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)
Forced Shutdown Caused by Excessive Leakage Due to Weld Failure

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)
									N/A	0 5 0 0 0
0 6	1 3	8 6	8 6	0 3 1	0 2	1 0	0 1	8 6		0 5 0 0 0

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)					
POWER LEVEL (10)	0 4 8	20.402(b)		20.405(c)		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)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
		20.405(a)(1)(iii)	X	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
Roger W. Ouellette - Associate Engineer, Licensing	AREA CODE 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	

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 June 13, 1986, at approximately 1600 hours, a weld break on Letdown piping resulted in excessive Reactor Coolant System leakage causing a forced shutdown. A loss of power to a Motor Control Center caused a loss of control power to the Variable Letdown Orifice. The orifice failed in the opened position. During the resulting transient, a 1 inch pipe weld on the discharge of the orifice broke. The unit was at 48% power at the time of this incident.

This incident is assigned Cause Code B, Design, Manufacturing, Construction/Installation deficiency. A weld on the outlet flange on the variable Letdown Orifice failed due to fatigue resulting from cavitation induced vibration.

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

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BACKGROUND

One of the functions of the Chemical and Volume Control (NV) System (EIIS:CB) is to maintain a programmed water level in the pressurizer and a required water inventory in the Reactor Coolant (NC) System (EIIS:AB). This is achieved by means of charging and letdown, which is a continuous feed and bleed process. The charging rate is automatically controlled by Pressurizer level. The letdown rate can be chosen to suit various plant operational requirements by selecting the proper combination of letdown orifices. Three parallel lines are provided to reduce the pressure and control the flow of reactor coolant leaving the NC System. Two of the lines incorporate fixed letdown orifices. The third line utilizes a valve as a variable orifice. An alternate (excess) letdown path is provided in the event that the normal letdown path is inoperable. The excess letdown can also be used to maintain normal heatup rate of the unit, by providing additional letdown capability during heatup.

Technical Specification (Tech Spec) 3.4.5.2 states that NC leakage shall be limited to 1 gpm of unidentified leakage. With unidentified leakage greater than 1 gpm, the leakage rate must be reduced to within limits within 4 hours or be in at least Hot Standby within the next 6 hours and in Cold Shutdown within the following 30 hours.

DESCRIPTION OF INCIDENT

On June 13, 1986, the Unit was at 48% power. The Variable Letdown Orifice, 1NV849, was in service and throttled to approximately 30 gpm to reduce pressure due to a NV to Component Cooling System (EIIS:CC) leak at the Letdown Heat Exchanger. The fixed orifices flowpaths were isolated.

At 1100 hours, the Unit entered the action statement of Tech Spec 3.4.5.2 due to unidentified NC leakage of 1.486 gpm. At 1500 hours, an Unusual Event was declared due to unidentified NC leakage of greater than 1.0 gpm. At approximately 1542 hours, alarms were received indicating the loss of Motor Control Center (MCC) 1MXD. This resulted in the loss of control power to 1NV849 and 1RL138, Hydrogen Cooler Temperature control valve, causing the valves to fail open and closed, respectively. Charging flow suddenly increased to approximately 130 gpm and Pressurizer level began decreasing. This gave the indication of a probable NC leak. At 1550:11 hours, an alarm was received indicating an increasing Hydrogen temperature on the Generator. At 1551:02 hours, 1NV849 was isolated, but the Pressurizer level continued to decrease. The hydrogen temperature on the Generator also continued to increase. The Containment Floor and Equipment Sump B High Level alarm was received at 1601:13 hours, confirming NC leakage.

At approximately 1610 hours, Reactor power and Turbine load were decreased due to high Generator hydrogen temperature and NC leakage. Pressurizer level was being maintained by maximum charging. At 1638:34 hours, the Main Turbine was manually tripped and the Unit entered Mode 2, Startup. At 1638:46 hours, valves 1NV1A and 1NV2B, NC Letdown to Regeneration Heat Exchanger Isolation valves, were manually closed in an attempt to isolate the NC leak. Excess Letdown was established at 1641:28 hours. Pressurizer level returned to normal. At approximately 1700 hours,

the Unit entered Mode 3, Hot Standby. A Work Request was initiated to investigate and repair MCC 1MXD. At 2105 hours, the Unit entered Mode 4, Hot Shutdown. On June 15, 1986, at 0257 hours, the Unit entered Mode 5, Cold Shutdown. The Work Request was completed on June 18, 1986.

CONCLUSION

This incident is assigned Cause Code B, Design, Manufacturing, Construction/ Installation deficiency. Upon shutdown of the unit, an investigation revealed a 360 degree circumferential weld failure on the outlet flange of 1NV849. The preliminary conclusion is that the weld failed due to fatigue resulting from cavitation induced vibration of 1NV849. This can be attributed to long term utilization of the valve throttled at low flow. 1NV849 had been used for approximately one month to reduce pressure due to the Letdown Heat Exchanger leak. A formal failure analysis is being performed by Westinghouse. The interim resolutions are to replace the failed weld and limit operation of 1NV849 to a short period of time, 5 to 10 minutes, at low flow when re-establishing letdown to minimize shock on the piping. Vibration in the vicinity of the letdown orifices will be monitored to verify acceptable operations. The weld has been repaired. Upon receipt of the Westinghouse report of the failure analysis, Duke will review the data and make recommendations for a permanent resolution.

A contributing cause to this incident is loss of power on MCC 1MXD. Investigation revealed that the nameplate on a control transformer in compartment R04A of MCC 1MXD became unglued. The nameplate fell against a terminal strip and caused an overload. The overload tripped the normal feeder breaker to the MCC and prevented the alternate feeder breaker from closing in. The failure of MCC 1MXD caused a loss of control power to 1NV849 and 1RL138. The breaker in 1MXD R04A was replaced and the work completed on June 18, 1986. On May 15, 1986, a Work Request was initiated to remove the nameplates from all control transformers in all Unit 1 and shared Nelson 600V MCCs. The work request was completed on June 16, 1986. The removal of all control transformer nameplates from Unit 2 Nelson 600V MCC was done in 1985 per Significant Deficiency No. 414/85-09. At that time, an inspection of Unit 1 revealed a low percentage of fallen nameplates. A decision was made to remove the Unit 1 nameplates during the first refueling outage.

An exact value of the leakrate was found to be difficult to determine. Personnel employed various calculation methods in an attempt to quantify the NC leakage. The method which was chosen as the most accurate was the Radwaste inventory method. This data covered the entire span of the incident, and the Radwaste input before and after the incident was constant. Therefore, using the Radwaste generation base as the most reliable indication, the average leakrate was determined to be 87 gpm.

A post shutdown inspection for NC leakage revealed a leak on the manway of the Pressurizer. The leak has been repaired.

Post incident vibration monitoring of the associated Unit 2 piping revealed no unusually high vibrations on the variable letdown orifice flowpath.

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

A review of NPRDS indicated there are no reported failures of this type involving Nelson MCC.

There were two previous incidents of a Unit Shutdown due to unidentified leakage at Catawba (see LER's 413/85-59 and 413/85-61).

CORRECTIVE ACTION

(1) Reactor power and Turbine load were decreased.

(2) Valves 1NV1A and 1NV2B were closed.

(3) A Work Request to repair MCC 1MXD R04A, was initiated and completed.

(4) A Work Request to remove all remaining control transformer nameplates from Unit 1 MCCs, was completed.

(5) Procedure changes to OP/1/A/6100/01, Controlling Procedure for Unit Startup and OP/1/A/6200/01, Chemical and Volume Control System, were implemented to add operational limitations for 1NV849.

(6) The weld failure was repaired.

(7) A followup surveillance will be performed based on the proposed action as stated in the final resolution of the weld failure cause.

(8) An accurate determination of the NC leakrate during this incident has been completed.

SAFETY ANALYSIS

All NC System leakage from the failed weld went to the Containment Floor and Equipment Sump. The water was pumped to the Waste Evaporator Feed Tank, Floor Drain Tank, and the Steam Generator Drain Tank. All water was eventually processed, sampled, and discharged through the Liquid Radwaste System. NC System inventory was maintained by the Centrifugal Charging Pumps and the Fueling Water Storage Tank. There were no unexpected exposure problems during the cleanup of the Containment Building.

During the Unit Shutdown, NC System cooldown rates did not exceed 100 degrees F in any 1 hour period. Pressurizer pressure did not decrease below 2050 psi and the Pressurizer level did not decrease below 19%. Average temperature decreased to 530 degrees F post shutdown, but stabilized at 551 degrees F after 30 minutes. The Steam Generator levels decreased to a minimum of 35% narrow range but quickly stabilized at approximately 50% post shutdown.

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
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October 1, 1986

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 Revision 2 to Licensee Event Report 413/86-31 concerning a forced shutdown cuased by excessive Reactor Coolant leakage due to a weld failure. 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 /lbs

Hal B. Tucker

RWO/49/slb

Attachment

xc: Dr. J. Nelson Grace, Regional Administrator
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