

# Maine Yankee

RELIABLE ELECTRICITY SINCE 1972

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April 3, 1997

MN-97-35

JRH-97-44

## UNITED STATES NUCLEAR REGULATORY COMMISSION

Attention: Document Control Desk

Washington, D. C. 20555

Reference: (a) License No. DPR-36 ( Docket No. 50-309 )

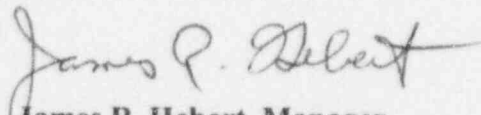
Subject: Maine Yankee Licensee Event Report 96-043-01, Generic Letter 96-01  
Identified Surveillance Issues, Revision-01

Gentlemen:

Please find enclosed Maine Yankee Licensee Event Report 96-043-01. This report is submitted in accordance with 10 CFR 50.73(a)(2)(i).

Please contact us should you have any questions regarding this matter.

Very truly yours,



James R. Hebert, Manager

Licensing & Engineering Support Department

mwf

Enclosure

c: Mr. Hubert Miller  
Mr. J. T. Yerokun  
Mr. D. H. Dorman  
Mr. Patrick J. Dostie  
Mr. Uldis Vanags

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## 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

FACILITY NAME (1)

Maine Yankee Atomic Power Company

DOCKET NUMBER (2)

50-309

PAGE (3)

1 OF 5

TITLE (4)

Generic Letter 96-01 Identified Surveillance Issues

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 NUMBER
12	27	96	96	-- 043	-- 01	04	03	97	FACILITY NAME	DOCKET NUMBER
OPERATING MODE (9)		5	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5: (Check one or more) (11)							
POWER LEVEL (10)		0	20.2201(b)		20.2203(a)(2)(v)		<input checked="" type="checkbox"/>		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

Ethan Brand, Supervisor, Nuclear Safety

TELEPHONE NUMBER (Include Area Code)

207-882-5661

## COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDs	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDs

## SUPPLEMENTAL REPORT EXPECTED (14)

<input checked="" type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE).	<input type="checkbox"/> NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
			05	31	97

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

On December 27, 1996, the plant was stable, operating in condition 5, Hot Shutdown, at zero percent power. The control room was notified of several GL 96-01 review issues which affected the operability of the Reactor Protective System (RPS). The RPS is not required to be operable in Hot Shutdown. The RPS was administratively tagged to prevent reactor startup prior to issue resolution. On December 30, 1996, additional GL 96-01 concerns were identified which affected the operability of the Emergency Core Cooling System and the Emergency Diesel Generators. In response to these deficiencies the plant was placed in Cold Shutdown. Additional GL 96-01 issues are currently being evaluated and are summarized in this LER.

All GL 96-01 issues have been screened for immediate operability issues.

All GL 96-01 issues will be evaluated and resolved and/or tested prior to plant restart.

A comprehensive root cause evaluation of these issues has been completed. Significant long term correction actions to be taken include developing a comprehensive surveillance testing and control program and identification and correction of deficient surveillance procedures.

## LICENSEE EVENT REPORT (LER)

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Maine Yankee Atomic Power Company	50-309	YEA	SEQUENTIAL	REVIS	2 OF 5
		96	-- 043	-- 01	

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

Revision 1 of this LER has been completely rewritten; no text change brackets are provided.

The intent of this LER is to discuss the issues pertaining to Maine Yankee's assessment of Generic Letter 96-01 (Logic Testing). Some of the issues discussed in this LER have been previously reported/discussed in LERs 96-020-00 "Automatic Function Logic Testing", 96-039-00 "Both Emergency Diesel Generators Declared Inoperable", 96-040-00 "Inadequate Surveillance Procedure For Reactor Trip Breaker Actuation" and 96-043-00 "Generic Letter 96-01 Identified Surveillance Issues". Given the similarity of the issues raised, Maine Yankee has concluded that a single LER will serve best to summarize this issue. These issues are provided in a summarized fashion in the attached table. The table contains the system or components affected, a brief description of the issue (including an internal reference to the issue number, some of which have been combined or voided) and current status.

As more information is obtained, this LER will be revised.

## INITIAL PLANT CONDITIONS:

On December 27, 1996, the plant was stable, operating in condition 5, Hot Shutdown, at zero percent power.

## EVENT DESCRIPTION:

The following three paragraphs describe two specific GL 96-01 issues in more detail as they affected the operability of the Reactor Protection System (RPS) and the Emergency Diesel Generators (EDG) due to inadequate surveillance testing. The remainder of the LER discusses GL 96-01 identified issues as a whole.

On December 27, 1996, the plant was stable, operating in condition 5, Hot Shutdown, at zero percent power. The control room was notified of several GL 96-01 review issues which affected the operability of the Reactor Protective System (RPS). The RPS is not required to be operable in Hot Shutdown. The RPS was administratively tagged to prevent reactor startup prior to issue resolution.

On 12/30/96 the ongoing GL 96-01 Project resulted in the identification of the diesel generator start circuitry for degraded grid voltage not having been tested. This feature protects the Emergency Core Cooling System during a degraded voltage by initiating diesel generator load shedding, thus ensuring that equipment is provided with adequate power.

At 0900 on 12/30/96, operations declared both trains of Emergency Core Cooling System (ECCS) (BQ/BP) inoperable due to the emergency power supply issue (EDGs). One train of ECCS is required by Technical Specifications in the hot shutdown condition, therefore the plant was placed in cold shutdown within the required Technical Specification time period. Operations also declared the Emergency Diesel Generators (EK) to be inoperable due to the missed logic circuitry testing. Placing the plant in a cold shutdown condition restored compliance with all affected Technical Specifications.

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During 1995, the NRC provided information notices regarding inadequate logic testing by surveillance procedures in the nuclear industry. In August 1995, a service request was issued to Yankee Nuclear Services Division to assess the adequacy of Maine Yankee surveillance procedures. This assessment was subsequently reinforced by the NRC in January 1996 through Generic Letter 96-01. The GL 96-01 Project was in progress during the Independent Safety Assessment (ISA) performed by the NRC at Maine Yankee during July and August of 1996.

The Independent Safety Assessment Team (ISAT) raised questions regarding the testing of certain safety circuits in August 1996. During the response to the ISAT questions which involved the Recirculation Actuation System (RAS) and High Pressure Safety Injection (HPSI) circuits, it was determined that these circuits and procedures had not yet been reviewed by the GL 96-01 Project. A review of these circuits concluded that surveillance procedures at Maine Yankee were inadequate in that they did not fully test the safety functions of the questioned circuits. Maine Yankee conducted tests to demonstrate operability of these questioned circuits not tested by the surveillance procedures. These tests resulted in the discovery of a severed wire in the 'A' High Pressure Safety Injection Pump (P-14A) start circuit as reported in LER 96-020. The surveillance testing of the logic circuitry which actuates the HPSI pump(s) was inadequate in that two parallel actuation paths were not independently verified. This was contrary to the Final Safety Analysis Report which states, in part, "Testing of the safety injection system active components, including pumps and valves, is initiated by simulating the initiating signals for the safeguards and utilizes the control circuit components to the maximum practicable extent" (FSAR, Appendix A, "Conformance to AEC Design Criteria", Criterion 48).

As a result of the discovery of the severed wire, the procedure review was then expanded to include Reactor Protection System (RPS), Emergency Core Cooling Systems (ECCS), and some Emergency Diesel Generator (EDG) circuits. The review was similar to the ongoing GL 96-01 Project in the areas to be reviewed, i.e. RPS, ECCS, and EDG, but was different in that it looked mainly at inputs and outputs to determine that the testing continues through to actuation of the final output devices. The intent was to confirm that the primary safety functions are tested to prevent a loss of function due to circuit discontinuities similar to the HPSI severed wire situation. The review of ancillary functions such as bypasses, interlocks, inhibit circuits, etc. were beyond the scope of this initial review. The scope of this review, including differences with the ongoing GL 96-01 Project, was provided in letter MN-96-123 from Maine Yankee to the NRC dated August 23, 1996. During the performance of this expanded review, several other surveillance test procedure deficiencies were identified which required additional tests, however, no other failures of equipment were uncovered as a result of these tests. (This issue is discussed in detail in LER 96-020).

The review being performed by the GL 96-01 Project was more comprehensive than the ISAT issues review with regard to circuit details and includes the ancillary functions.

The GL 96-01 Project completed its review of surveillance procedures and identified a number of procedural deficiencies, which included the items found as a result of the ISAT issue reviews. These issues are summarized in the attached table. There were no major differences in the type of procedural inadequacies found during the GL 96-01 review from those the ISAT review discovered.

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## SAFETY SIGNIFICANCE:

The inadequate logic testing of the Safety Injection Actuation System resulted in a severed wire in the autostart circuit for the 'A' High Pressure Safety Injection Pump (HPSI) (P-14A) going undetected for several years. The generic safety significance of the identified logic testing deficiencies is that equipment degradation could go undetected. This potential equipment degradation could have impaired the capability of the equipment to respond as designed. To date, with the exception of the HPSI Pump autostart circuit, no testing failures relating to logic circuitry have occurred.

## CAUSAL FACTORS:

A comprehensive Root Cause Evaluation was started in November, 1996 to evaluate the issues identified during the logic testing review. This report was completed on January 22, 1997.

The causal factors identified by the Root Cause Evaluation are:

- o The design basis functions of system components to be demonstrated by surveillance testing are not clearly defined.
- o Surveillance test procedure technical requirements regarding methods, acceptance criteria and scope are not defined.
- o The correct resources (personnel, methods, equipment) are not used to develop and revise surveillance procedures.
- o No program ownership has been established to oversee surveillance test implementation and development and to communicate surveillance test expectations.
- o Management policy was to limit surveillance testing of logic circuits to the scope explicit in the Technical Specifications.
- o The Self-Assessment process was ineffectual in identifying quality improvements in the surveillance program.

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Immediate corrections actions, still underway at this time, are to assess the safety significance of the identified issues, and to determine the required tests. All GL 96-01 issues have been screened for immediate operability issues and appropriate actions taken. Testing and/or resolution of all issues will be completed prior to plant startup. Identified testing discrepancies will be evaluated for incorporation into Maine Yankee surveillance procedures.

The following corrective actions will be implemented to reduce the likelihood of recurrence:

- o Develop a program within the engineering department for all surveillance testing and control.
- o Identify and correct deficient surveillance procedures.
- o Perform an engineering review of maintenance procedures which rely on surveillance procedures for functional test requirements to assure the design basis functions affected by the maintenance activity is adequately demonstrated by the specified surveillance procedure.
- o Incorporate findings and lessons to be learned from the Generic Letter 96-01 review into logic and control system procedures.

## PREVIOUS SIMILAR EVENTS:

The following three LERs document the results of initial reviews of GL 96-01 identified issues.

LER 96-020, Automatic Function Logic Circuit Surveillance Testing

LER 96-039, Both Emergency Diesel Generators Declared Inoperable

LER 96-040, Inadequate Surveillance Procedure for Reactor Trip Breaker Actuation

ATTACHMENT TO LER 96-043-01

System or Function	Testing Discrepancy	Test Status/Resolution
Containment Isolation System (CIS)	Trip of an NNS ventilation unit not verified. (Issue 25)	Not tested. Will be tested/resolved prior to restart.
CIS	Light indication used during logic testing was not indicative of actual trip path status for two of six CIS actuation relays. (Issue 14)	Not tested. Will be tested/resolved prior to restart.
Component Cooling Water pumps P-9A, B, 10A, B, Service Water pumps P-29A, B, C, D	These pump pairs are setup such that one pump is preferred during auto initiation. Surveillance testing does not adequately test all of the available permutations of pump availability. (Issues 47,48,49,50, 55,59,61,62,90)	Tested. No failures noted.
Emergency Diesel Generators (EDG)	The EDGs have the ability to feed both the NNS and 1E buses. The EDG load sequencing is not tested in this configuration. (Issue 53)	Tested. No failures noted.
EDG	Parallel paths for the field flash circuits are not independently tested. (Issue 39)	Tested. No failures noted.
EDG, Service Water Pumps (P-29 A-D), Safety Injection Pumps (P-14 A, B, S, P-12 A, B, P-61 A, B, S), Emergency Feedwater Pumps (P-25A, C), Component Cooling Water Pumps (P-9 A, B, 10A, B)	Switch contact positions for "Auto-After-Start" and "Auto-After-Stop" are not independently verified during testing. (Issues 32, 40,77, 83,84,86,88, )	Partially tested. No failures noted. Will be fully tested/resolved prior to restart.
EDG	The trip of feeder/cross tie breakers to the emergency bus is not verified during EDG load sequencing. (Issue 63, 76)	Testing partially complete. No failures noted.
EDG	The auto initiation of the two EDG start circuits are not separately tested. (Issue 38, 56, 68)	Tested. No failures noted.
EDG	The EDGs have an NNS trip in the event of a Plant Trip during EDG surveillance testing. The block of this trip path for the EDG during EDG load sequencing is not tested. (Issue 51, 67)	Tested. No failures noted.
Emergency Feed Water (EFW)	The manual override feature to reopen the EFW isolation valves after automatic closure is not tested. (Issue 34)	Not tested. Will be tested/resolved prior to restart.

## ATTACHMENT TO LER 96-043-01

System or Function	Testing Discrepancy	Test Status/Resolution
Electric Driven Fire Pump (P-4), EFW Pumps (P-25A,C), Component Cooling Water Pumps (P-9 A, B, 10, A, B)	These pumps are tripped and blocked from autostarting during a EDG load sequence for a certain period. This logic sequence is not adequately tested. (Issue 57, 58, 60, 65 ,75)	Testing partially complete. No failures noted.
Emergency Bus Under Voltage Relays	The reset function of these relays is not adequately tested. (Issue 85, 89)	Not tested. Will be tested/resolved prior to restart.
Excess Flow Check Valve (EFCV) (Main Steam Isolation System)	Parallel SOVs in the system are not independently tested.(Issue 17)	Tested. No failures noted.
Feed Train Trip (FTT)	The testing of the FTT system does not test the trip of the feedwater pumps (only tested the closure of feedwater valves). (Issue 35)	Not tested. Will be tested/resolved prior to restart.
Motor Operated Valve (MOV) block function	Following actuation of RAS, CIS, CSAS, or SIAS, MOVs in those systems should be blocked from manual (remote) repositioning. This block function has not been tested. (Issues 4,9,26,36)	Testing partially complete. No failures noted.
Pressurizer Proportional Heaters	The trip of the pressurizer proportional heaters is not tested for SIAS actuation or bus UV conditions. (Issue 37,79)	Not tested. Will be tested/resolved prior to restart.
Recirculation Actuation System (RAS)	Manual initiation of RAS not fully tested. (Issue 6)	Tested. No failures noted.
RAS/CIS/Safety Injection Actuation System (SIAS)	Dual diodes within the trip paths are not tested to ensure their ability to prevent a backfeed and misleading indications from the logic indicator lights. (Issue 23,24,31)	Partially tested. No failures noted.
Reactor Protection System (RPS)	A shunt path through a indication light circuit could have provided false indication of a trip relay actuation. Affects both automatic and manual reactor trip circuits. (Issues #1,2)	Tested. No failures noted.
RPS	The function of the "Low Steam Generator Pressure Trip Bypass" is not properly verified. (Issue 33)	Not tested. Will be tested/resolved prior to restart.
RPS	The Low Steam Generator Trip Bypass Switch bypass logic is not tested.(Issue 71)	Not tested. Will be tested/resolved prior to restart.
RPS	The primary coil in dual coil relays in the RPS trip matrix is not verified to function. (Issue 10,12,18,28,30,80,)	Not tested. Will be tested/resolved prior to restart.

## ATTACHMENT TO LER 96-043-01

System or Function	Testing Discrepancy	Test Status/Resolution
RPS	During RPS logic matrix testing, the matrix contacts are not verified to return to the trip cleared state following testing. (Issue 11)	Not tested. Will be tested/resolved prior to restart.
RPS	Several additional issues related to reset of RPS logic are being evaluated.	Not tested. Will be tested/resolved prior to restart.
RPS	RCS Flow "Zero Mode Bypass Switch", functions are not verified. (Issue 13,20)	Not tested. Will be tested/resolved prior to restart.
RPS	The Control Element Assembly withdrawal Prohibit function on a Thermal Margin/Low Pressure signal is not tested. (Issue 27)	Not tested. Will be tested/resolved prior to restart.
RPS	RPS Trip Inhibit Switch functions are not fully verified. (Issue 15, 19)	Not tested. Will be tested/resolved prior to restart.
Secondary Component Cooling water NNS isolation valves (SCC-A-460, 461)	SCC-A-460, 461 auto close on loss of suction pressure at the SCC pumps to isolate the NNS portion of the SCC system. This logic sequence is not tested. (Issue 74)	Tested. No failures noted.
SIAS/EDG	The logic to a)restart the EDG load shed if the EDG is being used for back feeding and a SIAS signal is received and b) start the EDG if a SIAS is received in conjunction with a degraded bus voltage condition, has not been tested. (Issue 16,66)	Tested. No failures noted.
SIAS	P-14A,B and S. The low suction trip block on SIAS is not tested. (Issue 21)	Tested. No failures noted.
SIAS/Feed Train Trip (FTT)	The initiation of a FTT with a SIAS in conjunction with low steam generator pressure is not tested. (Issue 29)	Not tested. Will be tested/resolved prior to restart.
SIAS	Pump P-61S, which can be aligned as a Containment Spray (CS) Pump or a Low Pressure Safety Injection Pump (LPSI) is not tested. Pump P-14S, which can be aligned as an A or B HPSI pump is not tested during SIAS testing. (Issue 43, 46,52, 73)	Partially tested. No failures noted.
SIAS	Automatic start of P-14 A, B or S is not verified during the start and load sequence logic test of the EDGs if the pumps were already running. (Issue 44,45,)	Testing complete. Testing revealing a cut wire in the P-14A autostart circuit which has been repaired and successfully retested.

## ATTACHMENT TO LER 96-043-01

System or Function	Testing Discrepancy	Test Status/Resolution
SIAS	P-14A, B and S., P-29A, B, C, D. P-25A, C. Logic start of an already running pump during testing not verified. (Issue 22, 64, 69)	Partially tested. No failures noted.
Steam Generator Blowdown Isolation Valves	Logic to prevent valve repositioning until reset not tested. (Issue 70)	Not tested. Will be tested/resolved prior to restart.