

LICENSEE EVENT REPORT (LER)

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

TITLE (4) Auxiliary Feedwater System Actuation Due to Debris In Feedwater Pump Turbine Condenser Waterbox

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)
02	22	88	88	07	01	09	19	88			0 5 0 0 0
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THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5. (Check one or more of the following) (11)

OPERATING MODE (9) <u>3</u>	<input type="checkbox"/> 20.402(b)	<input type="checkbox"/> 20.406(e)	<input checked="" type="checkbox"/> 50.73(a)(2)(iv)	<input type="checkbox"/> 73.71(b)
POWER LEVEL (10) <u>0</u>	<input type="checkbox"/> 20.406(a)(1)(i)	<input type="checkbox"/> 50.36(a)(1)	<input type="checkbox"/> 50.73(a)(2)(v)	<input type="checkbox"/> 73.71(e)
	<input type="checkbox"/> 20.406(a)(1)(ii)	<input type="checkbox"/> 50.48(a)(2)	<input type="checkbox"/> 50.73(a)(2)(vi)	OTHER (Specify in Abstract Below and in Text, NRC Form 355A)
	<input type="checkbox"/> 20.406(a)(1)(iii)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(vii)(A)	
	<input type="checkbox"/> 20.406(a)(1)(iv)	<input type="checkbox"/> 50.73(a)(2)(ii)	<input type="checkbox"/> 50.73(a)(2)(vii)(B)	
	<input type="checkbox"/> 20.406(a)(1)(v)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)	

LICENSEE CONTACT FOR THIS LER (12)

NAME Julio G. Torre, Associate Engineer - Licensing TELEPHONE NUMBER 710 14 317 13 1-18 10 21 9

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRCDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRCDS
0	NH	ISIVL121010		Y					

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 February 22, 1988, at 0135 hours, Main Feedwater Pump Turbine (CFPT) 2A tripped due to low vacuum in the CFPT 2A Condenser. The CFPT trip resulted in an automatic start of both Motor Driven Auxiliary Feedwater (CA) Pumps. An automatic actuation of Steam Generator Blowdown Isolation was also initiated. The Unit was in Mode 3, Hot Standby, at the time of this event. Two Inside Containment Isolation Valves did not fully close as designed, however Steam Generator (S/G) Blowdown Isolation was accomplished by the automatic closure of both penetrations' Outside Containment Isolation valves.

Inspection of the CFPT 2A Condenser waterboxes revealed a significant amount of Condenser Cooling Water (RC) interior pipe coating material. It is likely this material restricted flow of the cooling water through the condenser which caused the drop in CFPT 2A vacuum.

The Auxiliary Feedwater pumps were secured. The affected valves were repositioned to their previous alignment. The pipe coating material was later removed from the waterbox and the feed water pump was returned to service.

Adequate core heat removal capability was available at all times through the S/Gs. The health and safety of the public were unaffected by this event.

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		88	-007	-01	02	OF 05

TEXT (if more space is required, use additional NRC Form 365A (1/77))

BACKGROUND:

The Main Feedwater (EIIS:EJ) (CF) System supplies feedwater to the four Steam Generators (EIIS:SG) (S/G) at the temperature, pressure, and flow required to maintain proper S/G water levels. Flow is provided to the S/Gs by two 50% capacity, turbine (EIIS:TRB) driven feedwater pumps (EIIS:P). Each CF Pump Turbine (CFPT) has an associated CFPT condenser which condenses steam exhausted from the turbine, maintaining a vacuum. The condensate from the steam returns to the Main Condensate (EIIS:SD) System. Cooling water for the CFPT condensers (EIIS:COND) is supplied by the Condenser Circulating Water (RC) System. The RC System piping interior is coated with a protective coating to minimize corrosion of the carbon steel piping.

Motor (EIIS:MO) Driven Auxiliary Feedwater Pumps 2A and 2B are interlocked to start automatically on loss of both CFPTs.

S/G Blowdown (EIIS:WI) and Sampling Isolation is automatically initiated on an Auxiliary Feedwater (EIIS:BA) System autostart, to prevent the loss of S/G inventory through the Blowdown or Sampling Systems.

DESCRIPTION OF INCIDENT:

On February 16, 1988, while the Unit was in Mode 4, Hot Shutdown, CFPT 2A was being readied for an overspeed trip test. The turbine was uncoupled from the pump and vacuum established in CFPT 2A Condenser. During this process, the waterboxes on this condenser were fully vented to a water solid condition.

After successful completion of the overspeed tests, the turbine was recoupled to the pump. CF Pump 2A was returned to service on February 20, 1988, with no complications.

On February 22, 1988, at 0130:22 hours, Control Room Operators (CROs) received a Low CFPT 2A Exhaust Vacuum alarm. This occurred when the vacuum reached 24.4 inches of mercury (in. Hg) vacuum, decreasing. Immediately, the CROs attempted to contact a Nuclear Operations Technician (NOT), to investigate the cause of the low vacuum. Before the NOT could respond, at 0135:14 hours, the vacuum in the condenser reached the Low Vacuum Trip setpoint for the CFPT of 17.5 inches Hg, and CFPT 2A was automatically tripped. CFPT 2B had been previously removed from service for maintenance and was not available. Due to the loss of both CF Pumps, an automatic start of the Auxiliary Feedwater (EIIS:BA) (CA) Pumps 2A and 2B occurred and a S/G Blowdown Isolation was automatically initiated. The Unit was in Mode 3, Hot Standby, at the time of this event.

At 0137 hours, the CROs reset the CA Pump Autostart signal and stopped CA Pumps 2A and 2B because they were not needed to maintain S/G level.

Shortly thereafter, CROs noticed that 2NM200B, S/G 2B Blowdown Sample Inside Containment Isolation valve (EIIS:V), and 2BB150B, S/G 2B Blowdown Inside Containment Isolation Bypass valve, did not fully close as was required by the Blowdown Isolation signal. The Outside Containment Isolation valves for both

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TEXT: If more space is required, use additional NRC Form 266A's (17)

containment penetrations (EIIS:NH) had fully closed, and the penetrations were isolated.

An Operations Unit Supervisor and NOT went to the CFPT 2A Condenser to vent the waterboxes and re-establish vacuum. Upon their arrival they noticed that the automatic waterbox air vent was venting. The personnel also noticed that steam, instead of air, came from the vent. They manually opened two additional waterbox vent valves which also released steam. The venting process took approximately thirty minutes.

At 0210 hours, after discussion of the cause of the rapid decrease in CFPT 2A vacuum, a work request was originated to inspect the waterboxes of the condenser. The condensers were subsequently isolated and drained to support the inspection.

At 0516 hours, Operations personnel opened the power supply circuit breakers (EIIS:BRK) from 2NM201A, S/G 2B Blowdown Sample Outside Containment Isolation valve, and 2BB19A, S/G 2B Blowdown Outside Containment Isolation valve, to insure Containment integrity was maintained. 2BB150B was cycled several times from the Control Room and functioned properly. At 0558 hours, the valve was declared operable.

Work request 39541 OPS was voided at 0535 hours, due to the belief that the valve was operating properly and an indication problem existed. The valve would close fully with no flow.

After shift change at 0700 hours, a Catawba Construction and Maintenance Department (CMD) crew inspected CFPT 2A Condenser waterboxes. They found a substantial amount of RC pipe interior coating material in the CFPT inlet waterbox. The material was of the size and quantity to reduce a significant portion of cooling water flow through the condenser. This material was removed. By 1230 hours, the inspection work was completed and no further debris was discovered.

At 1140 hours, Work Request 39597 OPS was initiated to investigate and repair the apparent indication problem with 2BB150B.

The condenser was filled and vented, and CF Pump 2A was placed in service with no subsequent vacuum problems.

On February 26, 1988, 2NM200B was repaired and returned to service. The actuator, Limitorque Model Number SMB-000-5, was found to be traveling only half the stroke required to close the valve and was replaced.

On February 27, 1988, 2BB150B was repaired and returned to service. The actuator Rotork Model 14NA1 was found to be unable to fully close the valve against normal flow, and to be low on oil. The actuator was replaced and verified to cycle the valve at full flow conditions.

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CONCLUSION:

The reduction in vacuum was due to reduced RC flow to the condenser, caused by the delaminated pipe coating. It is likely that this delamination occurred after the RC pipe inspection, during the recent outage, when the RC System was returned to service. Due to the rapid reduction in vacuum, it is speculated that the delamination occurred suddenly, traveled low in the main RC piping until it reached the low point tee which supplied the CFPT condensers, traveled to the condensers, and covered enough tubes to cause a reduction in flow through the condenser. While vacuum decreased to the CFPT trip setpoint, steam started to form in the tubes.

The automatic actuation of the CA System occurred as designed. A S/G Blowdown Isolation was appropriately initiated. Two Inside Containment Isolation valves did not fully close, however S/G Blowdown Isolation was accomplished by the automatic closure of both penetrations' Outside Containment Isolation valves.

A review of NPRDS did not reveal what was considered to be an excessive number of failures of Limitorque Type SMB actuators or Rotork Type NAI actuators due to physical fault and requiring actuator replacement. The failure of the 2NM200B and 2BB150B actuators will be reported to NPRDS.

An Operations Staff Engineer suspected that the automatic waterbox vent may have sustained damage, fouling, or may not have properly functioned. He originated a work request to inspect the valve.

Inspection of the RC piping and condenser waterboxes is performed at the beginning of each refueling outage. During the next Unit 2 refueling outage these inspections will be performed by Operations Engineers.

As a result of LER 414/88-14, which was also concerned with RC pipe coating delamination problems, an inspection of the CFPT condenser waterboxes will be performed, and repairs to all delaminated RC pipe will be completed. Unit 1 will also be inspected for RC delamination problems. During the inspection and repairs, Quality Control Inspectors with coatings experience will be utilized to verify proper surface preparation and coating adhesion. These activities are identified as a Planned Corrective Action in that report.

Since the CFPT 2B Condenser RC Isolation valves were closed at the time the delamination occurred, there appeared to be no immediate need to inspect its waterbox prior to the next refueling outage.

A review of previous incidents revealed 13 Engineered Safety Features (ESF) actuations due to equipment failure related causes. Only one of these reports involved loss of main feedwater due to loss of CFPT condenser vacuum (see LER 413/86-07). The root cause was undetermined. Therefore, this is considered to be a recurring event.

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Catawba Nuclear Station, Unit 2

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CORRECTIVE ACTION:

SUBSEQUENT

- (1) Operations personnel vented the CFPT 2A condenser waterboxes, verified vacuum problems, and isolated the waterbox for inspection.
- (2) Operations personnel removed power from the Containment Isolation valves 2NM201A and 2BB19A to insure Containment integrity was maintained.
- (3) Instrumentation and Electrical (IAE) and Mechanical Maintenance personnel replaced 2NM200B and 2BB150B actuators.
- (4) CMD personnel inspected the CFPT 2A Condenser waterboxes and removed the RC pipe coating material.

PLANNED

2RC126, CFPT 2A Condenser Waterbox Vent will be investigated and its proper operation will be verified per Work Request 39258 OPS.

SAFETY ANALYSIS:

The loss of both Main Feedwater Pumps initiated an automatic start of the Motor Driven CA Pumps as designed. S/G levels were maintained throughout this event at 50% narrow range, and an adequate inventory of makeup was available to the CA pumps to maintain these levels. Adequate core heat removal capability was available at all times through the S/Gs.

The failure of the two Inside Containment Isolation valves to fully close had no effect on plant safety due to the closure of the redundant Outside Containment Isolation valves.

This incident is reportable pursuant to 10 CFR 50.73, Section (a)(2)(iv).

The health and safety of the public were not affected by this incident.

Duke Power Company  
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Vice President  
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**DUKE POWER**

September 19, 1988

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

Subject: Catawba Nuclear Station, Unit 2  
Docket No. 50-414  
LER 414/8<sup>p</sup>-07, Revision 1

Gentlemen:

Pursuant to 10 CFR 50.73 Section (a) (1) and (d), attached is Revision 1 to Licensee Event Report 414/88-07 concerning an actuation of the Auxiliary Feedwater System due to the loss of Main Feedwater Pump Turbine condenser vacuum. This event was considered to be of no significance with respect to the health and safety of the public.

Very truly yours,

A handwritten signature in cursive that reads "Hal B. Tucker".

Hal B. Tucker

LER10010.D1/lcs

Attachment

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