VERMONT YANKEE
NUCLEAR POWER CORPORATION

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October 15, 1996
BVY 96-125

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 96-022

As defined by 10CFR50.73, we are reporting the attached Reportable Occurrence as LER 96-022.

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 (2)	PAGE (3)
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TITLE (4) Combination of poor man-machine interface, an inadequate procedure, a mechanical failure, and inadequate Operating Experience Review results in an Emergency Diesel Generator to exceed Tech Spec outage time.

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)
09	13	96	96	-- 022 --	00	10	15	96	N/A	05000

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
B	EK	BKR	G080	Y	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 September 13, 1996 while shutdown for refueling Vermont Yankee (VY) discovered that the "A" Emergency Diesel Generator (EDG) output breaker was non-functional. The breaker was found in its normally open position, however its closing springs were discharged, rendering the breaker incapable of closing. The breaker closing spring charging mechanism had failed to charge the springs due to a failure of the charging mechanism ratcheting pawls. The location of the failure indicates that the failure occurred following the August 19 EDG breaker closing sequence. The EDG had been started and its output breaker closed on August 19, 1996 and again on August 20. This indicates that the breaker, and therefore the EDG, had been inoperable for approximately 25 days. This is contrary to the maximum time of 7 days allowed by VY Technical Specifications. This Technical Specification non-conformance results from the combined effects of the closing spring charging mechanism mechanical failure, a weak breaker cubicle design (inadequate visual cues), inadequate operating experience review, and the failure to proceduralize EDG breaker condition verification. VY is inspecting similar breakers, implementing a modification, and upgrading appropriate procedures to allow operators to confirm proper breaker condition following EDG operation. As the "3" EDG and the emergency Alternating Current (AC) power source were at all times available during this event, and the failure of a single EDG is bounded by our current plant accident and transient analyses, this event did not result in plant operation which endangered the health or safety of the public.

DESCRIPTION OF EVENT

On September 13, 1996 at 2030, while shutdown for refueling VY discovered that the "A" EDG output breaker (EIIS=BKR) was non-functional. The breaker was found in its normally open position, however its closing springs were discharged, rendering the breaker incapable of closing. The condition was discovered during a scheduled tagout. The breaker was tagged and a work order was initiated, and a troubleshooting and root cause plan was developed. The troubleshooting concluded that the breaker closing spring charging mechanism had failed to charge the springs due to a failure of the charging mechanism ratcheting pawls. The location of the failure indicates that the failure had occurred following the August 19 EDG breaker closing sequence. The EDG (EIIS=EK) had been started and its output breaker closed on August 19 and 20. This indicates that the breaker, and therefore the EDG, had been inoperable for approximately 25 days. This is contrary to the maximum time of 7 days allowed by VY Technical Specifications.

CAUSE OF EVENT

The root cause identified for this event was:

1. The mechanical failure of the charging mechanism hinge pin retaining device. The cause of this failure could not be determined as the retaining devices could not be located.

Contributing causes for this event were:

1. Inadequate operating experience review. Several operating experience sources cited a concern for breaker closing spring charging mechanism reliability, however recommended corrective actions were not implemented.

2. Plant procedures in their failure to require periodic verification of Safety Class 4kV breaker closing spring status.

3. Breaker cubicle design (man-machine interface, inadequate visual cues) in that it is impossible to verify that the breaker is in its standby configuration (breaker open with closing springs charged) without opening the cubicle access door.

ANALYSIS OF EVENT

Following replacement of the defective "A" EDG breaker (Breaker description; GE TYPE AM-4.16KV-250-8HB, SERIAL# 0224A1223-019) with a spare, a breaker failure mode investigation was performed on the affected breaker. The spare breaker was installed within 24 hours of discovery of the failed EDG breaker.

The breaker was found with the closing springs discharged. The cotter pin and washer on the "inside" end of the latching pawl hinge pin were missing. No deficiencies were noted in a breaker inspection performed on the affected breaker on September 19, 1995. At some time after the inspection, the cotter pin on the "inside" end of the hinge pin and flat washer became separated. This missing hardware was not found during this investigation. An intrusive examination of the failed breaker is scheduled.

The hinge pin was out of position by 1-5/16" preventing the pawls from holding the ratchet wheel when the ratcheting motion was reversed. This prevented the wheel from turning and compressing the closing springs. When the breaker was given a close signal, the charging motor started, but as the pawls did not engage the ratchet wheel, the springs did not compress. The motor continued to run, became overheated, and eventually open-circuited the winding. This left the breaker racked in with the springs uncharged.

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

This hinge pin problem does not appear to be a generic issue since the only other case identified through NPRDS was a similar occurrence at Browns Ferry in 1988. Maine Yankee cited similar conditions in INPO OE 7572, November 1995. However the pawl problem at Maine did not prevent spring charging as the misalignment was not severe.

1. Numerous nuclear network items indicated that there was reason to be concerned with the ability to monitor breaker closing spring condition. In addition to those cited above, other operating experience includes:

   a. INPO SEE-IN Documents EM13143, MI12897, MI15952, OE2042, OE7546

   b. NRC Information Notice, INF 94-02.

   Each document above identifies failures or potential failures of distribution breaker closing spring charging devices.

2. The formal evaluation and disposition of this type of information is currently being upgraded at VY as part of an overall Operating Experience Program upgrade project.

3. The corrective actions implemented as a result of this event will also address concerns relevant to the failure mechanisms cited in the above documents for VY emergency bus electrical distribution breakers.

A General Electric Service Advisory Letter, GE SAL Tab 073, No. 352.1, item 6, describes a change in hardware that is available. It replaces the hinge pin held in with washers and cotter pins on both ends, with a hinge pin that has a head on one end that is held in with a bolted disk. This upgrade may have prevented this event. The SAL states the change is to facilitate removal for maintenance.

The following describes the recent operational history of the "A" EDG Breaker, identifying the maximum time for which the EDG may have been unavailable due to the inoperable closing spring charging mechanism.

1.	8-19-96	Breaker closed at 05:40 hrs and the breaker re-charged the springs. (failure occurred at some point following successful spring recharge)
2.	8-19-96	Breaker opened at 14:23 hrs
3.	8-20-96	Breaker closed at 13:34 hrs
4.	8-20-96	Breaker opened at 16:05 hrs
5.	9-13-96	Breaker found in uncharged condition.

The only indication that the springs had failed to charge was the mechanical flag indicator located behind the compartment door. No procedures required verification of spring status. The springs were apparently in an uncharged condition for over three weeks without discovery.

SAFETY SIGNIFICANCE

The VY EDG's provide emergency backup electrical power to vital plant loads. The EDG's are important components supporting numerous systems in their response to plant conditions mitigating the consequences of postulated accidents. However, VY safety systems are designed with redundancy and separation to prevent single isolated failures such as this from threatening public health or safety.

Throughout the period that the A EDG was inoperable the B EDG was available and VY's Alternate AC Source, a tie line to the Vernon Hydroelectric Station was available. The EDG's are themselves emergency backup power sources and would only be

required should a loss of off-site electrical power occur. Further, the back-up device for the EDG's, the Vernon Tie-line, was available during the time which the "A" EDG was unknowingly inoperable. The failure of a single Emergency Diesel Generator, and its effect upon accidents with which VY is analyzed to cope, is considered in, and bounded by, VY Accident analyses. Additionally the "A" EDG output breaker could have been rapidly replaced, restoring the machine to a fully operable status, in the event that the "A" EDG was needed.

Therefore it is concluded that there were no safety consequences resulting from this event.

CORRECTIVE ACTIONS

1. Immediate

   a. The faulty breaker was removed and a spare breaker was installed. (Complete)

   b. Operations verified that the closing springs on all 4kV breakers were charged. (Complete)

   c. Performance Engineering performed an initial inspection of the breaker, and an inspection of all Emergency Bus 4kV breakers. No other significant problems were noted (Completed 9/15/96).

   d. Maintenance performed extensive troubleshooting on the failed breaker (Complete).

   e. A Training Change Request has been initiated to ensure that this event is reviewed during Electrical Craft and Auxiliary Operator training. (Complete)

   f. Operations implemented an interim corrective action to verify closing spring status after any Safety Class 4kV breakers are closed. This action will end upon verification of proper installation of the affected pin assemblies via an inspection of a representative sample of breakers. See immediate corrective action "g" (Complete)

   g. Maintenance will examine a representative sample of 4kV breakers to verify the presence of the affected hinge pin, flat washer and cotter pins (expected completion date: 11/1/96).

2. Long Term

   a. Maintenance will perform a detailed intrusive inspection of the failed breaker, post outage, and attempt to find the missing fastening components (washer and cotter pin, expected completion date: 2/14/97).

   b. Maintenance will review the Operating Experience information cited in the "ANALYSIS" section. The current breaker PM process will be evaluated against information provided in the operating experience documents and changes made to the PM's as necessary (expected completion date: 6/30/97).

   c. Performance Engineering will design a modification to allow monitoring charged status of selected breaker (including EDG out put breakers) closing springs without opening the breaker compartment doors (expected completion date: 3/19/97).

   d. VY will implement the breaker modification (long term corrective action "c"). Plant operator rounds sheets will be changed to add a check of emergency bus breaker charging spring status using the installed modification (expected completion date: 5/19/97).

f. Technical Support Department will implement the Operating Experience Program upgrade currently in progress. The general programmatic upgrade currently in progress will meet corrective action requirements for contributing cause number 3 (expected completion date 12/31/96).

ADDITIONAL INFORMATION

VY has reported no similar events in the past five years.