# VERMONT YANKEE
# NUCLEAR POWER CORPORATION

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October 24, 1996
BVY 96-131

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 96-025

As defined by 10CFR50.73, we are reporting the attached Reportable Occurrence as LER 96-025.

Sincerely,

VERMONT YANKEE NUCLEAR POWER CORPORATION

Robert J. Wanczyk

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

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) | DOCKET NUMBER ( ) | PAGE (3) |
|---|---|---|
| VERMONT YANKEE NUCLEAR POWER STATION | 05000271 | 01 OF 04 |

TITLE (4) Inadequate testing leads to misadjustment of isolation valve mechanical stop and failure to meet Technical Specification leak rate limits for containment purge isolation valve.

| 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 |
| 09 | 24 | 96 | 96 | -- 025 -- | 00 | 10 | 24 | 96 | N/A | |

| OPERATING MODE (9) | N |
|---|---|
| POWER LEVEL (10) | 00 |

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

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 20.2201(b) | | 20.2203(a)(2)(v) | X | 50.73(a)(2)(i) | | 50.73(a)(2)(viii) |
| | 20.2203(a)(1) | | 20.2203(a)(3)(i) | | 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 |
|---|---|---|---|---|---|---|---|---|---|
| D | BB | SHV | A108 | YES | 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 09/24/96 it was determined that the Vermont Yankee (VY) Primary Containment Nitrogen Purge System inboard torus isolation valve leaked in excess of Technical Specification (TS) limits for any single valve (VY TS 3.7.A.4). The excess leakage was due to an improperly adjusted mechanical stop which allowed the valve to exhibit directional isolation characteristics. The apparent cause of this event was an inadequate testing methodology in meeting Appendix J requirements. The valve has historically been tested assuming that valve isolation capabilities in either direction are equivalent. This allowed the misadjusted mechanical stop to go undetected. The mechanical stop was adjusted, and the valve retested satisfactorily. Although valve design provides isolation in either direction, valve installation was changed to ensure that primary containment pressure will assist valve seating. As the mechanical valve stop was in its as-found condition for an extended period of time, and its position resulted in leakage through the valve significantly in excess of TS limits for a single isolation valve, and former testing methodologies would not have discovered the problem, it was originally reported under 10CFR50.72(b)(2)(i), that the primary containment had operated in a seriously degraded condition. A subsequent review of historical data has revealed that the actual penetration leakage during the period since the mechanical stop adjustment was within allowable limits. Considering the capability of the outboard isolation valves, which had consistently passed Appendix J testing, it is shown that the containment system was at all times intact, providing a viable fission product barrier, consistent with plant design. Therefore, the condition is not considered to have presented significant risk to the health or safety of the public.

## DESCRIPTION OF EVENT

On 09/24/96 it was determined that the Vermont Yankee (VY) Primary Containment Nitrogen Purge System (EIIS = BB) inboard torus isolation valve (SB-16-19-10, EIIS = SHV) leaked in excess of Technical Specification (TS) limits for any single valve (VY TS 3.7.A.4). The excess leakage was due to an improperly adjusted mechanical stop which prevented firm valve seating and allowed the 18 inch Allis Chalmers butterfly valve to exhibit directional isolation characteristics.

Although vendor information indicates that the valve can provide leaktight isolation in either direction it is apparent from a review of valve design that differential pressure in one direction opposes the seating force imparted by the actuator, while differential pressure in the opposite direction assists actuator seating force. As part of our Appendix J program upgrade process the methodology for testing the torus Nitrogen Purge inboard isolation valve, the valve was tested in the "accident direction", that is with the differential applied simulating a pressurized primary containment.

The valve was tested on 09/24/96. Leakage was beyond the capacity of the test device's capability to measure.

## CAUSES OF EVENT

The apparent cause of this event was an inadequate Appendix J testing methodology, in that the testing approach was only valid if the mechanical stop was properly adjusted, and testing in the accident direction was the sole means of making that determination.

A contributing cause to this event appears to be inadequate written procedures and documentation. Specifically the vendor information supplied with the valve and valve actuator did not describe the potential effect of the mechanical stop adjustment producing a direction dependant isolation characteristic.

1. While the vendor drawing claims that the valve can be installed with system flow in either direction, and the mechanical stop adjustment process described cites that it can be performed with flow in the system, it does not identify that the flow needs to opposed valve closure for the adjustment process to allow adequate seating against differential pressure in either direction.

## ANALYSIS OF EVENT

Evaluation, initiated by this event, of the specific containment isolation functions attributed to valves in the nitrogen purge system and primary containment vacuum breaker system (EIIS = BF), confirmed that the true containment function of SB-16-19-10 is to isolate the pressure within the torus from the air and nitrogen purge supply lines. This validated the change in the direction of test pressure application implemented by the recent VY Appendix J program improvement.

Investigation of the cause of the high valve leakage rate revealed that the pneumatic actuator mechanical stop was not set to assure optimal seating in the accident direction.

Although VY had already upgraded the primary containment nitrogen/air purge isolation valve Appendix J testing methodology by testing all such valves in the "accident direction", the testing methods used also demonstrated bi-directional isolation characteristics of the specific butterfly valves installed in these applications at VY. Several nitrogen purge system isolation butterfly valves were tested in both directions. Each valve showed satisfactory (within Technical Specification limit) leak rates in both directions. It was concluded that with the valve stops properly adjusted the valves will perform satisfactorily with differential pressure applied in either direction. It was concluded however, that the installation of this type of butterfly isolation valve (with tapered seats and spring tension closed) such that primary containment pressure opposes the seating force, and testing in the reverse direction such that test pressure tends to close the valve, can mask a mechanical stop misadjustment.

Safety Significance

The specific date when the mechanical stop was last set could not be determined. The valve maintenance history references a mechanical stop adjustment made on 07/08/78. For the purposes of determining the safety significance of this event, this date was used as a conservative assumption.

Historical leak rates were reviewed for the outboard primary containment isolation valves in the lines common to SB-16-19-10.

This review shows that since 1978 the applicable pathway leakrates were within TS limitations and accident assumption values. This demonstrates that the containment system was at all times intact, providing a viable fission product barrier, consistent with plant design. Therefore, the condition is not considered to have presented significant risk to the health or safety of the public.

CORRECTIVE ACTIONS

Immediate Actions:

1. Vermont Yankee has discontinued the practice of "reverse direction" Appendix J local leakrate testing with the sole exception of Main Steam (EIIS = BD) Line Isolation Valves, for which reverse direction testing is conservative. This action is complete and led to the discovery of this event.

2. VY performed an engineering evaluation to support the reorientation of SB-16-19-10 in the system such that accident pressure assists valve closure and seating, and the valve has been installed such that primary containment pressure assists in valve closure (action complete).

3. Other Primary Containment Atmospheric Control isolation valves of similar design were inspected to ensure that valves were installed such that primary containment pressure assists in valve seating, providing optimal isolation characteristics (action complete).

Long Term:

1. Notes will be added to the plant equipment data base to caution users regarding the potential direction dependent isolation capability of containment isolation butterfly valves. The notes will include the potential effects of the mechanical stop adjustment (expected completion date 3/31/97).

2. The event cause analysis continues. Should the analysis determine new or different causes or identify significant additional corrective actions are necessary, a supplement to this event report will be submitted (expected completion date 12/30/96).

3. Drawing revisions will be initiated for applicable valve drawings to indicate the proper orientation of valve internals relative to primary containment to provide optimal seat tightness (expected completion date: 03/31/97).

ADDITIONAL INFORMATION

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

LER 95-15, TS 4.7.A.4 leakrate exceeded due to leakage from inboard flange of AC-8; LER 93-12,Appendix J type B&C failure due to seat leakage; LER 92-10, Appendix J type B&C failure due to seat leakage; LER 91-15, Containment Isolation Valve failure to close due to erosion/corrosion and displacement of screw-in seat.