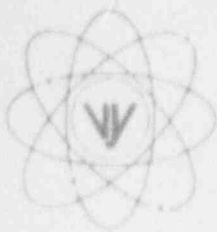


# VERMONT YANKEE NUCLEAR POWER CORPORATION



P.O. Box 157, Governor Hunt Road  
Vernon, Vermont 05354-0157  
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February 19, 1993

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

REFERENCE: Operating License DPR-20  
Docket No. 50-271  
Reportable Occurrence No. LER 92-017 Rev. 01

Dear Sirs:

As defined by 10 CFR 50.73, we are reporting the attached Reportable Occurrence as LER 92-017, Rev. 01

Very truly yours,

VERMONT YANKEE NUCLEAR POWER CORPORATION

*Donald A. Reid*  
for Donald A. Reid  
Plant Manager

cc: Regional Administrator  
USNRC  
Region I  
475 Allendale Road  
King of Prussia, PA 19406

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NRC Form 366 U.S. NUCLEAR REGULATORY COMMISSION (6-89)															APPROVED OMS NO. 3150-0104 EXPIRES 4/30/92 ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-350), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3160-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20603.																							
FACILITY NAME (1) VERMONT YANKEE NUCLEAR POWER STATION															DOCKET NO. (2) 0 5 0 0 0 2 7 1										PAGE (3) 0 1 OF 0 3													
TITLE (4) "A" Diesel Generator Inoperable Due to Low Jacket Coolant Pressure																																						
EVENT DATE (5) MONTH DAY YEAR 0 5 2 9 9 2 9 2									LER NUMBER (6) YEAR SEQ # REV # 9 2 0 1 7 0 1									REPORT DATE (7) MONTH DAY YEAR 0 2 1 9 9 3									OTHER FACILITIES INVOLVED (8) FACILITY NAMES DOCKET NO. (8) 0 5 0 0 0 0 0 0											
OPERATING MODE (9) N															THIS REPORT IS SUBMITTED PURSUANT TO REG'S OF 10 CFR §: CHECK ONE OR MORE (11)																							
POWER LEVEL (10) 1 0 0															20.402(b) 20.405(c) 50.73(a)(2)(iv) 73.71(b) 20.405(a)(1)(i) 50.36(c)(1) 50.73(a)(2)(v) 73.71(c) 20.405(a)(1)(ii) 50.36(c)(2) 50.73(a)(2)(vii) X OTHER: 20.405(a)(1)(iii) 50.73(a)(2)(i) 50.73(a)(2)(viii)(A) 20.405(a)(1)(iv) 50.73(a)(2)(ii) 50.73(a)(2)(viii)(B) 20.405(a)(1)(v) 50.73(a)(2)(iii) 50.73(a)(2)(x)																							
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**ABSTRACT** (Limit to 1400 spaces, i.e., approx. fifteen single-space typewritten lines) (16)

On 5/29/92, with the reactor at 100 % power, after completing the normal 8 hour monthly surveillance of the "A" Emergency Diesel Generator (EDG) (EHS = EK), several conditions were noted that rendered the "A" EDG inoperable. This event is being reported voluntarily under the "Other" category because a similar event occurred on 6/23/92, which made the "A" EDG inoperable, and because Waivers of Compliance were required during both events to complete the repairs of the EDG (See References a., b., c., & d.).

The 5/29/92 event, resulted from a crack in the #7 cylinder liner. The 6/23/92 event resulted from a crack located in the #10 cylinder liner. The root causes of these events were original flaws in the cylinder liner castings. The flaws propagated through the cylinder wall from a combination of fatigue cycles, below specification tensile strength of the cast iron material, and engine overload conditions that occurred on two separate occasions in 1990. (See LER 90-10).

The short term corrective action for the 5/29/92 event was to replace the #7 cylinder liner. The #3 cylinder liner was replaced with a new design because of blistered chrome areas. The short term corrective action of the 6/23/92 event was to replace all of the "A" EDG cylinder liners with the new design cylinder liner, except for liner #3. All cylinder liner adapter port gaskets were replaced and torqued with the new validated vendor supplied torque tool and method. An independent task force completed their review and presented Vermont Yankee with recommendations to ensure the continued reliability of the diesel generators. Potential 10 CFR Part 21 issues were reviewed on the rotational torquing method and it was determined not to be reportable.

NRC Form 366A U.S. NUCLEAR REGULATORY COMMISSION (6-89)		APPROVED OMS NO. 3150-0104 EXPIRES 4/30/92	
LICENSEE EVENT REPORT (LER) TEST CONTINUATION		ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-350), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3160-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20603.	
FACILITY NAME (1)	DOCKET NO (2)	LER NUMBER (6)	
		YEAR	SEQ #
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VERMONT YANKEE NUCLEAR POWER CORPORATION	05000271	92	017
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TEXT (If more space is required, use additional NRC Form 366A) (17)

## DESCRIPTION OF EVENTS

On 5/29/92, with the reactor at 100% power, after completing the normal 8 hour monthly surveillance of the "A" Emergency Diesel Generator (EDG) (EIS-EK), several conditions were noted that rendered the "A" EDG inoperable. This event is being reported voluntarily under the "Other" category for two reasons. The first is that a similar event occurred on 6/23/92, that also made the "A" EDG inoperable. The second reason is that a Waiver of Compliance was required to complete the repair and testing of the diesel generator for both events (See References a., b., c., & d.).

During the 5/29/92 event, jacket coolant pressure was low, discolored and the expansion tank overflowed. Investigations revealed that a crack in the liner of cylinder #7 was the initiator of this event. Cylinder liner #7 was replaced with an original design cylinder liner that was in stock. Cylinder liner #3 was replaced with a new design cylinder liner. Cylinder liner #3 was replaced because of blistered chrome areas. A one day Waiver of Compliance was granted by the USNRC, the "A" EDG was tested and declared operable on 6/4/92.

Cylinder liner #7 was shipped to Fairbanks Morse (FM) for evaluation. Yankee Atomic Electric Company's (YAEC) metallurgist followed their review in an effort to expedite the failure mechanism and probable cause. Initial evaluation indicated that the failure was most likely an isolated occurrence.

On 6/23/92 at 0450, with the reactor at 100% power, at approximately one and one half hours into the normal eight hour monthly surveillance, the "A" EDG tripped due to low jacket coolant pressure. The preliminary investigation performed by Vermont Yankee Maintenance revealed that the rotation method for installing the cylinder liner adapters, which was provided in Fairbanks Morse Service Information Letter (FM SIL Vol. A Issue 24 "Assembly of 8-1/8 O.P. Fuel Adapters to Liners), may have been inadequate. A Field Test showed that the required torque could not be obtained using this method. A new torque tool was purchased from the vendor, which when used as also provided in the Fairbanks Morse SIL, achieved the proper torque value.

While repair work continued on the diesel, a cylinder liner indication was identified on cylinder liner #10. It was determined that the indication was a through wall crack in the thread portion of the adapter port area of the air start plug. Maintenance then replaced all of the cylinders from the "A" diesel with the new cylinder liner design as recommended by the vendor, except cylinder liner #3 which was replaced with the new liner design during repairs from the May event.

All the removed cylinders were immediately subjected to a fluorescent magnetic particle inspection. None of the remaining liners showed evidence of any cracking.

The decision to replace all of the existing cylinder liners with the new design was made because Maintenance wanted to ensure that there were no cracks in any of the other cylinders. In order to verify this, the cylinder liners had to be removed. Additionally, the new cylinder liner has an o-ring, that due to its material, has a longer life than the existing o-ring. The new cylinder liner also provides an increase in cooling capability and a second seal, that seals between the jacket and the cylinder liner. A two (2) day Waiver of Compliance was granted by the USNRC to extend the (7) seven day LCO. The diesel work was completed and after start-up testing, the diesel was declared operable on 7/1/92.

It should be noted that the crack identified during the 6/23/92 event is very different from the crack discovered in cylinder #7 on 5/29/92. The three inch long crack identified on cylinder liner #10 was located in the thread portion of the adapter port area of the air start plug. The crack that was found in cylinder #7 was located between the fuel injector and air start check valve plug penetrations. This crack was vertical and approximately 5" in length. The #7 crack initiated in the chrome plate and propagated to the OD (water side). The #10 cylinder crack initiated on the OD (water side) and propagated into the ID.

## CAUSE OF EVENTS

The 5/29/92 event resulted from a crack in the #7 cylinder liner. The 6/23/92 event resulted from a crack in the #10 cylinder liner. Metallurgical evaluations by Vermont Yankee and the Vendor to determine the root cause of these failures are complete. The root causes of these two events were original flaws in the cylinder lower castings. The flaws propagated through the cylinder wall from a combination of fatigue cycles, below specification tensile strength of the cast iron material, and engine overload conditions that occurred on two separate occasions in 1990. (See LER 90-10).

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FACILITY NAME (1)	DOCKET NO (2)	LER NUMBER (6)	
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VERMONT YANKEE NUCLEAR POWER CORPORATION	05000271	9 2 - 0 1 7 - 0 1	0 3 OF 0 3

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

### ANALYSIS OF EVENTS

The 5/29/92 and 6/23/92 events did not pose any adverse safety implications.

- 1.) At the time of the events, the alternate diesel generator was tested for operability. As required by Tech Specs, the Low Pressure Coolant Injection (LPCI) system and Containment Cooling systems connected to the alternate diesel generator were operable. There was a short period of time on 6/27/92, when the Uninterruptible Power System (UPS) 1A (EHS = EF) was inoperable (See LER 92-18).
- 2.) The Vernon Hydro Station was notified of the situation and the dedicated tie-line was verified as being available.
- 3.) A review of scheduled surveillance activities was performed. Only those determined to be low risk were performed.

### CORRECTIVE ACTIONS

#### Short Term

The short term corrective action of the 5/29/92 event was to replace the #7 and #3 cylinder liners. Additionally, the coolant system was drained, flushed and refilled.

The short term corrective action of the 6/23/92 event was to replace all of the A diesel generator cylinder liners with the new design cylinder liner, except for liner #3. This liner was replaced with the new design cylinder liner during the 5/29/92 event. Additionally, all cylinder liner adapter port gaskets were replaced and torqued with the new validated vendor supplied torque tool and method.

#### Long Term

Vermont Yankee organized an independent task force to investigate the reliability concerns of the diesel generators. The task force's review included but was not limited to surveillance, trending and preventive maintenance efforts. The task force has completed their review and presented Vermont Yankee with recommendations to ensure the continued reliability of the diesel generators.

Potential 10 CFR Part 21 review was initiated on the rotational torquing method and it was determined to be not reportable. Upon completion of the metallurgical evaluations and the root cause evaluations, Vermont Yankee Corrective Action Reports were performed.

### ADDITIONAL INFORMATION

No similar events have been reported to the commission in the past five years.

### REFERENCES

- a.) Letter, Warren P. Murphy (VYNPC) to Region I Administrator (USNRC), "Request for Temporary Waiver of Compliance from Technical Specification LCO Requirements Pertaining to Emergency Diesel Generator," BVS 92-068, dated June 3, 1992
- b.) Letter, Charles W. Heal (USNRC) to Mr. Warren P. Murphy (VYNPC), "Temporary Waiver of Compliance Related to Vermont Yankee Emergency Diesel Generators," dated June 4, 1992
- c.) Letter, Warren P. Murphy (VYNPC) to Regional Administrator (USNRC), "Request for Temporary Waiver of Compliance from Technical Specification LCO Requirements Pertaining to Emergency Diesel Generator," BVS 92-074, dated June 29, 1992
- d.) Letter, Charles W. Heal (USNRC) to Mr. Warren P. Murphy (VYNPC), "Temporary Waiver of Compliance Related to Vermont Yankee Emergency Diesel Generators," dated July 1, 1992