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DENTON, H. R. Office of Nuclear Reactor Regulation, Director (post 851125

SUBJECT: Submits addl info re electrical separation at facility, clarifying SSER 4 concerning fire wrap used as electrical separation barrier. Revised FSAR page clarifying types of wraps used encl.

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CP&L
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SERIAL: NLS-86-437

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
United States Nuclear Regulatory Commission
Washington, DC 20555

SHEARON HARRIS NUCLEAR POWER PLANT
DOCKET NO. 50-400/LICENSE NO. NPF-53
ELECTRICAL SEPARATION

Dear Mr. Denton:

Carolina Power & Light Company (CP&L) hereby submits additional information concerning electrical separation at the Shearon Harris Nuclear Power Plant (SHNPP). The following information is being submitted to clarify the recently issued NRC Safety Evaluation Report Supplement 4 (SSER4) concerning fire wrap used as an electrical separation barrier.

SSER 4, page 8-12, states in part, "The fire wrap and fire blanket barriers are tested and qualified in accordance with American Society for Testing and Materials Standard ASTM-E-119 for a rating of 1 or 3 hours. The staff has been assured by the applicant that the fire wrap and fire blanket used for raceway installation at SHNPP have been tested and qualified in accordance with Standard ASTM-E-119." In actuality, three types of wrap systems are utilized (one-hour system, three-hour system, and thermal barrier wrap system) of which two are tested and qualified to ASTM-E-119. Each wrap system and its use is briefly described below:

A. One-Hour Wrap System

The one-hour wrap system is typically applied to a tray or a conduit for fire protection reasons. For electrical separation, this wrap is considered an acceptable barrier with no separation required between the wrap and the protected raceway.

B. Three-Hour Wrap System

The three-hour wrap system is typically applied to a conduit for fire protection reasons. For electrical separation, this wrap is considered an acceptable barrier with no separation required between the wrap and the protected raceway.

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C. Thermal Barrier Wrap

The thermal barrier wrap system is a Siltemp wrap applied with 100 percent overlap and covered with 3M No. 69 glass tape with 50 percent overlap. It is utilized on free air dropout cable as a steel tray cover is utilized to enclose an open tray. This particular wrap and technique has been selected for the following reasons:

1. The containment of the fault circuit is the primary concern.

2. Per catalog information, Siltemp does not melt until temperatures exceed 3000°F, similar to steel (see Attachment A).

3. Thermal conductivity is superior to steel barrier material (see Attachment A).

4. The wrap technique utilized at SHNPP has been proof tested by Beaver Valley (PW-E wrap technique). From the Beaver Valley testing, it is shown that this wrap type performs the function similar to a steel conduit (see Attachment B).

Attachment C contains a revised FSAR page to clarify the types of wraps used and to avoid confusion. It will be reflected in a future FSAR amendment. Based on the above information, CP&L requests that the SSER 4 discussion on electrical separation be supplemented to reflect this clarification.

If you have any questions on this subject or require additional information, please contact me.

Yours very truly,

S. R. Zimmerman
Manager
Nuclear Licensing Section

JHE/bmc (5071JDK)

Attachments

cc: Mr. B. C. Buckley (NRC)
Mr. A. S. Gill (NRC-PAEI)
Dr. J. Nelson Grace (NRC-RII)
Mr. G. F. Maxwell (NRC-SHNPP)

ATTACHMENT A

SILTEMP TECHNICAL BULLETIN

JULY 1982

(5071JDK/bmc)

AMETEK
HAVEG DIVISION

SILTEMP®

FABRIC-CH-SR
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TECHNICAL
BULLETIN HS-117
JULY, 1982

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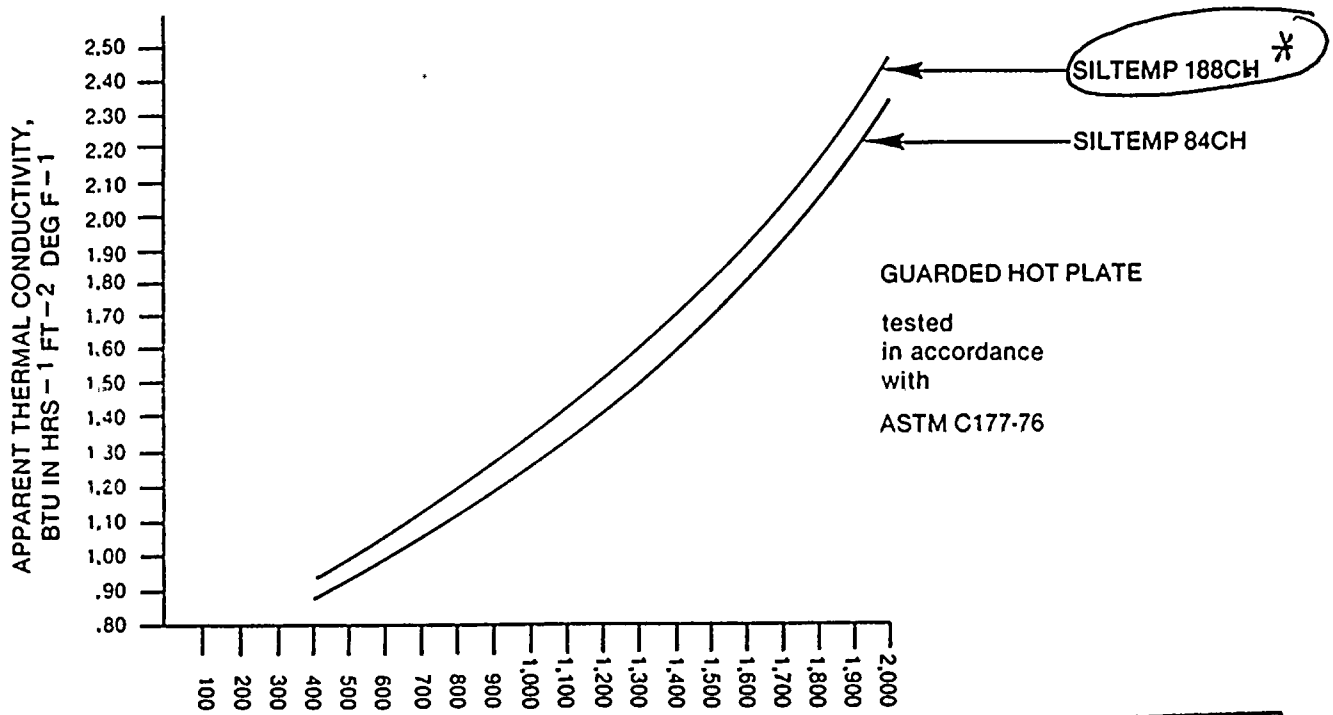

SHT 6 OF 6
BY: [illegible] DATE 4/29/86
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ATTACHMENT B

(The attached sheet has
been extracted from Duquesne
Light Co. Test Report
No. 17666-02, Revision A,
dated May 24, 1986.)

(5071JDK/kts)

8.0 TEST PROGRAM DESCRIPTION (Continued)

8.2 Configuration Number 1 (Continued)

8.2.4 Conclusions

These results generated the following conclusions:

1. During Test No. 1, the acceptability of design was demonstrated where two cables in free air come in contact with each other when a worst-case electrical fault occurs to a cable inside either PW A or PW B. The high temperature observed outside the PW B end of the fault cable (887.1°F), during Test No. 1, did scorch the jacket on the target cables, but the capability of the target cables to conduct rated current at 480 VAC (power target cable), 120 VAC (control target cable), or 50 VAC (instrument target cable), as applicable, or to successfully pass the Insulation Resistance and High Potential Tests after the Overcurrent Test was not impared. In addition, the high observed temperature was attributed to a chimney effect that occurred at the transition of the two wrapping materials. A

2. The PW B, used in Test No. 1, is capable of precluding ignition of a cable subjected to the worst-case electrical fault when the entire cable is wrapped in this wrap. Temperatures recorded inside the wrapping material exceeded the 770°F self-ignition temperature of the fault cables insulation (Reference Okonite Company ASTM D-1929-77 Report to Stone and Webster Engineering Corporation dated August 24, 1984). This cable did not ignite because the wrapping material limits the oxygen available to a level which is insufficient to sustain combustion.

3. The equivalency of the PW B and PW A was not demonstrated by Test No. 1.

4. The utilization of PW D, in Test No. 1A, does not provide sufficient mechanical integrity to withstand the gas pressure that develops as the faulted cable off-gasses. The 3M No. 69 glass tape parted in the center of the wrapped section which permitted very heavy off-gassing to occur at that point. These gasses did ignite and subsequently ignited the outer jacket on two of the target cables. All target cables maintain their continuity of power during the Overcurrent Test, but the target cable separated by one inch failed the Post-Test Functional Tests.

5. The utilization of PW E, in Test No. 1B, does provide sufficient integrity to withstand the gas pressure that develops as the fault cable off-gasses and to prevent an external flame from tracking along the outside of the wrapping material. The ignitions that occurred during this test were small and localized, outside the wrapping material, and occurred because flaming insulation fell from the unwrapped portion of this cable onto the wrapped portion.

ATTACHMENT C

(5071JDK/kts)

c. Test Results

The test results are detailed in Wyle Test Report No. 47879-02. The minimum separation distances based on the test results are detailed in Table 8.3.1.10.

27 Where conduit separation distances are detailed in Table 8.3.1.10, it applies to any enclosed raceway (i.e., conduit, box, equipment enclosure, condulet, fitting, etc.).

(2) Analysis - Where the damage potential is contained within a conduit, and the Class 1E cable(s) are in tray or are free air drop out cable, an analysis has been performed in accordance with the recommendations of Section 5.1.1.2 of IEEE-384-1974 to justify a minimum separation distance of one inch. The results of the analysis indicate that provided one-inch separation is maintained, any damage potential associated with the conduit will have no adverse affects on the Class 1E circuits.

(3) Installation of Barriers - Where the separation distances could not be justified by test or analysis suitable barriers/or approved protective coatings have been utilized, or cables have been installed in enclosed raceways which are suitable for protecting the cables. The minimum separation distance between enclosed raceways or between barriers and the raceway/cable(s) is one inch.

Add Insert "A"

(b) Cable and Raceway Hazard Areas - Analyses of the effects of pipe whip, jet impingement, missiles, fire, and flooding demonstrate that safety related electrical circuits, raceways, and equipment are not degraded beyond an acceptable level.

The analyses are referenced as follows:

High Pressure Piping	(Section 3.6)
Missiles	(Section 3.5)
Flammable Material	(Section 9.5.1)
Flooding	(Section 2.4)

In fire hazard areas outside the cable spreading rooms, where redundant safety related trays or safety related and non-safety related trays are exposed to the same fire hazard, protection has been provided by spatial separation, fire suppression systems, fire retardant coatings, fire barriers, or combination thereof.

INSERT "A"

The following are suitable barriers to meet the intent of IEEE-384:

(a) Steel Tray Covers - Tray covers are utilized to protect any raceway/cable which converges within the separation window of the tray. A top cover is used to protect above the tray and/or a bottom cover is used to protect below the tray.

(b) ~~Firewrap~~ Thermal barrier wrap system - A cable is firewrapped to protect any raceway/cable which converges within the separation window of the cable.

(c) ~~Fireblanket~~ One hour and three hour firewrap systems - One-hour and three-hour blankets are installed to meet the requirements of Section 9.5.1. These blankets are acceptable barriers.

Also, 1 inch of fire~~blanket~~ wrap is also equivalent to 1 inch of air. Since ~~fireblankets~~ are greater than 1 inch thick, separation is not required between ~~blankets~~ these wraps and protected raceways.

one hour and three hour firewrap systems