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

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October 10 1989

MP-13604

Re: 10CFR50.73(a)(2)(v)

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 88-026-03

Gentlemen:

This letter forwards Licensee Event Report 88-026-03 submitted as an update to report a significant change made to the modification proposed in LER 88-026-02. LER's 88-026-00, 88-026-01 and 88-026-02 were submitted pursuant to 10CFR50.73(a)(2)(v), any event or condition that alone could have prevented the fulfillment of the safety function of systems that are needed to mitigate the consequences of an accident.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY

Stephen E. Scace
Station Superintendent
Millstone Nuclear Power Station

SES/RNK:mo

Attachment: LER 88-026-03

cc: W. T. Russell, Region 1 Administrator
W. J. Raymond, Senior Resident Inspector, Millstone Unit Nos. 1, 2 and 3
D. H. Jaffe, NRC Project Manager, Millstone Unit No. 3

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NRC Form 366 (6-89) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104
EXPIRES: 4/30/92

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

PAGE (3): 1 OF 0 5

TITLE (4): Potential Damage to Safety Related Equipment Due to Design Inadequacy

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	
										0 5 0 0 0
1 1	1 8	8 8	8 8	- 0 2 6	- 0 3	1 0	1 0	8 9		0 5 0 0 0

OPERATING MODE (9)	1	THIS REPORT IS BEING SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
POWER LEVEL (10)	1 0 0	20.402(b)	20.402(c)	50.73(a)(2)(iv)	73.71(b)
		20.405(a)(1)(i)	50.36(c)(1)	X 50.73(a)(2)(v)	73.71(c)
		20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
		20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
		20.405(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	
		20.405(a)(1)(iv)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
Robert N. Keller, Engineer, Ext. 5507	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 NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE)	X NO				

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

On November 18, 1988 at 1630 hours, with the plant in Mode 1 at 100% power, engineering postulated a scenario which could, in the extreme case, result in a loss of redundant trains of safety related (vital) equipment. It was discovered that certain circumstances could lead to Millstone Unit 3 becoming isolated from the Millstone Station Switchyard while on-line. This could lead to an out-of-phase fast transfer to the Reserve Station Service Transformer (RSST) resulting in a potentially damaging transient on both trains of vital 4160V busses.

On December 29, 1988, with the plant in Mode 1 at 75% power, three relays were identified that, assuming a single failure, also could result in the postulated scenario.

Root cause of both events is inadequacy in plant design. The out-of-phase transfer scenario postulated had not been previously identified.

As a result of the first event, administrative controls were implemented to realign the 4160V busses to the RSST when either of the switchyard breakers were open. As a result of the later event, the power supply to the 4160V busses was manually aligned to the RSST. With the 4160V busses supplied by the RSST, the scenario is no longer feasible since the busses are in the post fast transfer state. A modification was completed on June 22, 1989 to eliminate the fast transfer on undervoltage.

1. Description of Event

On November 18, 1988 at 1630 hours, with the plant in Mode 1 at 100% power, plant engineering reported that a scenario had been postulated that could, in the extreme case, result in a loss of redundant trains of safety related (vital) equipment. This scenario was discovered during an engineering review of the effects of a main generator coastdown. Immediate action included the implementation of administrative controls to reduce the probability of occurrence of the postulated scenario. In addition, engineering initiated a Significant Safety Hazard Evaluation in compliance with 10CFR21, "Reporting of Defects and Noncompliance".

The following is a description of the events sequence that could lead to a loss of redundant safety related equipment (refer to Figure 1 for the one-line configuration of offsite and onsite power for Millstone Unit 3).

With Millstone Unit 3 main generator on-line, this scenario can be initiated in one of two ways.

1. Switchyard breaker 15G-14T-2 is open or out of service for repairs and breaker 15G-13T-2 opens automatically to isolate a fault on the switchyard north bus.

2. Switchyard breaker 15G-13T-2 is open or out of service for repairs and breaker 15G-14T-2 opens automatically to isolate a fault on the Millstone-Southington 348 transmission line.

Both situation 1 and 2 result in the isolation of the main generator from the Millstone Station Switchyard. Under these circumstances, the main generator breaker would remain closed. The turbine subsequently trips due to a power mismatch or turbine overspeed. A turbine-generator coastdown would follow. Since the main generator breaker receives no signal to open and excitation is still present, the main generator continues to provide power via the Normal Station Service Transformers (NSST's) to the Unit 3 6900V and 4160V electrical distribution systems.

Based on a computer model of the generator coastdown, voltage on the 4160V busses would decay to 3220V at approximately 76 seconds after the turbine trip. At this time the model predicts that the main generator frequency would be approximately 40HZ. At 3220 volts, the undervoltage relays on non-vital busses 34A and 34B actuate. After a 2 second time delay, all motor loads off of 34A and 34B trip and also the supply breakers from NSST-A to bus 34A and 34B trip. The tripping of the normal supply breaker initiates a "fast transfer" to the Reserve Station Service Transformer "A" (RSST-A). During this fast transfer, the RSST-A supply breakers to the vital busses 34C and 34D close approximately 6 cycles after the NSST-A supply breakers open. Due to the fact that motor loads remain connected to vital busses 34C and 34D during this 6 cycle interval, voltage/frequency on the busses is not expected to change significantly. Therefore, the RSST supply at 4160V/60Hz will not match the vital bus conditions of 3220V/40Hz. Vital bus connected loads will remain connected unless the fast transfer is not successful. Thus, the transient could damage the connected vital loads before the protective relays open RSST to 34C and 34D bus breakers.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Millstone Nuclear Power Station Unit 3	0 5 0 0 0 4 2 3	8 8	— 0 2 6	— 0 3	0 3 OF 0 5

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

I. Description of Event Cont'd.

On December 29, 1988 at 1600 hours, with the plant operating in Mode 1 at 75% power, 585 degrees F, 2250 psia, it was determined that a single failure of any one of three relays located at the Millstone Station Switchyard could also cause this turbine-generator trip/coastdown and subsequent out-of-phase 4160V bus supply transfer. This determination was made during a Switchyard Electrical Protection Drawing review resulting from the initial discovery of the postulated scenario. These relays of concern are the Pilot Wire Differential Relay 87PWY/U3, Pilot Wire Monitor and Transfer Trip Relay 36PWY/U3, and the Pilot Wire Tripping Relay 94PWY/U3.

At 1617 on December 29, 1988, the power supply to the 4160V busses was manually transferred to the RSST. In this configuration the bus transfer scheme is defeated, thereby eliminating the possibility of an out-of-phase transfer.

II. Cause of Event

The root cause of these events is design inadequacy. The turbine generator coastdown/out-of-phase transfer scenario is an event which was not considered in the original design basis of the plant. Therefore, design of systems and circuitry to prevent such an event is not in compliance with applicable Regulatory Guides or 10CFR design criteria.

III. Analysis of Event

These events are being reported in accordance with 10CFR50.73(a)(2)(v), as a discovery of a design inadequacy which alone could have prevented the fulfillment of the safety function of structures or systems that are needed to shutdown the reactor and sustain it in a safe shutdown condition, remove residual heat, control the release of radioactive material, or mitigate the consequences of an accident.

The postulated scenario could, in the extreme case, result in an overvoltage/overcurrent transient that could cause damage to the connected loads of the vital (safety related) bus. It can be considered a common mode failure in that both trains of operating safety related equipment would be simultaneously subjected to the transient.

Although the fast transfer schemes are similar, the non-vital 6900V busses would not be exposed to this type of transient because the undervoltage relays do not initiate the opening of their supply breakers from NSST-B. The undervoltage relays would shed all loads from the busses, so the motors would not be subject to the undervoltage/underfrequency condition experienced while the busses remain connected to the generator during coastdown. Control room operators would have the option to manually transfer the 6900V feed over to the RSST-B during the coastdown without the threat of equipment damage.

Pertaining to the November 18, 1988 event, a review of the Millstone Station Switchyard Log revealed that there were 12 instances where breaker 15G-13T-2 or 15G-14T-2 was open with Millstone Unit 3 on-line. The durations vary in length from 7 minutes to 790 minutes, with 10 less than 40 minutes. These were all due to manual switching evolutions (i.e., the breakers never opened automatically).

For the December 19, 1988 even., the only failure mode of the specified relays which could initiate the postulated scenario is spontaneous operation. The relays, which are normally deenergized, would have to experience a change of state due to shock or a seismic event. Since the relays are not Class 1E and have not been seismically tested, the profile of parameters required to cause this change of state is unknown.

IV. Corrective Action

Immediate corrective action included placement of caution tags on the Main Control Board status indicator lights for the 15G-13T-2 and 15G-14T-2 switchyard breakers. The tags require control room operators to manually transfer the Unit's offsite power supply to the Reserve Station Service Transformer, in the event that either of the two switchyard breakers open for any reason. When the vital busses are supplied via the RSST's, the Fast Transfer Scheme is disabled, thus effectively preventing the possibility of this scenario from occurring. Engineering reviewed possible scenarios with station power supplied from the RSST's and determined that it would not have a negative impact on plant operations. This is based on the fact that a Loss of Power (LOP) event will still result in a transfer to the Emergency Diesel Generators, and, if required, the operators can manually switch back to the NSST's.

On January 12, 1989, a temporary circuit modification was made which prevents the out-of-phase transfer from occurring. The modification removed the undervoltage trip of the NSST supply breakers to the non-vital busses, effectively preventing a "fast transfer" on undervoltage. All other aspects of the fast transfer were unaffected by the modification. The postulated scenario (or any loss of voltage at the NSST) will now result in a "slow transfer", where the vital busses isolate from the non-vital busses and become connected to the RSST (if RSST voltage is greater than 90%) or Emergency Diesel Generators. This interim modification permitted the plant to return to the normal electrical configuration with the NSST supplying all 4160V loads.

On June 22, 1989, a permanent modification was completed to eliminate the fast transfer on an undervoltage condition. This change employed a contact from the relay that receives the signal from the non-vital undervoltage relays to block the high speed closure of the supply breaker from the RSST. All other aspects of the fast transfer scheme remain unchanged. The fast transfer will still function as designed whenever the NSST supply breaker opens automatically for reasons other than undervoltage (i.e., overcurrent, current differential, etc.). An undervoltage condition on the non-vital busses will result in a slow transfer, where the vital to non-vital bus tie breaker opens and the supply breaker from the RSST closes. In addition to the above, a modification was made to ensure that whenever switchyard breakers 15G-13T-2 and 15G-14T-2 are both open, the main generator output breaker and NSST supply breakers (both 4160V and 6960V) will trip. This will result in a 4160V and 6900V bus supply fast transfer to the RSST.

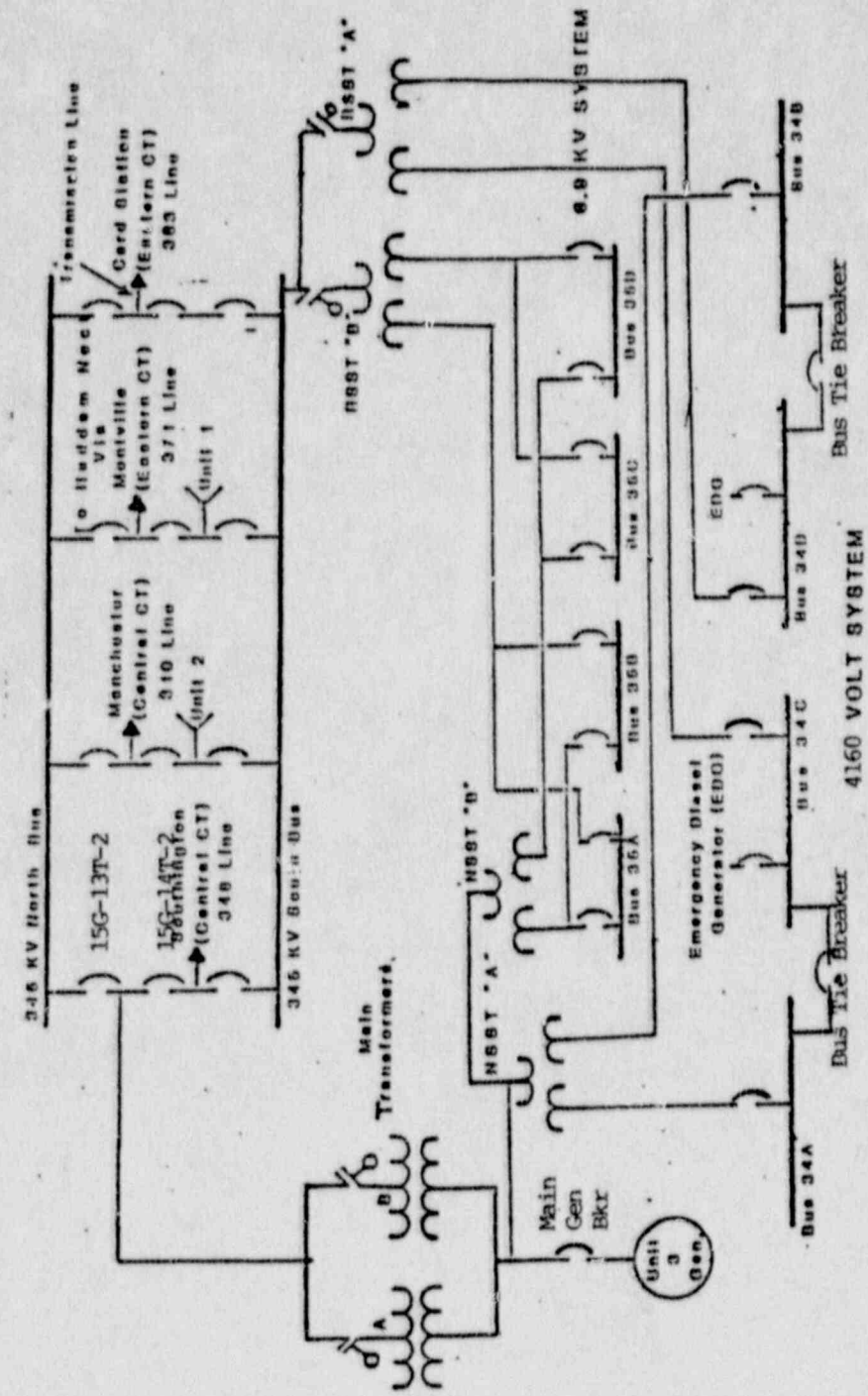
V. Additional Information

LER 50-423/88-028 reports a plant trip related to Emergency Diesel Generator Surveillance testing with the 4160V busses supplied by the RSST.

The B Emergency Diesel Generator was started for surveillance testing. When the B Emergency Diesel Generator was paralleled to the emergency 4160V bus 34D, the normal to emergency bus tie breaker opened on reverse overcurrent trip, deenergizing the normal bus 34B. The cause of this event was procedural deficiency. The applicable operating procedures have been corrected.

EIIS CODES

Systems	Components
Switchyard System - FK	Inter-Tie Transformers (NSST & RSST) - XFMR
	Switchyard Breakers - BKR
	Relay - RLY



ELECTRICAL DISTRIBUTION SYSTEM

FIGURE 1