

# NORTHEAST UTILITIES



The Connecticut Light and Power Company  
Western Massachusetts Electric Company  
Holyoke Water Power Company  
Northeast Utilities Service Company  
Northeast Nuclear Energy Company

General Offices: 125 Main Street, Berlin, Connecticut

P.O. BOX 270  
HARTFORD, CONNECTICUT 06414-0270  
(203) 665-5000

Re: 10CFR50.73(a)(2)(iv) &  
10CFR50.73(a)(2)(i)

July 9, 1991

MP-91-568

U.S. Nuclear Regulatory Commission  
Document Control Desk  
Washington, D.C. 20555

Reference: Facility Operating License No. NPF-49  
Docket No. 50-423  
Licensee Event Report 91-014-00

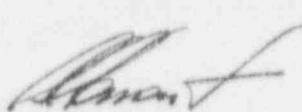
Gentlemen:

This letter forwards Licensee Event Report 91-014-00 required to be submitted within thirty (30) days pursuant to 10CFR50.73(a)(2)(iv), any event or condition that resulted in manual or automatic actuation of any Engineered Safety Feature (ESF), including the Reactor Protection System (RPS), and 10CFR50.73(a)(2)(i) any operation or condition prohibited by the plant's Technical Specification.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY

FOR: Stephen E. Scace  
Director, Millstone Station

BY:   
Carl H. Clement  
Millstone Unit 3 Director

SES/NDH:ljs

Attachment: LER 91-014-00

cc: T. T. Martin, Region I Administrator  
W. J. Raymond, Senior Resident Inspector, Millstone Unit Nos. 1, 2 and 3  
D. H. Jaffe, NRC Project Manager, Millstone Unit Nos. 1 and 3

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Estimated burden per response to comply with this information collection request: 50-0 hrs. Forward comments regarding burden estimate to the Records and Reports Management Branch (p-530), U.S. Nuclear Regulatory Commission, Washington, DC 20555, and to the Paperwork Reduction Project (3150-0104), Office of Management and Budget, Washington, DC 20503.

## LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Millstone Nuclear Power Station Unit 3										DOCKET NUMBER (2) 0 5 0 0 0 4 2 3 1 OF 0 3				PAGE (3) 1 OF 0 3			
TITLE (4) Reactor Trip Due to Switchyard Relay Malfunction																	
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								
0	6	0	9	9	1	9	1	0	7	0	9	9	1	0 5 0 0 0 0 1			
OPERATING MODE (9) 1			THIS REPORT IS BEING SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5. (Check one or more of the following) (11)														
POWER LEVEL (10) 1 0 0			20.402(d)				20.402(e)				X 50.73(a)(2)(iv)				73.71(b)		
			20.405(a)(1)(i)				50.36(c)(1)				50.73(a)(2)(iv)				73.71(c)		
			20.405(b)(1)(i)				50.36(c)(2)				50.73(a)(2)(vii)				OTHER (Specify in Abstract below and in Ter. NRC Form 365A)		
			20.405(a)(1)(iii)				X 50.73(a)(2)(ii)				50.73(a)(2)(viii)(A)						
			20.405(a)(1)(iv)				50.73(a)(2)(iii)				50.73(a)(2)(viii)(B)						
			20.405(b)(1)(v)				50.73(a)(2)(iii)				50.73(a)(2)(ix)						
LICENSEE CONTACT FOR THIS LER (12)																	
NAME Nelson D. Hulme, Senior Engineer, Ext. 5398										TELEPHONE NUMBER							
										AREA CODE 2 0 3 4 4 7 - 1 7 9 1							
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							
B	E	L	R	L	Y	W	1	2	0	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 fifteen single-space typewritten lines) (16)

At 1125 hours on June 9, 1991, with the plant at 100% power in Mode 1, at 2250 psia and 587 degrees Fahrenheit, a turbine and subsequent reactor trip occurred. The trips were due to a phase to ground fault on a 345 kilovolt (KV) system transmission line (external to the plant) in combination with a faulty switchyard pilot wire relay. The pilot wire relay scheme protects the 345KV transmission zone from the main generator output transformer to the switchyard tie breakers (which connect the plant to the distribution system transmission lines). These faults caused station switchyard breakers to open and resulted in Unit 3 load rejection schemes operating to initiate the trips.

The root cause of the trip was a loose restraint tap on the switchyard pilot wire relay. The tap screw was broken and was not completely tightened on the lug of the tap wire. The loose tap resulted in an open circuit and caused the pilot wire relay to actuate incorrectly to the transmission line fault. The cause of the broken tap screw could not be determined. All protection and safety systems functioned as designed as a result of the turbine and reactor trips. A Feedwater Isolation and Auxiliary Feedwater ESF actuation occurred as expected following a trip. No other ESF signals were initiated and the event posed no significant hazard to the health and safety of the public. The broken tap screw and affected wiring were repaired, and the pilot wire relay was returned to service.

LICENSEE EVENT REPORT (LER)  
TITLE CONTINUATION

Estimated burden per response to comply with this information collection request: 50.0 hrs. Forward comments regarding burden estimate to the Records and Reports Management Branch (p-630), U. S. Nuclear Regulatory Commission, Washington, DC 20565, and to the Paperwork Reduction Project (3150-0104), Office of Management and Budget, Washington, DC 20503.

FACILITY NAME (1)  Millstone Nuclear Power Station Unit 3	DOCKET NUMBER (2)  0 5 0 0 0 4 2 3 9 1	LER NUMBER (6)			PAGE (3)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
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TEXT (If more space is required, use additional NRC Form 366A (6-88))

I. Description of Event

At 1125 hours on June 9, 1991, with the plant at 100% power in Mode 1, at a pressure of 2250 psia and a temperature of 587 degrees Fahrenheit, a turbine trip and subsequent reactor trip occurred. The trips were due to a phase to ground fault on a 345 kilovolt (KV) distribution system transmission line (external to the plant) in combination with a faulty switchyard pilot wire relay. The pilot wire relay scheme protects the 345KV transmission zone from the main generator output transformer to the switchyard tie breakers (which connect the plant to the distribution system transmission lines). These faults caused the station switchyard tie breakers to open and resulted in the Unit 3 load rejection schemes operating to initiate the turbine trip. At 100% power, a turbine trip causes a reactor trip.

Normally, electrical power to internal plant loads is supplied from either the main generator or the switchyard via the Normal Station Service Transformers (NSST). Since both supply sources to the NSST were unavailable following the event, internal plant loads were automatically aligned to the Reserve Station Service Transformers (RSST). By design, 4.16KV loads were isolated from both the NSST and RSST, and then the RSST output breakers for the 4.16KV safety related (vital) busses were closed within 620 milliseconds of the loss of the NSST. The transfer of the 6.9KV RSST (which supplies the reactor coolant pumps and condensate pumps) occurred within 6 milliseconds. All 6.9KV loads continued to run except that the "A" Condensate Pump tripped and caused the standby "B" Condensate Pump to start. The reactor trip response procedures were immediately initiated, and power to the non-safety related 4.16KV busses was restored within 29 minutes of the trip. The indicated cause of the "A" Condensate Pump trip was overcurrent. An inspection of the breaker and motor identified no damage had occurred. After the inspection, the pump was satisfactorily started and operated. Off-site power was restored to the NSST at 1530 hours. The 6.9 KV busses were shifted to the NSST at 1644 hours, and the 4.16KV busses were shifted to the NSST at 1655 hours.

At the time of the trip, operators verified that the Reactor Trip and Bypass Beakers were open, that all control rods were fully inserted, and that neutron flux was decreasing. A Feedwater Isolation actuation occurred due to low Average Reactor Coolant System temperature following the trip. An Auxiliary Feedwater actuation occurred as a result of a steam generator low-low level signal. These are normal responses following a trip from 100% power. No additional Engineered Safety Features were required or initiated. The plant was stabilized at approximately 1216 hours, based on recovery of electrical power to the non-safety related busses and placement of the secondary system in a controlled configuration.

The original plant design initiated a fast (i.e., within 6 cycles) transfer of all plant 4.16KV loads to the RSST on a loss of the NSST. The 4.16KV fast transfer was subsequently deleted in order to preclude exceeding electrical limits on safety related equipment. LER 88-026 discusses the basis for modifying the 4.16KV transfer scheme. The delayed transfer of safety related 4.16KV loads to the RSST functioned satisfactorily to maintain operation of equipment vital to plant safety. However, the loss of non-safety related equipment impacted the recovery of the secondary plant. The loss of circulating water pumps caused a loss of condenser vacuum. A pressure increase resulted in the rupturing of the condenser blowout discs, and an increase in condenser hotwell temperature to approximately 175 degrees Fahrenheit. Once non-safety related power was restored, equipment was returned to normal. However, the circulating pumps were not started until condenser hotwell temperature had cooled significantly in order to avoid thermal shock to the condenser.

Technical Specification (TS) 3.8.1.1 requires verification of Emergency Diesel Generator operability within one hour of a loss of either offsite power source. This requirement was not fulfilled while operators were in the process of restoring power and following the emergency procedures associated with the event.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

Estimated burden per response to comply with this information collection request: 60.0 hrs. Forward comments regarding burden estimate to the Records and Reports Management Branch (p-530), U.S. Nuclear Regulatory Commission, Washington, DC 20555, and to the Paperwork Reduction Project (3150-0104), Office of Management and Budget, Washington, DC 20503.

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

II. Cause of Event

The root cause of the trip was a loose restraint tap on the switchyard 87PWY pilot wire relay. The tap screw was broken in the threaded hole and was not completely tightened on the lug of the tap wire. The loose tap resulted in an open circuit and caused the mis-operation of the pilot wire relay following the transmission line fault. The cause of the broken tap screw could not be determined.

The pilot wire relay is designed to actuate only on faults which occur between the main generator output transformer and the two 345KV switchyard output breakers. Electrical faults that occur within this zone actuate the pilot wire relay and cause a Unit 3 trip. Faults which occur outside the zone protected by the pilot wire relay scheme, such as the fault which occurred in this event, should not result in pilot wire relay actuation. External faults are isolated through a selective tripping scheme that may result in one of the Unit 3 switchyard tie breakers tripping, but will still enable Unit 3 to remain on line feeding the switchyard via the other tie breaker.

III. Analysis of Event

This event is being reported in accordance with 10CFR50.73(a)(2)(iv), any event or condition that resulted in manual or automatic actuation of any Engineered Safety Features (ESF) including the Reactor Protection System. An immediate notification was made in accordance with 10CFR50.72(b)(2)(ii).

All protection and safety systems functioned as designed as a result of the reactor trip. A Feedwater Isolation and Auxiliary Feedwater ESF actuation occurred as expected following a trip. No other ESF signals were initiated and the event posed no significant hazard to the health and safety of the public. The loss of non-vital power for approximately 29 minutes presented difficulties in returning the plant secondary systems to a normal shutdown condition as described in Section 1. An inspection was performed on equipment that could be affected by the excessive temperatures; no damage was observed. Secondary plant equipment was returned to normal operation, and the unit was returned to power.

As vital power was immediately shifted from the NSST to the RSST, the Emergency Diesel Generators (EDG) were not required to start automatically. Technical Specification (TS) 3.8.1.1 requires EDGs to be started within one hour of a loss of either offsite power source. This requirement was not met. The loss of non-safety related power resulted in plant operation in accordance with the Emergency Operating Procedures (EOPs) for an extended period. The EOPs frequently verify the safety related busses are energized. After the plant was placed in a stable condition and power was restored to the non-vital bus, a TS review was conducted. Operators were making preparations to run EDG surveillances when power was restored to the NSST. The Millstone Unit 3 Emergency Diesels have demonstrated very high reliability to start on demand. In the last three years there have been no "failures to start" with the testing criteria specified in Regulatory Guide 1.108. Therefore, the safety significance of not testing per the Technical Specification action statement was minimal.

IV. Corrective Action

The broken tap screw and affected wiring were repaired, and the pilot wire relay was returned to service. Although safety systems responded as designed to the trips and to a loss of the NSST, this event is considered to be a significant transient to Unit 3 because of the stress placed on the secondary, non-safety related systems. A design review will address the problems associated with the loss of circulating pumps and the attendant high temperatures experienced in the secondary systems. Since these issues address availability and not plant or public safety, the review will not be documented in a supplemental LER.



LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

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FACILITY NAME (1)  Millstone Nuclear Power Station Unit 3	DOCKET NUMBER (2)  0 5 0 0 0 4 2 3	LER NUMBER (5)			PAGE (3)	
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TEXT (if more space is required, use additional NRC Form 366A's) (17)

V. Additional Information

This is considered to be an isolated event as no LERs have been submitted on any similar electrical fault which resulted in a plant trip. An NPRDS search was conducted with the following conditions:

- \* Component -- Relay
- \* Manufacturer -- Westinghouse Electric Corp./Hagan
- \* Model Numbers -- HCB1/HCB-1

There were no records retrieved from NPRDS that met these search conditions.

The pilot wire relay is a Type HCB-1 relay manufactured by Westinghouse Electric Corporation. It measures the difference between current that is produced by the Unit 3 output transformer and the current delivered to the site switchyard busses via the two Unit 3 switchyard breakers. A sufficiently large difference between the transformer input current and the breaker(s) output current will isolate the fault through selective tripping of both switchyard breakers and the generator output breaker. This results in a plant turbine/reactor trip, and a transfer of electrical power from the NSST to the RSST.

ELIS CODESSystem

Main Generator  
Output Power System -- EL

Components

Relay -- RLY