NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES 8/31/88

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Cooper Nuclear Station	0 5 0 0 0 2 9 8	1 OF 0 5

TITLE (4) Inoperability of the High Pressure Coolant Injection System Due to Stem Nut Wear Of A Motor Operated Valve

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	1 1	9 2	9 2	— 0 0 8	— 0 0	0 7	1 0	9 2		0 5 0 0 0
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OPERATING MODE (9)	N	THIS REPORT IS 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)	20.405(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)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
Donald L. Reeves, Jr.	AREA CODE 4 0 2 8 2 5 - 3 8 1 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	
X	B J	8 4	L 2 0 C	Y							

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 Thursday morning, June 11, 1992, surveillance testing of the Torus high water level and Emergency Condensate Storage Tank (ECST) low level suction valve logic for the High Pressure Coolant Injection (HPCI) System was performed. The Control Room (CR) Operator involved in the testing suspected that HPCI-MOV-M058, the pump suction valve from the Torus, was not stroking properly. Previously during the surveillance test, the valve had been stroked twice with no deficiencies observed. However, at a subsequent step, when the logic was made up to cause the valve to open, no INTERMEDIATE position indication was observed. Subsequent OPEN and CLOSED status indications that were observed as the surveillance test proceeded did not appear to be correct. At the time of this event, the plant was in normal full power operation.

An analysis of the sequence of events concluded that when the valve was closed for the second time during the procedure, the bronze stem nut internal diameter threads had worn to the point where they were stripped as the valve was being torqued into its seat. As a result, they were no longer engaging the stainless steel stem of the valve. The root cause for the failure is due to lack of stem nut inspection acceptance criteria in the motor operator maintenance procedures.

The worn stem nut was replaced, the operator was re-installed, and limit and torque switch settings were properly adjusted. Post Maintenance testing of the valve included performance of MOV diagnostic testing and performance of a section of the surveillance test to assure proper operation of HPCI-MOV-M058 and its interlock with HPCI-MOV-M017. Further motor operator stem nut inspections based upon specific acceptance criteria will be performed to ensure the acceptability of the stem nuts that are currently installed in other motor operators subject to Generic Letter 89-10.

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A. Event Description

On Thursday morning, June 11, 1992, Surveillance Procedure (SP) 6.2.2.3.4, High Pressure Coolant Injection (HPCI) Suppression Chamber And Emergency Condensate Storage Tank (ECST) Water Level Calibration and Functional/Functional Test And Water Initiation, was being performed when, at step 8.3.9.1.d of the procedure, the Control Room (CR) Operator involved in the testing, suspected that HPCI-MOV-MO58, the pump suction valve from the Torus, was not stroking properly. Previously during the surveillance test, the valve had been stroked open and then closed, twice. No deficiencies had been observed in the Control Room. However, subsequent event analysis has revealed that when the valve closed the second time at step 8.2.25 of the procedure, the stem nut became disengaged from the stem.

Normally, upon valve closure, the motor for the valve operator is deenergized when the CLOSE torque switch is opened. With the stem nut disengaged from the stem, however, the torque switch was never actuated. Consequently, the motor operator continued to turn in the CLOSE direction. As the motor operator continued to run, the limit switches that provide OPEN and CLOSE status light indications and which function in an interlock circuit with HPCI-MOV-MO17, the HPCI System suction valve from the Emergency Condensate Storage Tank (ECST), were actuated. As a result, the valve position status lights cycled from OPEN to CLOSE, then back to OPEN and so on, at approximate 10 minute intervals. The interlock with HPCI-MOV-MO17 was also actuated with the same cycle frequency.

HPCI-MOV-MO17 is interlocked with HPCI-MOV-MO58 such that neither valve can be closed unless the other valve is open. Additionally, HPCI-MOV-MO17, the normal suction path for HPCI, will automatically close when HPCI-MOV-MO58 is opened. This latter automatic function occurs upon high Torus level or low ECST level.

This cycle time was reasonably consistent with the time frame when HPCI-MOV-MO58 was to be actuated as the surveillance test continued and when the valve was subsequently cycled by the CR Operator to further investigate: 1) the absence of INTERMEDIATE position indication at step 8.3.9.1.d, when the valve was thought to be stroking, and 2) the unusually long valve stroke time. This coincidence further inhibited the ability of the CR Operator to determine that the motor operator had malfunctioned.

After the CR Operator cycled HPCI-MOV-MO58 to check its operation (the valve remained closed; the change in valve position status lights were actuated as a matter of coincidence), he then opened HPCI-MOV-MO17, placing the HPCI System in its normal standby lineup. Subsequently, during performance of independent verification activities required by the surveillance procedure, the Instrument and Controls (I&C) Technician entered the HPCI Room to verify jumper removal. When in the proximity of HPCI-MOV-MO38, he heard the valve operator motor in operation and making an unusual noise. He called the CR Operator to advise him that the motor was operating. When the CR Operator looked at the valve status indications on the panel, both HPCI-MOV-MO58 and MO17 were indicating closed. The I&C Tech was then directed to open the breaker for HPCI-MOV-MO58.

A. Event Description (Continued)

At approximately 11:45 am, the Shift Supervisor declared the HPCI System to be inoperable because HPCI-MOV-MO58 did not appear to be functioning properly and because both HPCI suction valves were closed. The control switch for the HPCI Auxiliary Oil Pump was placed in the Pull-To-Lock position to prevent automatic startup of the system.

B. Plant Status

Operating at approximately 100 percent power under normal operating conditions.

C. Reportability

Inoperability of a single train safety system, reportable in accordance with 10CFR50.73 (a)(2)(v).

D. Cause

An analysis of the sequence of events has concluded that the stem nut internal diameter threads had worn to the point where they were no longer engaging the stainless steel stem upon closure of the valve at step 8.2.25 of the procedure. Due to the fact that the motor operator was disengaged from the valve, the motor operator closing torque switch was never actuated to stop the valve motor from operating in the CLOSE direction. As the motor operator continued to operate, the limit switches, which are operated by the gear train, were actuated, though not in the normal sequence. Therefore, all status indications for the valve following its closure in step 8.2.25 were incorrect.

This is the first failure of this type that has been experienced at CNS. Based upon the lack of stem nut failure history and minimal number of similar events throughout the industry that have been reported to NPRDS, this event is considered to be a random occurrence. The root cause of the stem nut failure is lack of specific inspection acceptance criteria in the procedures employed for inspecting, refurbishing and rebuilding Limitorque motor operators.

E. Safety Significance

Had operation of the HPCI System been required when HPCI-MOV-MO17 was CLOSED, the valve would have OPENED and stayed OPEN if the full OPEN limit switches for HPCI-MOV-MO58 were not actuated. As a result, the HPCI System could have functioned as designed for as long as 10 minutes. However, when the motor operator limit switch for HPCI-MOV-MO58 indicated that the valve had reached the OPEN position, HPCI-MOV-MO17 would have automatically CLOSED. With the actual position of HPCI-MOV-MO58 being CLOSED, the pump would have tripped on low suction pressure.

The most limiting accident requiring operation of the HPCI System is the small break Loss of Coolant Accident (LOCA). For accident analysis purposes, HPCI is assumed to be inoperable. Therefore, the response of the plant to the small break LOCA would have been as predicted in the latest accident analysis.

F. Safety Implications

The plant response to the small break LOCA analysis is most severe with the plant in operation at full power as it was when this deficiency was discovered.

G. Corrective Action

The valve operator was removed to further investigate the stem nut failure. The initial inspection showed that the threads on the nut had failed due to wear, but had not damaged the stem. The stem nut is made of bronze and typically will be subject to increased wear as compared to the stem, which is made of stainless steel. An independent failure evaluation of the stripped stem nut is being performed.

After replacing the stem nut, the operator was re-installed and limit and torque switch settings were properly adjusted. Post Maintenance testing of the valve included performance of MOV diagnostic testing. All acceptance criteria identified in Maintenance Procedure 7.3.35.1, Testing of Motor Operated Valves Using Motor Operated Valve Analysis And Testing System (MOVATS), were met. On June 13, at 10:40 am, following satisfactory performance of a section of SP 6.2.2.3.4 to verify correct operation of HPCI-MOV-MO58 and the logic system, including HPCI-MOV-MO17, the HPCI System was declared operable and was returned to standby service.

Upon NRC notification of this event on June 11, 1992, in accordance with the requirements of 10CFR50.72, it was reported that HPCI-MOV-MO17 could not initially be OPENED from the Control Room. An analysis of the sequence of events has concluded, however, that this information was incorrect. Due to the unexpected status indications associated with both HPCI-MOV-MO58 and MO17, the operability of HPCI-MOV-MO17 was not apparent. In fact, until the power supply breaker for HPCI-MOV-MO58 was opened, HPCI-MOV-MO17 would not have remained OPEN to serve as a source of water for the HPCI System. Based upon an evaluation of the valve logic diagram, HPCI-MOV-MO17 could have been OPENED with the control switch, regardless of the indicated position of HPCI-MOV-MO58. However, if the limit switch of MO58 were indicating the valve position as full OPEN when MO17 reached its full OPEN position, MO17 would have re-closed, as designed.

HPCI-MOV-MO17 was opened from the Control Room approximately one-half hour after the HPCI System had been declared inoperable. Upon being actuated, the valve operated properly. During the time between declaration of the HPCI System as being inoperable and opening of HPCI-MOV-MO17, no maintenance or repair activities had been performed on either MO17 OR MO58 or on their logic circuits, nor had the valves been manually actuated using the limitorque local operator.

G. Corrective Action (Continued)

The following actions are planned to ensure that similar failures of Generic Letter (GL) 89-10 motor operated valve stem nuts do not occur in the future:

1) CNS Limitorque maintenance procedures will be revised to provide detailed instructions for performing stem nut inspections. Acceptance criteria will be provided along with sign offs to ensure proper documentation of the inspection results.

2) GL 89-10 rising stem MOVs with their original stem nuts installed will be identified.

3) Following the above described activities, and as soon as plant conditions permit, a representative sample of the MOVs identified above will have their stem nuts inspected to determine if CNS has a potentially generic MOV stem nut wear problem.

4) Any GL 89-10 MOVs that have previously been baseline tested, and that require stem nut replacements as the result of the above inspections, will be appropriately re-tested as required by the CNS MOV Program Plan.

H. Similar Events

None.