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November 20, 1989

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

Subject: Catawba Nuclear Station
Docket No. 50-413
LER 413/89-23, Rev. 1

Gentlemen:

Attached is Revision 1 to Licensee Event Report 413/89-23, concerning Technical Specification 3.0.3 entered as a result of both trains of control room area ventilation being inoperable due to an incomplete testing procedure and damper malfunction.

This event was considered to be of no significance with respect to the health and safety of the public.

Very truly yours,

Tony B. Owen
Station Manager

keb\LER-NRC.TBO

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NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES 8/31/88

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
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TITLE (4) Technical Specification 3.0.3 Entered As A Result of Both Trains Of Control Room Area Ventilation Being Inoperable Due To An Incomplete Testing Procedure And Damper Malfunctions

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 9	1 5	8 9	8 9	—	0 2 3	—	0 1	1 2	0 6	8 9	Catawba, Unit 2	0 5 0 0 0 4 1 4
												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)	1 0 0	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
R.M. Glover, Compliance Manager	AREA CODE 8 0 3 — 8 3 1 1 - 3 2 3 6

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	
X	V C	V	R 4 1 1	N							

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 September 15, 1989, at 1315 hours, with Units 1 and 2 in Mode 1, Power Operation, Technical Specification 3.0.3 was entered due to both trains of the Control Room Area Ventilation (VC) System being inoperable. Train B of the VC System was already inoperable for maintenance. Train A of VC was declared inoperable following the unsatisfactory performance of a Control Room positive pressure test with only one of the two outside air intakes open. The Control Room return air damper was adjusted on Train A and the Control Room positive pressure test was performed with acceptable results in all alignments. Both trains were returned to operability on September 16, following successful testing. On October 10, with Train A of VC operable and Units 1 and 2 in Mode 1, Train B failed to satisfactorily pressurize the Control Room with only one intake open, during the performance of a VC flow balance test. Following damper adjustments, Train B satisfactorily pressurized the Control Room. It was found that several VC dampers were leaking by. These incidents are attributed to incomplete testing during pre-operational testing of the VC System, and to ventilation damper malfunctions. All other appropriate ventilation systems' pre-operational tests are being reviewed to assure complete testing was performed.

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

BACKGROUND

The Control Room Area Ventilation [EIIS:UC] (VC) and Chilled Water [EIIS:UE] (YC) Systems combine to form one system which is designed to maintain a suitable environment in the following plant areas at all times: Control Room, Cable Room, Battery Rooms, Switchgear Rooms, Motor Control Center (MCC) Rooms, and the Electrical Penetration [EIIS:PEN] Rooms at elevation 594+0. The VC/YC System is shared between both Units. There are two 100% redundant trains of VC/YC equipment. Each is capable of being powered by Unit 1 or Unit 2 Essential Auxiliary Power, but under normal conditions both trains are aligned to Unit 1. Two Diesel Generators [EIIS:GEN] (D/Gs) are provided per Unit to energize the Essential Auxiliary Power buses during emergency conditions.

Pressurization of the Control Room and Control Room Area is affected by the induction of outside air into the air handling systems serving these areas by way of filter [EIIS:FLT] trains and associated fans [EIIS:BLO]. The two outside air intakes are at two separate locations and consist of isolation valves [EIIS:V], a tornado damper, a radiation monitor, two chlorine detectors [EIIS:XT] and a smoke detector in each intake. The radiation monitors and the chlorine and smoke detectors are arranged so as to close their respective air intake valves upon detection of radiation, chlorine or smoke. Train separation provides for one shut-off valve in each intake to be Train A and the other to be Train B. The duct for the outside air intakes is arranged so that the Train A and Train B filter trains can take air from either intake location. This allows the Operator to switch to the alternate intake if one should become contaminated. The filtration system is also arranged so that a percentage of the return air from the Control Room and Control Room Area is routed through the filter train for clean-up purposes.

Technical Specification 3.7.6 specifies that two independent trains of VC/YC shall be operable during all operational modes. If one train becomes inoperable while either Unit is in Mode 4, Hot Shutdown, or above, the inoperable train must be restored to operability within seven days, or the operating Units must be shutdown. If both Units are below Mode 4 and one train is inoperable, the train must be restored to operability within seven days or the operable train must be operated in the FILTER mode. If both trains are inoperable, or with the operable train not capable of being powered by an operable emergency power source, all core alterations and positive reactivity changes must be suspended on both Units. The requirement for an operable emergency power source is only specifically stated for Units operating below Mode 4. However, the bases for Technical Specification 3.7.6 states that the operability of VC/YC ensures that ambient air temperature does not exceed allowable limits for equipment and instrumentation, and the Control Room will remain habitable, during and following all credible accident conditions. This implies that an operable emergency power supply should be a prerequisite to VC/YC operability in all modes.

The acceptance criteria for VC is as follows; each VC train must be capable of maintaining the Control Room at a positive pressure of greater than or equal to 0.125 inch water gauge (in.wg) relative to adjacent areas with pressurization air flow to the Control Room of less than or equal to 4000 cubic feet per minute (cfm).

EVENT DESCRIPTION

On August 23, 1989, during performance of Work Request 1512 MES, the Control Room (CR) pressure increased to a higher than normal level when an access door on 2CR-AHU-1 was opened (see PIR 0-C89-0277). Design Engineering requested that Performance conduct PT/0/A/4450/08, Control Room Positive Pressure Test, to ensure that no CR penetrations were degraded, by the higher pressure experienced on August 23, and that VC could establish the required positive pressure.

On September 15, 1989, with Units 1 and 2 in Mode 1, Power Operation, plans had been made to conduct the Control Room positive pressure test. At the time of the test, Train B of VC/YC was inoperable due to work on the Train B chiller and the Unit 2 VC inlet line (Train B) was isolated due to an inoperable EMF on that duct work.

With Train B of VC inoperable due to chiller work being performed, the CR positive pressure test was performed, at 0900 hours, with Train A of VC in service and the Train B outside air intake isolated due to EMF-43B being inoperable. The test failed with a CR pressure of 0.05 in.wg and 2396 cfm of outside air for pressurization. Train B had been declared inoperable on September 14, 1989, at 0625 hours.

EMF-43B was repaired and declared operable on September 15 at 0845 hours, and Train B outside air intake was opened. The CR positive pressure test was performed again and the results were acceptable with 0.15 in.wg and 3786 cfm of outside air for pressurization.

Work Request 7230 PRF was written to investigate the cause of inadequate CR pressurization with only one outside air intake open. Bahnson walked down the ducts and found no obstructions. In addition, Work Request 44238 OPS was written to inspect all CR penetrations for leaks.

The CR positive pressure test was performed again, with Train A in service, and all of the CR doors were taped per Work Request 44239 OPS. The test failed with each outside air intake individually isolated and CR pressurization increased only after both intakes were opened.

At 1315 hours, Technical Specification 3.0.3 was entered due to both trains of the VC System being inoperable. The NRC was notified and, based on the extensive compensatory measures established, granted an extension to 1200 hours on Septebmer 16, 1989, to return one train to service. These measures included

limitations on burning in the areas of the intakes, establishment of a fire watch in the intake areas, restriction of movement of chlorine cylinders in the plant, and instructions of the Operators on actions to take if one or both intakes became isolated.

The VC System was then aligned to Train B and the CR positive pressure test was performed. The results were acceptable in all alignments. After throttling the CR return air damper (1PFT-MVD-2) on Train A, the CR positive pressure test was performed with acceptable results in all alignments.

Performance tested Train B with acceptable results, with damper 1PFT-MVD-2 throttled, in all alignments and it was declared operable at 0909 hours on September 16, 1989. Train A was balanced (returning damper 1PFT-MVD-2 to its original position) and tested with acceptable results in all alignments and declared operable on September 16 at 1751 hours. Train B was not retested, because the effect of damper 1PFT-MVD-2 position on Train B was not known at the time.

As a result of flow balance concerns, Design Engineering reviewed the testing criteria for the VC System. Between September 16 and October 5, Design Engineering developed specific flow criteria for the split of flow exiting the Control Room Area Pressurizing Filter Train. PT/0/A/4450/08C, Control Room Area Ventilation Flow Balance, was developed to measure flow at various locations in the VC System, and provides for the performance of damper adjustments to achieve proper flows and Control Room pressurization.

On October 10, at 1000 hours, Train B of the VC System was declared inoperable for the performance of a Train B flow balance, under PT/0/A/4450/08C. Train A was operable, and Units 1 and 2 were in Mode 1. Train B failed to pressurize the Control Room with either intake isolated. The October 10 test data differed from the September 16 results due to damper 1PFT-MVD-2 position: on September 16 it was throttled, and on October 10, it was in its original position. Following damper adjustments, Train B satisfactorily pressurized the Control Room with either intake isolated, and Train B was declared operable by 1600 hours. Due to operability concerns, Operations performed a Control Room pressure test, with satisfactory results.

On October 11, Performance successfully tested Train A per PT/0/A/4450/08C. Test results agreed with the September 16 data.

An evaluation of past test data led to the conclusion that flow could be leaking past damper 1CR-D-9 (Train A Suction Damper), into the Train A recirculation line, and into the Train B Filter Unit from the common supply header (see Figure 1). On October 11, Work Request 7524 PRF was written to investigate/repair damper 1CR-D-9. The damper was subsequently found to be leaking, secured, and Train A of the VC System was declared inoperable. Damper 1CR-D-10 (Train A Discharge Damper) was also found to be leaking. A Compensatory Action was initiated, on October 11, to verify Control Room pressurization on each shift.

On October 13, following adjustments to reduce leakage through dampers 1CR-D-9 and 1CR-D-10, Trains A and B successfully pressurized the Control Room when tested under PT/0/A/4450/08C.

An inspection of dampers 2CR-D-4 (Train B Discharge Damper), 2CR-D-9 and 2CR-D-10 found all three dampers to be leaking. On October 17, Work Requests 7264 PRF, 7265 PRF and 7266 PRF were written to repair these dampers.

On October 20, a Train A flow balance was successfully performed under PT/0/A/4450/08C. On October 25, the linkages for dampers 2CR-D-4, 2CR-D-9 and 2CR-D-10 were adjusted to ensure that they fully closed, under their associated work requests. A Train A flow balance was subsequently performed, on October 25, with satisfactory results, under PT/0/A/4450/08C. The Compensatory Action was terminated on October 26, at 0930 hours.

CONCLUSION

These incidents have been attributed to defective pre-operational testing procedures. The test procedures did not test the system in all possible Modes of operation. The ability of each train of VC was not verified to be capable of meeting the acceptance criteria with only one outside air intake open. All other appropriate ventilation pre-operational tests are being investigated to ensure they were performed to demonstrate adequate performance during multiple intake alignments.

These incidents have also been attributed to equipment malfunctions. Returning damper 1PFT-MVD-2 to its normal position had enabled cross train flow, due to leakage past damper 1CR-D-9. The linkages for dampers 1,2CR-D-9 would not sufficiently close the blades, and required adjustments. Over a period of time, the linkages for these dampers had apparently slipped out of adjustment. Standing Work Requests (SWRs) have been developed to inspect dampers 1CR-D-4, 1CR-D-9 and 1CR-D-10 and 2CR-D-4, 2CR-D-9 and 2CR-D-10 every six months, to ensure that they fully close. The actuators for these dampers are currently checked every six months under 3064 SWR. A list of other dampers which should be periodically inspected to ensure full blade closure will be developed.

Dampers 1,2CR-D-4, 9 and 10 consist of an ITT-General Controls Linear Hydramotor Actuator and a damper/linkage assembly manufactured by Ruskin Mfg. Co. These linkage malfunctions are not NPRDS reportable.

A review of previous events showed two other cases in which Technical Specification 3.0.3 was entered for two trains of the VC System being inoperable, within the past twelve months (see LER 413/88-23 and LER 413/89-10). LER 413/89-10 also involved an equipment malfunction, however, the failed component was not similar (Train A Control Room Area Air Handling Unit 1 in-board motor [EIIS:MO] bearing). A review of the Operating Experience Program database did not indicate any previous VC System events being caused by a damper malfunction, or by defective pre-operational testing.

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

CORRECTIVE ACTION

SUBSEQUENT

1) All CR penetrations were inspected for leaks under Work Request 44238 OPS.

2) Train A's CR return air damper was adjusted under Work Request 7230 PRF.

3) Train B of VC was tested satisfactorily (in all intake alignments) and Train A of VC was balanced (returning Train A's CR return air damper to its original position) and tested satisfactorily.

4) From September 15 to September 16, 1989, compensatory measures were taken to limit burning in the area of the intakes, to establish a fire watch in the intake areas, to restrict movement of chlorine cylinders in the plant, and to instruct the Operators on actions to take if one or both intakes became isolated.

5) Design Engineering revised the criteria for Control Room and Control Room Area pressurization flow rates.

6) Performance developed a VC flow balance procedure, to ensure adequate pressurization in all alignments.

7) Dampers were adjusted per PT/0/A/4450/08C, enabling Train B to satisfactorily pressurize the Control room with either intake isolated.

8) Dampers 1CR-D-9 and 1CR-D-10 were repaired.

9) Dampers 2CR-D-4, 2CR-D-9, and 2CR-D-10 were repaired under Work Requests 7264 PRF, 7265 PRF, and 7266 PRF.

10) Both trains of the VC System satisfactorily pressurized the Control Room, in all alignments, under PT/0/A/4450/08C.

11) SWRs have been developed to inspect dampers 1,2 CR-D-4, 9 and 10 every six months.

12) A Compensatory Action was initiated to verify adequate Control Room pressurization once per shift.

PLANNED

1) All appropriate ventilation pre-operational tests are being reviewed to assure adequate testing of multiple intake alignments.

2) A list of other dampers which should be periodically inspected to ensure full blade closure will be developed.

SAFETY ANALYSIS

Technical Specification 3.7.6 allows one train of the VC System to be inoperable providing appropriate actions are taken. Technical Specification and FSAR requirements were met for flow, pressurization and filtration with Train B.

The Train A operability Technical Specification and FSAR requirements could have been met with both outside air intakes open. However, the Technical Specification and FSAR requirements could not be met with only one outside air intake open with only Train A in operation. In this case, VC was still able to provide 0.05 in.wg of pressurization in the CR. This is adequate to prevent migration of radioactivity into the CR until such time as the other train or outside air intake could be placed in service.

On October 10, 1989, Train A was in operation. Train A was demonstrated, on October 11, to be capable of meeting Technical Specification and FSAR requirements, when tested under PT/0/A/4450/08C.

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