VERMONT YANKEE
NUCLEAR POWER CORPORATION

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September 14, 1996
BVY 96-108

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

Reference: (a) License No. DPR-28 (Docket No. 50-271)

Subject: Reportable Occurrence No. LER 96-018

As defined by 10CFR50.73, we are reporting the attached Reportable Occurrence as LER 96-018.

Sincerely,

VERMONT YANKEE NUCLEAR POWER CORPORATION

Robert J. Wanczyk
Plant Manager

cc: USNRC Region 1 Administrator
USNRC Resident Inspector - VYNPS
USNRC Project Manager - VYNPS

NRC Form 366 (4-95) U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER ( )	PAGE (3)
VERMONT YANKEE NUCLEAR POWER STATION	05000271	01 OF 04

TITLE (4) Inadequate Installation and Inspection of Fire Protection Wrap Results in Plant Operation Outside of Its Design Basis, A Single Fire Would Impact Multiple Trains of Safety Related Systems.

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NO.(S) 05000
08	15	96	96	-- 018 --	00	09	14	96	N/A	

OPERATING MODE (9)	N
POWER LEVEL (10)	95

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: CHECK ONE OR MORE (11)

	20.2201(b)		20.2203(a)(2)(v)		50.73(a)(2)(i)		50.73(a)(2)(viii)
	20.2203(a)(1)		20.2203(a)(3)(i)	X	50.73(a)(2)(ii)		50.73(a)(2)(x)
	20.2203(a)(2)(i)		20.2203(a)(3)(ii)		50.73(a)(2)(iii)		73.71
	20.2203(a)(2)(ii)		20.2203(a)(4)		50.73(a)(2)(iv)		OTHER
	20.2203(a)(2)(iii)		50.36(c)(1)		50.73(a)(2)(v)		(Specify in Abstract below or in NRC Form 366A)
	20.2203(a)(2)(iv)		50.36(c)(2)		50.73(a)(2)(vii)		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NO. (Include Area Code)
ROBERT J. WANCZYK, PLANT MANAGER	802-257-7711

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS
NA					NA				
NA					NA				

SUPPLEMENTAL REPORT EXPECTED (14)				EXPECTED SUBMISSION DATE (15)	MO	DAY	YEAR
	YES (If yes, complete EXPECTED SUBMISSION DATE)	X	NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On 08/15/96, during a scheduled surveillance inspection, Vermont Yankee (VY) identified a flaw in a one-hour cable tray fire wrap installed to protect 4160 and 480 Volt power cables supplying Division I Emergency Core Cooling Systems from a postulated fire affecting cables which provide power to the Division II Emergency Core Cooling Systems. Both sets of cables are located within the same enclosure and are required to be protected in accordance with 10CFR50 Appendix R, Section III.G.2.c. The flaw, although quite small, was different from the tested configuration for Vermont Yankee electrical cable support tray fire wrap. Due to the nature and location of the flaw VY Fire Protection Engineers made the conservative determination that the fire wrap was non-functional. The non-functional wrap in the location cited introduces the possibility of a single fire impacting redundant trains of equipment needed to achieve cold shutdown. This potential damage, when assessed against the plant's on site repair/restoration capabilities was deemed to place the plant outside of it design basis for systems configuration compliance with Appendix R of 10CFR50, in that, restoration of systems capability within 72 hours could not be assured. The causes of the event were Cognitive Human Error in the application of the fire wrap, and additional Cognitive Human Error in the inspection of that installation. Training has been given and procedural requirements changed to prevent recurrence. Fire Protection Engineering has reviewed the condition of the wrap against the combustible loading and fire suppression/detection capabilities and determined that the cable tray could not be compromised within one hour.

DESCRIPTION OF EVENT

On 08/15/96, while performing a routine inspection, Vermont Yankee (VY) identified a flaw in a one-hour cable tray fire wrap. The wrap is installed to protect 4160 and 480 Volt power (EIIS=EA, EC) cables supplying Division I Emergency Core Cooling Systems from a postulated fire affecting cables which provide power to the Division II Emergency Core Cooling Systems and the Reactor Core Isolation Cooling System (RCIC, EIIS=BN). Both sets of cables are located within the same enclosure (room) and are required to be protected in accordance with 10CFR50 Appendix R, Section III.G.2.c. The flaw, although only 3 inches long and 1/4 inch wide, was not consistent with the tested configuration for Vermont Yankee electrical cable support tray 1 hour fire wrap. The flaw left exposed to room ambient temperature, a small section of support steel which provides direct support for the cable tray. This established a situation where the support steel, a very poor thermal insulator, provided the only physical barrier between the cable and the postulated fire. Therefore the Vermont Yankee Fire Protection Engineers made the conservative determination that the cable tray fire wrap was non-functional.

The cable tray wrap, manufactured by 3M corporation, was installed as an engineering design change in 1986 using the VY design change process. The implementation documentation, including drawings and written instructions, were reviewed. The documents were comprehensive and accurate. The cable tray wrap was installed and inspected by qualified individuals, however a small gap escaped the notice of both installer and inspector.

CAUSE OF EVENT

The causes were cognitive human errors on the part of those persons who installed (root cause, inadequate self-check) and inspected (contributing cause) the fire wrap during the implementation of Engineering Design Change Request (EDCR) 86-405.

ANALYSIS OF EVENT

The absence of a functional cable tray fire wrap in the location cited introduces the possibility of a single fire impacting redundant trains of equipment needed to achieve and maintain cold shutdown. This potential damage, when assessed against the plant's on site repair/restoration capabilities was evaluated to place the plant outside of it design basis for systems configuration compliance with Appendix R of 10CFR50. Specifically, restoration of systems capability within 72 hours could not be assured. As the Vermont Yankee Fire Hazards Analysis (FHA) cites, Appendix R of 10CFR50 allows postulated damage from a single fire to affect redundant systems required to establish and maintain cold shutdown provided that the results of the "damage (to both trains of equipment necessary to achieve cold shutdown) are limited so that at least one train can be repaired or made operable within 72 hours using on-site capability."

The Vermont Yankee (VY) Safe Shutdown Capabilities Analysis (SSCA) makes clear that the separation of electrical power supplies and control circuits by functional fire barriers is an essential element of the overall adequacy of the analysis. The SSCA states, "the cornerstone of the fire area evaluation is the separation analysis. In the separation analysis, all safe shutdown functions within a fire area were determined, and the impact of a postulated fire within that fire area, including spurious operation was determined. Recommendations and exemptions required to comply with 10CFR50, Appendix R, III.G were developed on the basis of the separation analysis, the fire area evaluation and existing fire barriers and other plant fire protection features (e.g., detection, suppression, and fire hazards)."

Assumptions and Bases for the Safe Shutdown Systems Analysis

The Safe Shutdown Capabilities analysis considers the effects of fire on plant equipment and identifies methods for achieving safe shutdown, including cold shutdown.

Several assumptions are made in the course of this analysis to ensure that the study closely reflects the impacts of a fire. The assumptions include fire damage to plant equipment including electrical cable.

In assessing the affects of fire damage to plant electrical cable the following conservative assumptions are made:

The integrity of insulation and external jacket material for electrical cables is susceptible to fire damage.

The SSCA assumes that functional integrity of electrical cables is lost when exposed to a fire in any fire area.

Further it was assumed that the resultant electrical cable failure would invariably result in "an unusable cable with regard to proper safe shutdown function..."

The fundamental concern for protecting circuits associated by common enclosure is to ensure that fire damage does not propagate into enclosures containing redundant safe shutdown divisions. In the context of the SSCA, enclosures include sealed fire areas and cable trays.

Circuit protection is provided in the case cited in this event by cable separation using a one-hour rated cable tray fire wrap and other features.

In assessing VY's conformance to Appendix R requirements the SSCA determined that the following plant modification was necessary. Using the VY design change process Division I power cables were wrapped within the NW corner room, Elevation 232', with a one-hour rated barrier. This is the wrap which was discovered to be flawed.

The SSCA concluded that should a fire occur in the affected enclosure, identified in the SSCA as Zone RB-1, the plant can achieve safe shutdown conditions as required. However, the SSCA goes on the say that, "the modifications described are necessary to ensure safe shutdown and Appendix R compliance."

As the recent inspection determined that the installed fire wrap could not be assured to perform to the standards prescribed by the SSCA and, as the adequacy of the SSCA is placed explicitly upon the installation of a rated one-hour fire wrap in that location, it was decided that the failure to have in place the barrier as prescribed placed the plant outside of its design basis for Appendix R implementation and conformance. This condition has been in place since the wrap was installed approximately 10 years ago in 1986.

Vermont Yankee recognizes that the assumptions made in the SSCA regarding the postulated damage to cable caused by any fire within the subject enclosure is very conservative. Fire Protection Engineering has reviewed the in situ and transient combustible loading in the area, along with the installed detection and suppression system capabilities and has determined that there is no fire which could reasonably be expected to occur in the area which would challenge the wrapped cable in its "as-found" condition.

Based upon the above it is determined that there were no adverse effects to public health or safety as a result of this event.

CAUSE ANALYSIS

The causes of the event were:

1. Root Cause - Human Error (cognitive) in the application of the fire wrap in that the worker performed an inadequate self-verification, and

2. Contributing Cause - Human Error (cognitive) in the inspection of the installation in that the required inspections, following individual steps during the installation process, failed to identify the flaw.

CORRECTIVE ACTIONS

1. Immediate

   a. A compensatory fire watch was established to monitor for fire and fire hazards in the affected area.

   b. The gap in the fire wrap was repaired in accordance with manufacturers instructions (complete).

   c. Current work efforts in the installation of a similar fire wrap were preceded with a training session which emphasized the need to maintain a questioning attitude. Installers, inspectors, engineers and supervisors were in attendance. (Complete 09/11/96).

2. Long Term

   a. The VY Installation and Test Procedure Checklists (Vermont Yankee Administrative Procedure 6001, Appendix B), will be revised in include a requirement for a post installation inspection following fire wrap installations or jobs of similar scope or significance. The expected completion date is 12/31/96.

Consistent with current VY management commitment, application of "STAR" self-checking and verification techniques is part of the current VY culture. It is consistently emphasized in training, plant communications and job preparation. This strong emphasis on attention to detail and self-checking/verification contributed to the discovery of the flaw. While not a corrective action per se, it directly works to minimize the recurrence of events of this type.

ADDITIONAL INFORMATION

Similar events in the past five years have been reported as LER94-018, LER96-007 and LER96-009.

VY cable tray fire wrap surveillance has recently been strengthened by the addition of Quality Control (QC) support in the inspection efforts. This enhancement contributed significantly to the ability to identify and correct this deficiency, thus meeting the intent of the enhancement.