Duke Power Company
Catawba Nuclear Station
P.O. Box 256
Clover, SC 29710

(803)831-3000

DUKE POWER

March 14, 1991

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

Subject: Catawba Nuclear Station
Docket No. 50-414
LER 414/91-05

Gentlemen:

Attached is Licensee Event Report 414/91-05, concerning TECHNICAL SPECIFICATION 3.0.3 ENTERED DUE TO BOTH TRAINS OF NUCLEAR SERVICE WATER BEING INOPERABLE.

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

Very truly yours,

H. W. Hampton
Station Manager

ken:LER-NRC.JWH

xc: Mr. S. D. Ebneter
Regional Administrator, Region II
U. S. Nuclear Regulator Commission
101 Marietta Street, NW, Suite 2900
Atlanta, GA 30323

R. E. Martin
U. S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Washington, D. C. 20555

Mr. W. T. Orders
NRC Resident Inspector
Catawba Nuclear Station

M & M Nuclear Insurers
1221 Avenues of the Americas
New York, NY 10020

INPO Records Center
Suite 1500
1100 Circle 75 Parkway
Atlanta, GA 30339

IE22
1/1

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)
Catawba Nuclear Station, Unit 2	0 5 0 0 0 4 1 4	1 OF 0 7

TITLE (4) Technical Specification 3.0.3 Entered Due to Both Trains of Nuclear Service Water Being Inoperable

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 2	1 2	9 1	9 1	0 0 5	0 0	0 3	1 2	9 1	N/A	0 5 0 0 0
										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
	AREA CODE
C. L. Hartzell, Compliance Manager	8 0 3 8 3 1 - 3 6 1 5

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 February 12, 1991, at 0840 hours, with Unit 2 at 99.5% power in Mode 1, Power Operation, Operations personnel discovered 2A1 Diesel Generator (D/G) Starting Air Tank pressure at 200 psig. The minimum operability pressure for these tanks is 210 psig. Being below the minimum pressure, the D/G Starting Air (VG) System was unable to provide the design bases of supporting two starts followed by three days of operation without the use of the VG air compressors. This rendered D/G 2A inoperable. D/G 2B was also inoperable at this time for scheduled maintenance activities. With both Diesel Generators inoperable, Unit 2 entered Technical Specification (T/S) 3.0.3, due to both trains of Nuclear Service Water being rendered inoperable. Tank pressure was quickly restored above 210 psig at 0852 hours by manually opening process flow valve, 2VG041, which had failed in the closed position. T/S 3.0.3 was exited at that time. This incident has been attributed to improper installation. Corrective actions include an expanded preventive maintenance program for the control valves/operators, increasing operating air pressure to the control valves, installing all new solenoid valves, and rerouting air control lines.

BACKGROUND

The design bases for the Diesel Generator (D/G) [EIIS:GEN] Engine [EIIS:ENG] Starting Air [EIIS:LC] (VG) System, is to support two starts (fast or automatic) followed by three days of operation without the use of the VG air compressors. Calculation CNC-1223.59-04-0006 determined that a minimum VG tank pressure of 210 psig would be required to support the design bases. Pressure below 210 psig would render the VG System and its associated D/G inoperable.

The VG System provides fast start capability for the diesel engines by using air under high pressure to power the diesel generator engine until it starts and can operate under its own power. It also provides a source of compressed air for the engine control panel instrumentation.

Control valves [EIIS:V], valve 2VG041 being one of these, alternate flow to the desiccant drying towers. Air enters the activated tower from the bottom passing through the desiccant and becomes progressively dryer as the moisture is absorbed. While the activated tower is drying the air, its associated flow control valve admits a predetermined amount of dry air into the top of the alternate tower to purge the moisture.

The air dryers have a standard 10 minute cycle which provides continuous drying process. Cams control the alternating 5 minute activation and 5 minute regeneration process. The air dryers are interlocked with their associated air compressor so that a dryer is only actuated when its compressor is in operation.

The Nuclear Service Water [EIIS:BI] (RN) System provides essential auxilliary support functions to Engineered Safety Features of the station. The system is designed to supply cooling water to various heat loads in both the safety and non-safety portions of each unit. Provisions are made to ensure a continuous flow of cooling water to those systems and components necessary for plant safety during normal operation and under accident conditions. Sufficient redundancy of piping [EIIS:PSP] and components is provided to ensure that cooling is maintained to essential loads at all times.

Technical Specification (T/S) 3.7.4 requires that at least two independent RN loops shall be operable.

a) With both Units in Mode 1, Power Operation, Mode 2, Startup, Mode 3, Hot Standby, or Mode 4, Hot Shutdown, each loop shall contain two operable RN pumps and associated emergency diesel generators, two essential equipment supply and return headers, and a supply and discharge flow path capable of being aligned to the Standby Nuclear Service Water Pond (SNSWP).

b) With only one unit in Mode 1, 2, 3, or 4, each loop shall contain at least one operable RN pump, associated emergency D/G, and the essential equipment supply and return header associated with the unit in Mode 1, 2, 3, or 4, and a supply and discharge flow path capable of being aligned to the SNSWP.

Since both Unit 2 D/G's were inoperable, T/S 3.7.4 could not be met because there is no action statement which addresses both trains of RN being inoperable. With both trains of RN inoperable, Unit 2 entered T/S 3.0.3.

Technical Specification 3.0.3 is required to be entered when the Unit is operating in a condition not permitted by Technical Specifications. This condition exists when a Limiting Condition for Operation is not met except as provided in the associated Action Requirements. It requires that within one hour action shall be initiated to place the Unit in a Mode in which the specification does not apply by placing it, as applicable, in:

a) At least Hot Standby in the next 6 hours,

b) At least Hot Shutdown within the following 6 hours, and

c) At least Cold Shutdown within the subsequent 24 hours.

The Catawba Nuclear Station T/S 3.0.3 interpretation states that the purpose of the one hour is to allow for preparation of an orderly shutdown before initiating a change in plant operation. It further states that if the equipment problem can be resolved within three hours, no load reduction is necessary. The remaining four hours leaves sufficient time to shutdown in a controlled and orderly manner, and well within the specified maximum cooldown rate and within the cooldown capabilities of the facility assuming only the minimum required equipment is operable. The Compliance Duty Engineer (or alternate) is to be notified about the situation such that he will understand why T/S 3.0.3 was entered and power was not reduced, so the NRC Resident Inspectors can be informed of the situation. This discussion with the Compliance Duty Engineer is in addition to the normal discussions with the Station Manager/Duty Station Manager.

Technical Specification 3.8.1.1 states that as a minimum, the following A.C. electrical power sources shall be operable in Modes 1, 2, 3, and 4:

a) Two physically independent circuits between the offsite transmission network and the Onsite Essential Auxiliary Power System, and

b) Two separate and independent D/G's.

If both D/G's are inoperable, the appropriate action to be taken is to demonstrate the OPERABILITY of two offsite A.C. circuits by performing Specification 4.8.1.1.1a within 1 hour and at least once per 8 hours thereafter;

NRC Form 366A
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/88

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6) YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	PAGE (3)
Catawba Nuclear Station, Unit 2	0 5 0 0 0 4 1 4	9 1	— 0 0 5	— 0 0	0 4 OF 0 7

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

restore at least one of the inoperable D/G's to OPERABLE status within 2 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. Restore both D/G's to OPERABLE status within 72 hours from time of initial loss or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

EVENT DESCRIPTION

On February 12, 1991, at approximately 0126 hours, Removal and Restoration (R&R) tags were issued for Diesel Generator 2B for various planned maintenance activities. Work pertaining to these R&Rs rendered the 2B Diesel Generator inoperable. Due to Diesel Generator 2B inoperability, Operations increased surveillance on Diesel Generator 2A to twice per shift as a precautionary measure. At 0840 hours, during Diesel Generator 2A surveillance, a Nuclear Operations Technician (NOT) found 2A1 VG Air Tank pressure at 200 psig. At tank pressure less than 210 psig, the VG System is not capable of meeting its design basis of providing 2 starts (fast or automatic) followed by three days of operation without the use of the VG air compressors. Therefore, at 0840 hours, on February 12, 1991, with both D/G's inoperable, Catawba Unit 2 entered T/S 3.0.3 for having both trains of RN inoperable.

The NOT contacted the Control Room immediately and informed them of the situation. Compliance, Duty Station Manager, Superintendent of Operations, and the Station Manager were notified by Operations. Operations having experienced problems similar to this in the past, directed their attention to the process flow valves which direct air flow through the drying towers. The NOT found valve 2VG041, one of two process flow valves, failed in the closed position. VG System leakage soon drained down the tank below the required operating pressure. The NOT was instructed to manually open valve 2VG041. At 0852 hours, with valve 2VG041 manually opened, the VG tank pressure increased above 210 psig. At that time Diesel Generator 2A was declared operable, and T/S 3.0.3 was exited.

Operations initiated work request 49280OPS to investigate and repair the actuator assembly for valve 2VG041. Maintenance personnel removed, disassembled, cleaned, and reinstalled the actuator. During inspection of the valve and actuator, no problem could be found which would cause the a failure. A Post-Maintenance Test (PMT) was performed with the valve operating correctly.

CONCLUSION

Previous failures of these process flow valves had generated many theories as to the cause of their failure and prompted several repairs and modifications. Each repair and/or modification was based on sound judgement, and all involved felt that the root cause of the failures was identified and corrected.

*U.S. GPO: 1986-520-589:00070

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Catawba Nuclear Station, Unit 2	0 5 0 0 0 4 1 4	9 1	— 0 0 5	— 0 0	0 5 OF 0 7

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

Repairs and modifications which have been accomplished or are planned thus far include the following:

- Rebuilt and/or replaced all valve actuators - Maintenance activities were performed as a result of failure.
- Installing all new solenoid valves on all drying skids.
- Increasing operating pressures from 75 psi to 100 psi - Approximately 50% complete

Increasing the operating pressures from 75 psi to 100 psi was the most recent modification, and felt to be a sure resolution. Additional power would be provided to the valve operators for positive operation. However, on February 21, 1991 at 1420 hours, 2A Diesel Generator was declared inoperable due to 2A VG Tank pressure being 190 psig. Process flow valve, 2VG041, failed closed again.

Maintenance Engineering Services (MES) began an in-depth review of the equipment and compared the equipment in the field to the vendor drawings. Reviewing the air dryer system schematic, CNM 1307.00-0098 001, a discrepancy was found. The lubricator/regulator air supply lines to the solenoid valves were routed from an alternate supply connection downstream of the drying towers. The vendor drawing shows the supply tapped off the compressor supply line just beyond the prefilter and trap assembly. MES contacted the vendor and explained the problems encountered with the process flow valves and the location of the air supply to the solenoid valves. The vendor recommended moving the supply line back to the location shown on the drawing. The vendor suspected that supply air for the solenoid valves could be depleted during the initial phase of the process flow valves swapping during a compressor startup. The valve or actuator with the least resistance would tend to operate first then try to operate the valve with more resistance with reduced or no air pressure, thus failing to open.

MES relocated the air supply lines as recommended. To test for proper operation, the timer was manipulated to swap the process flow valves during a compressor startup. The valves functioned as designed. Air supply lines were relocated on all eight solenoids (Units 1 and 2).

Investigations have traced the incorrect routing of the air supply lines back to the initial installation of the equipment. Documentation located in the Quality Assurance (QA) Vault has shown that the tubing was installed in the wrong location. The root cause of this incident has therefore been determined to be improper installation. Rerouting of the air lines should eliminate the failures of the process flow valves.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Catawba Nuclear Station, Unit 2	0 5 0 0 0 4 1 4	9 1	— 0 0 5	— 0 0	0 6 OF 0 7

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

Operations has requested Performance to evaluate the feasibility of reprogramming existing computer programs to alarm when the VG compressors exceed a predetermined run time. This will indicate a stuck valve and corrective actions can be quickly implemented.

A review of the Operating Experience Program data base for the past 24 months prior to this event, revealed one other LER written due to improper installation. LER 414/90-008 addressed the auxiliary feedwater fire protection system solenoid valves being installed backwards. This incident is determined to be recurring. Corrective actions for LER 414/90-008 would not have prevented this event.

CORRECTIVE ACTION

SUBSEQUENT

1) Manually opened process flow valve, 2VG041, and restored tank pressure.

2) Repaired 2VG041 on work request 492800PS.

3) Air operating pressures increased from 75 psi to 100 psi.

4) All tubing has been rerouted as shown on vendor drawings.

5) Station Problem Report, CNPRO5592 written to add air line dryer to solenoid supply line.

PLANNED

1) All solenoid valves will be replaced.

2) Performance will investigate the feasibility of reprogramming existing VG compressor points to alarm on excessive run time (approximately 15 minutes).

SAFETY ANALYSIS

Throughout this incident, off site power was available, and the RN pumps were physically operable at all times. On site power was supplied from the main generator through the Unit auxiliary transformer.

With 2A1 Diesel Generator Starting Air (VG) Tank pressure below 210 psig, the design basis of providing 2 starts (fast or automatic) followed by 3 days of operation without the use of the VG compressors could not be met. However, with the 200 psig tank pressure present, the diesel generator had sufficient air for a start attempt. If the first start attempt failed, the VG pressure fell below

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Catawba Nuclear Station, Unit 2	0 5 0 0 0 4 1 4	9 1	— 0 0 5	— 0 0	0 7 OF 0 7

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

150 psig, an automatic lockout would prevent further start attempts. The operators would be alerted by an alarm to take corrective action. The automatic lockout ensures that sufficient air reserves remain for a manual restart.

When the 2A1 Starting Air Receiver Tank was discovered to be below the minimum pressure, action was quickly taken to restore pressure above the minimum pressure at approximately 0900 hours. With the increased surveillance frequency, the inoperability of Diesel Generator 2A was promptly detected and corrected. In addition, pressure gauges are located on the tanks for local indication, with a low pressure alarm activated if pressure falls to 160 psig. A separate pressure switch on the engine control panel alarms if the air receiver tank pressure falls to 80 psig. These alarms, in addition to the Diesel Generator Lockout alarm, are annunciated separately on the local diesel engine control panel, and signals a generator diesel trouble alarm in the control room.

In the event that off site power was lost to Unit 2 and Diesel Generator 2A failed to start, the Shared Auxiliary Transformers SATA and SATB could have been used to provide power from Unit 1 to the Unit 2 essential busses. Guidance to perform the cross-connect is given in procedures OP/1(2)/A/6350/02 and OP/1(2)/A/6350/05.

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