

# VERMONT YANKEE NUCLEAR POWER CORPORATION



Ferry Road, Brattleboro, VT 05301-7002

November 07, 1996

BVY 96-141

(802) 257-5271

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 96-026

As defined by 10CFR50.73, we are reporting the attached Reportable Occurrence as LER 96-026.

Sincerely,

VERMONT YANKEE NUCLEAR POWER CORPORATION

Robert J. Wanczyk  
Plant Manager

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

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NRC Form 366 (4-95) U.S. NUCLEAR REGULATORY COMMISSION  <b>LICENSEE EVENT REPORT (LER)</b>				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) Inadequate design implementation and subsequent inadequate documentation of inspection findings result in operation outside of plant design basis for fire mitigation and Tech. Spec. non-compliance.											
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)	
10	07	96	96	-- 026 --	00	11	07	96	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)		X		50.73(a)(2)(i)		50.73(a)(2)(viii)	
POWER LEVEL (10) 00		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 ROBERT J. WANCZYK, 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						01 30 97	

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

On 10/07/96, while shut down for refueling, Vermont Yankee (VY) discovered that a fire barrier penetration seal, controlled and inspected per plant Technical Specifications (TS) had been improperly installed in 1979 (not per the original design specifications). The seal was evaluated to be inoperable. The seal is required to be operable at all times as prescribed by VY TS section 3.13.E.1. When it was determined that the fire barrier penetration seal was not operable, a fire watch was stationed as prescribed by VY TS. As the non-conformance had been in place since the original seal fabrication, and a fire watch had not been in place, it was deemed a violation of VY TS. As the affected barrier is credited in VY analyses in the prevention of propagation of fire from the cable vault to other areas, and as the VY FSAR states that the fire protection systems are designed to prevent the spread of fire from one area to another, this condition constituted operation outside of the plant design basis. The apparent causes of the event include inadequate design implementation and inspection. VY is repairing the non-conforming seal. Coincident with that repair a defect was identified in an adjacent seal. Repair of the second seal is also under way. Although the seals did not meet the requirements for a 3 hour rating they would have challenged propagation of a fire. The combination of automatic fire suppression and detection, an on-site fire brigade and the as-built condition of the fire barrier gives confidence that a postulated fire would have been rapidly detected, and extinguished such that plant safe shutdown capability would not have been jeopardized. This is consistent with the intent of the fire protection program at VY. Thus it is concluded that this event posed no threat to either the health or safety of the public.

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

#### DESCRIPTION OF EVENT

On 10/07/96, while shut down for refueling, Vermont Yankee (VY) discovered that a fire barrier penetration seal, controlled and inspected per plant Technical Specifications (TS) had not been installed per the original design specifications.

This event involves two seals which penetrate the west wall of the VY control building cable vault (EIS=NA) and enter the turbine building, hereafter termed the southern seal and the northern seal. The two seals share a similar configuration. They are approximately 3 ft. by 4 ft. in area, and pass through an 18 in. thick concrete wall, a seismic gap and the 36 in. thick turbine building (EIS=NM) wall. Each seal provides for the passage of 6 cable trays and numerous runs of conduit between the cable vault and turbine building.

The southern blackout seal was determined to be inoperable on 10/07/96 following questions raised during minor repairs to the turbine building side of the northern blackout seal. The defect in the southern seal was insufficient thickness of fire resistant elastomer in some areas of the 3 ft. by 4 ft. seal to meet the three hour rating. The original design specifications called for a minimum of 5 inches. The upper region of this seal was found to have less than five inches of fire resistant elastomer installed.

During repairs of the southern blackout seal, an inspection was performed whereby a major defect was originally discovered in the northern blackout seal rendering it also inoperable (10/29/96). The nature of the seal defect was the failure to adequately grout under the affected cable trays from the cable vault side. This resulted in two deep voids beneath the two lowest trays in the northern blackout seal. One void is approximately 6 in. wide, the other is approximately 3 in. wide.

The seals are required to be operable at all times as prescribed by VY TS section 3.13.E.1. When it was determined that repairs were needed on the northern blackout seal, a fire watch was stationed as prescribed by VY TS. The fire watch will be maintained pending repair of the affected seals. The seal repairs are currently under way.

#### Historical Account

In 1979 VY implemented a plant design change to upgrade the plant's ability to prevent propagation of postulated fires at the facility. The design was consistent with commitments communicated in a January 1978 Nuclear Regulatory Commission Safety Evaluation Report on Branch Technical Position 9.5-1, Appendix A, issued to VY.

The fire barrier seal non-conformances were apparently a result of inadequate design implementation and associated Quality Control inspection on 9/29/79. The seals appeared suitable for their purpose and had been routinely inspected (visual) and generally evaluated as satisfactory.

Subsequent inspections of VY fire barrier penetration seals have revealed seal problems in other plant applications. As a result of a number of non-conforming fire seals discovered in the third quarter of 1992, several improvements were made to the VY fire barrier seal penetration inspection program, including the addition of what will hereafter be called 1993 inspection requirements.

1993 inspection requirements were implemented to establish and capture baseline information to be used in subsequent visual inspections. The 1993 inspections included intrusive sampling and taking measurements not typical of routine visual seal inspections. It was the intent to establish the as-built configuration of each seal, implement appropriate corrective actions and then resume standard visual inspection practices using the baseline information obtained.

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The two affected seals were inspected on 4/6/93 and 4/8/93 per the 1993 inspection requirements. The inspection revealed that one of the two seals (the southern seal) did not have adequate depth of fire sealant material. However, the inspector transposed the inspection results yielding the following:

<u>Seal</u>	<u>Reported Inspection Results</u>	<u>Actual Inspection Results</u>
Northern blackout seal	in need of major repair	satisfactory (voids undetected until 1996)
Southern blackout seal	satisfactory	in need of major repair

Repair efforts were therefore initiated to repair the wrong seal. The seal identification error went undetected until the root cause analysis for this event discovered the mistake.

On 02/05/95, following the completion of inspection of 100% of the fire barrier penetration seals per the 1993 inspection criteria, the seal inspection procedure was revised to resume standard visual inspections using the baseline information gained.

On 05/30/96 the VY fire seal inspection procedure and process were revised to provide better direction and guidance for seal inspections. This included a threshold for determining what constitutes major versus minor defects and actions to take upon the discovery of either. VY also provided task specific training to personnel performing fire seal penetration inspections.

On 08/08/96 routine inspection of the cable vault northern and southern seals was performed. Some minor (surface) defects were identified on the turbine building side of the northern blackout seal which required repair. The as-found seal was considered operable.

During excavation of the northern seal to affect the minor repairs needed, it was discovered that the physical configuration of the northern blackout seal was inconsistent with the information provided in the 1993 inspection documents.

The resulting investigation revealed a 04/93 inspection transposition error. It was further realized that the ensuing 1993 repairs were made on the wrong seal and that the southern blackout seal had been the inoperable seal. The firewatch, in place for the anticipated northern seal repair, was maintained as a compensatory measure for the inoperable southern seal.

On 10/07/96 the Fire Protection group also performed an evaluation to determine if similar conditions could exist elsewhere at VY. The northern and southern blackout seals are unique installations. Although similar to one another, they are unlike any other seal design installed at VY. Therefore the installation and implementation weakness was concluded to be a potential for these two seals only and not indicative of a generic problem with VY fire barrier penetration seals. VY performed an inspection of the northern seal but found no additional defects at that time.

During the 10/96 repair work on the southern blackout seal to correct the longstanding deficiency, the QC inspector assigned to cover that job performed an intensive, detailed inspection of the adjacent northern blackout seal. This inspection revealed a defect in that seal which led to the conclusion that it too had been inoperable since its 1979 installation. This defect was also due to inadequate original installation in 1979. Due to the location of the void, it was not within the scope of the 1993 repair effort on this seal. The focus during that effort was upon the upper elastomer portion of the seal while the void was discovered beneath the lowest set of cable trays in a grouted section of the assembly.

Repairs to both the northern and southern seals are being made at this time. An engineering evaluation is under way to evaluate the methodologies and assumptions used in the 1993 baseline inspections, assess the effectiveness of previous corrective actions taken relative to fire seal problems, and determine if there are other similar conditions. A supplement to this report will be written to communicate the conclusions of this evaluation.



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### CAUSES OF EVENT

1. The root causes of this event were:
  - a. Inadequate design implementation and Quality Control verification on the part of the original installation contractor in 1979 (applicable to both seal installations).
  - b. Inadequate documentation of inspection results, in that the information gathered from the 1993 inspections did not identify the defective seal (southern blackout seal elastomer only). This is considered to be a cognitive error.
2. Contributing causes of this event were:
  - a. Inadequate documentation of inspection results, in that detailed mapping of the seal configurations was not provided (southern seal elastomer).
  - b. Limited access and visibility of the subject seals make the systematic, methodical approach to a comprehensive inspection extremely challenging (northern and southern seals).

The cause analysis process is continuing for this event. Any adjustments made to the cause determination or proposed corrective actions will be communicated in the supplement to this report.

### ANALYSIS OF EVENT

Both seals previously mentioned are unique installations. They are, due to the combination of their size, complexity and inaccessibility, unlike any other seal design installed at VY. Therefore the installation and implementation weaknesses are considered to be specific to these two seals and not indicative of generic problems with VY fire barrier penetration seals.

### Safety Significance

Although the seals did not meet the requirements for a 3 hour rating they would have challenged propagation of a fire. The plant is equipped with automatic fire detection and suppression systems on both sides of the degraded fire barrier.

The applicable portion of the turbine building is unoccupied during power operation and, therefore, normally free of significant transient combustibles and activities involving ignition sources. The fixed combustible loading in the cable vault is generally limited to cables in enclosed cable trays.

Both the turbine building and the cable vault are classified as fire control areas which are subject to plant administrative controls (including permits) for ignition source work and introduction of significant combustible materials.

The combination of automatic fire suppression and detection, an on-site fire brigade, plant administrative controls and the as-built condition of the fire barrier gives confidence that a postulated fire have would be rapidly detected, and extinguished such that plant safe shutdown capability would not have been jeopardized.

This is consistent with the intent of the VY fire protection program. Therefore, it is concluded that this event posed no threat to the health or safety of the public.

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## CORRECTIVE ACTIONS

### Immediate Actions:

1. Technical Specification compensatory fire watch was in place to support the seal repair work which was in progress and led to the discovery of this event. This watch will be maintained until seal repairs are complete.
2. A detailed inspection of both seals has been completed and necessary repairs initiated (action complete).

### Long Term:

1. An engineering evaluation will be performed to:
  - a. Review the methodologies and assumptions used in the 1993 baseline inspections.
  - b. Assess the effectiveness of previous corrective actions taken relative to fire seal problems
  - c. Determine if there are similar conditions
  - d. Determine why 10/96 evaluation for similar conditions did not reveal the northern seal void
  - e. Combine information gathered with the completed root cause analysis to validate or adjust conclusions drawn and corrective actions taken. This action may involve additional field inspections.

(expected completion date for the evaluation: 12/31/96).

2. Repairs to the cable vault west wall northern and southern seals (blockouts) will be made to establish the 3 hour rated configuration (expected completion date 11/30/96).

Due to many changes made in the design implementation process and procedures since these designs were implemented, a similar occurrence would not be expected to occur at this time. Therefore changes to the current process are not considered necessary as a corrective action for this event.

## ADDITIONAL INFORMATION

Vermont Yankee currently has a rigorous seal inspection program. There are currently 1850 fire barrier penetration seals subject to the VY fire seal inspection program. Approximately 42 seals were cited with deficiencies during the 1996 inspection period. VY considers the identified deficiencies to be indicative of the improved inspection process.

There have been 4 similar events reported over the past five years:

- |           |  |
|-----------|--|
| LER 93-01 | Degraded vital fire barriers due to inadequate documentation of assumptions and inadequate procedures. |
| LER 94-18 | Two vital fire barriers inoperable due to degraded fire penetration seals.                             |
| LER 95-04 | Incomplete repair of inoperable vital fire barrier penetration fire seal.                              |
| LER 96-07 | Vital fire dampers not installed in accordance with manufacturers instructions.                        |