

November 24, 1997

Mr. J. P. O'Hanlon
Senior Vice President - Nuclear
Virginia Electric and Power Company
5000 Dominion Blvd.
Glen Allen, Virginia 23060

SUBJECT: DENIAL OF REQUEST FOR EXEMPTION FROM THE REQUIREMENTS OF APPENDIX R TO 10 CFR 50; SURRY POWER STATION, UNIT NOS. 1 AND 2 (TAC NOS. M94330 AND M94331) AND NORTH ANNA POWER STATION, UNIT NOS. 1 AND 2 (TAC NOS. M94333, M94334, M94581 AND M94582)

Dear Mr. O'Hanlon:

By letter dated December 15, 1995, as supplemented April 22, 1996, you requested an exemption from the requirements of Section III.G.2.f. of Appendix R to Part 50 of Title 10 of the Code of Federal Regulations for Thermo-Lag Radiant Energy Heat Shields inside containment.

On the basis of its review, the staff concluded that the use of Thermo-Lag radiant energy heat shields inside containment at Surry and North Anna is unacceptable, and, therefore, your request for an exemption from the aforementioned requirements of 10 CFR Part 50 for Surry, Units 1 and 2, and North Anna, Unit 1, is denied. Since North Anna, Unit 2, was licensed to operate in 1980, Appendix R does not apply. Therefore, the staff treated your request for North Anna, Unit 2, as a deviation request rather than an exemption request. A deviation is also denied.

The enclosed Safety Evaluation (SE) provides the basis for our denials.

The staff has completed its evaluation of this matter and we are, therefore, closing out TAC Nos. M94330, M94331, M94333, M94334, M94581, and M94582.

Sincerely,

(Original Signed By)
James E. Lyons, Director
Project Directorate II-1
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Docket Nos. 50-280, 50-281,
50-302 and 50-339
Enclosure: Safety Evaluation
cc w/enclosure: See next page
Distribution

Docket File PUBLIC
PDII-1 RF B. Boger
G. Hill (4) M. Boyle
ACRS J. Johnson, RII
S. West E. Connell
T. Harris (E-mail SE only)

THIS FILE CONTAINS COPY

DOCUMENT NAME: G:\NOANNA\M94581-2.DEN * Previously concurred

	PM-PDII-1	PM-PDII-1	PD-PDII-1	LA-RDII-1	OGC*
NAME	GEdison	NKalyanam	EDunnington	JLyons	SHom
DATE	11/24/97	11/24/97	11/24/97	11/24/97	11/13/97
COPIES?	YES/NO	YES/NO	YES/NO	YES/NO	YES/NO

OFFICIAL RECORD COPY

9712030161 971124
PDR ADOCK 05000280
P PDR



Virginia Electric & Power Company

cc:

Mr. J. Jeffrey Lunsford
County Administrator,
Louisa County
P.O. Box 160
Louisa, Virginia 23093

Michael W. Maupin, Esq.
Hunton and Williams
Riverfront Plaza, East Tower
951 E. Byrd Street
Richmond, Virginia 23219

Dr. W. T. Lough
Virginia State Corporation
Commission
Division of Energy Regulation
P.O. Box 1197
Richmond, Virginia 23209

Old Dominion Electric
Cooperative
4201 Dominion Boulevard
Glen Allen, Virginia 23060

J. H. McCarthy, Manager
Nuclear Licensing and Operations
Support
Virginia Electric and Power Company
Innsbrook Technical Center
5000 Dominion Boulevard
Glen Allen, Virginia 23060

Office of the Attorney General
Commonwealth of Virginia
900 East Main Street
Richmond, Virginia 23219

Senior Resident Inspector
North Anna Power Station
U.S. Nuclear Regulatory Commission
1024 Haley Drive
Mineral, Virginia 23117

Senior Resident Inspector
Surry Power Station
U.S. Nuclear Regulatory Commission
5850 Hog Island Road
Surry, Virginia 23883

Robert B. Strobe, M.D., M.P.H.
State Health Commissioner
Office of the Commissioner
Virginia Department of Health
P.O. Box 2448
Richmond, Virginia 23218

Regional Administrator,
Region II
U.S. Nuclear Regulatory Commission
Atlanta Federal Center
61 Forsyth St., SW, Suite 23T85
Atlanta, Georgia 30303

W. R. Matthews, Manager
North Anna Power Station
P.O. Box 402
Mineral, Virginia 23117

J. P. O'Hanlon
Senior Vice President - Nuclear
Virginia Electric and Power Co.
Innsbrook Technical Center
5000 Dominion Boulevard
Glen Allen, Virginia 23060

Mr. David Christian, Manager
Surry Power Station
Virginia Electric and Power Company
5570 Hog Island Road
Surry, Virginia 23883

Chairman
Board of Supervisors
of Surry County
Surry County Courthouse
Surry, Virginia 23683

Mr. R. C. Haag
U.S. Nuclear Regulatory Commission
Atlanta Federal Center
61 Forsyth St., SW, Suite 23T85
Atlanta, Georgia 30303



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

DENIAL OF LICENSEE REQUEST FOR EXEMPTION FROM SECTION III.G.2.f OF APPENDIX R
TO 10 CFR PART 50

SURRY POWER STATION, UNITS 1 AND 2, NORTH ANNA POWER STATION, UNITS 1 AND 2

DOCKET NOS. 50-280, 50-281, 50-338, AND 50-339

1. INTRODUCTION

Appendix R, "Fire Protection program for Nuclear Power Facilities Operating Prior to January 1, 1979," to Title 10 of the Code of Federal Regulations (10 CFR Part 50), establishes fire protection features required to satisfy General Design Criterion 3, "Fire Protection," of Appendix A to 10 CFR Part 50 with respect to certain generic issues for nuclear power plants licensed to operate prior to January 1, 1979. Surry Power Station, Units 1 and 2 (Surry) were licensed to operate on May 25, 1972, and January 29, 1973, respectively. North Anna Power Station, Units 1 and 2 (North Anna) were licensed to operate on November 26, 1977, and August 21, 1980, respectively.

By letter dated December 15, 1995, Virginia Electric and Power Company (the licensee) submitted a request for exemption from the technical requirements of Section III.G.2.f. of Appendix R for Thermo-Lag radiant energy heat shields inside containment at Surry and North Anna. By letter dated October 15, 1996, the staff sent a request for additional information regarding the December 15, 1995, exemption request. The licensee responded by letter dated April 22, 1997.

Since North Anna, Unit 2, was licensed to operate in 1980, the licensee is not required to meet the requirements of Appendix R as a regulatory requirement. Therefore, the staff has treated the licensee's request for North Anna, Unit 2, as a deviation request from the guidance contained in Appendix A to Branch Technical Position (BTP) Auxiliary Power Conversion System (APCSB) 9.5-1 rather than a request for an exemption from Appendix R.

2. EXEMPTION REQUESTED

The licensee requested an exemption from the technical requirements of III.G.2.f. of Appendix R for Thermo-Lag radiant energy heat shields inside containment to the extent that, when separation of cables and equipment and associated circuits of redundant trains by a horizontal distance of 20 feet without intervening combustibles cannot be achieved, inside noninerted containments, these cables and equipment and associated circuits of redundant trains are to be separated by noncombustible radiant energy heat shields. The fire barrier material used for radiant energy heat shields at Surry and North Anna is Thermo-Lag 330-1 (Thermo-Lag), a combustible material.

9712030203 971124
PDR ADDOCK 05000280
P PDR

3. DISCUSSION

At Surry and North Anna, Thermo-Lag is used as a radiant energy heat shield for equipment and instrumentation located inside containment. The equipment and instrumentation that are the subject of the exemption request are:

At Surry, Unit 1, the reactor coolant system (RCS) pressure indication circuits (3 feet 6 inches elevation), the pressurizer level indication circuits (18 feet 4 inches elevation), and the residual heat removal (RHR) pump motors (13 feet 0 inches elevation).

At Surry, Unit 2, the RCS pressurizer level indication circuits (18 feet 4 inches elevation), the steam generator level indication circuits (3 feet 6 inches, 18 feet 4 inches and 27 feet 7 inches elevations), and the RHR pump motors (13 feet 0 inches elevation).

At North Anna, Unit 1, the RCS pressure indication circuits (262 feet 10 inches elevation), the pressurizer level indication circuits (292 feet 10 inches elevation), the neutron flux indication circuits (231 feet 6 inches elevation), and the RHR pump motors (231 feet 6 inches elevation).

At North Anna, Unit 2, the RCS pressurizer level indication circuits (262 feet 10 inches and 292 feet 10 inches elevations), and the RHR pump motors (231 feet 6 inches elevation).

At Surry, fire areas 15 and 16 are the primary containments for Units 1 and 2, respectively. Primary and alternate trains of instrumentation are routed through two different penetration areas within each containment. There is an electrical penetration area into the cable vault/tunnel area at approximately the 15 feet 0 inches elevation and another electrical penetration area into the fuel building at the 47 feet 4 inches elevation. These two penetration areas, at each unit, are separated by more than 20 feet horizontally and 30 feet vertically.

At North Anna, fire areas 1-1 and 1-2 are the primary containments for Units 1 and 2, respectively. Primary and alternate trains of instrumentation are routed through two different penetration areas within each containment. There is an electrical penetration area into the cable vault/tunnel area and another electrical penetration area into the fuel building. These two penetration areas, at each unit, are each separated by more than 20 feet horizontally and 30 feet vertically.

Free standing radiant energy shields or box enclosures are installed to provide separation between primary and alternate instrumentation or components that are less than 20 feet apart horizontally. Thermo-Lag preformed half-rounds protect conduits until a distance of 20 feet of horizontal separation is achieved or until a barrier which is constructed of heavy concrete is encountered.

The radiant energy shields protecting conduits are fabricated from 1/2-inch thick Thermo-Lag preformed half-rounds. The boxes around cable penetrations and transmitters, and the panels between transmitters and between the RHR motors are fabricated from 1/2-inch thick Thermo-Lag panels.

Intervening combustibles in the form of cable trays exist between primary and alternate trains of instrumentation separated by more than 20 feet or by Thermo-Lag radiant energy shields.

Fire detection has not been provided in the immediate vicinity of the equipment and conduits protected by the radiant energy shields, with the exception of the reactor coolant pumps that are provided with heat detectors that alarm in the control room.

Fire extinguishers are located outside of the containment at the personnel access hatch and dry hose stations, in the case of Surry, and standpipes, in the case of North Anna, for use by the fire brigade are located within the containment annulus.

4. EVALUATION

The licensee states the combustible radiant energy shields inside containment will perform their intended function on the basis of a combination of factors that include: (1) negligible amounts of intervening combustibles near the shields; (2) the flame resistant nature of the cables; (3) the automatic fire detection; (4) the defense in depth; (5) the limited ignition sources; (6) the lack of transient combustibles; (7) a containment that is a multi-level open structure; and (8) the fact that Thermo-Lag requires large heat fluxes or high temperatures to ignite.

BTP APCS 9.5-1 and its Appendix A define non-combustible materials as "materials, no part of which will ignite and burn when subjected to fire." The definition of "non-combustible" used by the NRC in its Standard Review Plan (NUREG 0800, SRP 9.5-1, Fire Protection) was derived from National Fire Protection Association (NFPA) Standard 220, "Standard on Types of Building Construction." NFPA 220, which is referenced by the SRP, defines noncombustible material as "[a] material which in the form in which it is used and under the conditions anticipated, will not ignite, burn, support combustion, or release flammable vapors when subjected to fire or heat. Materials which are reported as passing ASTM E136... shall be considered noncombustible materials." On that basis, the staff used the test methods specified in ASTM E136 to assess the combustibility of Thermo-Lag. As reported in NRC Information Notice 92-82, the NRC concluded that Thermo-Lag is combustible as defined in the aforementioned NRC fire protection guidelines. The staff views combustibility as a material property which is independent of the fire loading in the area of the material and, therefore, the use of Thermo-Lag as a radiant energy shield inside containment is unacceptable. NRC Information Notice 92-82 also recommended that licensees reevaluate their use of Thermo-Lag radiant energy shields inside the containment and seek other solutions such as exemptions where technically justified.

For Surry, in a letter dated February 25, 1988, the staff granted an exemption from Section III.G.2.d. for the fire areas that are the subject of this request to the extent that it requires redundant cables and equipment inside a noninerted containment to be separated by 20 feet horizontally with no intervening combustibles. The staff based its approval of this exemption on the adequacy of fire stops used on vertical cable trays (intervening combustibles) and noncombustible radiant energy heat shields in the area of the redundant train interactions associated with the RCS hot and cold leg temperature, steam generator level, neutron flux monitoring, RCS pressure and pressurizer level instrumentation.

For North Anna, in a letter dated November 6, 1986, the staff granted an exemption from Section III.G.2.d for the fire areas that are the subject of this request to the extent that it requires redundant cables and equipment inside a noninerted containment to be separated by 20 feet horizontally with no intervening combustibles. The staff based its approval of this exemption on the adequacy of the fire stops used on vertical cable trays (intervening combustibles) and noncombustible radiant energy heat shields in the area of the redundant train interactions associated with RCS hot and cold leg temperature, steam generator level, neutron flux monitoring, RCS pressure and pressurizer level instrumentation. Therefore, the combustibility of the radiant energy heat shields was not factored in the overall evaluation.

On December 28, 1994, the staff issued a request for additional information regarding Generic Letter 92-08 pursuant to 10 CFR 50.54(f). One of the questions addressed Thermo-Lag material consistency. To help resolve this question, the Nuclear Energy Institute (NEI) coordinated a generic chemical analysis program. NEI analyzed the Thermo-Lag samples sent by licensees and based on the results of the analysis, concluded that all of the samples were similar in chemical composition. The licensee, however, did not participate in the chemical consistency program. As a result, the licensee is unable to establish with reasonable assurance that the Thermo-Lag in use at Surry and North Anna is represented by the population of samples that were tested.

Generic letter 86-10 responds to a question in regard to the issue of limited amount of intervening combustibles and what would be sufficient justification to support an exemption request as follows:

If more than negligible quantities of combustible materials (such as isolated cable runs) exist between redundant shutdown division, an exemption request should be filed. [Negligible quantity is an admitted judgmental criterion, and this judgement should be made by a qualified fire protection engineer and documented for later NRC audit.] Justifications for such exemptions have been based on the following factors:

1. A relatively large horizontal spatial separation between redundant divisions; all cables qualified to IEEE-383;

2. The presence of an automatic fire suppression system over the intervening combustible (such as a cable tray fire suppression system);
3. The presence of fire stops to inhibit fire propagation in intervening cable trays;
4. The likely fire propagation direction of burning intervening combustibles in relation to the location of the vulnerable shutdown division;
5. The availability of compensating active and passive fire protection.

In view of the fact that: (1) the radiant energy shields inside the containment constitute intervening combustibles; (2) additional intervening combustibles in the form of cable trays are also present in containment; (3) there is no automatic fire suppression system over the intervening combustibles in question; and (4) manual suppression would be delayed due to the time required to enter containment, the use of Thermo-Lag radiant energy shields inside containment is unacceptable. The licensee's request for exemption from Section III.G.2.f. of Appendix R for Thermo-Lag radiant energy heat shields inside containment for Surry, Units 1 and 2, and North Anna, Unit 1, to the extent that it requires that, inside noninerted containment, redundant trains of equipment needed to achieve and maintain safe shutdown conditions be separated by a horizontal distance of more than 20 feet with no intervening combustible or fire hazards or a noncombustible radiant energy shield, should be denied. In regard to North Anna, Unit 2, a deviation from the guidance contained in Appendix A to BTP APCS 9.5-1 should not be granted.

5. CONCLUSION

On the basis of its evaluation, the staff has concluded that the use of combustible radiant energy heat shields inside containment at Surry and North Anna is unacceptable. Therefore, the licensee's request for an exemption from the requirements of Section III.G.2.f. of Appendix R to 10 CFR Part 50 for Surry, Units 1 and 2, and North Anna, Unit 1, is denied. A deviation from the guidance contained in Appendix A to BTP APCS 9.5-1 for North Anna, Unit 2, is also denied.

Reviewers: Pat Madden and Daniele Oudinot

Date: **November 24, 1997**