NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/85

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Catawba Nuclear Station, Unit 1	0 5 0 0 0 4 1 3	1 OF 0 4

TITLE (4)

Manual Reactor Trip Following Loss of Cooling to Reactor Coolant Pump Motors

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 5 0 0 0
0 1	1 4	8 5	8 5	0 0 4	0 0	0 2	1 3	8 5		0 5 0 0 0

OPERATING MODE (9)	2	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
POWER LEVEL (10)	0 0 0	20.402(b)	20.405(c)	X 50.73(a)(2)(iv)	73.71(b)
		20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)
		20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	X 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)	50.72(b)(2)(ii)
		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
	AREA CODE
Roger W. Ouellette, Assistant Engineer - Licensing	7 0 4 3 7 3 - 7 5 3 0

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	
B	B I	V	P 3 0 4	No							

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 January 14, 1985, at 1440 hours, the Unit 1 reactor was manually tripped. The reactor coolant pumps had been previously shutdown due to the loss of motor cooling water, and the ability to control unit reactivity was therefore less than desirable. The loss of motor cooling is attributed to a malfunction of valve 1RN-A83, which opens to supply an alternate source of cooling water to the reactor coolant pumps when the normal source is not available. 1RN-A83 was manually opened following the unit trip to restore cooling water. Work Request 3369 IAE was later originated to investigate the failure of 1RN-A83 to open as required. Unit 1 was in Mode 2 (Startup) and 0% power at the time of this incident.

This incident is classified as a Component Malfunction, due to 1RN-A83 not opening as required.

This incident is reportable pursuant to 10 CFR 50.73, section (a)(2)(iv), and 10 CFR 50.72, section (b)(2)(ii).

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

The Containment Chilled Water (YV) System provides the normal source of cooling water to the Containment Ventilation (VV) system and to Reactor Coolant (NC) Pump motors. The system includes four air-operated valves which align the cooling water for the ventilation units and the NC Pumps to either the Nuclear Service Water (RN) or the YV System. The alignment is selected by means of selector switches in either the control room or in the Containment Mechanical Equipment Building (CMEB). The four alignment valves are:

1RN-C02 YV Chiller Water to Lower Containment Ventilation Supply
1RN-C03 Lower Containment Ventilation return to YV Header
1RN-A83 RN to Lower Containment Ventilation Supply
1RN-C04 Lower Containment Ventilation Return to RN Non-Ess header

Each valve is failed upon receipt of a loss of power signal by redundant solenoid operators. When controlled from the control room, the valves operate simultaneously. When controlled remotely, they may be operated individually.

The YV System is the preferred source of cooling for the NC Pump Motors and the VV Units. Valves 1RN-A83 and 1RN-C04 therefore remain closed unless a swap-over to RN is required.

1RN-A83 is a Posi-Seal, 12" butterfly valve which utilizes a Bettis 722C-SR60-10 actuator. The actuator requires control air to close the valve and utilizes an internal spring to open the valve. A search of the Nuclear Plant Reliability Data did not indicate widespread failures of this type of valve attributed to mechanical causes.

On January 14, 1985, a vendor was onsite to drill additional wells associated with the Cathodic Protection System. The location of the well had been specified and had been previously marked in the yard. As the vendor was drilling a well at site coordinates 49+34"X", and 46+16.5"Y", an Instrument Air (VI) System line was drilled through. This line is 2 inch Polybutylene piping. Piping layout drawing CN-1823-03.85-04, R21 indicates that this VI line is located on Y coordinate 46+18"Y". Therefore, the line was possibly as much as 1.5 feet away from the location specified on the piping layout drawing.

The VI line which was ruptured supplies control air to the YV Control Panel (1YV-CP-1) in the CMEB. The loss of control air to 1YV-CP-1 caused the YV Chillers and Pumps to shutdown. The four YV/RN swap-over valves are located in the Auxiliary Building and are supplied by a different VI header than 1YV-CP-1. The swap-over valves therefore did not attempt to realign to RN supply as they did not experience a loss of control air. A control room annuciator indicated YV flow had been lost and a Nuclear Equipment Operator (NEO) was dispatched to the CMEB to investigate. The NEO reported the ruptured VI line to the control room. That header was subsequently isolated.

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

After the YV chillers and pumps shutdown, NC motor stator winding temperature and containment pressure began to increase. Realizing that a swap-over to RN had not occurred, the NCO realigned the YV control switch from AUTO to RN, but did not receive indication that a swap-over had taken place. A NEO then verified that 1RN-A83 was still closed. An unsuccessful attempt was also made to swap-over to RN by transferring controls to 1YV-CP-1 in the CMEB.

A release through the Containment Air Release and Addition (VQ) System was made during this period and returned containment pressure to within the Technical Specification limits.

The NC Pumps were shutdown after high motor stator temperature alarms were received. The NC System began cooling down after the pumps were stopped. Procedures TP/1/A/2100/02, Low Power Physics Testing, and PT/1/A/4150/24, Stuck Rod Worth Test, were in progress. As moderator density increased due to cooling, power level increased to a level in excess of the Zero Power Physics Testing Limit of 1×10^{-6} amps Intermediate Range. To support testing, all control banks and shutdown banks had been inserted with the exception of rod H-14 and 100 steps of shutdown Bank A.

As there were no rods available to compensate for the increasing power level, the reactor trip breakers were opened from the control room on recommendation of the test coordinator conducting core physics testing. Boration of the NC System was also initiated and later restored the shutdown margin to greater than 1.3% $\Delta K/K$.

Shift personnel continued the investigation of 1RN-A83 after the reactor was tripped. A pipe wrench was applied to the shaft connecting the actuator to the operator. As pressure was applied, the valve seat apparently loosened and the valve fully opened. Shift personnel had verified that control air was completely removed from the actuator before manually opening the valve. RN flow was re-established via 1RN-A83 approximately 15 minutes after unit shutdown. Proper operation of 1RN-A83 was also verified later that shift.

The actual location of the VI line differing from the design specified location contributed to this incident. For this reason, a contributing cause of an Installation Deficiency is assigned to this incident. The coordinates which specify the location of in-ground equipment are marked by surveyors prior to installation. During the surveying-installation process, a deviation in location of the VI piping occurred. The well locations specified did not conflict with piping shown on design drawings. There is not a composite drawing currently available which shows all equipment in yard areas. Further activities in this area are planned with the intent of producing a composite drawing.

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

The malfunction of 1RN-A83 was the direct cause leading to the manual reactor trip. For this reason, the cause is considered to be attributable to Component Malfunction. The failure of 1RN-A83 to open properly led to manual shutdown of the NC pumps and the increase in power level which required the manual reactor trip. The Zero Power Testing Tave limit of $\geq$541°F was maintained throughout this incident as were cooldown rates. After the manual reactor trip on January 14, 1985, personnel verified that 1RN-A83 would cycle properly and further investigation was discontinued. In the period that followed the drilling into the VI line, a flexible hose was routed from the Nitrogen Building to the CMEB to supply instrument air to 1YV-CP-1 and allow normal YV System operation.

On January 23, 1985, at approximately 1500 hours, a crane parked on top of the flexible hose and isolated VI to the CMEB. Again, 1RN-A83 would not open when attempted by the NCO. A NEO was dispatched and manually assisted the valve in opening. Work request 3369 IAE was issued to inspect the actuator. The actuator was removed and installed on a spare valve. While the actuator was removed, 1RN-A83 was gagged open, and the YV System was aligned to RN. Actuator torque was checked and found to be within the required values when installed on the spare valve. However, the actuator stop was not properly adjusted, which allowed the actuator to overtravel the valve on closure. The actuator was adjusted and replaced on 1RN-A83 on February 2, 1985. Actuator stops are set by the vendor thus, this is considered an isolated case.

Damage may have occurred to the seating material of 1RN-A83 and the valve should be inspected. Due to the operational requirements of 1RN-A83, this cannot be done until Unit 1 is in a cold shutdown condition. Priority 5 work request 3393 IAE has been originated to inspect 1RN-A83 when proper unit conditions exist.

CORRECTIVE ACTION

1) 1RN-A83 was manually opened following the manual reactor trip.
2) Proper valve operation was verified later that shift.
3) A flexible hose was routed to supply instrument air to the CMEB.
4) After 1RN-A83 failed to open on January 23, 1985, Work Request 3369 IAE was originated to investigate/repair the actuator.
5) 1RN-A83 was gagged open and the actuator was removed.
6) Actuator stops were found out of adjustment. The actuator was adjusted and re-installed on February 2, 1985.
7) Work Request 3393 IAE, Priority 5, will be performed in order to inspect 1RN-A83 seat.

SAFETY ANALYSIS

A manual reactor trip was initiated per the direction of the Core Physics Test Coordinator as power level exceeded the test limit 1×10^{-6} amps Intermediate Range. If a manual trip had not been initiated, the Intermediate and Power Range Trips were available to trip the reactor at a level corresponding to 20% indicated thermal power. The reactor tripped with no anomalies. The health and safety of the public were not affected by this incident.

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VICE PRESIDENT
NUCLEAR PRODUCTION

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February 13, 1985

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

Subject: Catawba Nuclear Station, Unit 1
Docket No. 50-413

Gentlemen:

Pursuant to 10 CFR 50.73 Section (a) (1) and (d), attached is Licensee Event Report 413/85-04 concerning a manual reactor trip following loss of cooling to the reactor coolant pump motors. This event was considered to be of no significance with respect to the health and safety of the public.

Very truly yours,

H.B. Tucker /lsb

Hal B. Tucker

RWO:slb

Attachment

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