



Entergy Nuclear Northeast

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BVY 03-105

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

**Subject: Vermont Yankee Nuclear Power Station
License No. DPR-28 (Docket No. 50-271)
Reportable Occurrence No. LER 2003-001-00**

As defined by 10CFR50.73, we are reporting the attached Reportable Occurrence as LER 2003-001-00.

Sincerely,

ENERGY NUCLEAR OPERATIONS, INC.
VERMONT YANKEE

A handwritten signature in cursive script that reads "Kevin H. Bronson".

Kevin H. Bronson
General Manager

cc: USNRC Region I Administrator
USNRC Resident Inspector - VYNPS
USNRC Project Manager - VYNPS
Vermont Department of Public Service

IE22

NRC FORM 366 (7-200*)			U.S. NUCLEAR REGULATORY COMMISSION			APPROVED BY OMB NO. 3150-0104 EXPIRES 7-31-2004 <small>Estimated burden per response to comply with this mandatory information collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bis1@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104) Office of Management and Budget, Washington, DC 20503. If a means used to impose information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.</small>					
LICENSEE EVENT REPORT (LER) <small>(See reverse for required number of digits/characters for each block)</small>											
1. FACILITY NAME VERMONT YANKEE NUCLEAR POWER STATION (VY)			2. DOCKET NUMBER 05000271			3. PAGE 1 of 4					
4. TITLE Reactor Shutdown Completed for an Increase in Unidentified Leakage Located inside Primary Containment from a Reactor Head Vent Valve Packing Gland due to Lack of Sufficient Documented Guidance for Repacking Manual Valves											
5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED		
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER	
09	27	2003	2003	001	00	11	19	2003	N/A	05000 -	
9. OPERATING MODE			11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)								
N			<input type="checkbox"/>	20.2201(b)	<input type="checkbox"/>	20.2203(a)(3)(ii)	<input type="checkbox"/>	50.73(a)(2)(ii)(B)	<input type="checkbox"/>	50.73(a)(2)(ix)(A)	
10. POWER LEVEL			<input type="checkbox"/>	20.2201(d)	<input type="checkbox"/>	20.2203(a)(4)	<input type="checkbox"/>	50.73(a)(2)(iii)	<input type="checkbox"/>	50.73(a)(2)(x)	
100			<input type="checkbox"/>	20.2203(a)(1)	<input type="checkbox"/>	50.36(c)(1)(i)(A)	<input type="checkbox"/>	50.73(a)(2)(iv)(A)	<input type="checkbox"/>	73.71(a)(4)	
			<input type="checkbox"/>	20.2203(a)(2)(i)	<input type="checkbox"/>	50.36(c)(1)(ii)(A)	<input type="checkbox"/>	50.73(a)(2)(v)(A)	<input type="checkbox"/>	73.71(a)(5)	
			<input type="checkbox"/>	20.2203(a)(2)(ii)	<input type="checkbox"/>	50.36(c)(2)	<input type="checkbox"/>	50.73(a)(2)(v)(B)	<input type="checkbox"/>	OTHER Specify in Abstract below or in NRC Form 366A	
			<input type="checkbox"/>	20.2203(a)(2)(iii)	<input type="checkbox"/>	50.46(a)(3)(ii)	<input type="checkbox"/>	50.73(a)(2)(v)(C)			
			<input type="checkbox"/>	20.2203(a)(2)(iv)	<input checked="" type="checkbox"/>	50.73(a)(2)(i)(A)	<input type="checkbox"/>	50.73(a)(2)(v)(D)			
			<input type="checkbox"/>	20.2203(a)(2)(v)	<input checked="" type="checkbox"/>	50.73(a)(2)(i)(B)	<input type="checkbox"/>	50.73(a)(2)(vii)			
			<input type="checkbox"/>	20.2203(a)(2)(vi)	<input type="checkbox"/>	50.73(a)(2)(i)(C)	<input type="checkbox"/>	50.73(a)(2)(viii)(A)			
			<input type="checkbox"/>	20.2203(a)(3)(i)	<input type="checkbox"/>	50.73(a)(2)(ii)(A)	<input type="checkbox"/>	50.73(a)(2)(viii)(B)			
12. LICENSEE CONTACT FOR THIS LER											
NAME						TELEPHONE NUMBER (Include Area Code)					
Kevin Bronson, General Manager						(802) 257-7711					
13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT											
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX		
D	SB	V	H037	Y							
14. SUPPLEMENTAL REPORT EXPECTED						15. EXPECTED SUBMISSION DATE			MONTH	DAY	YEAR
<input type="checkbox"/>	YES (If yes, complete EXPECTED SUBMISSION DATE)				<input checked="" type="checkbox"/>	NO					
								N/A	N/A	N/A	
16. ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)											
<p>On 09/27/03 at 0440 with the reactor at 100 percent power, a change in drywell temperature led operators to the discovery of an increase in unidentified leakage inside the Primary Containment. The leakage was determined to have risen by 3.6 gallons per minute (gpm), exceeding the Technical Specification (TS) limit for an increase in unidentified reactor coolant leakage of greater than 2 gpm within a 24 hour period [TS 3.6.C.1.b.]. As directed by the TS Limiting Conditions for Operation, an orderly shutdown was initiated to place the reactor in a cold shutdown condition within twenty-four hours. On 09/28/03, a walk-down of the drywell identified that valve V2-19 was the source of the leakage. V2-19 is a two inch, manually operated, normally open globe valve, located in the reactor head vent piping that is closed only during refuel outages. Visual inspection indicated that the valve was leaking past the stem packing. An investigation revealed that the gland nuts were hand-tight, thereby indicating minimal radial load on the packing material. The packing volume was visually intact and V2-19 was not back-seated. The primary cause of this event was determined to be inadequate document provisions that caused improper assembly of the valve packing while performing preventative maintenance during November of 1999. Specifically, the packing procedure for this valve did not provide complete instructions for the consolidation of packing during installation. This event posed no increased risk to the health and safety of the public due to the relatively small size of the leak as compared to the analyzed event for a Design Basis Loss of Coolant Accident.</p>											

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
VERMONT YANKEE NUCLEAR POWER STATION (VY)	05000271	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	2 of 4
		2003	- 001	- 00	

Narrative:

DESCRIPTION:

On 09/27/03 with the reactor at full power, an increase in the reactor coolant unidentified leakage inside primary containment of greater than 2 gallons per minute (gpm) within a 24 hour period was discovered during calculations performed using the normal containment sump 6 hour surveillance. In accordance with the Technical Specification (TS) Limiting Conditions for Operation, a reactor shutdown was initiated to have the plant in a cold shutdown condition within 24 hours. Unidentified leakage had increased by 3.6 gpm for a total of 4.01 gpm. The combined identified and unidentified total leakage after the 3.6 gpm increase was 5.51 gpm. Additionally, all Emergency Core Cooling Systems and associated safety related equipment were operable and available at the time of this event.

Event Timeline

09/27/03

- 0440 - A change in drywell temperature was indicated in the Control Room.
- 0510 – The Operations Manager was notified of this anomaly.
- 0530 – An indication of an increase in the unidentified leakage inside the drywell was noted by operators.
- 0710 – Unidentified leakage inside primary containment was calculated to have increased by approximately 3.6 gpm, which exceeded the Technical Specification Limiting Condition for Operation requirement for an increase in unidentified coolant leakage of greater than 2 gpm within a twenty-four hour period [TS 3.6.C.1.b.].
- 0740 – Operators commenced decreasing power to shutdown the reactor as required by TS 3.6.C.3.
- 1030 – The NRC Resident was notified of the Technical Specification required plant shutdown.
- 1052 – The NRC Operations Center was notified of the Technical Specification required plant shutdown in accordance with 10 CFR 50.72(b)(2)(i). NRC Event Number 40202 was assigned to this event.

On 09/28/03, a walk-down of the drywell identified that V2-19 was the source of the increase in unidentified leakage. V2-19 is a 2 inch, Safety Class 1, Dresser/Hancock Model 7150W, normally open, manually operated globe valve that is located in the Reactor Head Vent piping. The Reactor Head Vent is utilized to vent off non-condensable gases from the reactor vessel head during operation and is closed during refueling outages to prevent a refueling cavity leak path after the cavity has been flooded. Visual inspection indicated that the valve was leaking past the stem packing. Additional as-found inspections discovered that the gland nuts were hand-tight (able to be loosened by hand) indicating minimal radial load on the packing material. The packing volume was found to be visually intact and V2-19 was not back-seated.

On 09/29/03, V2-19 was repacked in accordance with OP 5281, a procedure that was revised on 01/24/2001 as a corrective action to an event that occurred on 04/03/2000 involving a packing consolidation issue.

ANALYSIS:

During a repack of V2-19 in 1990, high temperature asbestos style packing was replaced with an improved graphite packing configuration of two sealing rings between two braided end rings in accordance with the manufacturer's recommendation. During November of 1999, V2-19 was repacked in order to satisfy the previously established 6RFO/9 Year Preventative Maintenance interval.

- Endurance testing of graphite packing has shown thousands of cycles (open/close) before leakage caused solely by packing wear is observed.

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Narrative:

- The lack of back-seating V2-19 or the valve having a damaged back-seat was eliminated as a cause for this event. If installed properly, graphite stem packing is designed to seal against constant system pressures without the need of a back-seat.
- Inspection of the stem and stuffing box during the recovery repack was determined to be acceptable with no indication of degradation.
- The four ring packing assembly used in this valve is an acceptable configuration by the Electrical Power Research Institute (EPRI) and the packing manufacturer, Chesterton.
- The packing arrangement installed in 1999 was verified by reviewing the installation notes and during the current repack of the valve to be in the proper configuration as detailed in the packing procedure, OP 5281, and the packing manufacturer's recommendation.
- V2-19 has been in service for thirty years. Vibration of the pipeline was ruled out as being a contributing factor. If it was, previous occurrences of leaking packing would have been documented. Due to the configuration of the piping and processes this valve and system are designed for, flow induced vibration is low.

During installation, new packing must be consolidated in order to radially expand it against the valve stem and stuffing box. There are two types of consolidation.

- "Installation consolidation" is a function of new packing material and is dependent upon ring density, the number of rings installed, and the clearances of the rings against the stem and stuffing box. Leakage from installation consolidation tends to occur during or shortly after re-packing. During installation, each packing ring is seated with a gland or tamping tool. The valve is then cycled and the gland tightness is re-checked until no additional movement of the nuts occurs. This typically requires 4 or more full open to close cycles to complete and is a requirement of the packing installation steps of OP 5281, since 2001.
- "In-service consolidation" tends to occur over a longer period of time. Sufficient gland loads (and margin) need to be applied to account for in-service packing consolidation that in the case of graphite packing can be up to 3 percent of the total packing volume. Inadequate gland load will result in premature packing leakage. Motor and air operated valve gland loads are typically calculated and applied with a calibrated torque wrench. Post maintenance testing provides verification that radial packing loads are adequate to seal the valve. For manual valves like V2-19, proper gland loading is usually accomplished as a "skill of the trade" with a standard wrench and can vary considerably based upon individual judgment and work space limitations.

In summary, the as-found condition of V2-19 with the gland nuts hand tight and the packing volume intact would indicate that the packing leak was caused by either improper consolidation, or that an inadequate gland load was applied during the 1999 repack.

CAUSE:

The root cause of this event was determined to be inadequate maintenance procedure provisions that resulted in the improper assembly of the valve stem packing. The packing procedures for this valve did not provide complete instructions on consolidation of the packing at installation. Consolidation of the packing during assembly of V2-19 relied primarily on the "skill of the craft". This lack of sufficiently detailed information caused the premature leakage.

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Narrative:

CORRECTIVE ACTIONS:

Immediate

1. Reactor shutdown was completed in accordance with Technical Specifications.
2. V2-19 was disassembled, inspected and repacked with the previously revised procedure.
3. Operations back-seated selected manual valves (including V2-19) in the drywell prior to plant startup from this event.

Long Term

1. An evaluation is in progress to compile a list of high energy system manual valves which have not been repacked since the revised OP-5281 guidance was implemented, to inspect and/or consider repacking these valves at the next most appropriate opportunity. The actual gland loads of these valves will be verified before or during RFO-24.
2. Evaluation of back-seating selected manual valves in the drywell prior to plant startup for permanent implementation is being pursued as a corrective action to this event.

ASSESSMENT OF SAFETY CONSEQUENCES:

When operators discovered that the unidentified leakage inside the drywell had increased greater than 2 gpm during the past 24 hour period, the TS Limiting Condition for Operation [TS 3.6.C.3] was entered and a reactor shutdown was initiated. This limit provides the operators with conservative guidance that a degrading condition within primary containment is in progress that requires corrective action to resolve.

Prior to the event, the total leakage inside primary containment was 1.91 gpm and the unidentified leakage was 0.41 gpm. The total calculated unidentified drywell leakage increased to 4.01 gpm and the total calculated leakage increased to 5.51 gpm as a result of the 3.6 gpm increase of unidentified leakage in the previous 24 hours. Both of these values are within the other TS limits as the total combined unidentified leakage did not exceed 5 gpm and the total leakage from all reactor coolant sources inside the drywell did not exceed 25 gpm, as described in TS 3.6.C.1.a.

In view of the fact that the total unidentified leakage and the total identified plus unidentified leakage inside the drywell did not exceed TS 3.6.C.1.a., reactor safety was maintained and primary containment function was not compromised. The increase in unidentified leakage was well within the analyses provided for a Design Basis Loss of Coolant Accident that primary containment is designed to contain and mitigate. If a worst case complete failure of the packing gland had occurred, due to the small size of the breach (less than two inches in diameter), primary containment would have been capable of safely mitigating the event.

This event posed no increased risk to the health and safety of the public due to the relatively small size of the leak as compared to the analyzed event for a Design Basis Loss of Coolant Accident.

ADDITIONAL INFORMATION:

No similar events have been reported to the NRC, or have occurred at Vermont Yankee within the past ten years.