

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) McGuire Nuclear Station, Unit 1	DOCKET NUMBER (2) 0 5 0 0 0 3 6 1 9	PAGE (3) 1 OF 0 5
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TITLE (4) Control Area Ventilation/Chilled Water System Inoperable Due to
Thermostat Set Low and Refrigerant Leak

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 1	0 7	8 7	8 7	0 0 1	0 0	0 2	0 6	8 7	McGuire Unit 2		0 5 0 0 0 0 3 7 0
									0 5 0 0 0 0		

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (Check one or more of the following) (11)

OPERATING MODE (9) 1	20.402(b)	20.406(c)	60.73(a)(2)(iv)	73.71(b)
POWER LEVEL (10) 1 0 0	20.406(a)(1)(i)	50.36(e)(1)	60.73(a)(2)(v)	73.71(e)
	20.406(a)(1)(ii)	50.36(e)(2)	60.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
	20.406(a)(1)(iii)	XXX 50.73(a)(2)(i)	60.73(a)(2)(viii)(A)	
	20.406(a)(1)(iv)	50.73(a)(2)(ii)	60.73(a)(2)(viii)(B)	
	20.406(a)(1)(v)	50.73(a)(2)(iii)	60.73(a)(2)(ix)	

LICENSEE CONTACT FOR THIS LER (12)

NAME Phillip B. Nardoci - Licensing	TELEPHONE NUMBER
	AREA CODE: 7 0 4 3 7 3 - 7 4 8 2

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)

YES (If yes, complete EXPECTED SUBMISSION DATE) NO

EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR

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

On January 7, 1987, at 0328, the Train B Chiller for the (Shared) Control Area Ventilation/Chilled Water (VC/YC) system tripped on refrigerant low temperature because the chiller thermostat setting was positioned too cold. Train A had been declared inoperable at 0200 due to a loss of refrigerant from a leaking threaded fitting on the chiller's oil cooler. With both trains of VC/YC inoperable, Units 1 and 2 entered Technical Specification (T.S.) 3.0.3, requiring one train of VC/YC to be made operable within one hour. Units 1 and 2 were in Mode 1, Power Operation, at 100% power at the time of the incident. At 0428, power reduction of both units was begun at the rate of 1MW per minute.

The Train B Chiller refrigerant low temperature cutout switch was manually reset and the thermostat was adjusted for warmer exiting chilled water. At 0640, VC/YC Train B was declared operable and the units secured from T.S. 3.0.3. Refrigerant was added to the Train A Chiller and VC/YC Train A declared operable at 1315. It could not be determined when the Train B Chiller thermostat had been adjusted to the lower setting. The (slowly) leaking fitting will be repaired once qualified materials are obtained.

The loss of both trains of VC/YC did not last long enough to cause any Control Room Area High Temperature Alarms. The health and safety of the public were not affected.

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

On January 7, 1987, at 0328, the Train B Chiller [EIIS:CHU] for the (Shared) Control Area Ventilation/Chilled Water (VC/YC) system [EIIS:VI] tripped on refrigerant low temperature because the chiller thermostat [EIIS:TH] setting was positioned too cold. Train A had been declared inoperable at 0200 due to a loss of refrigerant from a leaking threaded fitting [EIIS:PSF] on the chiller's oil cooler [EIIS:CLR]. With both trains of VC/YC inoperable, Units 1 and 2 entered Technical Specification (T.S.) 3.0.3, requiring one train of VC/YC to be made operable within one hour. Units 1 and 2 were in Mode 1, Power Operation, at 100% power at the time of the incident. At 0428, power reduction of both units was begun at the rate of 1MW per minute. By 0455, the Control Room Hi Temperature procedure was fully implemented. The Control Room reached a maximum temperature of approximately 83 degrees-F.

The Train B Chiller refrigerant low temperature cutout switch [EIIS:TS] was manually reset and the thermostat was adjusted for warmer exiting chilled water. At 0640, VC/YC Train B was declared operable and the units secured from T.S. 3.0.3. After the control area temperature had been reduced, refrigerant was added to the Train A Chiller, and VC/YC Train A declared operable at 1315.

EVALUATION:

Background

The VC/YC systems are shared by both units and maintain the environment in the Control Room, Cable Room, Battery Room, Switchgear Rooms, and Electrical Penetration Rooms. These environments must be maintained within acceptable temperature limits for proper equipment operation and operator occupancy during normal and post accident conditions.

T.S. 3.7.6 states when one train of the VC/YC system is inoperable in Modes 1, 2, 3, or 4, the inoperable train must be restored to operable status within seven days or be in at least Hot Standby within the next six hours and in Cold Shutdown within the following thirty hours. When both trains of the VC/YC system are inoperable, T.S. 3.0.3 requires that within one hour, action must be initiated to place the units in a mode in which the technical specification does not apply.

The chillers in the VC/YC system have several machine protection circuits. The refrigerant low temperature cutout, with a manual reset, protects the chiller tubes from freezing by tripping the compressor [EIIS:CMP] if the refrigerant temperature drops too low. The exiting chilled water low temperature cutout stops the compressor if the exiting chilled water drops below its setpoint.

Description of Incident

On January 7, 1987, at approximately 0200, VC/YC Train B was shutdown to allow maintenance work on the non-safety related outside air fan [EIIS:FAN] and for rotation of VC/YC Trains A and B.

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At 0200, VC/YC Train A had failed two start attempts requiring Train B to be restarted. VC/YC Train A was declared inoperable under T.S. 3.7.6 and investigation begun to determine why the Train A Chiller would not start.

At 0328, VC/YC Train B tripped due to the refrigerant low temperature cutout protection circuit actuation. Although no alarms were received in the control room or at the local panel indicating the chiller had tripped, personnel troubleshooting the Train A Chiller informed Control Room personnel that Train B had tripped (a work request was initiated to repair the problems associated with the VC chillers not giving alarms to the HVAC annunciators [EIIS:ANN] when the chillers trip). With both trains of VC/YC inoperable, Units 1 and 2 entered T.S. 3.0.3, requiring action to begin shutting down the units if one train was not made operable within one hour. A work request was written to investigate and repair the VC/YC Train B Chiller.

At 0428, after being unable to return the VC/YC system to operable status, Units 1 and 2 commenced shutdown at the rate of 1MW per minute. At approximately 0445, the Control Room Hi Temperature Procedure had been fully implemented to alleviate temperature increases. At 0455, the control room had reached a maximum temperature of 83 degrees-F, (approximately 15 degrees-F above normal), during this event. This elevated temperature caused the 7300 Process Control system [EIIS:JE] to have erratic readings on Channel IV Main Steam pressure for D Steam Generator (S/G) [EIIS:SG]. Station personnel were concerned that if the heat induced erratic steam pressure readings from the 7300 Process Control cabinets caused two channels on one S/G to drop, a safety injection would occur.

At 0505, the Train B refrigerant low temperature cutout switch was manually reset and the chiller was able to be started. However, the Train B VC/YC Chiller tripped two more times due to refrigerant low temperature chiller protection. It was determined that the thermostat controlling the exiting chiller water temperature was set too cold for proper operation. This resulted in the chiller shutting down to prevent the refrigerant tubes from getting too cold and freezing. The chiller was again reset and the exiting chiller water thermostat adjusted to a warmer position to obtain the proper temperature. At 0620, VC/YC Train B was running consistently and at 0640, Train B was declared operable and the units secured from T.S. 3.0.3 and the power reduction.

Investigation of the VC/YC Train A inoperability determined that the chiller was low on refrigerant. The loss of refrigerant was due to a leak (discovered in September, 1986) from a threaded fitting to the chiller's oil cooler. Refrigerant was added and the refrigerant low temperature cutout switch reset. The chiller was successfully run and VC/YC Train A declared operable at 1315.

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Conclusion

The inoperability of both trains of the VC/YC system was not due to a common mode failure. Train A inoperability resulted from a low refrigerant charge in the chiller. (Low refrigerant charge causes supercooling of the refrigerant due to an increase of the refrigerant expansion volume.) Refrigerant had been slowly leaking out of a threaded fitting on a pipe to the chiller's oil cooler for several months. The fitting could not be repaired without cutting the connected copper piping. Due to delays in obtaining qualified materials to repair the leak, personnel had been informally checking the refrigerant charge on a weekly basis using the Control Room Chiller Preventative Maintenance procedure. Since the refrigerant charge can be checked only while the chiller package is running, the status of the charge was unknown. It is suspected that enough charge leak-off occurred while the chiller package was not running to prevent the start attempts on January 7, 1987.

The inoperability of Train B was the result of the exiting chilled water thermostat being set too cold for the chiller to achieve. When the exiting chilled water thermostat is set below the cooling capability of the chiller, the chiller attempts to cool the water to the demanded temperature. On January 7, 1987, the refrigerant temperature dropped to the setpoint of the refrigerant low temperature cutout and the chiller tripped. The thermostat required an adjustment (warmer) to allow the chiller to continue to operate.

The VC/YC chiller thermostat control knobs do not change position due to vibration. Personnel involved say no one made any adjustments to the Train B chiller prior to repair personnel. The preventative maintenance procedure used to work on the VC/YC Chillers does not have any documentation for 'AS FOUND' and 'AS LEFT' readings for the chiller controls. Therefore, it could not be determined when the thermostat had been adjusted to the colder setting.

A review of past McGuire Reports revealed there have been three incidents which had the VC/YC Chillers trip on low refrigerant temperature. The incident described in LER 369/81-44 required readjustment of the exiting chilled water thermostat because the thermostat was set too cold for the low chiller load. The incident described in LER 369/83-48 also required the thermostat for the exiting chilled water to be adjusted due to previous work in which the chiller condenser tubes [EIIS:TBG] were cleaned. The incident described in LER 369/83-56 was partly due to a leaking flange which resulted in a loss of refrigerant (Situation for Train A in this report).

ADDITIONAL CORRECTIVE ACTIONS:

Tags saying "NO ONE IS TO ADJUST ANY OF THESE CONTROLS WITHOUT FIRST CONTACTING HVAC MAINTENANCE" have been hung in front of the VC/YC Chiller control switches inside each of the control cabinets. The Control Room Chiller Preventative

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Maintenance procedure will be modified to include on the data sheet to document "AS FOUND" and "AS LEFT" chiller control settings.

The VC/YC Train A leaking oil cooler fitting will be repaired. Station personnel will monitor VC/YC Train A refrigerant charge and oil level on a daily basis until the leak from the threaded fitting on the chiller's oil coller is repaired.

SAFETY ANALYSIS:

During this incident, there was a period of 1 hour and 37 minutes when the VC/YC system was not providing any cooling. During this time period, the Control Room temperature did not exceed approximately 83 degrees-F due to the utilization of the Control Room Hi Temperature procedure. There were several spurious alarms that apparently resulted from the elevated Control Room temperature. The Channel IV Steam Pressure on D S/G had alarms due to erratic readings of low pressure. If there had been two out of four channels on one out of four S/Gs indicating low pressure, a Safety Injection/Reactor trip would have occurred. The loss of both trains of the VC/YC system did not last long enough to cause any Control Room area high temperature alarms (Control Room Alert at 85 degrees-F and Alarm at 90 degrees-F). If the VC/YC system had been inoperable long enough for a more significant temperature increase to take place, there could have been electronic equipment failures in the 7300 Process Control cabinets [EIIS:CAB] resulting in a Reactor trip concurrent with unreliable readings on unit status.

With the cooling portion of the VC/YC system inoperable, in the event of an accident resulting in the possibility of chlorine or radioactive airborne contamination, the VC/YC system air handling filtration units would have been operated which would have maintained the habitability of the Control Room.

There were no personnel injuries, personnel overexposures, or releases of radioactive material as a result of this incident. The health and safety of the public were not affected by this incident.

DUKE POWER COMPANY

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February 6, 1987

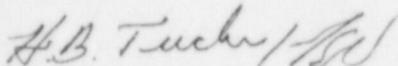
U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Subject: McGuire Nuclear Station, Units 1 and 2
Docket No. 50-369 and 50-370
LER 369/87-01

Gentlemen:

Pursuant to 10CFR 50.73 Sections (a)(1) and (d), attached is Licensee Event Report 369/87-01 concerning the (shared) control area ventilation/chilled water system being inoperable due to a chiller thermostat set too low and a refrigerant leak which is submitted in accordance with §50.73(a)(2)(i)(B). Initial notification of this event was made (pursuant to §50.72 Section (b)(i)(A) with the NRC Operations Center via the ENS on January 7, 1987. This event was considered to be of no significant with respect to the health and safety of the public.

Very truly yours,



Hal B. Tucker

PBN/45/jgm

Attachment

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