

## LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)

DOCKET NUMBER (2)

PAGE (3)

Catawba Nuclear Station, Unit 1

0 5 0 0 0 4 1 1 3 1 OF 0 5

TITLE (4)

Auto-Start of the Turbine Driven Auxiliary Feedwater Pump

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 3	0 6	8 5	8 5	0 1 7	0 1	0 5	0 6	8 5			0 5 0 0 0	
THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5: (Check one or more of the following) (11)												
OPERATING MODE (9)			20.402(b)			20.405(c)			X 50.73(a)(2)(iv)			73.71(b)
POWER LEVEL (10)			20.405(a)(1)(i)			50.36(c)(1)			50.73(a)(2)(v)			73.71(c)
0 3 0			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)(ix)			

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
AREA CODE	
Roger W. Ouellette, Assistant Engineer - Licensing	710 4 317 31-17 151310

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

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE)	NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
<input checked="" type="checkbox"/>	<input type="checkbox"/>				

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

On March 6, 1985, at 1930 hours, the Turbine Driven Auxiliary Feedwater Pump automatically started due to wide range level instrumentation sensing low-low levels in two-of-four steam generators. Unit 1 was in Mode 1 at 30% reactor power at this time.

Prior to the start of the Turbine Driven Auxiliary Feedwater Pump, a secondary system transient was initiated after pressurization of Condensate Polishing Demineralizer 1B. During the transient, steam generator levels did not decrease to the setpoint at which the Motor-Driven Auxiliary Feedwater Pumps actuate. The Turbine Driven Pump was shutdown after steam generator levels began to re-establish. Subsequent investigation revealed that the wide range instrumentation dipped momentarily on decreasing steam generator levels. Therefore, this incident is classified as a Design Deficiency.

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

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## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

APPROVED OMB NO. 3150-0104

EXPIRES: 8/31/85

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

The Condensate (CM), Main Feedwater (CF), and Auxiliary Feedwater (CA) Systems combine to supply the shell side of the Steam Generators (S/G) with feedwater to maintain an adequate heat sink for the reactor coolant system.

The CM System takes condensate from the Condenser Hotwells, purifies it through the Polish Demineralizers, reheats it to improve thermal cycle efficiency, and delivers it to the CF System through the Hotwell Pumps and Condensate Booster Pumps (CBP's).

The CA System ensures sufficient feedwater supply to the S/G's in the event of loss of the CM/CF Systems. The Turbine Driven Auxiliary Feedwater Pump (CA Pump #1) will automatically start in the event of:

- Two-of-four low-low level sensed by either narrow or wide range instrumentation in any two S/G's, or
- Loss of off-site power (blackout)

On March 6, 1985, at approximately 1915 hours, personnel notified the Reactor Operator (RO) that they would be realigning the Condensate (CM) System to pressurize Condensate Polishing Demineralizer 1B. Demineralizer 1B had been previously removed from service so that maintenance on the associated strainer could be performed. Demineralizers 1A, 1D, and 1E remained in service. To pressurize Demineralizer 1B, OP/O/B/6250/09, Operating Procedure for the Condensate Polishing Demineralizers, was used. In that procedure, the effluent valve was throttled, and the influent bypass valve and influent isolation valve were opened. When the demineralizer reached operating pressure, the influent valves were closed, and the effluent valve controller was placed in the AUTO position. As the effluent valve utilizes a fail-as-is solenoid operator, the effluent valve control switch should have been placed in CLOSE, and then back to AUTO, to maintain the Polisher in a pressurized condition. Since the procedure did not provide instructions to close the effluent valve prior to placing the controller in AUTO, that valve remained throttled. All of the Demineralizers are controlled by a master controller which provides a setpoint for the individual valve controllers so that equal flow is maintained in each cell. Since the effluent valve for Demineralizer 1B remained throttled, the effluent valves for Demineralizers 1A, 1D, and 1E also throttled as the master controller attempted to equalize Demineralizer flows.

Demineralizer Bypass Valves, 1CM-42 and 1CM-186, may be selected to automatically throttle when a differential pressure of 35 psid is detected across the Demineralizers. These valves are controlled by a Manual-Auto Controller in the Control Room. Normal system operation calls for this controller to be in AUTO. When the effluent valves throttled, 1CM-42 and 1CM-186 should have opened to provide condensate flow to the CBP's. These valves apparently did not open as expected, although no computer monitoring points exist for these valves.

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TEXT (If more space is required, use additional NRC Form 365A's) (17)

When the Demineralizer effluent valves throttled, and the Bypass Valves apparently did not open, the flow to the CBP's suction began decreasing. Hotwell Pump (HWP) 1B started automatically. This pump is designed to start at CBP suction pressure of 75 psig. Load Rejection Bypass Control Valve, 1CM-83, is designed to modulate to maintain a CBP suction pressure of 100 psig. That valve began opening after the start of HWP 1B, but should have begun opening prior to the start of HWP 1B. Proper operation of this valve should have provided sufficient suction to prevent the CBP's from tripping on low suction pressure.

The CBP's trip automatically on low suction pressure sensed on 2-out-of-3 pressure switches after a 5 second time delay. After HWP 1B started and 1CM-83 began to open, CBP 1A tripped. All CBP's were then off, and CF Pump 1B was expected to trip as a result. CF Pump 1A was not operating at the time. Control wiring, which would have tripped the CF Pumps on loss of all CBP's, had not been included on design drawings and had not been installed.

An attempt was made to start all CBP's, which immediately tripped due to the existing low suction pressure. The opening of 1CM-83 re-established CBP suction pressure and allowed CBP 1C to automatically start about 7 seconds after the initial trip of CBP 1A. The CF Pumps will trip after low suction flow is present for 5 seconds. CF Pump 1B did not trip during this incident, as low suction flow was not present continuously for 5 seconds.

S/G levels began decreasing after the Demineralizer effluent valves throttled and condensate flow decreased. S/G Low Level Alert annunciators were received in the control room during the period. To reduce steam flow from the S/G's, turbine generator load was reduced from 250 MW to 25 MW. Also, Main Steam Bypass to Condenser Valves were cycled to maintain constant Tave, and reactor power at 30%. At 1930:08 hours, valve 1SA-5, Steam Supply #2 to CA Pump #1, opened to start CA Pump #1. The pump operated for 1 minute and 49 seconds before being shutdown. The Motor Driven Auxiliary Feedwater Pumps did not start on low-low S/G Narrow Range level at this time. S/G A and C Narrow Range levels reached minimum values of 22.9% and 21.65%, respectively. 17% Narrow Range S/G level will initiate an autostart of the Motor Driven CA Pumps at 30% power. Therefore, the Motor Driven CA Pumps were not required to start at this time.

CF Pump 1B remained in service and CBP 1C automatically started after suction pressure to the CBP's was re-established due to the opening of 1CM-83. S/G levels began to re-establish within about 3 minutes and had stabilized to previous levels within around 25 minutes. The autostart of CA Pump #1 also provided additional feedwater which aided in restoration of S/G levels prior to that pump being shutdown.

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

Valve 1SA-2, Steam Supply #1 to CA Pump #1, did not open during this incident. 1SA-2 and 1SA-5 generally open concurrently to assure steam supply to CA Pump #1. There is one situation where 1SA-5 should open without 1SA-2 opening: S/G wide range level transmitters which provide indication to the Standby Shutdown Facility (SSF) will open 1SA-5 on low-low S/G level in two-of-four S/G's. The calculation and settings of these wide range transmitters were checked and found to be correct. The wide range instrumentation was subsequently trended on chart recorders during the full power turbine trip testing. At this time, when S/G levels were decreasing, the output of the recorders was observed to dip to a level which did not correspond with actual S/G level as indicated by narrow range. The dip in transmitter output was of short duration, but was long enough to start CA Pump #1.

This incident is classified as a Design Deficiency. The autostart of CA Pump #1 during this incident is attributed to the dip in wide range transmitter outputs while S/G levels were decreasing.

1CM-83 did not respond as expected during this incident. Response of that valve was subsequently investigated and found to be slow. Proper operation of this valve should have prevented the decrease in flow to the suction of the CBP's.

1CM-42 and 1CM-186 should have opened automatically if the differential pressure setpoint across the demineralizers was reached. It was not possible to determine if these valves responded properly due to the positions not being computer monitored.

Proper operation of these valves should have prevented the decrease in flow to the suction of the CBP's. Response of these valves was investigated. Response of 1CM-42 was acceptable. 1CM-186 was found to have a damaged positioner. The cause of this positioner problem is not known.

The need for the proposed interlock to shutdown the CF Pumps on the loss of all CBP's was re-evaluated. That interlock was determined not to be desirable. No further action in that area is planned.

Valve 1CA-52B, CA Pump #1 Discharge to S/G B, was observed from computer indication to be opening and closing intermittently prior to the start of CA Pump #1, and after the shutdown of that pump. This valve operation appeared to be unrelated to the start of CA Pump #1.

CORRECTIVE ACTION

1. CA Pump #1 was secured after S/G levels began increasing and CF suction pressure had been restored.
2. Procedure OP/0/B/6250/09 was revised per procedure change #6.



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

3. Work Request 3854IAE was initiated to investigate and repair valves LCM-42 and LCM-186.
4. Work Request 3855IAE was initiated to investigate and repair valve LCM-83.
5. Station Problem Report CNPR-00650 was initiated to identify the need for timing devices to prevent false starts of CA Pump #1 due to wide range instrumentation.
6. Work Request 3990IAE was initiated to investigate valve LCA-52B.
7. A Station Problem Report will be initiated to add a booster relay to LCM-83 to speed the response of that valve.

SAFETY ANALYSIS

During this incident, steam generator narrow range levels did not decrease to the setpoint (17% level at 30% Power) which would initiate a low-low steam generator level reactor trip. Therefore, the ability of the steam generators to provide core heat removal was not challenged. If low-low level had occurred, actuation of the Motor Driven Auxiliary Feedwater Pumps would have restored steam generator levels and decay heat removal capability.

The health and safety of the public were unaffected by this incident.

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May 6, 1985

Instrument 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 Supplement 1 to Licensee Event Report 413/85-17 concerning auto-start of the turbine driven auxiliary feedwater pump. 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 / BT*

Hal B. Tucker

RWO:slb

Attachment

cc: Dr. J. Nelson Grace, Regional Administrator  
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