



**North  
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February 12, 1993

United States Nuclear Regulatory Commission  
Washington, D.C. 20555

Attention: Document Control Desk

Reference: Facility Operating License No. NPF-86, Docket No. 50-443

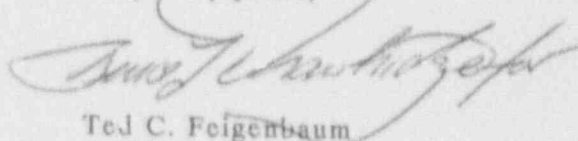
Subject: Licensee Event Report (LER) No. 93-003-00: Automatic Reactor Trip Due to  
a Phase to Ground Fault on the 25kV System

Gentlemen:

Enclosed please find Licensee Event Report (LER) No. 93-003-00 for Seabrook Station. This submittal documents a Reactor Trip and Engineered Safety Feature actuation which occurred on January 14, 1993. This event is being reported pursuant to 10 CFR 50.73(a)(2)(iv). This event was previously reported by North Atlantic as a non-emergency four hour report pursuant to 10 CFR 50.72(b)(2)(ii) on January 14, 1993.

Should you require further information regarding this matter, please contact Mr. James M. Peschel, Regulatory Compliance Manager, at (603) 474-9521, extension 3772.

Very truly yours,



Ted C. Feigenbaum

TCF:MJM/act

Enclosures: NRC Forms 366, 366A

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cc: Mr. Thomas T. Martin  
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## LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNRB 7714), 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) SEABROOK STATION

DOCKET NUMBER (2)

05000

PAGE (3)

1 OF 3

TITLE (4) AUTOMATIC REACTOR TRIP DUE TO A PHASE TO GROUND FAULT ON THE 25 KV SYSTEM

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
01	14	93	93	-- 003 --	00	02	12	93	FACILITY NAME	DOCKET NUMBER
										05000
										05000
OPERATING MODE (9)		1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)							
			20.402(b)			20.405(c)			X 50.73(a)(2)(iv)	73.71(b)
			20.405(a)(1)(i)			50.73(c)(1)			50.73(a)(2)(v)	73.71(c)
POWER LEVEL (10)		100	20.405(a)(1)(ii)			50.73(c)(2)			50.73(a)(2)(vii)	OTHER
			20.405(a)(1)(iii)			50.73(a)(2)(i)			50.73(a)(2)(viii)	(Specify in
			20.405(a)(1)(iv)			50.73(a)(2)(ii)			50.73(a)(2)(viii)(B)	Abstract below
			20.405(a)(1)(v)			50.73(a)(2)(iii)			50.73(a)(2)(x)	and in Text, NRC Form 36CA)

## LICENSEE CONTACT FOR THIS LER (12)

NAME Mr. James M. Peschel, Regulatory Compliance Manager

TELEPHONE NUMBER (Include Area Code)  
(603) 474-9521 extension 3772

## 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
B	EL	UDMP	P295	Y					

## SUPPLEMENTAL REPORT EXPECTED (14)

YES

(If yes, complete EXPECTED SUBMISSION DATE).

X

NO

EXPECTED SUBMISSION DATE (15)

MONTH

DAY

YEAR

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

On January 14, 1993, at 2019, an automatic reactor trip from 100 percent power occurred. This reactor trip followed a turbine trip caused by a phase to ground fault on the 25 kV main generator isolated phase bus (EL). This event was reported to the NRC at 2135 as an immediate notification pursuant to 10CFR50.72(b)(2)(ii), automatic actuation of the Reactor Protection System (RPS) and Engineered Safety Feature (ESF) System.

The 25 kV main generator isolated phase bus connects the output of the main generator to the three phase transformer used to step up the 25 kV generator output to the 345 kV grid voltage. Each air-insulated phase of the bus is surrounded by a duct assembly that isolates it from the other phases and the surrounding area. The bus conductors are cooled by a bus cooling unit that includes redundant fans and associated backdraft dampers downstream of the fans. A phase to ground fault occurred when a blade from the damper for the running fan became detached from the damper frame and was carried in the air stream, eventually making contact with the bus and a section of air duct.

There were no adverse safety consequences as a result of this event. The plant response to the trip was normal, and all operator actions were determined to be correct.

The damper blade failure was attributed to an inadequate damper blade pivot pin design by the vendor who supplied the bus duct cooling fan units. Corrective action was to redesign the damper assemblies to reduce the possibility of blade failure and to add a heavy debris screen downstream of the damper to prevent migration of loose parts if a future damper failure should occur.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

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FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
SEABROOK STATION	05000443	93	-- 003 --	00	2 OF 3

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

Description of Event

On January 14, 1993, at 2019, an automatic reactor trip occurred from 100 percent power. This reactor trip was initiated when the main generator ground fault protective relays actuated, resulting in the opening of the main generator circuit breaker and a turbine trip. The turbine trip initiated a reactor trip consistent with plant design. The reason for the ground fault protective relay actuation was a phase to ground fault in the 'B' phase of the 25 kV isolated phase bus.

Electrical power leaves the Seabrook Station main generator via the isolated phase bus. This bus consists of one conductor for each phase of the main generator output, with each conductor totally enclosed in an aluminum duct assembly. This duct isolates the individual phases from one another and from the environment. The bus conductors are air cooled by a bus cooling unit that consists of redundant fans and an air-to-water heat exchanger. Cooling air is supplied directly to the B phase of the isolated phase bus by either of the two cooling fans. Downstream of each fan is a backdraft damper that prevents reverse air flow through the idle fan. On January 14, 1993 a plastic damper blade shaft pivot pin failed and allowed a blade to break free of the damper frame. The blade was carried in the air stream from the fan until it made contact with the B phase conductor and the duct assembly. In response to the contact, the main generator ground fault protective relays actuated to protect the generator stator, opening the generator output breaker and resulting in a turbine trip. This turbine trip generated the Reactor Protection System (RPS) trip signal that initiated the automatic reactor trip.

The response to the reactor trip and the subsequent recovery actions by plant operators were determined to be correct. Primary plant system response was normal with expected Engineered Safety Feature (ESF) actuations (Emergency Feedwater System [BA] actuation on Steam Generator LO-LO level and Feedwater System [SJ] Isolation in response to the reactor trip).

At 2135 EDT on January 14, 1993 North Atlantic made a four-hour notification to the NRC pursuant to 10CFR50.72(b)(2)(ii) since this event resulted in an RPS and an ESF actuation.

Safety Consequences

There were no adverse safety consequences as a result of this event. Plant equipment functioned as designed and operator actions were determined to be correct. At no time during the event was there any impact on the health and safety of plant employees or the public.

Root Cause

The root cause of this event was determined to be an inadequate damper blade pivot pin design by the vendor who originally supplied the bus duct cooling fan units.

Corrective Actions

The backdraft dampers downstream of the isolated phase bus duct cooling fans were modified to strengthen the damper frames, replace the original plastic damper blade pivot pins with carbon steel pins, and replace the blade linkage assemblies with a significantly stronger linkage. In addition, a heavy debris screen has been added downstream of the dampers to prevent any loose damper components from being carried in the airstream to the isolated phase bus in the event a future damper failure occurred.



LICENSEE EVENT REPORT (LER)  
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SEABROOK STATION	05000443	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	3 OF 3
		93	-- 003 --	00	

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

North Atlantic will evaluate the need to replace the modified dampers with dampers specifically designed for high air flow, to periodically inspect these dampers, and to install inspection ports in the bus duct to facilitate periodic damper inspection. This evaluation is expected to be completed by September 15, 1993.

Plant Conditions

At the time of this event, the plant was in MODE 1, at 100 percent power, with a Reactor Coolant System temperature of 587.5 degrees Fahrenheit and a pressure of 2235 psig.

Related Events

This is the third event at Seabrook Station where mechanical failure of a component in a support system caused a reactor trip.

LER 90-018-00 reported a reactor trip caused by excessive vibration of the Electrohydraulic Control pressure switches, which was due to an unsatisfactory location of these pressure switches during plant design.

LER 90-025-00 reported a reactor trip caused by fatigue failure of a control air pipe nipple, which was due to an inadequate location of the air booster relay.

However, neither of these events is similar to the event reported in this LER, which was due to an inadequate vendor design of an integral component which could not be inspected once the equipment was delivered without major equipment removal. The corrective actions for LERs 90-018-00 and 90-025-00 would not have prevented this event.