Complex, elevations 108 ft. and 124 ft. The access route to this fire area is provided by battery-pack emergency lighting. The Auxiliary Building and the Control Complex are served by separate ventilation systems. Further, per the fire pre-plans, smoke from fires in the Control Complex would not be exhausted to the lower level of the Auxiliary Building. For fires in this area, portable lighting, which is stored outside the area and not subjected to fire damage, would provide the only dependable source of lighting to support these safe shutdown actions.

Fire Area AB-119-6 - The fires that could result in the need for operator action in this fire area are located in the Control Complex, elevations 108 ft. and 124 ft. The access route to this fire area is provided by battery-pack emergency lighting. The Auxiliary Building and the Control Complex are served by separate ventilation systems. Further, per the fire pre-plans, smoke from fires in the Control Complex would not be exhausted to this level of the Auxiliary Building.

Fire Area CC-124-111 - The fires that could result in the need for operator action in this fire area are located in the Control Complex, elevation 108 ft. The access route to this fire area is provided by battery-pack emergency lighting. It would be expected that some smoke could be detected throughout the Control Complex, however, smoke dispersion to other elevations (fire areas) by natural circulation would be limited. While these areas are served by the same ventilation system, the design of the ventilation system is such that return air from the lower level of the Control Complex is not ducted directly back to the upper levels of the Control Complex. The Control Complex ventilation system can be operated in a smoke purge mode. Further, per the fire pre-plans, smoke from fires

in the lower elevations of Control Complex would not be exhausted to this level of the Control Complex.

Fire Area CC-145-118B - This fire area is the Main Control Room. The fires that could result in the need for operator action in this fire area are located in the Auxiliary Building, the Intermediate Building and the lower levels of the Control Complex. The Auxiliary and Intermediate Buildings and the Control Complex are served by separate ventilation systems. It would be expected that some smoke could be detected throughout the Control Complex, however, smoke dispersion to other elevations (fire areas) by natural circulation would be limited. The design of the Control Complex ventilation system is such that return air from the lower level of the Control Complex is not ducted directly back to the upper levels of the Control Complex. The Control Complex ventilation system can be operated in a smoke purge mode. Further, per the fire pre-plans, smoke from fires in the lower elevations of Control Complex would not be exhausted to this level of the Control Complex.

Fire Area IB-119-201 - The fires that could result in the need for operator action in this fire area are located in the Auxiliary Building, the Control Complex and the lower level of the Intermediate Building. The access route to this fire area is through the Turbine Building. The Auxiliary Building, the Control Complex, the Intermediate Building and the Turbine Building are served by separate ventilation systems. Further, per the fire pre-plans, smoke from fires in the Auxiliary Building would not be exhausted to the Intermediate and Turbine Buildings. Per the fire pre-plans, smoke from fires in the Control Complex would generally be directed to the stair tower and out the roof. Smoke could also be exhausted to the Turbine Building (see discussion for Fire Area TB-119-400). Smoke from the lower level of the Intermediate Building would migrate to the upper level of the building through unsealed penetrations and by the ventilation system. However, the portion of the upper level that would be accessed for manual operation of valves has a very high ceiling (approximately elevation 143') that is open to the atmosphere. The actions that may be required are located at the floor level (elevation 119').

Fire Area TB-95-400 - The fires that could result in the need for operator action in this fire area are located in the Control Complex, elevation 124 ft. The access route to this fire area is provided by battery-pack emergency lighting. The Turbine Building and the Control Complex are served by separate ventilation systems. Further, per the fire pre-plans, smoke from fires in the Control Complex would not be exhausted to or through the lower level of the Turbine Building.

Fire Area TB-119-400 - The fires that could result in the need for operator actions in this fire area are located in the Auxiliary Building, the Control Complex and the 95 ft. elevation of the Intermediate Building. The access route to this fire area is through the Turbine Building. These buildings are served by separate ventilation systems. Further, per the fire pre-plans, smoke from fires in the Auxiliary Building and the lower level of the Intermediate Building would not be exhausted to the Turbine Building. Smoke from fires in the Control Complex would generally be directed to the stair tower and out the roof. Smoke could also be

exhausted to the Turbine Building. The Turbine Building is equipped with roof vents and louvered type windows which can be operated to setup natural ventilation. The building is served by both supply and exhaust fans which can be configured to remove any smoke. Further, the volume of the building is such that it does not easily lend itself to smoke layering/stratification. A cross ventilation scheme can be easily achieved by opening the east roll-up doors and the two west side doors. Smoke ejectors could be also used to augment smoke removal. In addition, the operator actions in this area do not require the operator to monitor any instrumentation but only to position a switch.

2. Fire Area AB-95-3

(a) Specify the total number of valves in this fire area that require operator action following a fire.

The operator actions in this fire area consist of manually aligning valves for the makeup system. Fires in five plant areas could result in the need for these actions. Either one or two valves may require re-alignment to respond to the fire, depending on which fire area is involved. A total of four different valves could be affected.

(b) For each valve in this area that requires operator actions; specify the type of valve, the location of the valve relative to the floor level, and any special actions, such as climbing a ladder or the use of tools or equipment necessary to manipulate or repair the valve.

The makeup system valves in this area that may require operator action, are motor operated valves with manual handwheels. These valves vary in location from floor level to approximately chest height. The operation of these valves does not require any special actions. The valves are manually operated by using the hand-bar to disengage the motor and by using the handwheel to stroke the valve.

(c) The request states that operator actions are required in this fire area following a fire in this area. Provide a detailed discussion of the vulnerability of these valves to fire damage.

This fire area encompasses the Auxiliary Building Elevation 95 with the exception of the cubicles housing makeup pumps MUP-1A and MUP-1B. The operator actions in this fire area consist of manually aligning valves for the makeup system. Depending upon the extent and type of fire damage, one of two valves for the suction side of a makeup pump and one of fives valves for injection may require manual alignment. Potential fire damage to the redundant power sources and cables for these valves, may result in the need for post-fire operator action. These valves are typical Limitorque motor operated valves with handwheels, which have been widely accepted as not subject to mechanical damage due to fire. The valves and the components required for manual operation are steel, and are installed in water filled piping. There are no significant fire hazards installed immediately around the valves. Further, the valves are located in portions of the fire area that are provided with ionization smoke detectors and automatic wet pipe sprinkler coverage.

3. Fire Area AB-119-6

(a) Specify the total number of valves in this fire area that require alignment following a fire.

The operator actions in this fire area consist of manually aligning valves for the makeup system. Two valves may require re-alignment. Fires in four plant areas could result in the need for these actions.

(b) For each valve in this fire area that requires operator actions; specify the type of valve, the location of the valve relative to the floor level, and any special actions, such as climbing a ladder or the use of tools or equipment necessary to manipulate the valves.

The valves in this area that may require operator action are manual valves that are operated by handwheels. These valves are located approximately knee to chest level above the floor. The operation of these valves does not require any special actions.

4. Fire Area CC-145-118B

(a) Specify the total number of switches in this fire area that require positioning following a fire.

This fire area is the Main Control Room. The main control board is provided with 8-hour battery-pack lighting. The total number of switches that are located on panels not covered by the battery lighting units, is seven. However, the maximum number of switches that may require positioning for any one fire is five.

5. Fire Area IB-95-200

(a) Verify that no exemption from Section III.J of Appendix R to 10 CFR 50 is being requested for this fire area.

No exemption from Section III.J is requested for Fire Area IB-95-200.

6. Fire Area IB-119-201

(a) Specify the total number of valves in this fire area that require alignment following a fire.

The operator actions in this fire area consist of manually aligning valves for the emergency feedwater system and for the auxiliary feedwater pump discharge. A total of four valves may require re-alignment. Fires in four plant areas could result in the need for these actions.

(b) For each valve in this fire area that requires operator actions; specify the type of valve, the location of the valve relative to the floor level, and any special actions, such as climbing a ladder or the use of tools or equipment necessary to manipulate the valve.

The two feedwater system valves in this area that may require operator action are manual valves that are operated by handwheels. These valves are located at floor level. The operation of these valves does not require any special actions.

The two emergency feedwater system valves in this area that may be used to isolate equipment are motor operated valves with manual handwheels. These valves are accessible from installed platforms (stair access). The operation of these valves does not require any special actions. The valves are manually operated by using the hand-bar to disengage the motor and by using the handwheel to stroke the valve.