UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
WASHINGTON, D.C. 20555

May 13, 1994

NRC INFORMATION NOTICE 94-34: THERMO-LAG 330-660 FLEXI-BLANKET AMPACITY DERATING CONCERNS

Addressees

All holders of operating licenses or construction permits for nuclear power reactors.

Purpose

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice to alert addressees to a potential problem involving the use of nonconservative ampacity derating data by licensees based on previous representations by the vendor, Thermal Science, Inc. (TSI). It is expected that recipients will review the information for applicability to their facilities and consider actions, as appropriate, to avoid similar problems. However, suggestions contained in this information notice are not NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances

The vendor, TSI, stated in a purchase document, "TSI's Bid Document 618," dated June 25, 1986, for Northeast Utilities Service Company (Millstone Units 1 and 2) that the Thermo-Lag 330-660 Flex-Blanket material will produce test results similar to those of the Thermo-Lag 330-1 material. For example, the vendor cited a 7.47 percent ampacity derating factor for the Thermo-Lag 330-1 material based on reported test results for a 1-hour-rated fire barrier conduit system.

On November 8, 1993, the NRC staff wrote to TSI requesting information regarding the ampacity derating data provided licensees for the application of the Thermo-Lag 330-660 Flexi-Blanket fire barrier system.

On December 22, 1993, TSI responded stating that Texas Utilities Electric Company had recently conducted an ampacity derating test at the Omega Point Test Laboratories. The test, using a 1-hour design (three 0.64 cm [0.250 inch] layers) of the Thermo-Lag 330-660 Flexi-Blanket material, had resulted in a 21.2 percent ampacity derating factor for a 3C/#6 AWG Air Drop configuration. In addition, the vendor stated that, to the best of its knowledge, no ampacity derating test has been performed on the 3-hour design (five 0.64 cm [0.250 inch] layers) of the Thermo-Lag 330-660 Flexi-Blanket fire barrier system.

Attachment 1 contains a list of the organizations that TSI identified as having purchased the Thermo-Lag 330-660 Flexi-Blanket material for use in nuclear power generating plants.

Discussion

Title 10 of the Code of Federal Regulations, Part 50, Appendix A, General Design Criterion (GDC) 17, "Electric power systems," if applicable, requires that onsite and offsite electric power systems be provided to permit the functioning of structures, systems, and components important to safety. The safety function of either electrical power system (assuming the other system is not functioning) is to provide sufficient capacity and capability to ensure that vital functions are maintained. Cables routed in electrical raceways are derated to ensure that systems have sufficient capacity and capability to perform their intended safety functions. Other factors that affect ampacity derating include cable fill, cable loading, cable type, raceway construction, and ambient temperature.

Cable derating calculations that are based on inaccurate or nonconservative derating factors could result in the installation of undersized cables or overfilling of raceways. Either of these conditions could cause operating temperatures to exceed design limits within the raceways, thereby reducing the expected design life of the cables. TSI stated in the 1986 procurement document referenced above that the Thermo-Lag 330-660 material will produce similar ampacity results as those of the Thermo-Lag 330-1 material. Because of the wide range of ampacity derating factors documented for various Thermo-Lag materials, some licensees may not have adequately accounted for the insulating effects of the Thermo-Lag 330-660 material in their derating analyses.

The National Electrical Code, Insulated Cable Engineers Association publications, and other industry standards provide general ampacity derating factors for open-air installations, but do not include derating factors for fire barrier systems. The Insulated Conductors Committee of the Institute of Electrical and Electronics Engineers (IEEE) Power Engineering Society, Task Force 12-45, has been developing IEEE Standard Procedure P848, "Procedure for the Determination of the Ampacity Derating of Fire Protected Cables," for use as an industry standard. The industry consensus standard development process may result in the formulation of a uniform technical approach to the determination of ampacity derating factors for cables enclosed by fire barrier systems.

Related Generic Communications

In NRC Information Notice (IN) 92-46, "Thermo-Lag Fire Barrier Material Special Review Team Final Report Findings, Current Fire Endurance Tests, and Ampacity Calculation Errors," the staff informed licensees that a licensee had discovered a mathematical error in the calculation of the ampacity derating

factor as published in an Industrial Testing Laboratories, Incorporated, test report. A preliminary assessment of the use of lower-than-actual ampacity derating factors indicates that the Thermo-Lag barrier installations may allow cables to reach temperatures that exceed their ratings, which could accelerate cable aging.

In IN 94-22, "Fire Endurance and Ampacity Derating Test Results for 3-Hour Fire-Rated Thermo-Lag 330-1 Fire Barriers," the staff informed licensees of the preliminary results of fire endurance and ampacity derating tests conducted by NRC at the Underwriters Laboratories, Incorporated, during December 1993. The principal objective of the tests was to evaluate the performance of the barriers against the results of tests previously reported by TSI.

This information notice requires no specific action or written response. If you have any questions about the information in this notice, please contact the technical contact listed below or the appropriate Office of Nuclear Reactor Regulation (NRR) project manager.

Brian K. Grimes, Director
Division of Operating Reactor Support
Office of Nuclear Reactor Regulation

Technical contact: Ronaldo V. Jenkins, NRR
(301) 504-2985

Attachments:
1. Licensees Who Purchased Thermo-Lag 330-660 Flexi-Blanket Thermal Barrier Material
2. List of Recently Issued NRC Information Notices

LICENSEES WHO PURCHASED
THERMO-LAG 330-660 FLEXI-BLANKET THERMAL BARRIER MATERIAL[1]

Utility	Facility
Carolina Power & Light Co.	Brunswick
Cleveland Electric Illuminating Co.	Perry Nuclear Plant
Commonwealth Edison	Braidwood Station
Entergy Operations, Inc.	Waterford 3
Consumers Power	Palisades
Florida Power Corporation	Crystal River Unit 3
Fluor Engineers Co.	San Onofre
Georgia Power	E. I. Hatch
	Plant Vogtle
Gulf States Utilities[2]	River Bend
GPU Nuclear	Oyster Creek
	Three Mile Island
Long Island Lighting	Shoreham
Iowa Electric	Duane Arnold Plant
Northern States Power	Prairie Island
South Carolina Electric & Gas Co.	Virgil C. Summer
Tennessee Valley Authority	Browns Ferry
	Watts Bar
Toledo Edison Co.	Davis Besse Power Station
Texas Utilities Electric	Comanche Peak Units 1 and 2
Washington Public Power Supply System	WNP-2

[1] From TSI letter to NRC dated December 22, 1993.

[2] Licensee is now Entergy Operations, Inc.

LIST OF RECENTLY ISSUED NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
94-33	Capacitor Failures in Westinghouse Eagle 21 Plant Protection Systems	05/09/94	All holders of OLs or CPs for nuclear power reactors.
93-53, Supp. 1	Effect of Hurricane Andrew on Turkey Point Nuclear Generating Station and Lessons Learned	04/29/94	All holders of OLs or CPs for nuclear power reactors.
94-32	Revised Seismic Hazard Estimates	04/29/94	All holders of OLs or CPs for nuclear power reactors.
94-31	Potential Failure of Wilco, Lexan-Type HN-4-L Fire Hose Nozzles	04/14/94	All holders of OLs or CPs for nuclear power reactors.
90-68, Supp. 1	Stress Corrosion Cracking of Reactor Coolant Pump Bolts	04/14/94	All holders of Ol or CPs for pressurized water reactors.
94-30	Leaking Shutdown Cooling Isolation Valves at Cooper Nuclear Station	04/12/94	All holders of OLs or CPs for nuclear power reactors.
94-29	Charging Pump Trip during a Loss-of-Coolant Event Caused by Low Suction Pressure	04/11/94	All holders of OLs or CPs for pressurized water reactors.
92-51, Supp. 1	Misapplication and Inadequate Testing of Molded-Case Circuit Breakers	04/12/94	All holders of OLs or CPs for nuclear power reactors.
94-28	Potential Problems with Fire-Barrier Penetration Seals	04/05/94	All holders of OLs or CPs for nuclear power reactors.

OL = Operating License
CP = Construction Permit

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Original Signed by
Brian K. Grimes

Brian K. Grimes, Director
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Office of Nuclear Reactor Regulation

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*see previous concurrence

OFFICE	*OGCB\DORS	*Tech Editor	*EELB\DE	*C:\EELB\DE
NAME	RJKiessel	MMejac	RVJenkins	CHBerlinger
DATE	4/12/94	4/14/94	4/18/94	4/21/94

OFFICE	*D:DE\NRR	*C:OGCB\DORS	D:DORS\NRR
NAME	BWSheron	AJKugler	BKGrimes
DATE	4/22/94	5/05/94	5/9/94

Document Name: 94-34.IN

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NAME	BWSheron	AJKugler	BKGrimes
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Document Name: G:\SHARED\INTHERM.660

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*RVJenkins	PGill	CHBerlinger		TechEd*
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