# VERMONT YANKEE NUCLEAR POWER CORPORATION



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> Feb. 23, 1998 BVY 98-024

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

Subject:

Vermont Yankee Nuclear Power Station License No. DPR-28 (Docket No. 50-271) Reportable Occurrence No. LER 98-01, P.ev. 0

As defined by 10CFR50.73, we are reporting the attached Reportable Occurrence as LER 98-01, Rev. 0.

Len

Sincerely, VERMONT ANKEE NUCLEAR POWER CORFORATION Green Plant Manage

1:01

USNRC Region I Administrator USNRC Resident Inspector - VYNPS USNRC Project Manager - VYNPS VT Department of Fublic Service

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

On 01/24/98, while periorming a post work inspection of a fire barrier penetration seal subject to Vermont Yankee plant Technical Specifications (TS) following work potentially affecting the seal, it was discovered that the penetration seal did not conform to the tested configuration for a 3-hour rated seal. A compensatory fire watch was established as required by plant TS, and the seal was repaired. The cause investigation continues flowever, interviews with personnel familiar with the work history of VY fire barrier penetration seals indicate that the non-conforming seal may not have been disturbed since initial plant construction. Therefore it is not expected that a root cause can be determined. Long term corrective actions to preclude similar events are under evaluation. The results of that evaluation will be submitted in a revision to this report. Although the seal did not meet the requirements for a 3 hour rating it would have challenged propagation of  $\varepsilon$  to  $\varepsilon$ . The combination of automatic fire suppression and detection, an on-site fire brigade and the as-built condition of the fire barrier seal 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. Therefore it is concluded that this event prised no significant increase in risk to either the health or safety of the public.

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## DESCRIPTION OF EVENT

On 01/24/98, while operating at 97 percent of rated power, during the performance of a post work inspection of a fire barrier penetration seal subject to Vermont Yankee plant Technical Specifications (TS) following work potentially affecting the seal, it was discovered that the penetration seal did not conform to the tested configuration for a 3-hour rated seal. The fire barrier was between a 4160 volt switchgear room in the control building (EIIS=NA) and a hallway connecting the turbine building (EIIS=NM' and the radwaste building (EIIS=NE). The major non-conformance was discovered by the VY Fire Protection Engineer as he was assessing minor degradation caused by work done in a cable tray penetrating a rated fire barrier. The movement of cable tray covers during the work effort resulted in minor clacking in the grout shal around the tray. The work crew contacted the Fire Protection Engineer (FPE) to have the minor flaw assessed. Upor inspection, the FPE confirmed that the damage caused by the work effort. While investigating the gap, the FPE discovered the gap to penetrate deeply into the wall. The FPE requested that the seal be excavated to ensure that the seal, absent any disturbance caused by the cable tray work, conformed to the rated configuration. The excavation revealed that the seal had not been properly constructed, and that a major void had been left during the seal's original installation. The volume of the void was sufficient for the FPE to conclude that it did not meet the requirements for a 3 hole rated fire barrier seal penetration as required by plant TS. A compensatory fire watch was established as required by plant TS, and the seal was repaired.

## CAUSES OF EVENT

The cause investigation continues. However, interviews with personnel familiar with the work history of VY fire barrier penetration seals indicate that the non-conforming seal may not have been disturbed since initial plant construction. Therefore it is not expected that a root cause can be determined. Long term corrective actions to preclude similar events are under evaluation. The results of that evaluation will be submitted in a revision to this report.

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### ANALYSIS OF EVENT

The Fire Protection Program at Vermont Yankee uses a defense-in-depth concept to achieve a high degree of firu safety. The objective of the defense in depth is to:

- 1. Reduce the potential of fires starting,
- 2. Rapidiy detect, control, and promptly extinguish those fires that do occur,
- Provide adequate protection for structures, systems, and components so that a fire will not prevent the safe shutdown of the plant, and prevent the release of a significant amount of radioactive material, when fires occur

The fire barrier penetration seal described in this report supports objective number 3 of the Fire Protection Program through conformance to the VY Fire Protection System design bases. VN system Design Bases are divided into two categories, Safety Design Bases and Power Generation Design Bases.

Safety Design Basis - The safety design basis for a safety system states in functional terms the unique design requirements which establish the limits within which the safety objective shall be met.

A safety objective describes in functional terms the purpose of a system or component as it relates to conditions considered to be of primary significance to the protection of the public. This relationship is stated in terms of radioactive material barriers or radioactive material release. VY Fire Protection Systems have no Safet, Design Bases. The systems are not credited for protection of the public but provide protection for plant equipment in support of continued operation and are therefore assigned Power Generation Design Bases.

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Power Generation Design Basis - The power generation design basis for a power generation system states in functional terms the unique design requirements which establish the limits within which the power generation objective shall be met. Power Generation Design Bases of the VY Fire Protection Systems are listed below.

The Fire Protection System shall prevent propagation of fire and isolate the areas of the fire by:

- 1. Providing a reliable supply of fresh water for fire fighting purposes.
- 2. Providing a reliable system for delivery of the water to potential fire locations.
- 3. Providing automatic fire detection in those areas where the danger of fire is more pronounced.
- Providing fire extinguishment by fixed equipment activated automatically or manually in those areas where danger of fire is most pronounced.
- 5. Providing manually operated fire extinguishing equipment for use by sta. personnel at selected locations.
- 6. Providing means to isclate areas so that fires are prevented from propagating from one area to another.

As previously mentioned, the VY Fire Protection Program is a detense-in-depth approach. Similarly the systems employed by VY in support of the system design bases provide defense-in-depth against propagation of a fire. The fire barrier seal found in the non-conforming condition challenged achievement of the Fire Protection System design basis number 6 (listed above). However the other layers of protection afforded by the chosen approach mitigated the significance of that non-conforming seal.

10CFR50 Appendix R states that when "considering the effects of fire, those systems associated with achieving and maintaining safe shutdown conditions assume major importance to safety because damage to them can lead to core damage resulting from loss of coolant through boiloff." The seal is credited in VY's Safe Shutdown Capabilities Analysis in domonstrating that the 10CFR50 APP R requirements are met, and that those systems associated with achieving and maintaining safe shutdown conditions are available in the event of a fire affecting either the west switchgear room or the radwaste building hallway.

£ though the seal did not meet the requirements for a 3 hour rating, it would have challenged propagation of a fire, as described in the plant TS bases. The combination of automatic fire suppression and detection, an on-site fire brigade and the as-built condition of the fire barrier seal gives confidence that a postulated fire would have been rapidly detected, and extinguished such that plant safe shutdown car ability would not have been jeopardized. This is consistent with the intent of both the fire protection program and the 10CFR50 Appendix R program at VY. Therefore it is concluded that this event posed no significant increase in risk to either the health or safety of the public.

# CORRECTIVE ACTIONS

## Immediate Actions:

1.

An Event Report was initiated to document this event and initiate a root cause analysis to determine the cause and appropriate corrective actions for this event. The expected completion date is 03/13/98.

2. The non-conforming seal was repaired. This action is complete.

### Long Term Actions:

Long term corrective actions to prevent recurrence and to prevent occurrence of similar events will be developed in accordance with the VY internal event report process and communicated in a supplement to this report.

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## ADDITIONAL INFORMATION

Vermont Yankee currently has a rigorous seal inspection program. There are in excess of 1800 fire barrier penetration seals subject to the VY fire seal inspection program. VY considers the identified deficiencies to be indicative of the recently improved inspection processes and techniques, and the additional resources recently committed to the fire protection program.

There have been 5 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.

LER 96-26 Inadequate design implementation and subsequent inadequate documentation of inspection findings result in operation outside of plant design basis for fire mitigation and fiech. Spec. non-compliance.