VERMONT YANKEE
NUCLEAR POWER CORPORATION

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February 27, 1997
BVY 97-32

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 97-01, Rev. 01

As defined by 10CFR50.73, we are reporting the attached Reportable Occurrence as LER 97-01, Rev. 01.

Sincerely,

VERMONT YANKEE NUCLEAR POWER CORPORATION

Gregory A. Maret
Plant Manager

cc: USNRC Region I Administrator
USNRC Resident Inspector - VYNPS
USNRC Project Manager - VYNPS

IE22/1

NRC Form 366 (4-95) U.S. NUCLEAR REGULATORY COMMISSION	APPROVED BY OMB NO. 3150-0104 EXPIRES 04/30/98
LICENSEE EVENT REPORT (LER)	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)
VERMONT YANKEE NUCLEAR POWER STATION	05000271	01 OF 04

TITLE (4) Inadequate design/procedural coordination allows plant operation under conditions where a single postulated electrical failure coincident with a LOCA could result in containment overpressure.

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
02	07	97	97	-- 001 --	00	02	27	97	N/A	

OPERATING MODE (9)	N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: CHECK ONE OR MORE (11)							
			20.2201(b)		20.2203(a)(2)(v)		50.73(a)(2)(i)		50.73(a)(2)(viii)
POWER LEVEL (10)	100		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)	X	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)
GREGORY A. MARET, 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
NA				NO	NA				
NA					NA				

SUPPLEMENTAL REPORT EXPECTED (14)				EXPECTED SUBMISSION DATE (15)	MO	DAY	YEAR
X	YES (If yes, complete EXPECTED SUBMISSION DATE)		NO		04	30	97

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

On 02/07/97 during an investigation for an unrelated issue, Vermont Yankee (VY) discovered the potential for a postulated electrical failure in the containment isolation control circuitry to challenge primary containment integrity. Plant design ensures that either the drywell vent and purge (VP) outboard isolation valves or the corresponding inboard isolation valves will close as designed given any postulated single failure. However it was recognized that the failure to close at least one of the inboard vent or purge isolation valves could challenge containment integrity. Were a Loss of Coolant Accident (LOCA) to occur, concurrent with the postulated single failure in the torus/drywell VP valve control circuitry, while containment inerting/deinerting was in progress, a flow path would be present which would allow a portion of the steam to bypass the available heat sink (suppression pool), potentially overpressurizing the containment pressure vessel. This flow path was possible because VY containment inerting procedures allowed simultaneous opening of the torus and drywell inboard VP paths while inerting and/or deinerting the containment. VY has established administrative controls to preclude simultaneously opening both the torus and drywell vent or purge paths during normal plant operation. Cause analysis efforts continue. Because plant Technical Specifications only allow the high volume drywell and torus VP paths to be opened with the plant in cold shutdown (or for 24 hours after plant startup, or for the 24 hours preceding shutdown); the affected circuit is tested each operating cycle; and a LOCA must occur coincident with the electrical failure; the probability that the containment overpressurization could occur is exceedingly low. Therefore this event is not considered to have presented an increased threat to public health or safety.

DESCRIPTION OF EVENT

On 02/07/97 during a cause analysis investigation for an unrelated issue, while operating at 100% power, VY discovered the potential for a postulated electrical failure to affect primary containment (EIIS=NH) integrity. It was postulated that a single electrical failure which disables the torus and drywell vent and purge (EIIS=VB) inboard isolation valves (EIIS=ISV) could allow an open flow path from the drywell to the torus air space partially bypassing the primary containment heat sink.

VY was constructed with a Mark-I Containment, consisting of a drywell which houses the reactor pressure vessel, recirculation system and other major equipment; and a torus, which contains approximately 70,000 cubic feet of water as a heat sink for any potential steam leaks. Any steam issuing from a LOCA would normally be forced from the drywell pressure vessel to beneath the water level within the torus (see Figure I). The condensing action achieved by the water in the torus limits the increase in primary containment pressure to less than the design pressure of the containment pressure vessel.

VY Containment isolation logic (EIIS=JE) design ensures that a single component failure cannot prevent automatic closure of the potential containment leakage pathways. For the containment vent and purge lines the design ensures that either the outboard isolation or the two inboard isolations will close given any postulated single failure. However the cited electrical failure could allow two 18 inch bypass lines connecting the drywell to the torus air space to remain open, thus partially bypassing the water and reducing the condensation of the steam. The bypass can occur via the air purge inboard isolation valves and through the drywell and torus inboard vent valves as the same control logic provides isolation of both flow paths.

Upon discovery of this design vulnerability, VY established administrative controls to preclude simultaneously opening both the torus and drywell purge and vent valves during normal plant operation. The potential for the single electrical failure coincident with a LOCA allowing containment overpressurization is present only when both inboard isolation valves for either the containment vent or purge functions are open simultaneously. Therefore VY has affixed warning tags upon the applicable valve control switches prohibiting the cited configuration. VY is in the process of changing plant procedures to preclude the alignment.

Technical Specifications do not forbid simultaneous opening of the drywell and torus high volume vent and purge line isolation valves with the plant pressurized. However the Technical Specifications (TS's) restrict such operations to 24 hour operating windows, allowing 24 hours following startup for containment inerting, and 24 hours prior to plant shutdown for plant deinerting. These are the only time periods in the past where the single failure vulnerability posed a threat to primary containment integrity.

As the time at which the vulnerability existed was such a small fraction of plant operating time, and the affected circuit has been satisfactorily tested once each operating cycle in the past; and a LOCA must occur coincident with the postulated electrical failure; the probability that the postulated containment overpressurization could have occurred is extremely low.

Further it should be recognized that the control circuits and actuating devices affected are of a fail-safe design. That is, they deenergize to actuate. The electrical failure postulated is, as an isolated incident, a relatively low probability failure, thus further reducing the probability of the primary containment overpressurization.

CAUSES OF EVENT

1. The apparent cause of this event was the failure to properly coordinate the cited design vulnerability with appropriate administrative controls during initial plant design and licensing efforts. The cause analysis investigation for this event continues.

ANALYSIS OF EVENT

The design bases of the Primary Containment Isolation (PCIS), and Primary Containment Systems (PCS) work together to mitigate the radiological consequences of postulated accidents which could release radioactive steam into the Primary Containment pressure vessel (the drywell). Although two separate systems, PCIS and PCS are designed to function together to ensure that such material released into the drywell would be adequately retained and processed. In this event it was discovered that the configuration of PCIS logic and the associated valve and piping configurations, although consistent with PCIS design bases, introduced a scenario which could result in primary containment overpressurization, which could challenge the primary containment's ability to adequately retain radioactive material and mitigate the radiological consequences of a LOCA. This condition has existed since plant initial construction and licensing.

A 1973 analysis was performed for VY to quantify the effects of an undetected flow path from the containment drywell directly to the torus air space, partially bypassing the suppression pool. The analysis was performed to determine the potential effects of leaking/ajar torus-to-drywell vacuum breaker check valves (EIIS=BF). The analysis determined that such a bypass flow path as small as 0.2 square feet in area coincident with an in-containment leak could cause containment overpressurization.

As previously stated, the potential for this event to manifest itself as an actual containment overpressurization requires several rare conditions/failures to occur simultaneously. The following conditions must be concurrent to threaten containment integrity.

1. Containment inerting/deinerting must be in progress. This would allow the affected inboard isolation valves to be opened. This condition is only permitted with the plant in a cold shutdown condition or within the 24 hours preceding a plant shutdown, or for 24 hours following plant start up. This limits this condition to approximately one half of one percent of plant operating time.

2. A LOCA must occur. It should be recognized that this need not be a large LOCA to present a hazard. A small to intermediate break would also pose a threat. However, a LOCA of any significant magnitude is an extremely rare event.

3. A "hot short" or some similar failure must occur which maintains energized the "deenergize to actuate" isolation and control logics for the affected valves despite a valid isolation signal. Control circuits failing in the energized condition, although not unheard of, are rare. The "deenergize to actuate" design is typically considered a "fail safe" configuration. This failure must occur between the time of the previous cyclic surveillance and the advent of conditions 1 and 2 above.

It should also be recognized that the primary containment is one of four fission product barriers specifically designed to retain the radioactive materials associated with the fission process. Other barriers in place include the fuel cladding itself, the reactor coolant pressure boundary, and the secondary containment.

Safety Significance

Due to the relative rarity of each individual failure described above, a scenario which requires that each rare event occur simultaneously is considered of extremely low probability. Therefore this event is not considered to have presented an increased threat to public health or safety.

NRC Form 366 U.S. NUCLEAR REGULATORY COMMISSION
(4-95)

LICENSEE EVENT REPORT (LER)

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		YEAR	SEQUENTIAL NUMBER	REV #	
VERMONT YANKEE NUCLEAR POWER CORPORATION	05000271	97	-- 001 --	00	04 OF 04

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

CORRECTIVE ACTIONS

Immediate Actions:

1. Interim plant administrative controls have been implemented to prohibit simultaneously opening the affected containment inboard isolation valves, precluding the cited mechanism to containment overpressurization (this action is complete).

2. A Basis for Maintaining Operation (BMO) was generated which defines the cited design/procedural controls mismatch, citing the need for added administrative controls to preclude introducing those conditions which would challenge the containment as described herein. The BMO also cites additional hardware changes which would address the current vulnerability (this action is complete).

3. An event report was initiated which requires a formal root cause analysis and corrective action recommendation. The results of this analysis, including long term corrective action recommendations will be issued in a supplement to this Licensee Event Report (expected completion date is 04/30/97).

ADDITIONAL INFORMATION: Several events reported in the past 5 years have involved original plant design and/or licensing issues. The determination as to which of these are similar to this event will be determined following completion of the cause analysis and communicated in the supplement to this report.

FIGURE I