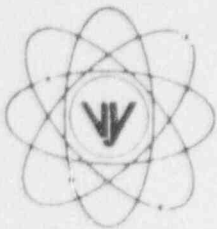


VERMONT YANKEE NUCLEAR POWER CORPORATION



P.O. Box 157, Governor Hunt Road
Vernon, Vermont 05354-0157
(802) 257-7711

May 29, 1997
BVY 97-72

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

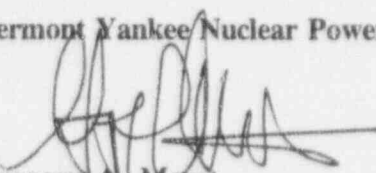
Reference: (a) License No. DPR-28 (Docket No. 50-271)

Subject: Reportable Occurrence No. LER 97-006, Rev. 1

As defined by 10CFR50.73, we are reporting the attached Reportable Occurrence as LER 97-006, Rev. 1.

Sincerely,

Vermont Yankee Nuclear Power Corporation


Gregory A. Maret
Plant Manager

040014

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

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NRC Form 366 (4-95) U.S. NUCLEAR REGULATORY COMMISSION LICENSEE EVENT REPORT (LER)				APPROVED BY OMB NO. 3150-0104 EXPIRES 04/30/98 ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.							
FACILITY NAME (1) VERMONT YANKEE NUCLEAR POWER STATION						DOCKET NUMBER (2) 05000271		PAGE (3) 01 OF 05			
TITLE (4) Use of an inadequate design implementation document during initial plant construction results in the failure to maintain proper electrical separation of electrical cables.											
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)	
03	26	97	97	-- 006 --	01	05	29	97	N/A	05000	
OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: CHECK ONE OR MORE (11)									
N		20.2201(b)		20.2203(a)(2)(v)		50.73(a)(2)(i)		50.73(a)(2)(viii)			
POWER LEVEL (10) 100		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 GREGORY A. MARET, PLANT MANAGER								TELEPHONE NO. (Include Area Code) 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				NO	.....	NA				
NA					.....	NA				
SUPPLEMENTAL REPORT EXPECTED (14)						EXPECTED SUBMISSION DATE (15)		MO	DAY	YEAR	
X	YES (If yes, complete EXPECTED SUBMISSION DATE)			NO				08	30	97	

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

On 3/26/97 during Appendix R program enhancement efforts, Vermont Yankee discovered an electrical cable installation in variance with the VY FSAR requirements for separation of electrical cables. Specifically, it was discovered that a non-safety lighting panel supply cable passed in proximity to both division I and division II Engineered Safety Feature actuating and power cables. This configuration conflicts with VY's single failure criteria for safety systems, creating a condition where a single failure of an active component (the safety-class circuit breaker providing protection for the non-safety lighting circuit) could challenge redundant ESF trains. This configuration has been in place since initial plant construction due to the use of an inadequate installation guideline. VY has rerouted the subject lighting cable to conform to the applicable separation criteria. Follow-up investigation has revealed similar cable routing non-conformances including a single electrical box which houses cable potentially affecting one Low Pressure Coolant Injection subsystem and a cable providing DC power to the High Pressure Coolant Injection system. VY has performed an extensive, systematic assessment of its cable routing. Cable separation non-conformances discovered are being evaluated for their safety implications. Compensatory measures and bases for maintaining operation are being developed as necessary. The non-conforming cables are typically low-voltage signal/control cables and/or protected by multiple safety class protective devices. These devices provide highly reliable protection against faults which could reasonably be expected to challenge the cable insulation. Additionally, the cable mixing found was bounded by VY's current Appendix R analyses. Therefore this event is not considered to have presented an increased threat to public health or safety.

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TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

DESCRIPTION OF EVENT

On 3/26/97 while operating at rated power Vermont Yankee (VY) was performing an evaluation aimed at enhancing its 10CFR50 Appendix R high impedance fault study. During the evaluation, VY discovered an electrical cable (EIS=CBL1, CBL4) installation at variance with the VY FSAR requirements for separation of electrical cables. Specifically, it was discovered that a non-safety lighting panel supply cable passed in proximity to both Division I and Division II Engineered Safety Features actuating and power cables. The cable, routed through both Division I (SI) and Division II (SII) cable trays (EIS=TY, FA) passed in immediate proximity to numerous SII ESF control and actuating circuits and the conductor which provides 125 Vdc control power to the 4160 Vac switchgear (EIS=SWGR) in SI. This configuration conflicts with VY's single failure criteria for safety systems and creates a condition where a single failure of an active component (the safety-class circuit breaker providing protection for the non-safety lighting circuit) could challenge redundant ESF trains. A configuration wherein the failure of a single active component challenges redundant ESF trains is inconsistent with the design basis of the plant.

The event investigation showed that this configuration had been in place since initial plant construction due to an inconsistency between the VY Final Safety Analysis Report and the cable installation guideline used. The VY FSAR specifically prohibits cable routing which would allow any single cable to pass through both SI/DI and SII/DII cable trays. The installation guideline however, allowed such a configuration provided certain considerations were met.

VY initially isolated the affected lighting panel (EIS=FF) supply cable by opening its isolation breaker. VY has since rerouted the affected cable in accordance with the applicable electrical separation criteria. Follow-up investigation revealed similar cable routing non-conformances. VY has performed an extensive, systematic assessment of cable routing drawings. The assessment also included field walkdowns and a review of VY's Appendix R safe shutdown data base. Approximately sixty cable separation non-conformances have been discovered, and have been evaluated for their safety implications.

Subsequent evaluations have concluded that eight of these 60 circuits possessed inadequate circuit protection to preclude insulation damage in the event of a circuit fault and a failure of the primary protective device. These cables have been rerouted to conform with FSAR separation criteria. Compensatory measures and bases for maintaining operation are being developed or revised as necessary. The non-conforming cables identified and evaluated to date are described herein.

CAUSES OF EVENT

1. The investigation shows that the majority of the cable separation non-conformances are due to the use of an inadequate installation guideline, during initial plant construction, which did not meet the VY Final Safety Analysis Report requirements for cable separation.

Due to the date of the installations, it is not expected that a root cause for the installation document error can be determined. The investigation is continuing.

2. Two nonconforming cables have been found which were installed during later configuration change efforts. The cause for these non-conformances is also under investigation.

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ANALYSIS OF EVENT

A broad spectrum of safety significant systems are potentially affected by this non-conformance. A review of early licensing communication reveals that the original plant design may have allowed cable runs to be evaluated on an individual basis to allow variance with the standard criteria of physical separation between redundant ESF electrical cables. However, it is clear from a review of the original plant FSAR appendix which documents VY's response to the Atomic Energy Commission's inquiries, that very early in the licensing process VY committed to prohibiting configurations where a single non-safety cable could be run with the electrical circuits of redundant ESF's. The FSAR further states that single failures of passive components were to be considered for protection system circuitry subject to IEEE-279, 1971.

At this time, the following circuit routings have been discovered which are inconsistent with the FSAR's cable separation requirements.

1. The aforementioned non-safety lighting panel feed was discovered which interfaces with both the DC control power for SII 4160 Vac switchgear (EIS=EK) and numerous SI ESF component control circuits.
 - a. This non-safety circuit is protected by a safety class breaker (EIS=BKR).
 - b. Backup protection is provided to the circuit by a safety class breaker supplying the parent motor control center (EIS=PL). Therefore any short circuit in the affected cable will be isolated prior to cable damage.
 - c. This 480 Vac circuit has been rerouted to meet the FSAR separation criteria for electrical cable.
2. An Uninterruptible Power Supply (UPS) Feed (SII, EIS=EJX) is routed through a common box with DC power supporting the High Pressure Coolant Injection (HPCI) System (Division I DC, DI, EIS=BT).
 - a. This potentially allows a single failure to challenge both the HPCI system and the one train of Low Pressure Coolant Injection power from the affected UPS.
 - b. The 480 Vac feed is automatically deenergized on an accident signal.
 - c. The DC supply to HPCI is protected with a safety class protection device.
 - d. Both the 480 Vac and the DC supply have back-up safety class protective devices. Therefore, any short circuit in these cables will be isolated prior to cable damage.
3. A second non-safety lighting panel feed was discovered which interfaces with both SI and SII circuits.
 - a. This non-safety 480 Vac circuit is protected by a safety class breaker.
 - b. Backup protection is provided to the circuit by a safety class breaker supplying the parent motor control center. Therefore any short circuit in this cable will be isolated prior to cable damage.

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4. Additional cable routings were discovered in the cable vault which are inconsistent with current VY FSAR requirements for cable separation.
 - a. The function of approximately 60 nonconforming non-safety cables have received an initial review.
 - b. These include a routing of NNS cables which enters SI and SII cable trays in the Cable Vault potentially affecting SI Residual Heat Removal (EIS=BO) and Core Spray (EIS=BM) logic trains as well as SII Residual Heat Removal Service Water (EIS=BI) pumps.
 - c. All of these nonconforming NNS cables are 120V or less and are used for either indication, annunciation, control power and interlocks, signal inputs from instrumentation or relaying.
 - 1) The indication, annunciation and signal inputs, and interlocks are low level (EIS=CBL3) and as such cannot generate sufficient energy to cause damaging short circuits within the cables.
 - 2) The power feeds are powered from safety class buses via safety class breakers. The buses have safety class breaker feeds which provide backup short circuit protection. Therefore, any short circuit in these NNS cables will be isolated prior to cable damage.
5. On 5/2/97, as a result of questions raised during this event investigation, two more NNS signal cable routings were discovered to be in conflict with VY electrical separation criteria, in that they pass through an SI and an SII manhole. The routing allowed these cables to pass in proximity to circuits potentially affecting redundant components within ESF systems.
 - a. These nonconforming NNS cables are 120 Vac.
 - b. Each signal cable is protected by multiple fuses and a control power transformer, providing reliable protection against postulated faults which could challenge cable insulation.

Additionally, affected control power and interlock circuitry is protected by multiple devices such as a breaker and fuse (EIS=FU), two breakers in series, or a fuse and control power transformer (EIS=XFMR).

For a postulated fire the bounding assumptions and analyses documenting VY's compliance with 10CFR50 Appendix R remain intact.

Safety Significance

The non-conforming cables are typically low-voltage signal and control cables and/or protected by multiple safety class protective devices. These devices provide highly reliable protection against faults which could reasonably be expected to challenge the cable insulation. Additionally, the cable mixing found was bounded by VY's current Appendix R analyses. Therefore this event is not considered to have presented an increased threat to public health or safety.

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CORRECTIVE ACTIONS

1. Event reports were initiated which require formal root cause analyses and corrective action recommendations. The results of these analyses, including long term corrective action recommendations will be issued in a supplement to this Licensee Event Report (expected completion date is 07/30/97).
2. A 100 percent review of electrical cable installation drawings was performed. The assessment also included field walkdowns and a review of VY's Appendix R safe shutdown data base. (action complete).
3. Bases for maintaining operation are being generated as necessary to justify continued operation for the non-conformances identified. This action continues as necessary, as the non-conforming cable runs are further evaluated (this action is ongoing).
 - a. Subsequent evaluations have concluded that eight of the approximately 50 non-conforming cable runs should be rerouted as their protective devices could not be demonstrated to be adequate.
 - b. These cables have been rerouted to conform with FSAR separation criteria.

ADDITIONAL INFORMATION:

The following similar events have been reported in the last five years. Each reported upon an original plant construction or design inadequacy.

- | | |
|-----------|--|
| LER 97-05 | Inadequate design/operating license coordination allows plant configuration which could result in a loss of secondary containment integrity in the event of a LOCA coincident with containment inert/deinert operations. |
| LER 97-04 | Inadequate design allows VY Vital Switchgear to be vulnerable to flooding from Fire Main rupture. |
| LER 97-03 | Overpressure protection not provided for turbine building as described in the VY FSAR due to an unknown cause. |
| LER 97-02 | Inadequate design allows VY Vital Switchgear to be vulnerable to flooding during the Maximum Postulated Flood (MPC) conditions. |
| LER 97-01 | Inadequate design evaluation allows plant operation under conditions where a single postulated electrical failure coincident with a LOCA could result in containment overpressure. |
| LER 96-15 | Original B31.1 ANSI Code section that required overpressurization relief for isolated piping section was not considered in the original design. |
| LER 96-14 | Failure to provide tornado protection for diesel generator rooms as specified in the Final Safety Analysis Report due to unknown cause. |