

# New Hampshire Yankee

Ted C. Feigenbaum  
President and  
Chief Executive Officer

NYN-91118

July 26, 1991

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

Attention: Document Control Desk

Reference: Facility Operating License No. NPF-36, Docket No. 50-443

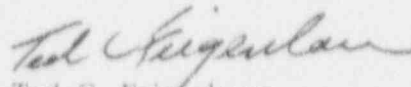
Subject: Licensee Event Report (LER) No. 91-008-00: Turbine Trip with Reactor Trip  
Due to an Inadvertent Actuation of Switchyard Circuit Breakers

Gentlemen:

Enclosed please find Licensee Event Report (LER) No. 91-008-00 for Seabrook Station. This submittal documents an event which occurred on June 27, 1991, and is being reported pursuant to 10CFR50.73(a)(2)(iv).

Should you require further information regarding this matter, please contact Mr. Allen L. Legendre, Lead Engineer - Compliance, at (603) 474-9521, extension 2373.

Very truly yours,

  
Ted C. Feigenbaum

TCP:WJT/act

Enclosures: NRC Forms 366, 366A

9108010174 910726  
PDR ADOCK 05000443  
S PDR

United States Nuclear Regulatory Commission  
Attention: Document Control Desk

July 26, 1991  
Page two

cc: Mr. Thomas T. Martin  
Regional Administrator  
United States Nuclear Regulatory Commission  
Region I  
475 Allendale Road  
King of Prussia, PA 19406

Mr. Gordon E. Edison, Sr. Project Manager  
Project Directorate I-3  
Division of Reactor Projects  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555

Mr. Noel Dudley  
NRC Senior Resident Inspector  
P.O. Box 1149  
Seabrook, NH 03874

INPO  
Records Center  
1100 Circle 75 Parkway  
Atlanta, GA 30339

## LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Seabrook Station										DOCKET NUMBER (2) 0 5 0 0 0 4 4 3										PAGE (3) 1 OF 4				
TITLE (4) Turbine Trip with Reactor Trip Due to an Inadvertent Actuation of Switchyard Circuit Breakers																								
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 NAMES						DOCKET NUMBER(S)									
0	6	2	7	9	1	9	1	0	0	8	0	0	7	2	6	9	1	0	5	0	0	0		
OPERATING MODE (9) 1			THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5. (Check one or more of the following) (11)																					
POWER LEVEL (10) 11010			20.402(b)			20.407(c)			<input checked="" type="checkbox"/> 50.73(a)(2)(iv)			73.71(b)												
			20.405(v)(1)(i)			50.38(a)(1)			<input type="checkbox"/> 50.73(a)(2)(v)			73.71(c)												
			20.405(a)(1)(ii)			50.38(a)(2)			<input type="checkbox"/> 50.73(a)(2)(vi)			OTHER (Specify in Abstract below and in Text, NRC Form 308A)												
			20.405(a)(1)(iii)			50.73(a)(2)(i)			<input type="checkbox"/> 50.73(a)(2)(viii)(A)															
			20.405(a)(1)(iv)			50.73(a)(2)(ii)			<input type="checkbox"/> 50.73(a)(2)(i)(iii)(B)															
			20.405(a)(1)(v)			50.73(a)(2)(iii)			<input type="checkbox"/> 50.73(a)(2)(ix)															
			20.405(a)(1)(vi)			50.73(a)(2)(iv)			<input type="checkbox"/> 50.73(a)(2)(x)															
LICENSEE CONTACT FOR THIS LER (12)																								
NAME Allen L. Legendre, Lead Engineer - Compliance, Extension 2373												TELEPHONE NUMBER AREA CODE 603 474-1952												
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)																								
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC										
SUPPLEMENTAL REPORT EXPECTED (14)												EXPECTED SUBMISSION DATE (15)			MONTH	DAY	YEAR							
<input type="checkbox"/> YES (If y/n, complete EXPECTED SUBMISSION DATE)												<input checked="" type="checkbox"/> NO												

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space type set x lines) (16)

On June 27, 1991, at 1:34 p.m., a turbine generator trip with a subsequent reactor trip occurred while the plant was at 100% power. The turbine trip was initiated when two switchyard 345kV circuit breakers tripped open disconnecting the generator from the offsite distribution system.

The event occurred during the performance of a preventive maintenance activity on a breaker failure relay [50BF-2/11(H)] for 345kV circuit breaker 11. As the relay was being returned to service (closure of two knife blade switches), momentary arcing occurred across the contacts. The arcing caused a high speed tripping auxiliary relay to pick up without picking up an associated lock out relay. This partial relay actuation resulted in 345kV circuit breakers 11 and 163 opening without generating a signal to open the Unit Auxiliary Transformer (UAT) supply breakers to unit busses 1 through 6. Because of this, the automatic transfer to the Reserve Auxiliary Transformers (RAT) was prevented, resulting in the automatic starting of both emergency diesel generators. Offsite power remained available to the RATs at all times. A turbine trip occurred within one second of the opening of the 345kV circuit breakers. The turbine trip initiated a reactor trip. Following the reactor trip, natural circulation was established. A Main Feedwater Isolation and subsequent Emergency Feedwater Actuation also occurred. Additionally, a Containment Ventilation Isolation and an actuation of the Control Room Emergency Air Cleanup and Filtration System occurred due to the momentary deenergization of the Emergency Busses.

The root cause has been determined to be a manufacturing error in the relay housing contact block assembly for the breaker failure relay. This breaker failure relay was caution tagged to preclude any further maintenance until it is replaced during the first refueling outage. Other relays similar in design will be inspected to ensure that the correct switch assemblies are installed. In addition, the automatic transfer scheme from the UATs to the RATs and the tripping scheme for the out of step relay will be reevaluated.

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
Seabrook Station	0500044391	--	008	--	00	2	OF 04

TEXT (If more space is required, use additional NRC Form 306A's) (17)

On June 27, 1991, at 1:34 p.m., EDT, a turbine generator trip with a subsequent reactor trip occurred while the plant was at 100% reactor power. The turbine trip was initiated when two switchyard 345kV circuit breakers (11 and 163) tripped open disconnecting the generator from the offsite distribution system.

### Description of Event

Prior to the event, the plant was at 100% power, with plant systems in a steady state condition. The event occurred during the performance of a preventive maintenance activity on a breaker failure relay [50BF-2/11(H)] for 345kV circuit breaker 11. When the two knife blade switches were closed to restore the relay to service, a momentary arcing occurred across the contacts. This caused a high speed tripping auxiliary relay (94-78/B3), part of the 78/B3 out of step relay, to actuate without, actuating an associated lock out relay (86-78/B3). This partial relay actuation resulted in the opening of 345kV circuit breakers 11 and 163 without generating a relay signal to open the Unit Auxiliary Transformer (UAT) supply breakers to unit busses 1 through 6. As a result of the UAT breaker not opening, the automatic transfer to the Reserve Auxiliary Transformers (RAT) was prevented, resulting in both emergency diesel generators starting automatically and energizing 4kV vital busses E5 and E6. It is important to note however, that offsite power remained available to the RATs at all times during the transient. Power was manually transferred to the RATs once operators ensured that the plant was in a stable condition.

The sudden loss of turbine load caused the early valve actuation (EVA) and the power load unbalance (PLU) protective features to actuate the rapid closure of the turbine control valves and intercept valves. A turbine trip occurred within one second of the opening of the 345kV circuit breakers. The rapid closure of the turbine control valves created pressure pulses which resulted in a Main Feedwater Isolation. These pressure pulses were transmitted through the steam flow transmitters (water filled lines and sensed by the high pressure side of the steam generator narrow range level transmitter. This resulted in the steam generator high-high signal and subsequent feedwater isolation. Actual steam generator levels did not approach the high-high level setpoint (P-14) at any time. Due to the loss of feedwater to a steam generator, an Emergency Feedwater Actuation occurred as designed.

The turbine trip initiated a reactor trip. Natural circulation was established in the Reactor Coolant System (RCS) as expected. Due to the loss of power, condenser steam dumps were not available, except for a brief period (approximately one second) following the trip. The atmospheric steam dump valves in each of the four main steam headers opened to control steam pressure during the event. Plant buses were re-energized from the offsite power sources beginning at 1:54 p.m. EDT with all busses being reconnected by 2:20 p.m. EDT.

In addition, when 345kV circuit breakers 11 and 163 opened, vital instrument bus 1E momentarily deenergized resulting in a Train "A" Containment Ventilation Isolation and an actuation of the Control Room Emergency Air Cleanup and Filtration System.

### Safety Consequences

There were no adverse safety consequences as a result of this event. Offsite power remained available to the RATs at all times during the transient. All the applicable trips and interlocks associated with the reactor trip functioned as designed. In addition, the emergency diesel

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
Seabrook Station	0 5 0 0 0 4 4 3	9 1	0 0 8	0 0	0 3	OF	0 4

TEXT (If more space is required, use additional NRC Form 366A-1 (1/77))

generators reached their rated speeds and voltage, and sequentially energized their respective loads as required.

All operator actions were determined to be appropriate to ensure the safety of the plant. At no time during this event was there any impact on the health and safety of plant employees or the public.

### Root Cause

The root cause has been determined to be a manufacturing error in the relay housing contact block assembly on the 345kV breaker 11 breaker failure protection relay. The contact block is designed to have a make-before-break feature which allows the relay to be removed from service while other relay protection circuits remain in service. The contact assembly is comprised of a bank of knife blade style switches in the relay housing. The knife blade switches are in pairs with one of the paired switches being configured to make-before-break while the other is configured as a break-before-make switch. This configuration allows the device to be removed from a current transformer circuit without interrupting the circuit. Post-trip troubleshooting revealed that one of the pairs of knife blade switches was incorrectly assembled with two break-before-make switches.

### Corrective Action

After the trip, the plant was placed in HOT STANDBY in accordance with operating procedure OS1000.11, "Post Trip to Hot Standby". An event evaluation and post trip review were immediately initiated. A Human Performance Enhancement System (HPES) analysis as well as a root cause analysis were also initiated.

The subject relay, 50BF-2/11(H), was caution tagged to preclude any further maintenance while the unit is operating at power. The out of step relay (78/B3) was tagged out of service until a thorough test is performed. Additional corrective actions include the following:

- 1) The relay housing for relay 50BF-2/11(H) will be replaced during the first refueling outage.
- 2) Other relay assemblies similar in design to relay 50BF-2/11(H) will be inspected to ensure that the correct switch assemblies are installed. These inspections will be performed before further preventative maintenance activities are conducted on the relays. These inspections are currently scheduled to be completed by December 31, 1991.
- 3) The tripping scheme for the out of step relay (78/B3) and the automatic transfer scheme from the UATs to the RATs will be reevaluated. This evaluation is currently scheduled to be completed by December 31, 1991.
- 4) An evaluation will be conducted to determine the cause for the momentary deenergization of the vital instrument bus 1E. This evaluation is currently scheduled to be completed during the first refueling outage.

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104

EXPIRES: 8/31/90

FACILITY NAME (1)  Seabrook Station	DOCKET NUMBER (2)  0 5 0 0 0 4 4 3 9 1	LER NUMBER (3)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
		0 0 8	0 0	0 4	OF	0 4	

TEXT (If more space is required, use additional NRC Form 305a's) (17)

Plant Conditions

At the time of this event, the plant was in Mode 1, Power Operation at 100%, with an RCS temperature of 587 degrees Fahrenheit and pressure of 2,235 psig.

This is the first event of this type at Seabrook Station.