

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Catawba Nuclear Station, Unit 1										DOCKET NUMBER (2) 0 5 0 0 0 4 1 3 1 OF 0 4				PAGE (3) 1 OF 0 4		
TITLE (4) Auxiliary Feedwater Pump Start Due To Main Feedwater Pump Trip																
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 7	3 1	8 5	8 5	0 4	9	0 0	0 8	2 9	8 5					0 5 0 0 0		
OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 8: (Check one or more of the following) (11)														
1		20.402(b)				20.406(e)				<input checked="" type="checkbox"/> 50.73(a)(2)(iv)				73.71(b)		
POWER LEVEL (10)		20.406(a)(1)(i)				50.38(e)(1)				50.73(a)(2)(v)				73.71(e)		
0 1 1 5		20.406(a)(1)(ii)				50.26(e)(2)				50.73(a)(2)(vii)				<input checked="" type="checkbox"/> OTHER (Specify in Abstract below and in Text, NRC Form 308A)		
		20.406(a)(1)(iii)				50.73(a)(2)(i)				50.73(a)(2)(viii)(A)						
		20.406(a)(1)(iv)				50.73(a)(2)(ii)				50.73(a)(2)(viii)(B)						
		20.406(a)(1)(v)				50.73(a)(2)(iii)				50.73(a)(2)(ix)				50.72(b)(2)(ii)		
LICENSEE CONTACT FOR THIS LER (12)																
NAME										TELEPHONE NUMBER						
Roger W. Ouellette, Associate Engineer - Licensing										7 1 0 1 4 3 1 7 1 3 1 - 1 7 1 5 1 3 1 0						
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)												EXPECTED SUBMISSION DATE (15)		MONTH	DAY	YEAR
<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE)												<input checked="" type="checkbox"/> NO				

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

On July 31, 1985, at 2335 hours, the Motor Driven Auxiliary Feedwater (CA) pumps auto-started due to the trip of Main Feedwater (CF) Pump A. The CF pump trip occurred while shutting the reactor down to perform condenser tube leak repairs. CF pump turbine speed was increased, as directed by the appropriate operating procedure, prior to swapping feedwater flow from the lower CF nozzles to the upper CA nozzles. When this was done, a feedwater transient was initiated in the system, making feedwater flow intermittently swing high and low, and eventually tripped CF pump A on high discharge pressure.

The swing began because of the sluggish response of the CF pump A recirculation valve, and was propagated due to controller overshoot, and system interaction with the condensate cleanup flow control valve. Therefore, this incident is classified as a Design Deficiency. 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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LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104

EXPIRES: 8/31/85

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)		
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TEXT (If more space is required, use additional NRC Form 366A's) (17)

When it becomes necessary to reduce reactor power, procedure OP/1/A/6100/03, Controlling Procedure for Unit Operation, is used to reduce reactor power to 15% at which point procedure OP/1/A/6100/02, Controlling Procedure for Unit Shutdown, is implemented. During performance of OP/1/A/6100/03, and at 15% power, the feedwater flow path to the Steam Generators (S/G) is swapped from the Lower Main Feedwater (CF) nozzles to the Upper Auxiliary Feedwater (CA) nozzles, with the feedwater regulating valves still automatically controlling S/G level. Prior to swapping nozzles, CF pump turbine speed is increased to accommodate any increase in system head due to the change in system alignment.

CF pump recirculation control valves (ICF6 and ICF13 for pumps A and B respectively) modulate to maintain CF pump minimum flow of 4000 GPM by directing pump discharge to the condenser when a condition of high system head reduces CF flow. The CF pumps will trip on a low suction flow of 3000 GPM, and an emergency high discharge pressure of 1385 PSIG. Valve ICM127, CM (Condensate System)/CF Cleanup Flow control Valve, serves to control flow in high and low pressure cleanup, but also serves as a flow path (to the upper surge tank) to provide minimum condensate booster pump flow.

During routine surveillance on the evening of July 30, 1985, Steam Generator (S/G) chemistry parameters were found to be out of specification. Operations entered Action Level 3 of Abnormal Procedure AP/O/A/5500/34, Secondary Chemistry Out of Specification Abnormal Procedure, which required a reduction of reactor power level to <2% within four hours. From 2050 hours to 2241 hours, the Nuclear Control Operator (NCO) added a total of 150 gallons of boric acid to the Volume Control Tank (VCT) to begin a plant shutdown from about 82% reactor power. At 2250 hours, Main Feedwater (CF) Pump B was secured at approximately 45% reactor power per OP/1/A/6100/03.

Because of reactor power reduction, there was less xenon burn-up, causing increased xenon levels within the core and a consequential rapid power reduction. To slow the power reduction, at 2310 hours the NCO added 350 gallons of non-borated water to the VCT to dilute the reactor coolant boron concentration.

CF Pump A turbine speed was increased at 15% reactor power in preparation for swapping feedwater flow from the lower CF nozzles to the upper CA nozzles. At this point it is believed that the feedwater regulating valves began to automatically throttle to reduce feedwater flow. Flow was apparently decreased to below 4000 GPM, as valve ICF6 automatically opened to provide pump minimum flow. ICF6 intermittently cycled throughout the remainder of this incident.

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At 2327:52 hours, the NCO manually tripped the turbine per procedure OP/1/B/6300/01, Turbine Generator, to take the unit off line. At 2330:55 hours, ICM127 auto-opened and intermittently cycled throughout the remainder of this incident. From 2331 to 2333 hours, the NCO swapped feedwater flow from the lower CF nozzles to the upper CA nozzles, and at 2335 hours, CF Pump A tripped on Emergency Discharge High Pressure. Both Motor Driven CA Pumps immediately auto-started (due to both CF pumps being in tripped condition) to provide feedwater flow to the S/G's. The CF Pump A turbine was reset and the pump was placed back in service. At 2344 hours both Motor Driven CA Pumps were secured, and by 0100 hours on 7/31/85, all required notifications of the actuation had been completed.

When CF Pump A turbine speed was increased in preparation for swapping nozzles, the feedwater regulating valves throttled to prevent a feed flow/steam flow mismatch. As feedwater flow decreased, ICF6 responded slowly. Because of the sluggish response characteristics of the valve control, ICF6 continued to overshoot, intermittently modulating open and closed throughout this incident.

When flow decreased enough to open ICF6 (4000 GPM), the setpoint for opening ICM127 had also been reached (8000 GPM). As ICF6 modulated open and overshoot its setpoint, CM/CF flow increased to above the closing setpoints for ICF6 and ICM27. This caused throttling of ICF6 and ICM27, and of the feedwater regulating valves, which were controlling to compensate for feed flow/steam flow mismatch. This caused a flow reduction which began the process again. The interaction of the CF pump recirculation valves, ICM127, and the feedwater regulating valves tend to propagate feedwater oscillations rather than dampen them out.

The CF pump recirculation valves (ICF6 and ICF13) respond slowly due to long runs of instrument tubing and "controller wind-up". ICM127 responds slowly due to the same problem. Therefore, this incident is classified as a Design Deficiency. This problem was identified and described in LER's 413/85-41 and 413/84-17, Revision 1. The planned corrective actions outlined in these reports had not been completed at this time.

CORRECTIVE ACTION

1. CF Pump A was restarted and both Motor Driven CA Pumps were secured.
2. Changes were made to procedures OP/1/A/0250/01, Condensate and Feedwater System, and OP/1/A/6100/03, Controlling Procedure for Unit Operation, to accomplish the following:

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

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

- a. Manually control the CF pump recirculation valves while below 17% reactor power.
 - b. While in the Automatic Mode, the adjustable setpoints for the CF pumps recirculation valves and CM/CF cleanup flow control valve will be adjusted to avoid interaction that will propagate feedwater oscillations.
3. The corrective actions outlined in LER 413/84-17, Revision 1 will be implemented. The modification package will include the following:
- a. Delete automatic flow control of the CF pump recirculation valves, replacing it with manual position control by the operator, thereby making the loop respond more rapidly.
 - b. Provide a solenoid for the valve controls to rapidly vent air pressure at low flow conditions, ensuring CF pump minimum flow, even while being manually controlled by the operator.
 - c. Delete the pneumatic controls for valve 1CMI27, replacing them with electronic controls, thereby providing more rapid response of the valve.

SAFETY ANALYSIS

Programmed S/G level is ramped with power level. Because of the rapid reactor power descent due to xenon, actual S/G levels were higher than programmed level throughout this incident. This ensured adequate heat removal capability. The steam dump valves to the condenser opened intermittently, providing a relief path for S/G pressure. Neither S/G nor primary parameters were significantly affected. The Motor Driven CA Pumps auto-started as designed, and were subsequently secured after restarting CF Pump A. The health and safety of the public were not affected by this incident.

DUKE POWER COMPANY
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HAL B. TUCKER
VICE PRESIDENT
NUCLEAR PRODUCTION

August 29, 1985

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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 413/85-49 concerning an Auxiliary Feedwater pump start due to Main Feedwater pump trip. 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

Hal B. Tucker

RWO:slb

Attachment

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