WOLF CREEK
NUCLEAR OPERATING CORPORATION

Matthew W. Sunseri
President and Chief Executive Officer

June 2, 2010
WM 10-0017

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

Reference: 1) Letter ET 09-0018, dated December 16, 2009, from T. J. Garrett, WCNOC to USNRC

2) Letter dated May 6, 2010, from B. K. Singal, USNRC, to M. W. Sunseri, WCNOC, "Wolf Creek Generating Station – License Amendment Request for Use of Fire-Resistive Electrical Cable (TAC NO. ME2966)"

Subject: Docket No. 50-482: Response to Request for Additional Information Related to License Amendment Request for Use of Fire-Resistive Electrical Cable

Gentlemen:

Reference 1 provided Wolf Creek Nuclear Operating Corporation's (WCNOC) application for approval pursuant to License Condition 2.C(5), regarding the use of fire-resistive cable at Wolf Creek Generating Station (WCGS) for certain power and control cables associated with two motor-operated valves on Train B Component Cooling Water System. Reference 2 provided a request for additional information related to the application. Attachment I provides a response to the request for additional information. The Enclosure provides revised pages associated with Attachment II and III to Reference 1.

The response to the request for additional information clarifies information provided in Reference 1, does not expand the scope of the application as originally noticed, and does not impact the conclusions of the Nuclear Regulatory Commission (NRC) staff's original proposed no significant hazards consideration determination as published in the Federal Register (75 FR 10831). In accordance with 10 CFR 50.91, a copy of this submittal is being provided to the designated Kansas State official.

A006
NRR

This letter contains no commitments. If you have any questions concerning this matter, please contact me at (620) 364-4008, or Mr. Richard D. Flannigan at (620) 364-4117.

Sincerely,

M W Sunseri

Matthew W. Sunseri

MWS/rlt

Attachment

Enclosure

cc: E. E. Collins (NRC), w/a, w/e
T. A. Conley (KDHE), w/a, w/e
G. B. Miller (NRC), w/a, w/e
B. K. Singal (NRC), w/a, w/e
Senior Resident Inspector (NRC), w/a, w/e

STATE OF KANSAS)
) SS
COUNTY OF COFFEY)

Matthew W. Sunseri, of lawful age, being first duly sworn upon oath says that he is President and Chief Executive Officer of Wolf Creek Nuclear Operating Corporation; that he has read the foregoing document and knows the contents thereof; that he has executed the same for and on behalf of said Corporation with full power and authority to do so; and that the facts therein stated are true and correct to the best of his knowledge, information and belief.

By M W Sunseri
Matthew W. Sunseri
President and Chief Executive Officer

SUBSCRIBED and sworn to before me this 2nd day of June, 2010.

Cindy Novinger
Notary Public

NOTARY PUBLIC STATE OF KANSAS
CINDY NOVINGER
My Appt. Exp. 7/8/10

Expiration Date 7/8/2010

Response to Request for Additional Information

Reference 1 provided Wolf Creek Nuclear Operating Corporation's (WCNOC) application for approval pursuant to License Condition 2.C(5), regarding the use of fire-resistive cable at Wolf Creek Generating Station (WCGS) for certain power and control cables associated with two motor-operated valves on Train B Component Cooling Water (CCW) System. Reference 2 provided a request for additional information related to the application. The request for additional information included questions from the Fire Protection Branch and the Electrical Engineering Branch. The specific Nuclear Regulatory Commission (NRC) question is provided in italics.

Fire Protection Branch

1. *The licensee states in its application that the proposed change "...will not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire." If the proposed installation would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire, explain why the change would not fall under WCGS License Condition 2.C(5)(b).*

Response: WCNOC's evaluation of the proposed change determined that it would not adversely impact the ability to achieve and maintain safe shutdown in the event of a fire. This is based on the test reports provided in Enclosures I and II of Reference 1. However, WCNOC determined that the proposed change could be viewed as an adverse change to the approved WCGS Fire Protection Program because use of fire-resistive cable is not one of the approved methods to protect the redundant train of post-fire safe shutdown equipment as described in 10 CFR 50, Appendix R. While WCGS was licensed to operate after January 1, 1979, during initial plant licensing the NRC requested a comparison of the Fire Protection Program to the technical requirements of 10 CFR 50, Appendix R. The WCGS Updated Safety Analysis Report (USAR), Appendix 9.5E, contains the comparison of the WCGS Fire Protection Program against the requirements of Section III of Appendix R to 10 CFR 50. This comparison is considered part of the approved WCGS Fire Protection Program. Since the WCGS response to Section III.G.2 does not include use of fire-resistive cable in lieu of one of the methods in III.G.2, WCNOC considered the proposed change to constitute a change that could adversely impact the ability to achieve and maintain safe shutdown in the event of a fire.

2. *Please provide a detailed summary of the analysis that demonstrates that the installed configurations will be bounded by the tested configurations with respect to electrical properties (voltage, current, conductor size, number of conductors, etc.) of the installed cables. The summary provided should include a discussion of key assumptions, methods, results, and conclusions.*

Response: During a phone call between the NRC and WCNOC on April 20, 2010, further clarification of this question was requested. WCNOC indicated that Section 3 of Attachment I of Reference 1 contains a detailed technical evaluation of the electrical properties of the Meggitt cable during fire and non-fire conditions. The NRC requested a summary table similar to the cable support table on page 6 of 13 of Attachment I to Reference 1. The following tables provide the requested information.

TABLE 1

COMPARISON OF PHYSICAL CHARACTERISTICS OF MEGGITT Si2400 CABLE WITH THAT USED AT WCGS

Parameter	Tested Configuration	WCGS Configuration	Conclusion	Applicable Test/References
Outside Diameter	0.592 in	0.592 in	Tested configuration bounds installed configuration	121039 E-057C-00002 Spec. E-057C
Sheath Thickness	0.0155 in	0.0155 in	Tested configuration bounds installed configuration	121039 E-057C-00002 Spec. E-057C
Sheath Material	321 Stainless Steel	321 Stainless Steel	Tested configuration bounds installed configuration	121039 E-057C-00002 Spec. E-057C
Conductor Material	Nickel Clad (27%) Copper	Nickel Clad (27%) Copper	Tested configuration bounds installed configuration	121039 E-057C-00002 Spec. E-057C
Insulation	Silicone Dioxide	Silicone Dioxide	Tested configuration bounds installed configuration	121039 E-057C-00002 Spec. E-057C

TABLE 2

COMPARISON OF TESTED/REQUIRED CONFIGURATION WITH WCGS CONFIGURATION FOR CIRCUITS CONTAINING MEGGITT SI2400 FIRE RESISTIVE CABLES

VALVE EGHV0016

Parameter	Tested/Required Configuration	WCGS Configuration	Conclusion	Applicable Test/References
POWER CABLES				
Voltage Rating	600 VAC	600 VAC	Tested configuration bounds installed configuration	121039
Number of Conductors/ Conductor Size	4/C # 8 AWG	3/C # 6 AWG	Note 1	121039
Current (Amps)	N/A	0.75 A	Note 2	N/A
Minimum Insulation Resistance @ 1925 F	3.1 Meg Ohms - ft	1.0 Meg Ohms - ft	Note 3	121069 E-057C-00002
Minimum Motor Terminal Voltage	379 VAC	380 VAC	The calculated minimum motor terminal voltage exceeds the required voltage and is therefore acceptable.	E-025-00007, Sheet 211 Calc. XX-E-004
CONTROL CABLES				
Voltage Rating	600 VAC	600 VAC	Tested configuration bounds installed configuration	121039
Number of Conductors/ Conductor Size	7/C # 10 AWG 8/C # 12 AWG	7/C # 12 AWG	Tested configuration bounds installed configuration	121039

TABLE 2

COMPARISON OF TESTED/REQUIRED CONFIGURATION WITH WCGS CONFIGURATION FOR CIRCUITS CONTAINING MEGGITT SI2400 FIRE RESISTIVE CABLES

VALVE EGHV0016

Parameter	Tested/Required Configuration	WCGS Configuration	Conclusion	Applicable Test/References
Starter Coil Pickup Current	1.261 Amps	1.362 Amps	The available pickup current exceeds the minimum required and is therefore acceptable.	Calc. XX-E-012
Minimum Insulation Resistance	7/C # 10 AWG 4.2 Meg Ohms - ft 8/C # 12 AWG 7.8 Meg Ohms - ft	1.0 Meg Ohms - ft	Note 4	121039
Minimum Starter Voltage	88.8 VAC	95.93 VAC	The available starter voltage exceeds the required starter voltage and is therefore acceptable.	Calc. XX-E-012

Notes:

1. Type testing of various conductor sizes and number of conductors utilizing ASTM E-119 resulted in all cable specimens in test 121039 successfully withstanding the fire and hose stream test for 3 hours. The Meggitt power cable chosen for use at WCGS is a 3 conductor # 6 AWG cable. This configuration was not specifically tested in 121039. The 3/C # 6 AWG cable and 4/C # 8 AWG cables are similar in configuration and the same in material composition which provides reasonable assurance that the two will perform similarly under fire exposure.

2. The full load current for valve EGHV0016 motor is 0.75 amps per E-025-00007, Sheet 211. 3/C # 6 AWG Meggitt Si2400 cable is capable of carrying 330 Amps at 2000 °F. Therefore, the cable is suitable for supplying the valve motor.

3. The 4/C # 8 AWG cable tested had a minimum insulation resistance (IR) of 3.1 Meg Ohms - ft during the fire test. The 3/C # 6 AWG cable was not tested. None of the cables tested had an IR less than 3.1. Meggitt datasheet shown on WCGS document E-057C-00002 lists a minimum IR of 1.0 Meg ohms – ft. Therefore, for conservatism, a value of 1.0 Meg ohms - ft is used for the 3/C # 6 AWG cable.

4. The 7/C # 12 AWG Si2400 cable was not specifically tested. The test report shows that the 7/C # 14 AWG cable had a minimum insulation resistance of 16.2 Meg Ohms - ft while the 7/C # 10 AWG cable had a minimum insulation resistance of 4.2 Meg Ohms - ft. For conservatism, WCGS uses a value of 1.0 Meg Ohms – ft for the 7/C # 12 AWG Si2400 cable.

TABLE 3

COMPARISON OF TESTED/REQUIRED CONFIGURATION WITH WCGS CONFIGURATION FOR CIRCUITS CONTAINING MEGGITT SI2400 FIRE RESISTIVE CABLES

VALVE EGHV0054

Parameter	Tested/Required Configuration	WCGS Configuration	Conclusion	Applicable Test/References
POWER CABLES				
Voltage Rating	600 VAC	600 VAC	Tested configuration bounds installed configuration	121039
Number of Conductors/ Conductor Size	4/C # 8 AWG	3/C # 6 AWG	Note 1	121039
Current (Amps)	N/A	0.75 A	Note 2	N/A
Minimum Insulation Resistance	N/A	1.0 Meg Ohms - ft	Note 3	121069 E-057C-00002
Minimum Motor Terminal Voltage	379 VAC	380 VAC	The calculated minimum motor terminal voltage exceeds the required voltage and is therefore acceptable.	E-025-00007, Sheet 211 Calc. XX-E-004
CONTROL CABLES				
Voltage Rating	600 VAC	600 VAC	Tested configuration bounds installed configuration	121039
Number of Conductors/ Conductor Size	7/C # 10 AWG 8/C # 12 AWG	7/C # 12 AWG	Tested configuration bounds installed configuration	121039
Starter Coil Pickup Current	1.261 Amps	1.353 Amps	The available pickup current exceeds the minimum required and is therefore acceptable.	Calc. XX-E-012

TABLE 3

COMPARISON OF TESTED/REQUIRED CONFIGURATION WITH WCGS CONFIGURATION FOR CIRCUITS CONTAINING MEGGITT SI2400 FIRE RESISTIVE CABLES

VALVE EGHV0054

Parameter	Tested/Required Configuration	WCGS Configuration	Conclusion	Applicable Test/References
Minimum Insulation Resistance	7/C # 10 AWG 4.2 Meg Ohms - ft 8/C # 12 AWG 7.8 Meg Ohms - ft	1.0 Meg Ohms - ft	Note 4	121039
Minimum Starter Voltage	88.8 VAC	95.28 VAC	The available starter voltage exceeds the required starter voltage and is therefore acceptable.	Calc. XX-E-012

Notes:

1. Type testing of various conductor sizes and number of conductors utilizing ASTM E-119 resulted in all cable specimens in test 121039 successfully withstanding the fire and hose stream test for 3 hours. The Meggitt power cable chosen for use at WCGS is a 3 conductor # 6 AWG cable. This configuration was not specifically tested in 121039. The 3/C # 6 AWG cable and 4/C # 8 AWG cables are similar in configuration and the same in material composition which provides reasonable assurance that the two will perform similarly under fire exposure.

2. The full load current for valve EGHV0054 motor is 0.75 amps per E-025-00007, Sheet 213. 3/C # 6 AWG Meggitt Si2400 cable is capable of carrying 330 Amps at 2000 °F. Therefore, the cable is suitable for supplying the valve motor.

3. The 4/C # 8 AWG cable tested had a minimum insulation resistance (IR) of 3.1 Meg Ohms - ft during the fire test. The 3/C # 6 AWG cable was not tested. None of the cables tested had an IR less than 3.1. Meggitt datasheet shown WCGS document E-057C-00002 lists a minimum IR of 1.0 Meg ohms – ft. Therefore, for conservatism, a value of 1.0 Meg ohms - ft is used for the 3/C # 6 AWG cable.

4. The 7/C # 12 AWG Si2400 cable was not specifically tested. The test report shows that the 7/C # 14 AWG cable had a minimum insulation resistance of 16.2 Meg Ohms - ft while the 7/C # 10 AWG cable had a minimum insulation resistance of 4.2 Meg Ohms - ft. For conservatism, WCGS uses a value of 1.0 Meg Ohms – ft for the 7/C # 12 AWG Si2400 cable.

3. *In its application dated December 16, 2009, the licensee states that:*

> *WCNOC is proposing to route the new fire-resistive cable from the valves to the motor control center, which would include installation of the cable in Fire Areas A-16 and A-21." [Attachment I, page 3 of 13]*

a. *Does this indicate that the Meggitt cable is to be installed in all three (A-16, A-21, and A-27) fire areas? If so, please elaborate on the planned installation of Meggitt cable in fire areas A-16 and A-21.*

b. *Do fire areas A-16 and A-21 require the same fire rating for the Meggitt cables that are proposed to be installed as the fire rating that is required in fire area A-27? If the fire resistance of the Meggitt cable is not required in the additional fire areas, please describe why the Meggitt is being installed in the additional areas.*

c. *If the Meggitt is not to be installed in the additional fire areas, clearly describe what will be installed in each of the three fire areas.*

Response:

Fire area A-27 is located in the Auxiliary Building and includes the room listed in Table A-27-1.

Table A-27-1
Room Located in Fire Area A-27

ROOM #	DESCRIPTION
1403	Rod Drive/MG Set Room

Fire area A-27 is protected with a total flooding Halon fire suppression system. In addition, automatic fire detection is installed throughout. The automatic suppression and detection system meets the intent of 10CFR50, Appendix R, Section III.G.2.c.

Fire area A-16 is located in the Auxiliary Building and includes the rooms listed in Table A-16-1.

Table A-16-1
Rooms Located in Fire Area A-16

ROOM #	DESCRIPTION
1401	CCW pump and heat exchanger area (B)
1402	Corridor (No.1)
1406	CCW pump and heat exchanger area (A)
1408	Corridor (No. 2)

Fire area A-16 is divided into two sections (A-16 North and A-16 South). The area between A-16 North and A-16 South is a minimum of 20'-0" in width and is considered an area free of combustibles and fire hazards in accordance with 10CFR50, Appendix R Section III.G.2.b.

Fire area A-21 is located in the Auxiliary Building and includes the room listed in Table A-21-1.

Table A-21-1
Room Located in Fire Area A-21

ROOM #	DESCRIPTION
1501	Train B Control Room A/C Unit

Fire area A-21 has no installed automatic suppression system but is provided with automatic fire detection throughout.

These fire areas are shown on USAR Figures 9.5.1-2-03 and 9.5.1-2-04.

Reference 1 indicated that the fire-resistive cable from the valves to the motor control center which would include installation in fire areas A-16 and A-21. The fire-resistive cable will not be installed in fire area A-27. Rather, a more direct route will be taken from the valves to the motor control center which is located in fire area A-21. Fire area A-21 is directly above fire area A-16 North so the fire-resistive cable will only be installed in fire areas A-16 and A-21.

The location of valves EGHV0016 and EGHV0054 are in the portion of fire area A-16 South of the combustible free zone. The fire resistance rating of the cable is not required in the South portion of fire area A-16. The fire-resistive cable will run within the combustible free zone to the North portion of fire area A-16 and then turn upwards into fire area A-21. The fire resistance rating of the cable is required within the combustible free zone and A-16 North because valves EGHV0016 and EGHV0054 are credited for a fire in area A-16 North. The fire resistance rating of the cable is not required in fire area A-21.

4. *In several places in its application, the licensee describes the use of Meggitt cable for 1 hour fire rated applications. Examples include:*

> *This testing demonstrated that the cable is capable of providing an equivalent level of protection as would be provided by a 3-hour and 1-hour rated fire barrier as described by Title 10 of the Code of Federal Regulations (10 CFR), Part 50, Appendix R, Section III.G.2. [Attachment I, page 5 of 13]*
>
> *The WCGS design specifies that fire-resistive cables required to only withstand a 1-hour fire are to be routed with the most practical routes along walls and ceilings. Fire detectors and automatic fire suppression systems are installed in the 1-hour fire areas, which mitigate the possibility of damage from equipment or material failing and falling onto the fire-resistive cable. [Attachment I, page 6 of 13]*
>
> *The 600 volt fire-resistive control and power cables are type tested to 1925°F to verify 1 hour and 3 hour fire ratings, and to verify environmental qualifications in accordance with NRC Generic Letter 86-10, Supplement 1. [Attachment II, page 10 of 17]*
>
> *Fire-resistive cable, which has been successfully tested per the requirements of U.S. Nuclear Regulatory Commission (NRC) Generic Letter 86-10, Supplement 1, may be used in lieu of the rated fire barrier requirement in III.G.2.a and c." [Attachment II, page 17 of 17]*

However, the majority of the application describes a specific 3-hour fire-rated installation.

a. *Does the licensee also intend to install the Meggitt cable in lieu of 1-hour rated barriers, or in other 3-hour rated applications?*

b. *If so, please describe these additional applications in detail.*

c. *If not, the application should be amended to remove references to other installations.*

Response:

a. The fire-resistive cable (Meggitt cable) will be installed in the specific locations described in Reference 1 (EGHV0016 and EGHV0054 power and control cables) in lieu of 3-hour rated barriers only. The fire-resistive cable has been tested to withstand a 3-hour ASTM E-119 fire exposure (Reference 1, Enclosures I and II). Reference 1, page 6 of 13 in Attachment I, stated:

> The WCGS design specifies that fire-resistive cables required to only withstand a 1-hour fire are to be routed with the most practical routes along walls and ceilings. Fire detectors and automatic fire suppression systems are installed in the 1-hour fire areas, which mitigate the possibility of damage from equipment or material failing and falling onto the fire-resistive cable.

This statement was included in the application for the potential use of the fire-resistive cable in 1-hour applications. However, the specific application addressed by this amendment request will not be in a 1-hour application. The proposed changes to USAR

Table 9.5E-1 (Sheet 6) provided in Attachment II (page 17 of 17) of Reference 1 has been revised to reference only III.G.2.a only rather than III.G.2.a and c.

b. WCNOC does not have any current plans to install the fire-resistive cable in additional applications.

c. There are no other installations referenced in the application. The only installations included in the application are valves EGHV0016 and EGHV0054. The proposed change to USAR Table 9.5E-1 (Reference 1, Attachment II, page 17 of 17) is modified to indicate that the use of fire-resistive cable is applicable to valves EGHV0016 and EGHV0054. The revised page is provided in the Enclosure to this submittal.

5. *On page 8.3-29 of its application, related to the proposed modification to WCGS USAR, the licensee states:*

> *Openings in solid floors for vertical runs of cables are sealed with fire resistant material with the exception of 600 volt fire-resistive control and power cables which are routed independent of raceways. [Attachment II to the application, page 12 of 17]*

a. Please describe in detail the relationship between this change and the requested licensing action.

b. If there is no relationship, please retract the change from this application, or explain why it is appropriate.

c. If this change is related to this application, please provide a detailed summary of the plant-specific analyses that demonstrate the acceptability of unsealed openings in fire area boundaries, and other rated barriers, related to Meggitt cables, as described above. The summary provided should include a discussion of key assumptions, methods, results, and conclusions.

Response: The proposed change was incorrectly shown in Reference 1, Attachment II, page 12 of 17. The intended change was to add the additional wording to the prior sentence that states, "In addition, the cables are enclosed in conduit." The proposed change should have read:

"In addition, the cables are enclosed in conduit <u>with the exception of 600 volt fire-resistive control and power cables which are routed independent of raceways</u>."

The revised page is provided in the Enclosure to this submittal.

6. *In the Regulatory Evaluation section of the application the licensee states:*

> *Paragraph (e) states "Nuclear power plants licensed to operate after January 1, 1979, shall...satisfy Criterion 3 of Appendix A to this part in accordance with the provisions of their licenses." [Attachment I, page 11 of 13]*

Paragraph 50.48(e)of 10 CFR is no longer in force, and was removed nearly 10 years ago (65 FR 38190, June 20, 2000).

a. *Please revise the Regulatory Evaluation to ensure that only currently in-force regulations are referenced, or provide an explanation for the use of obsolete references. In addition, please ensure that the descriptions of regulation sections are accurate (e.g., the description of the 10 CFR III.G.2. requirements).*

Response: Section 4.1 of Reference 1 is replaced by the following:

4.1 Applicable Regulatory Requirements/Criteria

10 CFR 50, Section 48, Fire Protection, in paragraph (a)(1) states, in part: "Each holder of an operating license issued under this part or a combined license issued under part 52 of this chapter must have a fire protection plan that satisfies Criterion 3 of appendix A to this part." Paragraph (b) states, in part: "Appendix R to this part establishes fire protection features required to satisfy Criterion 3 of appendix A to this part with respect to certain generic issues for nuclear power plants licensed to operate before January 1, 1979."

10 CFR 50, Appendix R Section III.G.2 states, in part: "Except as provided for in paragraph G.3 of this section, where cables or equipment, including associated non-safety circuits that could prevent operation or cause maloperation due to hot shorts, open circuits, or shorts to ground, of redundant trains of systems necessary to achieve and maintain hot shutdown conditions are located within the same fire area outside of primary containment, one of the following means of ensuring that one of the redundant trains is free of fire damage shall be provided:

a. Separation of cables and equipment and associated non-safety circuits of redundant trains by a fire barrier having a 3-hour rating. Structural steel forming a part of or supporting such fire barriers shall be protected to provide fire resistance equivalent to that required of the barrier;

b. Separation of cables and equipment and associated non-safety circuits of redundant trains by a horizontal distance of more than 20 feet with no intervening combustible or fire hazards. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area; or

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

10 CFR 50, Appendix A, *Criterion 3—Fire protection.* Structures, systems, and components important to safety shall be designed and located to minimize, consistent with other safety requirements, the probability and effect of fires and explosions. Noncombustible and heat resistant materials shall be used wherever practical throughout the unit, particularly in locations such as the containment and control room. Fire detection and fighting systems of appropriate

capacity and capability shall be provided and designed to minimize the adverse effects of fires on structures, systems, and components important to safety. Firefighting systems shall be designed to assure that their rupture or inadvertent operation does not significantly impair the safety capability of these structures, systems, and components.

The WCGS Fire Hazards Analysis (FHA) is documented in document E-1F9905, which is incorporated into the USAR by reference and is part of the approved fire protection program. Section 4.6.1 of E-1F9905 reads, in part "The design goal for safety-related areas outside of the Containment was to provide the equivalent of a 3-hour rated fire barrier between redundant trains, as described in 10 CFR 50, Appendix R, Paragraph III.G.2.a. Where this was not possible, credit was taken for the detection and suppression systems installed in the plant, and compliance to the provisions of Appendix R, Paragraphs III.G.2.b and c, was addressed."

The WCGS USAR, Appendix 9.5E, provides a comparison of the WCGS Fire Protection Program against the requirements of Section III of Appendix R to 10 CFR 50. Although WCGS obtained its operating license after January 1, 1979, the NRC stated, in the WCGS SER (NUREG-0881) dated April, 1982, that they will condition the WCGS operating license to require WCGS to meet the technical requirements of Appendix R to 10 CFR 50, or provide equivalent protection. However, the Condition never appeared in the WCGS full power operating license when it was issued on June 4, 1985.

Table 9.5E-1 in Appendix 9.5E of the WCGS USAR indicates in response to the provisions in 10 CFR 50 Appendix R Section III.G that redundant trains of systems required to achieve and maintain hot standby are separated by 3-hour rated fire barriers or the equivalent provided by III.G.2.

7. *In its application, the licensee references a precedent, but does not relate the precedent to its different licensing basis for WCGS:*

   Amendment No. 123 to Shearon Harris Nuclear Power Plant, Unit 1 Facility Operating License No. NPF-62 approved the use of fire-resistive electrical cables in lieu of alternatives specified in Section C5.b.2 of Branch Technical Position Chemical Engineering Branch 9.5-1 for certain volume control tank outlet valves.

   a. *Revise the discussion to clearly relate the requirements that the precedent is satisfying to those in the WCGS licensing basis that are of concern in the current application.*

Response: The below additional information is provided in regards to the referenced precedent.

<u>WCGS Fire Protection Program Licensing Basis</u>

NUREG-0881, "Safety Evaluation Report related to the operation of Wolf Creek Generating Station, Unit No. 1," Supplement No. 5 (hereafter referred to as SSER No. 5 (Reference 3)) was based on a site audit to close out open items from the NUREG-0881, "Safety Evaluation Report related to the operation of Wolf Creek Generating Station, Unit No. 1," (hereafter referred to as SER (Reference 4)), letters submitted February 1, 1984 (Reference 5), February 24, 1984 (Reference 6), August 23, 1984 (Reference 7), January 13, 1985 (Reference 8) and SNUPPS FSAR through Revision 17 and WCGS FSAR Site Addendum Revision 15. SSER No. 5 was the final pre-license supplement of the SER, that addressed the WCGS Fire Protection

Program. The purpose of the supplement was to provide the NRC evaluation of items that had not been previously resolved, and to address changes to the SER that resulted from the receipt of additional information. SSER No. 5 identifies in Section 1.1 that the discussions are supplementary to and not in lieu of previous discussions, unless otherwise noted.

Based on several direct references in SSER No. 5, it is evident that the NRC Staff predominantly utilized BTP CMEB 9.5-1 as the review guidance document when it conducted the supplemental evaluation of the fire protection items addressed in SSER No. 5. At the time of SSER No. 5 compilation, BTP CMEB 9.5-1 was the current version presenting the guidelines acceptable to the staff for implementing General Design Criterion 3 of 10 CFR 50 Appendix A. It contained acceptance criteria listed in a number of documents, including Appendix R to 10 CFR 50, and BTP ASB 9.5-1. However, the NRC had requested by letter dated September 30, 1976, that WCGS provide a comparison of the Fire Protection Program to Appendix A to BTP APCSB 9.5-1, which as previously identified, is a predecessor to BTP CMEB 9.5-1.

A review of SSER No. 5 Section 9.5.1 direct references to BTP CMEB 9.5-1, in comparison with the corresponding WCGS evaluated requirements of Appendix A to BTP APCSB 9.5-1 (USAR 9.5A) and Appendix R to 10 CFR 50 (USAR 9.5B), found no substantial variances between the applicable document requirements. Therefore, regarding the various iterations of the *Guidelines for Fire Protection for Nuclear Power Plants*, (BTP APCSB 9.5-1, BTP ASB 9.5-1, and BTP CMEB 9.5-1), the USAR comparison to Appendix A to BTP APCSB 9.5-1 presents the license basis. The BTP CMEB 9.5-1 direct reference approvals in SSER No. 5, and reference to BTP ASB 9.5-1 are considered bounded by the WCGS's commitment to the Vassallo Letter (Reference 9) and the USAR comparisons to Appendix A to BTP APCSB 9.5-1 and Appendix R to 10 CFR 50.

Amendment No. 123 to Shearon Harris Nuclear Power Plant, Unit 1 Facility Operating License No. NPF-62

By letters dated August 18, 2005 (Reference 10), as supplemented by letter dated February 15, 2006 (Reference 11), Progress Energy Carolinas, Inc. applied for an amendment to the Shearon Harris Nuclear Power Plant, Unit 1 to allow the use of fire-resistive cable (type Si2400 manufactured by Meggitt Safety Systems, Inc.) for protection of safe shutdown electrical cables. In Reference 10, Progress Energy identified that the Harris UFSAR Section 9.5.1.2.2, "Barriers and Access," states that fire barriers with a minimum fire resistance rating of three hours were provided such that both redundant divisions or trains of safety-related systems were not subject to damage from a single fire to the extent possible in accordance with NRC position C.5.b.2 of Branch Technical Position (BTP) Chemical Engineering Branch (CMEB) 9.5-1 (NUREG-0800), dated July 1981. The safety evaluation for Amendment No. 123 (Reference 12), Section 4.0, states, in part: "The NRC staff concludes that the deviation from fire protection program requirements in License Condition 2.F in Facility Operating License NPR-63 for HNP is acceptable for using fire-resistive electrical cable in lieu of the alternatives specified in Section C5.b.2 of BTP 9.5.-1 for the VCT outlet valves ....)" Based on the information in Reference 10 and Reference 12, the licensing basis for Shearon Harris Nuclear Power Plant Fire Protection Program is BTP 9.5-1.

Comparison of BTP CMEB 9.5-1 to Appendix R Section III.G.2

NUREG 0800, Section 9.5.1, Position C.5.b.1 of BTP CMEB 9.5-1 states: "Fire protection features should be provided for structures, systems and components important to safe shutdown. These features should be capable of limiting fire damage so that:

(a) One train of systems necessary to achieve and maintain hot shutdown conditions (not standby for PWR) from either the control room or emergency control station(s) is free of fire damage; and

(b) Systems necessary to achieve and maintain cold shutdown from either the control room or emergency station(s) can be repaired within 72 hours."

NUREG 0800, Section 9.5.1, Position C.5.b.2 of CMEB 9.5-1 provides the following three (3) methods for meeting the criteria specified by Position C.5.b.1:

(a) Separation of cables and equipment and associated circuits of redundant trains by a fire barrier having a 3-hour rating. Structural steel forming a part of or supporting such fire barriers should be protected to provide fire resistance equivalent to that required of the barrier;

(b) Separation of cables and equipment and associated circuits of redundant trains by a horizontal distance of more than 20 feet with no intervening combustible or fire hazards. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area; or

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

Appendix R to Part 50, Section III.G, *Fire protection of safe shutdown capability,* states, in part:

1. Fire protection features shall be provided for structures, systems, and components important to safe shutdown. These features shall be capable of limiting fire damage so that:

a. One train of systems necessary to achieve and maintain hot shutdown conditions from either the control room or emergency control station(s) is free of fire damage; and

b. Systems necessary to achieve and maintain cold shutdown from either the control room or emergency control station(s) can be repaired within 72 hours.

2. Except as provided for in paragraph G.3 of this section, where cables or equipment, including associated non-safety circuits that could prevent operation or cause maloperation due to hot shorts, open circuits, or shorts to ground, of redundant trains of systems necessary to achieve and maintain hot shutdown conditions are located within the same fire area outside of primary containment, one of the following means of ensuring that one of the redundant trains is free of fire damage shall be provided:

a. Separation of cables and equipment and associated non-safety circuits of redundant trains by a fire barrier having a 3-hour rating. Structural steel forming a part of or supporting such fire barriers shall be protected to provide fire resistance equivalent to that required of the barrier;

b. Separation of cables and equipment and associated non-safety circuits of redundant trains by a horizontal distance of more than 20 feet with no intervening combustible or fire hazards. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area; or

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

Based on a review of the above information, it can be concluded the licensing basis between the two plants is essentially the same.

8. *In its application, the licensee proposed an addition to the WCGS Fire Hazard Analysis (FHA), page 17 of 274*

> *Safety-related cable in the general plant area is qualified to Institute of Electrical and Electronics Engineers (IEEE) 383-1974. All single conductors inside control panels meet the flame resistance requirements of Insulated Power Cable Engineers Association (IPCEA) S-19-81 or S-61-402, or Military Specification MIL-W-810044B3. [Attachment III, page 5 of 27]*

a. *Please describe in detail the relationship between this change and the requested licensing action.*

b. *If there is no relationship, please retract this change from the application or explain why it is appropriate.*

Response:

a. Meggitt Safety Systems manufactures termination assemblies for their fire-resistive cables. The termination assemblies utilize insulated copper conductors that meet military specification MIL-W-81044B. Meggitt Safety Systems does not utilize IPCEA S-19-81 or S-61-402 in the manufacture of their termination assemblies. A review of MIL-W-81044B and the IPCEA standards shows that the MIL standard meets or exceeds the IPCEA standards and therefore the termination assemblies are considered acceptable for use within control cabinets at WCGS.

The intended locations of the fire-resistive cable as described in Reference 1 will not have any cable or termination assemblies installed inside control cabinets. The proposed change in Reference 1, Attachment III, page 5 of 27, was made to allow future use of the cable within control cabinets. However, since Reference 1 is only applicable to the installation of the cable for valves EGHV0016 and EGHV0054 and these specific applications do not involve control cabinets, this portion of the change is withdrawn. The

revised page is provided in the Enclosure to this submittal and includes changing "fire-resistive material" to "fire-resistive cable" for further clarification.

b. The change is being withdrawn based on the response to Question a.

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9. *On page 3 of the LAR, the licensee stated:*

> *The cables are purchased as safety related, seismically-qualified, environmentally-qualified, Class 1 E cables, which meet the 3-hour fire endurance rating when tested per the requirements of Supplement 1 to Generic Letter 86-10, "Implementation of Fire Protection Requirements," (Reference 6.1). For the proposed application, the cables are not used in a harsh environment and therefore, are not required to be environmentally qualified.*

However, as noted on page 5 of Attachment II to the LAR, the licensee proposed adding the new fire-resistive cables to Table 3.11 (B)-3 (Sheet 68) of Section 3.11 of WCGS's USAR. Specifically, these cables are described as being required to function during a high energy line break accident (as denoted by the letter 'A' in the Category column).

a. Please explain the apparent discrepancy.

Response:

The fire-resistive cables are being purchased as safety related, seismically qualified, environmentally qualified, Class 1E. However, the specific installation of the cable as described in Reference 1 and in Question 3 above, is not in a harsh environment. Therefore, the proper category for the Meggitt Si2400 cable for a high energy line break (HELB) is category D (Item is in a mild environment post accident). Attachment II, page 5 of 17 is revised to category D. The revised page is provided in the Enclosure to this submittal.

10. *This question is only applicable if the new fire-resistive cables are required to meet NRC's environmental qualification requirements. On page 5 of the LAR, the licensee stated:*

> *The cables are type Si2400 manufactured by Meggitt Safety Systems, Inc. This cable has demonstrated that it is capable of operating continuously for three hours during the most severe design basis fire, and it satisfies the other design considerations such as environmental qualification, seismic, and electrical characteristics.*

a. Please provide a summary of your environmental qualification technical analysis. In your response, provide details that demonstrate that the new fire-resistive cables will perform their design function under postulated design bases events (i.e., loss of coolant accident, high energy line break, and main steam line break). Also, please provide the environmental qualification profiles for each area that these cables will be located to show that the new fire-resistive cables will be bounded by the original assumptions.

b. *Please describe whether the conventional cables that the new fire-resistive cables will be connected to are environmentally qualified.*

c. *Please describe the impact of connecting (i.e., splicing) the new fire-resistive cables to the existing conventional cables (i.e., the impact on both the new fire-resistive cables and the conventional cables) on the environmental qualification of each type of cable.*

d. *Please describe whether the splices and supports are environmentally qualified.*

e. *Please describe how the new fire-resistive cables will be protected from water and chemical sprays.*

Response:

a. As stated in the response to Question 9, the specific use of the fire-resistive cable as described in the application does not include a harsh environment. Therefore, no environmental qualification technical analysis was performed for the specific uses described in Reference 1.

The purchase specification (E-057C) requires that the cables meet or exceed the following environmental conditions:

Temperature	-40 C to 50 C (-40 F to 122 F)
Pressure	+/- 2 psig
Humidity	50 to 100 % Relative Humidity
Radiation	1 X 10^3 rad/hr Operating Dose Rate
	3.5 X 10^7 rad Integrated Dose

The environmental design conditions for the rooms in which the cables will be installed are as follows:

Room	Environmental Conditions (USAR Tables 3.11(B)-1 and 3.11(B)-2)							
	Normal				Post-Accident			
	Temp max/min (F)	Pressure (psig)	Humidity max/min (%)	Radiation	Temp Max (F)	Pressure (psig)	Humidity max (%)	Radiation
1402	104/60	Atm.	70/5	< 0.0005 rad/hr < 200 rad	106	1.0	71	220 Rad
1408	104/60	Atm.	70/5	0.002–0.004 rad/hr < 1000 rad	106	1.0	71	1,120 Rad
1501	104/60	Atm.	70/5	< 0.001 rad/hr < 350 rad	105	Atm.	71	101 Rad

Based on a comparison of the purchase specification E-057C requirements against the environmental profiles of each room, the fire-resistive cables will perform their intended function under normal and accident conditions.

b. The conventional control cables to which the fire-resistive cables will be connected are 600 Volt copper control cables purchased under specification E-057. The conventional power cables to which the fire-resistive cables will be connected are 600 Volt copper power cables purchased under specification E-058. Based on USAR Table 3.11(B)-3 (Sheet 68) the conventional cables are environmentally qualified.

c. There is no adverse impact of connecting the new fire-resistive cable to the existing conventional cable. The connections are made within an approved termination box using approved termination blocks. The fire-resistive cable is fitted with a termination assembly equipped with pigtails made of conventional conductors of the proper size for the application. The pigtails will be provided with termination lugs then landed on the termination block. The conventional cable will be pulled into the termination box and similarly landed on the appropriate lug. Therefore, there is no splicing of the conventional cable to the fire-resistive cable outside an approved termination box. Since the rooms are not harsh environments, there are no environmental qualification requirements for the cables.

d. Since the rooms are not harsh environments, there are no environmental qualification requirements for the splices and supports.

e. The terminations are protected from direct water and chemical sprays by being located within a NEMA 1 termination box which is consistent with other termination boxes in the area. The fire-resistive cable has a continuous stainless steel outer jacket which will protect the conductors and insulation against water and chemical sprays.

References:

1. Letter ET 09-0018, "License Amendment Request (LAR) for Use of Fire-Resistive Electrical Cable," from T. J. Garrett, WCNOC, to USNRC, December 16, 2009.

2. NRC letter from B. K. Singal, USNRC, to M. W. Sunseri, WCNOC, "Wolf Creek Generating Station –License Amendment Request for Use of Fire-Resistive Electrical Cable (TAC NO. ME2966)," May 6, 2010.

3. NUREG-0881, "Safety Evaluation Report related to the operation of Wolf Creek Generating Station, Unit No. 1," Supplement No. 5, March 1985.

4. NUREG-0881, "Safety Evaluation Report related to the operation of Wolf Creek Generating Station, Unit No. 1," April 1982.

5. Letter SLNRC 84-0014, "Fire Protection Review," from N. A. Petrick, SNUPPS, to H. R. Denton, USNRC, February 1, 1984.

6. Letter SLNRC 84-0037, "Fire Protection Review," from N. A. Petrick, SNUPPS, to H. R. Denton, USNRC, February 24, 1984.

7. Letter SLNRC 84-0109, "Fire Protection Review," from N. A. Petrick, SNUPPS, to H. R. Denton, USNRC, August 23, 1984.

8. Letter KMLNRC 85-028, "Fire Protection, Control Room Halon System," from G. L. Koester, KGE, to H. R. Denton, USNRC, January 13, 1985.

9. "Nuclear Plant Fire Protection Functional Responsibilities, Administrative Controls and Quality Assurance," August 27, 1977.

10. Letter HNP-05-06, "Request for License Amendment to Use Fire-Resistive Cable at Harris Nuclear Plant," August 18, 2005. ADAMS Accession Number: ML052640144

11. Letter HNP-06-004, "Response to Request for Additional Information (RAI) Regarding the Request for a License Amendment to Use Fire-Resistive Cable at Harris Nuclear Plant," February 15, 2006. ADAMS Accession Number: ML060540397

12. Amendment No. 123 to Shearon Harris Nuclear Power Plant, Unit 1 Facility Operating License No. NPF-62, "Shearon Harris Nuclear Power Plant, Unit 1 – Issuance of Amendment on Use of Fire Resistive Cable (TAC NO. MC8134)," May 1, 2006. ADAMS Accession Number: ML061140227

Revised Pages to Attachment II and III to ET 09-0018
(4 pages)

WOLF CREEK

TABLE 3.11(B)-3 (Sheet 68)

COMPONENT NUMBER	DESCRIPTION	LOCATION ROOM No.	SPEC. NUMBER	(4) SHUTDN HOT	SHUTDN COLD	CATEGORY LOCA	CATEGORY MSLB	CATEGORY HELB	NORM ENV	ACCIDENT ENVIRONMENT T	P	R	H	SP
ZSI219	ELECTRICAL PENETRATION ASSY	2000	E-035	X	X	A	A	D	T1	F3	F6	T4	T2	T5
ZSI219	ELECTRICAL PENETRATION MODULE	2000	E-035B	X	X	A	A	D	T1	F3	F6	T4	T2	T5
ZSI233	ELECTRICAL PENETRATION ASSY	2000	E-035	X	X	A	A	D	T1	F3	F6	T4	T2	T5
ZSI233	ELECTRICAL PENETRATION MODULE	2000	E-035B	X	X	A	A	D	T1	F3	F6	T4	T2	T5
ZSI234	ELECTRICAL PENETRATION ASSY	2000	E-035	X	X	A	A	D	T1	F3	F6	T4	T2	T5
ZSI234	ELECTRICAL PENETRATION MODULE	2000	E-035B	X	X	A	A	D	T1	F3	F6	T4	T2	T5
ZSI243	ELECTRICAL PENETRATION ASSY	2000	E-035	X	X	A	A	D	T1	F3	F6	T4	T2	T5
ZSI243	ELECTRICAL PENETRATION MODULE	2000	E-035B	X	X	A	A	D	T1	F3	F6	T4	T2	T5
ZSI249	ELECTRICAL PENETRATION ASSY	2000	E-035	X	X	A	A	D	T1	F3	F6	T4	T2	T5
ZSI249	ELECTRICAL PENETRATION MODULE	2000	E-035B	X	X	A	A	D	T1	F3	F6	T4	T2	T5
ZSI250	ELECTRICAL PENETRATION ASSY	2000	E-035	X	X	A	A	D	T1	F3	F6	T4	T2	T5
ZSI250	ELECTRICAL PENETRATION MODULE	2000	E-035B	X	X	A	A	D	T1	F3	F6	T4	T2	T5
ZSI258	ELECTRICAL PENETRATION ASSY	2000	E-035	X	X	A	A	D	T1	F3	F6	T4	T2	T5
ZSI258	ELECTRICAL PENETRATION MODULE	2000	E-035B	X	X	A	A	D	T1	F3	F6	T4	T2	T5
ZTB-1	TERMINAL BOXES	(7) (8)	E-028			A	A	D	T1	F3	F6	T4	T2	T5
ZTB-2	TERMINAL BOXES	(5)	E-028			A	A	A	T1	F25	F39	T2	T2	NA
ZZB	5 KV POWER CABLES	(5)	E-029	X	X	A	D	D	T1	F25	F39	T2	T2	NA
ZZC1	600 VOLT COPPER CONTROL CABLE	(2)	E-057	X	X	A	A	A	T1	F3	F6	T4	T2	T5
ZZC2	600 VOLT COPPER CONTROL CABLE	(2)	E-057A	X	X	A	A	A	T1	F3	F6	T4	T2	T5
ZZC3	600 VOLT COPPER CONTROL CABLE	(2)	E-057B	X	X	A	A	A	T1	F3	F6	T4	T2	T5
ZZG	600 VOLT POWER CABLE	(2)	E-058	X	X	A	A	A	T1	F3	F6	T4	T2	T5
ZZJ	600 VOLT SHIELDED INSTRUMENTATION CABLE	(2)	E-062	X	X	A	A	A	T1	F3	F6	T4	T2	T5
ZZJ1	600 VOLT SHIELDED INSTRUMENTATION CABLE	(2)	E-062A	X	X	A	A	A	T1	F3	F6	T4	T2	T5
ZZP	PREFABRICATED CABLE ASSEMBLIES	(2) (9)	E-095	X	X	A	A	D	T1	F3	F6	T4	T2	T5
ZZR	CABLE BREAKOUT KIT	(2)	(1)	X	X	A	A	A	T1	F3	F6	T4	T2	T5
ZZS	600 VOLT SHIELDED INSTRUMENTATION CABLE	(2)	E-062	X	X	A	A	A	T1	F3	F6	T4	T2	T5
ZZT	THERMOCOUPLE EXTENSION CABLE	(2)	E-061	X	X	A	A	A	T1	F3	F6	T4	T2	T5
ZZU	5 KV CABLE SPLICE MATERIAL	(5)	E-029	X	X	A	D	D	T1	F25	F39	T2	T2	NA
ZZV	CABLE END SEAL KIT	(2)	(1)	X	X	A	A	A	T1	F3	F6	T4	T2	T5
ZZW	NUCLEAR MOTOR CONNECTION KITS	(2)	(1)	X	X	A	A	A	T1	F3	F6	T4	T2	T5
ZZX	COAXIAL & TRIAXIAL CABLE	(2)	E-060	X	X	A	A	A	T1	F3	F6	T4	T2	T5
ZZY	600 V CABLE TERMINATION MATERIAL	(2)	(1)	X	X	A	A	A	T1	F3	F6	T4	T2	T5
ZZY	HEAT SHRINK FLD. SPLICING SYSTEM	(2)	(1)	X	X	A	A	A	T1	F3	F6	T4	T2	T5
ZZZ	STUB CONNECTION KIT	(2)	(1)	X	X	A	A	A	T1	F3	F6	T4	T2	T5
ZZZ	TERMINAL LUGS	(2)	(1)	X	X	A	A	A	T1	F3	F6	T4	T2	T5
ZZZ	TRANSITION SPLICE KIT	(2)	(1)	X	X	A	A	A	T1	F3	F6	T4	T2	T5
ZZC4	600 VOLT FIRE-RESISTIVE CONTROL AND POWER CABLE	(5)	E-057C	X	X	D	D	D	T1	F25	F39	T2	T2	NA

WOLF CREEK

The 600 volt fire-resistive control and power cables are routed independent of raceways. The fire-resistive cables are routed in the same manner as conduits.

b. Cables associated with each safety-related separation group, as defined in Section 8.3.1.3, are run in separate conduits, cable trays, ducts, and penetrations.

c. The arrangement of electrical equipment and cabling minimizes the possibility of a fire in one separation group from propagating to another separation group.

In the absence of confirming analyses to support less stringent requirements, the following rules apply to those areas in which the only source of fire is electrical. Areas in which the only source of fire is electrical are divided into two groups--cable spreading rooms and general plant areas. (See Section 8.3.1.4.1.4 for exemptions) Table 8.3-5 contains analyses of alternate minimum separation distances as allowed by RG 1.75.

GENERAL - Routing of instrumentation, control, or power cables through rooms or spaces where there is a potential for accumulation of large quantities of combustible fluids is avoided. Where such routing is unavoidable, only cables of one separation group are allowed. In addition, the cables are enclosed in conduit. Openings in solid floors for vertical runs of cables are sealed with fire resistant material.

GENERAL PLANT AREAS - In plant areas from which equipment with potential hazards such as missiles, external fires, and pipe whip are excluded, the separation criteria are as follows:

a. Cable trays of different separation groups have a minimum horizontal separation of 3 feet if no physical barrier exists between the trays. In the limited number of areas where horizontal separation of 3 feet is unattainable, a fire barrier is installed extending at least 1 foot above the top of the tray (or to the ceiling) and 1 foot below the bottom of the tray (or to the floor).

b. For cable trays of different separation groups, there is a minimum vertical separation of 5 feet between open-top trays stacked vertically. In the limited number of areas where trays of different separation groups are stacked with less than 5 feet of vertical separation, a fire barrier is placed between the two separation groups. The barrier extends 1 foot to each side of the tray system (or to the wall).

WOLF CREEK

TABLE 9.5E-1 (Sheet 6)

10CFR50 Appendix R	WCGS
	batteries are served by a battery charger that can be manually connected to the plant emergency ac power supply. The ESW pumphouse also complies.
III. G. Fire Protection of Safe Shutdown Capability	
1. Fire protection features shall be provided for structures, systems, and components important to safe shutdown. These features shall be capable of limiting fire danger so that:	USAR Appendix 9.5B provides an area-by-area analysis of the power block that demonstrates that no single fire can prevent safe shutdown.
a. One train of systems necessary to achieve and maintain hot shutdown conditions from either the control room or emergency control station(s) is free of fire damage; and	Redundant trains of systems required to achieve and maintain hot standby are separated by 3-hour-rated fire barriers, or the equivalent provided by III.G.2, or else a diverse means of providing the safe shutdown capability exists and is unaffected by the fire.
b. Systems necessary to achieve and maintain cold shutdown from either the control room or emergency control station(s) can be repaired within 72 hours.	For redundant trains of systems required to achieve and maintain cold shutdown that could potentially be affected by
2. Except as provided for in paragraph G.3 of this section,	

Fire-resistive cable for EGHV0016 and EGHV0054, which has been successfully tested per the requirements of NRC Generic Letter 86-10, Supplement 1, may be used in lieu of the rated fire barrier requirement in III.G.2.a.

4.5 Fire Effects on Electrical Equipment and Safe Shutdown Information

4.5.1 The following discussions provide information on the WCGS plant design and nomenclature, the assumed effects of fire, and the response of certain devices.

1. Redundant PFSSD mechanical systems are referred to in the analysis as Train A and Train B. Train A is served by electrical separation groups 1 and 3, while Train B is served by electrical separation groups 2 and 4. Electrical separation groups 5 and 6 are typically for non-safety related equipment. However, in limited cases these groups also provide a PFSSD success path.

2. The FHA and supporting documents XX-E-013 and E-1F9910 include the effects of a postulated fire hazard on PFSSD cables, exposed conduit and instrumentation. Embedded conduits are not considered due to the heat sink provided by the encasing barrier. Section 8.3.1.4 of the USAR provides the basis and criteria for the interdependence of redundant systems.

3. If a fire is postulated to cause a short in a circuit and that circuit is protected by an individual overcurrent protection device, that device is assumed to function to clear the fault without further degradation of the power source.

, use of fire-resistive cable

4. Separation of the devices for nuclear safety-related controls and instrumentation is achieved by physical separation or barriers between separation groups for the same protective function, in accordance with Regulatory Guide 1.75.

4.6 General Information on Design Features

4.6.1 Redundant equipment and circuits required for safe shutdown are also protected against the effects of potential exposure fires. These protection features include fixed fire detection and suppression systems, fire barriers, control of combustibles, and physical separation. The design goal for safety-related areas outside of the Containment was to provide the equivalent of a 3-hour rated fire barrier between redundant trains, as described in 10 CFR 50, Appendix R, Paragraph III.G.2.a. Where this was not possible, credit was taken for the detection and suppression systems installed in the plant, and compliance to the provisions of Appendix R, Paragraphs III.G.2.b and c, was addressed.

use of fire-resistive cable,

, the use of fire-resistive cable,

4.6.2 In most fire areas, the boundaries are defined by walls, floors, and ceilings. In the Reactor Building, however, such natural boundaries do not completely enclose localized fire hazards. For the Fire Areas inside of the Containment, the provisions of 10 CFR 50 Appendix R, Paragraphs III.G.2.d, e, and f were addressed.

4.6.3 Emergency lighting is provided for areas required for operation of safe shutdown equipment and for access and egress to those areas. It consists of sealed beam units with individual 8-hour minimum battery power supplies.

4.6.4 Safety-related cable in the general plant area is qualified to IEEE-383-1974. All single conductors inside control panels meet the flame resistance requirements of IPCEA S-19-81 or S-61-402.