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February 7, 2001
JPN-01-003

U.S. Nuclear Regulatory Commission
Mail Stop O-P1-17
Washington, D.C. 20555-0001
Attn: Document Control Desk

SUBJECT: James A. FitzPatrick Nuclear Power Plant
Docket No. 50-333
**Response to Request for Additional Information
Regarding 10 CFR Part 50, Appendix R Exemptions**

REFERENCE: 1. NYPA letter, J. Knubel to USNRC, JPN-00-041, "Request for Exemption from 10 CFR 50, Appendix R, III.G.2.c Requirement for a One-Hour Rated Fire Barrier Wrap," dated October 30, 2000

2. NRC letter, from G. Vissing to M. Kansler, "James A. FitzPatrick Nuclear Power Plant - Request for Additional Information Regarding 10 CFR Part 50, Appendix R Exemptions," dated December 29, 2000

Dear Sir:

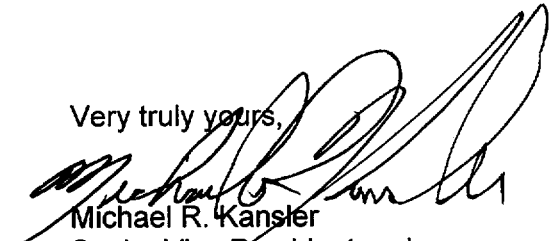
In Reference 1, an exemption request from the requirements of 10 CFR 50, Appendix R, was submitted for the James A. FitzPatrick Nuclear Power Plant. Subsequently, the NRC requested, in Reference 2, additional information in order to evaluate the adequacy of fire protection and safe shutdown capability at the James A. FitzPatrick nuclear power plant. Attachment 1 to this letter contains the Entergy Nuclear Operations (ENO), Inc.'s response to the NRC's request.

ADD

Attachment 2 contains a correction to a typo on page 5 of Reference 1.

There are no new commitments made in this letter. If you have any questions, please contact Ms. Charlene Faison at 914-272-3378.

Very truly yours,



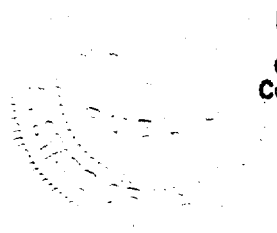
Michael R. Kansler
Senior Vice President and
Chief Operating Officer

STATE OF NEW YORK
COUNTY OF WESTCHESTER
Subscribed and sworn to before me
this 17th day of February 2001


Notary Public

Attachments: As stated
cc: See next page

PATRICIA L. TERRY
Notary Public, State of New York
No. 4991258
Qualified in Westchester County
Commission Expires Jan. 27, 2022



cc: Regional Administrator
U.S. Nuclear Regulatory Commission
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King of Prussia, PA 19406

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- 1) Page 2 - The exemption request states that more than 90% of the combustibles in the area with the fire wrap are cable. State what constitutes the other "less than 10%" of the combustible loading in the fire area. Also, describe the proximity of the non-cable combustibles in relation to the fire wrap.

The following non-cable combustible materials are located in the West Cable Tunnel:

**fiberglass water tank, 74TK-3 (~2250 lbs.)
two 22 foot fiberglass fire brigade extension ladders
one 20 foot fiberglass maintenance folding ladder
fiberglass ("Bondstrand") piping**

74TK-3 is located 12 feet horizontal distance from the fire wrap of concern. The ladders are in excess of 50 feet from the fire wrap system.

The fiberglass piping is located in two areas. Fiberglass drain piping is present in the immediate vicinity of the fire barrier wrap. This system consists primarily of 3 inch nominal diameter pipe which serves laboratory drains on the 272 foot elevation above and are routed adjacent to the wrap before penetrating the east wall of the West Cable Tunnel. A section of this piping system runs perpendicular to the fire barrier wrap and two runs of 3 inch nominal diameter pipe pass directly over the wrap and within 2 inches of the wrap.

The second system of fiberglass pipe is located along the west wall of the West Cable Tunnel and serves the domestic water system. The system consists of a run of 6 inch and 3 inch nominal diameter piping. These two runs of piping are located 135 feet from the fire barrier wrap at the closest point.

Based on the generally horizontal configuration of the piping, the presence of a full-area sprinkler system, a full-area smoke detection system, and available manual fire suppression capabilities, the spread of fire along the piping system is not considered credible.

Fires involving transient materials in the immediate vicinity of the fire wrap which may also involve the fiberglass piping are highly unlikely based on the administrative controls on combustibles and ignition sources. In the unlikely event such a fire did occur, the primary concern would be the transient material, and not the fiberglass pipe. This is particularly true as the pipe is located above the fire wrap system. The potential consequence of a transient based fire is discussed in the response to Question 10.

The fiberglass tank is of cylindric construction, with the axis parallel to horizontal. The tank has two small pumps associated with it. The pumps are unlikely ignition sources for the tank due to the curved tank surface, which minimizes the potential for "banking" of heat under the tank, as well as the generally low ignitability of the fiberglass tank itself. In addition, the pumps are not located directly under the tank.

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Administrative controls on transient combustibles and ignition sources make a transient based fire involving the tank highly unlikely.

In the event a transient based fire did involve the fiberglass tank, the 12 feet horizontal separation, in conjunction with the full area suppression system and/or manual suppression capabilities, would preclude the fire wrap from being significantly challenged by such a fire.

Based on the above separation distances, the nature of the combustibles as well as the presence of the full area suppression system, the above combustible materials are not considered a significant exposure hazard to the fire wrap system.

- 2) Page 2 - No information is provided as to the type of cable which makes up the majority of the combustibles in the area. Are the cables IEEE 383 rated, or have they been evaluated as equivalent to IEEE 383 (if so, provide technical justification for equivalency)? If some or all of the cables are neither rated nor equivalent, is there any evidence that the installed cables restrict flame spread (if so, provide technical justification). Provide a basis for the assertion made on, Page 12 of Attachment 2, Section 12, Fire Scenario, which states that, "a fire in this zone is postulated to be a slowly developing cable fire."

The West Cable Tunnel runs in a general north-south direction and widens at the southern end of the tunnel. The area of concern is the extreme east end of the wide southern portion of the West Cable Tunnel where the wrapped B Division armored cable runs in a tray from north to south. The fire wrapped armored cable is routed for about 15 feet in a tray with a metal bottom over nine A Division cable trays. The nine A Division cable trays carry a total of 748 cables consisting of 59 different cable types.

The original cables for JAF were specified and ordered prior to 1974 when the IEEE Std. 383-1974 was issued. An analysis was performed by JAF¹ which evaluated the flame retardant standards, specified for the cable used in an open raceway at JAF, and it was determined that they met standards which were similar to IEEE 383-1974.

Cables that are identified to be from a manufacturer not included in the original purchase orders have been verified as meeting IEEE-383 specifications for flammability based on their manufacturer's catalog specifications.

The sample review of the nine cable trays under the wrapped cable is considered to be representative of the cables within this fire zone (the West Cable Tunnel). The majority of these cables, in this section of the tunnel, continue their run through most of the tunnel. Since these cables can be traced to cable which meets IEEE-383 flammability standards, or a similar standard, based on engineering judgement, a cable based fire in the West Cable Tunnel would be a slowly developing fire.

¹ Letter of 11/20/92, Ebasco RVR-92-11R from R. V. Rebbapragada, Evaluation of the flame retardant characteristics of cables installed at JAFNPP.

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- 3) Page 2 - No discussion of transient ignition sources is discussed in the exemption request. What controls are in place for hot work, such as cutting, welding, etc., in the fire area? Do the controls in the fire area with the fire wrap differ from the controls in place for other plant fire areas?

Hot work, including cutting and welding, is controlled by administrative procedure AP-14.03.

AP-14.03 stipulates that hot work be controlled by issuance of a hot work permit and requires that the work area be inspected prior to the commencement of hot work activities to assure that procedural requirements are satisfied. Furthermore, AP-14.03 requires that the area be cleared of combustible material within 35 feet of the work area if practical or that the combustibles be covered with fire resistant cloth. In addition, AP-14.03 restricts the handling of combustible or flammable liquids within 35 feet of the hot work area.

AP-14.03 also requires that a trained fire watch, equipped with a suitable fire extinguisher, be present during and for the ½ hour following completion of the hot work activities.

AP-14.03 is currently under revision to provide stricter controls over hot work in the West Cable Tunnel due to the non-conforming fire wrap. AP-14.03 will require fire protection personnel to approve any hot work activities in the tunnel. Approval will specifically consider the proximity of proposed hot work to the fire wrap and combustibles in the area such as the fiberglass water tank. Additionally, AP-14.03 will require fire protection personnel to perform an inspection of the Hot Work area at least every 2 hours to assure permit restrictions are satisfied and good fire prevention practices are being followed.

- 4) Page 3 - It is stated that there are evaluations and justification of the installed fire detection system not meeting the code. Provide a basis and technical justification that the code deviations do not adversely impact system performance.

The following are the identified NFPA Code deviations and their supporting technical justifications:

- i) **It was determined that various circuits were not supervised or not properly supervised (NFPA-72D, 1979, Sections 2-7.1 and 2-7.2). The adequacy of fire detection circuitry supervision was evaluated and documented in JAF-ANAL-FPS-02001, dated March 7, 1995. The report concluded that the fire detection circuitry between the Fire Protection Relay Cabinet (FPRC) in the relay room and the Fire Protection Panel (FPP) in the control room warranted an increased test frequency. The FPP panel is a "mimic" panel which provides for the display of indicating lights and audible alarms for fire alarms, supervision system activation, and trouble signals for areas protected. These indications are derived from relays**

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mounted within the FPRC panel. There is approximately a forty foot cable run between these two panels. The FPP panel is in the control room between the shift managers office and the crescent. The lamp circuits between the FPRC and the FPP panels are tested on a monthly basis. This provides a reasonable assurance that all these circuits are free from faults and this is a satisfactory alternative to circuit monitoring. Prompt recognition of a fire condition also requires the proper operation of the audible fire alarm, located in the Control Room. While this circuitry is not monitored for loss of integrity, monthly testing of the Fire Pumps conducted under ST-76AC and ST-76B confirm the integrity of the audible alarm circuitry.

- ii) There is no provision for automatically recording alarms received by the propriety protective signaling system (NFPA-72D, 1979, Sections 4-5.1, 4-5.2, and 4-7.1). The concern in this case is to avoid losing an alarm (i.e., not being recorded by operations personnel) when the panel resets or another incoming alarm "masks" the first signal. However, Plant Alarm Response Procedures are designed to ensure that fire detection system alarms are appropriately acknowledged.

The operators are alerted by visual and audible alarms. Silencing of the audible alarm requires an operator to depress the acknowledge button but would still leave the visual alarm. Any additional incoming alarms would therefore not be masked since the audible alarm would "reflash". Before the alarm is reset (turning off the visual alarm) procedures require that an operator be dispatched to investigate the cause of the alarm. Since the control room is continuously manned and all alarms are investigated and identified promptly no alarm would be "lost" or essentially ignored/overlooked and the intent of NFPA-72D is met.²

- iii) The sufficiency of the testing performed to verify proper connection (supervision) of the detectors (NFPA-72E, 1978, Sections 2-5.2.1 and 8-1.5) was questioned. The acceptability of the system installation and the associated pre-operational testing was evaluated and documented in JAF-ANAL-FPS-02091, dated June 19, 1995. The report summarizes a review of the pre-operational testing of the Fire Detection System (including a circuit integrity test), a check of the electrical drawings, and the methodology used by the existing surveillance tests to simulate actual fire alarm conditions and how they ensure the availability of the entire fire detection system. The report concluded that there was adequate assurance that the fire detectors were properly wired.
- iv) Environmental qualification of fire detection panels was not established. The FPP, FPRC, and multiplexing equipment are not UL Listed or FM approved for use in Propriety Fire Protection Signaling Systems. Such listing requires that the equipment be qualified to certain environmental condition as well as variations in input voltage. The intent of requiring UL listing or FM approval, including related environmental and input voltage variation testing, is to ensure that the equipment meets minimum acceptance standards applicable to Fire Protection Signaling Systems. The equipment in question has been installed and utilized for nearly

² NYPA memorandum from F. A. Bloise and J. Pechacek to J. Street, dated March 27, 1996 (JDED-96-0216), regarding JAFNPP Resolution of NFPA 72D-1979 Code Non-Conformance Closure of ACTS Item 18770.

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twenty years and has demonstrated its reliability. This fulfills the primary intent of this aspect of NFPA-72D and the deviation is deemed acceptable.

- v) The loading on the fire detection signaling lines exceeds established loading limits. However, this has not prevented the system from adequately performing its design function. Consequently, signaling line deviations have been accepted-as-is.
- vi) Smoke detectors in the West Cable Tunnel deviate from the spacing requirements of NFPA-72E to the extent that two beam pockets which should have detectors do not. One beam pocket is located in the vicinity of column lines B-9 and B-10 and is located 110 feet from the fire wrap of concern. The other pocket contains the access stairway, located approximately 85 feet from the fire wrap. Additional smoke detectors located in the general area are deemed adequate in providing early warning fire detection of any credible fire which may expose the fire wrap system.
- vii) The power supply arrangement of various fire detection panels required to operate to provide early warning fire detection do not satisfy NFPA-72D requirements. The deviations are as follows:
 - Local Panel 76CP-2 is not provided with a secondary power supply. This panel is fed from normal 120 volt AC distribution panel RRACA8. This supply is considered highly reliable in that it is fed normally via electrical bus 10300 which derives power from the normal station service Transformer T4. If this source is lost, power to bus 10300 is automatically realigned to the reserve station service Transformer T3.
 - The local multiplex transmitter associated with 76CP-2 is not provided with a backup power supply fully conforming with NFPA-72D. The primary power supply is powered by a 120 volt AC vital supply, backed-up by the plant emergency diesel. This power supply is highly reliable and judged to meet the intent of NFPA-72D.
 - The 24 volt DC power supply for the central supervising station does not fully comply with the options stipulated by NFPA-72D. The 24 volt DC power is supplied from the two separately derived 120 volt AC distribution panels RRACA8 and RRACB8. The 24 volt DC power is monitored for loss of supply. The 24 volt DC power can be manually switched from the usual supply from RRACA8 to the backup supply from RRACB8. The 120 volt AC supply from distribution panel RRACA8 provides power to the Multiplex receivers inside the FPRC panel. These Multiplex receivers are monitored for trouble and this trouble alarm is tested on a monthly basis. Consequently, the intent of the standard has been satisfied.

In addition, compensatory measures for the loss of fire detection systems protecting safety-related areas, including the system protecting the West Cable Tunnel, are controlled by site administrative procedures. Compensatory measures include assuring the availability of back-up fire suppression and the posting of fire watches.

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- 5) Page 3 - Include the type of hazard classification to which the sprinkler system was designed, light, ordinary, extra hazard, the basis for the classification, and the technical justification that the classification is appropriate for the hazard.

The sprinkler system in the West Cable Tunnel is designed and installed as an Extra Hazard (Group 1) occupancy. The system is capable of providing 0.3 gpm/ft² to the most hydraulically remote 2,500 ft² as well as 0.15 gpm/ft² of cable tray horizontal area.

NFPA 13 defines Extra Hazard Occupancies as:

“Occupancies or portions of other occupancies where quantity and combustibility of contents is very high and flammable and combustible liquids, dust, lint or other materials are present, introducing the probability of rapidly developing fires with high rates of heat release.”

Extra Hazard (Group 1) includes occupancies described above with little or no flammable or combustible liquids.

Classifying the hazards in the West Cable Tunnel as “Extra Hazard (Group 1)” is conservative since a rapidly developing fire with high heat release is not expected due to the type and configuration of the fixed combustibles in the area, as well as the administrative controls which restrict the quantity of transient hazards.

The West Cable Tunnel sprinkler system is conservatively designed such that it is capable of adequately controlling and suppressing fires of greater severity than would be expected in the cable tunnel.

- 6) Page 3 - It is stated that water hose lines are located in the zone. For significant fire scenarios the fire brigade would have to prepare hose lines prior to entering the fire area. Discuss the availability of fire hoses outside the area which the brigade would use prior to entering the area.

In the unlikely event access to hose stations within the Cable Tunnel were blocked due to the effects of fire, hose stations 76FH-131 and 133, located on elevation 272 of the Administration Building could be utilized. The travel distance between these hose stations and the proximal entrance into the West Cable Tunnel is approximately 105 feet. Additional lengths of 1½ inch fire hose are available on elevation 272 of the Administration Building to allow the use of both 76FH-131 and 133 for fire suppression activities in the vicinity of the fire wrap system. Two and one-half inch fire hose is readily available in exterior hydrant hose houses adjacent to the Administration Building if higher flows are necessary.

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Station fire drills, simulating a West Cable Tunnel fire, have confirmed the ability of the fire brigade to effectively utilize hose stations 76FH-131 and 133 for combating a fire in the vicinity of the fire wrap system.

- 7/8) Page 5 - Section iii of 10 CFR 50.12(a)(2) is included in the exemption which discusses undue hardship or costs. Discuss how this exemption qualifies under Section iii of 10 CFR 50.12(a)(2) which discusses undue hardship and/or costs, specifically discuss undue hardship and/or costs if this exemption were not to be approved.

Note: Page 5 - The quote from 10 CFR 50.12(a)(2) is missing the word "not" from the fourth line between "is" and "necessary."

The undue hardship would be the cost of a plant modification to correct the condition. Two potential options are:

- i) **Construct a duct bank crossing the West Electrical Tunnel and reroute the cable through it.**

Preliminary Cost Estimate: \$1,130,000

- ii) **Rewrap the cable with an adequately tested and approved system.**

Preliminary Cost Estimate: \$500,000

The "typo" has been corrected and a new page 5 of the exemption request is included in this response as Attachment 2. We believe that the balance of question 8 is a continuation of question 7, see above response.

- 9) Page 12 - The discussion of administrative controls, states that 15 gallons of combustible liquid is allowed to be stored in the area without a permit or evaluation. Is there any restriction concerning storing this in the area of the fire barrier (i.e., is there an exclusion zone)?

Transient combustibles are controlled by Administrative Procedure AP-14.02, "Combustibles and Flammable Material Control," which requires that transient combustibles be controlled by combustible control permits when administrative limits are exceeded. The limits established for Safety Related areas, including the West Cable Tunnel, are as follows:

- i) **Work Site constantly attended (except regular breaks not exceeding one hour in duration):**
- a. **25 pounds ordinary combustibles or plastics**
 - b. **15 gallons of Class II or III combustible liquids stored in an approved container(s)**
 - c. **1 pint of flammable liquid stored in an approved container**
 - d. **one 14 ounce aerosol can**

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ii) Work Site not attended at all times:

- a. 10 pounds of ordinary combustibles or plastics**
- b. 15 gallons of Class II or III combustible liquids stored in Safety Cans**
- c. Combustible liquids shall not be left unattended for a period exceeding one shift.**

If a work activity requires that the above limits be exceeded then issuance of a Combustible Control Permit is required prior to transporting the materials into the area. Combustible Control Permits are reviewed by the fire protection staff to ensure that the proposed materials do not create an unacceptable fire hazard. Consideration is given to impact on the existing fire suppression and detection systems, proximity of other combustibles and ignition sources, and the ignitability and combustion characteristics of the proposed material. Additional administrative controls may be imposed, at the discretion of the fire protection staff, to lessen the hazard associated with the proposed materials including the requirement that the materials be constantly attended.

AP-14.02 provides specific guidance regarding the introduction and storage of transient combustibles in the plant. This guidance includes the avoidance of storing combustible or flammable material within a horizontal distance of 5 feet and a vertical distance of 15 feet from cable trays and to store combustible materials in sealed metallic containers whenever possible. Additional guidance regarding the storage of combustible and flammable liquids includes the requirement to maintain all liquid containers closed when they are not in use, and that storage containers meet requirements similar to those of NFPA 30, "Flammable and Combustible Liquids Code," for containers and portable tanks.

In addition to the specific requirements above, the combustible control program contained in AP-14.02 is based upon minimizing both the quantity of transient combustibles within the plant and the duration which they are present. AP-14.02 contains guidance that only those materials necessary to complete a job should be introduced into the plant and furthermore that combustibles not controlled under a permit should be removed at the end of the work activity or the end of the shift, whichever is sooner.

- 10) Page 9 - The transient combustible limits for the fire area are 15 gallons of combustible liquid and 25 lbs. of plastic. The submittal neither describes any restrictions on placement of these materials in the fire area nor describes any controls on ignition sources. Would a fire involving this postulated combustible load in the area of the fire wrap result in fire damage more severe than an ASTM E-119 fire exposure? Provide technical justification for your conclusion.

Restrictions on the placement of combustible materials in the fire area are described above in the reply to question 9. Control of ignition sources are described in the reply to question 3, above.

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Considering the presence of a full area automatic suppression system as well as an in tray³ suppression system and assuming the transient hazards are ignited, the fire wrap system would be expected to experience a significantly more mild environment than an ASTM E-119 test. This conclusion is based on fire protection principles as well as the established cooling capability of an effective sprinkler system.

In the unlikely event that the combustible material ignited and the automatic suppression system failed, manual suppression activities would be relied upon to limit fire damage. The area is provided with full area automatic fire detection capability ensuring prompt fire detection and fire brigade response. Although it is true that under ideal conditions, the time/temperature curve expected for some combustible materials may result in a quicker temperature rise than the ASTM E-119 curve, it is generally recognized that it is the area under the time/temperature curve which establishes overall severity.

As the fire is expected to be promptly extinguished by manual fire suppression activities, extended exposure to high temperatures is not expected. Consequently, even assuming the failure of the automatic fire suppression systems, under the worst case fire expected based on transients which may be present, the actual exposure of the installed system is expected to be less severe than the ASTM E-119 test exposure.

³ Note: the fire barrier wrap of interest is in a cable tray protected by spray nozzles.

Attachment 2 to JPN-01-003

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west cable tunnel would not unduly risk the public health and safety, as the conditions presented in the previously NRC approved exemption are bounding.

The requested exemption is consistent with the common defense and security

The common defense and security are not affected by this exemption request.

Special circumstances are present as defined in 10 CFR 50.12(a)(2)

10 CFR 50.12(a)(2) states, in part:

“The commission will not consider granting an exemption unless special circumstances are present. Special circumstances are present whenever... (ii) Application of the regulation in the particular circumstances would not serve the underlying purpose of the rule or it is not necessary to achieve the underlying purpose of the rule; or (iii) Compliance would result in undue hardship or other costs that are significantly in excess of those contemplated when the regulation was adopted, or that are significantly in excess of those incurred by others similarly situated.”

Underlying purpose of the rule

Achieve and Maintain Hot Shutdown – III.G.2.c

Compliance with the performance criteria of a one hour rated fire barrier wrap is not necessary to achieve the underlying purpose of the rule since safe shutdown conditions can be achieved and maintained with the use of a fire barrier wrap that does not meet that performance criteria, may have a fire endurance rating of less than one-hour but has been evaluated to be adequate for the hazards to which it is exposed.

Conclusion

This exemption request is warranted under the provisions of 10 CFR 50.12, in that it is authorized by law, does not present an undue risk to the public health and safety and is consistent with the common defense and security.

Special circumstances are present considering the lack of sufficient evidence that the fire barrier wrap meets the acceptance criteria for a rated one-hour fire barrier wrap (compliance with Section III.G.2.c). Safe shutdown conditions can be achieved and maintained with the installed fire barrier wrap protecting the safe shutdown power cable along with area wide automatic detection and suppression.

This exemption request is consistent with the ultimate objective of Appendix R, which is safe shutdown. There is no need to, or safety benefit associated with meeting the performance requirements of a one-hour fire rated barrier wrap since the use of the installed fire barrier wrap with a fire endurance rating less than one-hour has been shown to be a safe and effective means of protecting the cable and thereby achieving safe shutdown.

The information contained in this exemption request will permit the staff to complete its review of the FitzPatrick Appendix R fire protection program and issue a Safety Evaluation Report documenting their approval of the use of the installed fire barrier wrap to protect the safe shutdown capability of the plant.