



May 31, 2007

United States Nuclear Regulatory Commission
Attention: Document Control Desk
One White Flint North
11555 Rockville Pike
Rockville, MD 20852-2738

Serial No. 06-325A
NL&OS/GDM R14'
Docket Nos. 50-305
50-336/423
50-338/339
50-280/281
License Nos. DPR-43
DPR-65/NPF-49
NPF-4/7
DPR-32/37


DOMINION ENERGY KEWAUNEE, INC. (DEK)
DOMINION NUCLEAR CONNECTICUT, INC. (DNC)
VIRGINIA ELECTRIC AND POWER COMPANY (DOMINION)
KEWAUNEE POWER STATION UNIT 1
MILLSTONE POWER STATION UNITS 2 AND 3
NORTH ANNA POWER STATION UNITS 1 AND 2
SURRY POWER STATION UNITS 1 AND 2
GENERIC LETTER 2006-03, "POTENTIALLY NONCONFORMING HEMYC AND MT
FIRE BARRIER CONFIGURATIONS"
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

On April 10, 2006, the NRC issued Generic Letter (GL) 2006-03, "Potentially Nonconforming Hemyc and MT Fire Barrier Configurations." The GL requests licensees to: 1) determine whether Hemyc or MT fire barrier material is installed and relied upon at their stations for separation and/or safe shutdown purposes to satisfy applicable regulatory requirements, and 2) describe the controls that were used to ensure that other fire barrier types relied on for separation of redundant trains located in a single fire area are capable of providing the necessary level of protection. Additional information was requested to be provided if it was determined that Hemyc or MT fire barriers are credited for compliance.

DEK, DNC and Dominion reviewed GL 2006-03 and provided their combined response for the four subject stations in a letter dated June 8, 2006 (Serial No. 06-325). As noted in that letter, neither Hemyc nor MT fire barrier configurations are used at Kewaunee, Millstone, North Anna or Surry Power Stations. The NRC subsequently requested additional information to facilitate the completion of their review of the previously provided response to GL 2006-03. The DEK, DNC and Dominion combined response to the request for additional information is provided in the attachment.

If you have questions or require additional information, please contact Mr. Gary D. Miller at (804) 273-2771.

Sincerely,



Gerald T. Bischof
Vice President – Nuclear Engineering
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Dominion Nuclear Connecticut, Inc.
Virginia Electric and Power Company

Commitments being made in this letter:

1. An engineering evaluation will be performed to formally document the acceptability of the Kewaunee Power Station pull box configuration, which deviates from the tested configuration for the fire retardant wrap 3M Interam E-50A mat. The evaluation will be performed in accordance with the guidance contained in Generic Letter 86-10.

Attachment:

- Response to NRC Request for Additional Information, Generic Letter 2006-003

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(SEAL)

ATTACHMENT

Response to NRC Request for Additional Information
Generic Letter 2006-03

Kewaunee Power Station
Millstone Power Station Units 2 and 3
North Anna Power Station Units 1 and 2
Surry Power Station Units 1 and 2

NRC Comment:

“Question 1b, requests the licensee to provide, ‘A description of the controls that were used to ensure that other fire barrier types relied on for separation of redundant trains located in a single fire area are capable of providing the necessary level of protection. Addressees may reference their response to GL 92-08 to the extent that the responses address this specific issue.’ The [Dominion] response lacks the detail for NRR to consider the issue closed.”

NRC Question 1

The Dominion response discusses approval of fire barriers by a testing laboratory, such as UL or FM. Does this mean that the installed barriers were installed in accordance with UL or FM listings for 1- or 3 -hour rated fire barriers designed to protect electrical raceway systems (UL describes as Thermal Barrier Systems (XCLF), labeled as TB-#, or Electrical Circuit Protection Systems (FHIT))? If so, provide the UL/FM design numbers that were used for the fire rated assemblies, for each plant as applicable.

Dominion Response

- **Millstone Power Station Units 2 and 3**

The fire barrier wrap used at Millstone Unit 2 is not installed in accordance with UL or FM listings for 1- or 3-hour rated fire barriers designed to protect electrical raceway systems. The qualification testing for the fire barrier wrap material used at Millstone Unit 2 is discussed in the responses to Questions 3 through 5 below.

Millstone Unit 3 does not rely on fire barrier wrap to separate redundant trains located within the same fire area. Physical separation, water curtains or other approved deviations are used instead.

North Anna Power Station Units 1 and 2

The installed fire wrap barriers used at North Anna Power Station Units 1 and 2 are not qualified in accordance with UL or FM listings to protect electrical raceways systems. Specifically, fire barriers made of 3M Interam E-53A series mat are used to provide 1-hour rated fire protection for the power cables to charging pump 1-CH-P-1C and component cooling water pump 2-CC-P-1A. 3M Interam E-53A does not have a UL/FM design number.

- Surry Power Station Units 1 and 2

Surry Units 1 and 2 do not rely on fire barrier wrap installed in accordance with UL or FM listing to protect electrical raceways systems. There are no fire barriers credited to protect redundant trains of electrical raceways within the same fire area outside containment except for circuits associated with the charging pumps for Units 1 and 2. An exemption has been approved to use a three-hour barrier wall to separate the other unit's charging system, which is credited for shutdown in the affected unit with a fire in accordance with Appendix R Section III.G.3.

Pyrocrete 241 manufactured by Carbolite Company and Bio K-10 mortar manufactured by Bio-Fire Protection, Inc., have been installed on fiberglass piping in the Charging Pump Service Water System. The Bio K10 mortar has been tested in accordance with UL Design No. CAJ5006. Qualification testing of Pyrocrete 241 is discussed in the responses to Questions 4 and 5 below.

- Kewaunee Power Station

Kewaunee Power Station (KPS) used UL Electrical Circuit Protective System (FHIT) No. 7 to meet 3-hour rated configurations on conduit. The system uses 3M Interam E-50A endothermic mat and was installed per the detailed instructions supplied by the manufacturer of the Electrical Circuit Protective System (Minnesota Mining & Manufacturing Company (3M)).

Another 3-hour E-50A mat configuration (large pull box) was not installed per UL or FM design listings.

Although not considered to be applicable to this GL response, as further explained in response to Question 4 below, KPS also uses a 3-hour fire-rated Marinite board/Kaowool/Flamemastic electrical circuit (pull box) protective enclosure and a 3M Interam E-5A-4 endothermic mat to wrap an angle support for the pull box enclosure. Neither of these was installed per UL or FM design listings.

If UL/FM design numbers for thermal barrier systems were not used as the basis for the design and installation of the Dominion fire rated assemblies, the following questions [i.e., 2-5] apply:

NRC Question 2

Do Dominion plants rely on barriers other than Hemyc and MT to separate redundant trains located within the same fire area (which plants)?

Dominion Response

Millstone Unit 2, North Anna Units 1 and 2, Surry Units 1 and 2 and Kewaunee Power Station rely on barriers other than Hemyc and MT.

As noted in the response to Question 1 above, Millstone Unit 3 does not rely on fire barriers to separate redundant trains of electrical raceways located within the same fire area.

NRC Question 3

If so, what barrier types are used (provide name of manufacturer and name of material, and their application (conduit, cable tray) for each plant?

Dominion Response

- **Millstone Power Station**

Millstone Unit 2 uses Thermo-Lag 330 and 770 fire wrap, which is manufactured by Thermal Science Inc. Applications include conduit, cable trays and junction boxes.

This question is not applicable to Millstone Unit 3.

- **North Anna Power Station Units 1 and 2**

Fire retardant wrap using 3M Interam E-53A series mat is used to protect power cables for charging pump 1-CH-P-1C and component cooling water pump 2-CC-P-1A.

- **Surry Power Station Units 1 and 2**

As noted above, Surry Units 1 and 2 do not rely on fire barriers to separate redundant trains of electrical raceways located within the same fire area. However, Pyrocrete 241 manufactured by Carbolite Company and Bio K-10 mortar manufactured by Bio-Fire Protection, Inc. have been used to protect redundant trains of fiberglass piping in the Charging Pump Service Water System.

- Kewaunee Power Station

Kewaunee Power Station uses 3M Interam E-50A as a 3-hour fire wrap configuration on conduit and a large pull box.

Additionally, although not considered to be applicable to this GL response because it is not used to separate redundant trains within the same fire area, KPS also uses Marinite/Kaowool/Flamemastic electrical circuit (pull box) protective enclosure and 3M Interam E-5A-4 as a 3-hour wrap for the pull box enclosure angle support.

The above installed configurations are further described in response to Question 4 below.

NRC Question 4

If other barriers are used, how were the materials tested? Did Dominion use the current NRC guidance contained in Generic Letter 86-10, Supplement 1, for testing? Or for barriers installed prior to the issuance of GL 86-10, Supplement 1, how were the barriers tested (did they use ASTM E-119 fire exposure, did they use a 250°F temperature rise acceptance criteria, or some other acceptance criteria)?

Dominion Response

- Millstone Power Station Units 2 and 3

For Millstone Unit 2, Thermo-Lag fire wrap is used to separate redundant trains located in a single fire area. The Thermo-Lag configurations that are used were tested as part of the "NEI Application Guide for Evaluation of Thermo-Lag 330 Fire Barrier Systems" and through test configurations documented in Omega Point Laboratories Test Report No. 14980-100676, "Fire Endurance Test of Articles Protected with Thermo-Lag Fire Barrier Systems", dated January 12, 1997.

The Omega Point Laboratories and NEI tests used for qualification of the Thermo-Lag fire barrier configurations used the current NRC guidance contained in Generic Letter 86-10, Supplement 1 to confirm that the Thermo-Lag configurations will provide a qualified barrier. Even though a configuration in the Omega Point Laboratories Test Report used by Millstone Unit 2 exhibited a minor amount of cable degradation from the thermal effects of the fire exposure, the configuration was reviewed and it was concluded that it would provide adequate protection for the cables, and the cables would remain functional during and after a fire.

This question is not applicable to Millstone Unit 3.

- North Anna Power Station Units 1 and 2

The fire retardant wrap 3M Interam E-53A series mat was tested in accordance with ASTM E-119. The acceptance criterion consisted of a 250°F temperature rise.

- Surry Power Station Units 1 and 2

Pyrocrete 241 has been qualified by Thermal Transmission Test (ref. Tech. Report EP-0011) that uses the ASTM E-119 fire exposure and the failure criteria of an average temperature of 250°F or single point temperature 325°F above ambient backside temperature. The barrier was installed prior to the issuance of GL 86-10 Supplement 1. Pyrocrete 241 has also been tested under UL designs N715, N716, N717, N718 and S706.

The Bio K10 mortar has been tested in accordance with UL Design No. CAJ5006.

- Kewaunee Power Station

The 3-hour conduit configuration test assembly of E-50A was subjected to fire exposure in accordance with the "Outline of Proposed Investigation for Fire Tests of Electrical Circuit Protective Systems, UL Subject 1724." The hose stream test was conducted in accordance with the American Nuclear Insurers (ANI) Standard titled "ANI/MAERP Standard Fire Endurance Test Method to Qualify a Protective Envelope for Class 1E Electrical Circuits" dated July 1979. UL Subject 1724 utilizes the ASTM E-119 (1983) Standard Time-temperature curve to define the character of the furnace fire during testing. The subsequent hose stream test, identified as part of this fire test, conforms with the hose stream test requirements defined in ASTM E-119 (1983). Both the fire test and the hose stream test were conducted prior to the issuance of Generic Letter 86-10.

The 3-hour large pull box configuration of E-50A was not specifically tested. The 3-hour installation drawings and instructions were developed by 3M for KPS based on 3M fire protection engineering judgment. Per discussion with the 3M fire protection specialist, this judgment was based on previous fire tests for a 3-hour steel raceway test assembly (included in the same fire test as the 3-hour conduit test assembly described above) and on prior testing of E-50A on a smaller pull box configuration test assembly.

The 3-hour configuration test assembly of E-5A-4 on the angle support assembly and the 3-hour configuration of an electrical circuit (pull box) enclosure consisting of Marinite/Kaowool/Flamemastic 77 were subjected to fire exposure and hose stream tests utilizing the guidance provided in Supplement 1 to NRC Generic Letter 86-10. This testing was provided specifically for the KPS configuration. It should be noted that

the description of the installation and testing of this pull box enclosure and its E-5A-4 wrapped angle support are not considered applicable to this GL response because the pull box enclosure and its E-5A-4 wrapped angle support are not utilized to separate redundant trains in the same fire area. The enclosure is attached to and extends an existing III.G.3 fire area boundary and as such is not applicable to the stated purpose of this GL response. This description is provided for information only.

NRC Question 5

When field installations differed from the tested configurations, did Dominion use NRC guidance from Generic Letter 86-10, or the current guidance from Generic Letter 86-10 Supplement 1? If neither of the above guidance documents were used, what criteria [were] used for deviating from tested configurations?

Dominion Response

- **Millstone Power Station**

Millstone Unit 2 field configurations were installed in accordance with the Omega Point Laboratories and NEI tests and did not deviate from tested configurations.

This question is not applicable to Millstone Unit 3.

- **North Anna Power Station Units 1 and 2**

Field installation of fire retardant wrap, 3M Interam E-53A series mat, deviated from the tested configuration by providing an additional layer of E-53A series mat to ensure that a 1-hr rating would be achieved. The deviation was not addressed using the guidance within Generic Letter 86-10 or Supplement 1 to the Generic Letter. The addition of an extra layer improved fire resistance and ensured the 1 hr rating would be achieved.

- **Surry Power Station Units 1 and 2**

Field installation of Pyrocrete 241 and Bio-K10 mortar did not deviate from tested configurations.

- **Kewaunee Power Station**

For a large pull box, field installation of fire retardant wrap, 3M Interam E-50A series mat, was based on 3M-developed installation drawings and instructions for a 3-hour system. Discussion with the manufacturer identified that the basis for the drawings/instructions for installing a 3-hour E-50A system on the large pull box was 3M engineering judgment, which was based on review of applicable fire test reports.

However, actual field installation of the 3M Interam E-50A series mat on the large pull box deviated from the manufacturer's 3-hour installation drawings/instructions by utilizing E-50C endothermic mat instead of a E-50A series mat for a portion of the outermost layer. This deviation was noted on the Maintenance Work Request that performed this installation and was authorized by the Responsible Engineer without a noted reference to supporting basis documentation. Additionally, per discussion with the manufacturer, the 3M drawings/instructions deviated from one of the tested configurations that was reviewed and contributed to the manufacturer's engineering judgment. Specifically, a CS-195 intumescent sheet was not used at the pull box/concrete wall interface.

Subsequent discussion with 3M identified that E-50A and E-50C are the same endothermic mat with the same thickness, with the exception that the foil backing is aluminum in the E-50A mat and stainless steel in the E-50C mat. Additionally, the CS-195 intumescent sheet was utilized in the tested configuration to support the sealing of the pull box/concrete wall interface which included a barrier penetration. The KPS configuration does not include a through-wall penetration into the pull box and consequently did not require the use of the intumescent sheet. These deviations were not addressed using the guidance within Generic Letter 86-10 at the time of installation in 1987. A formal engineering evaluation will be performed to document the acceptability of the deviations of the fire retardant wrap 3M Interam E-50A mat from the tested configuration, specifically: 1) not using CS-195 intumescent sheet backing to the pull box configuration, and 2) replacing a portion of the outermost layer with E-50C mat. The evaluation will be performed in accordance with the guidance contained in Generic Letter 86-10.

Although not considered to be applicable to this GL response, as explained in response to Question 4 above, no deviations from the tested configuration were identified for the 3-hour wrap of E-5A-4 angle support for the Marinite/Kaowool/Flamemastic electrical circuit (pull box) protective enclosure nor for the enclosure itself.