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December 19, 2007

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

Subject: Duke Power Company LLC d/b/a Duke Energy Carolinas, LLC (Duke)
Catawba Nuclear Station, Units 1 and 2
Docket Nos. 50-413, 414
Licensee Event Report 413/2007-004 Revision 0

Attached is Licensee Event Report 413/2007-004 Revision 0 entitled, "Control Room Area Chilled Water System Inoperable in Excess of Technical Specification Requirements due to Unanticipated Component Interactions."

There are no regulatory commitments contained in this letter.

This event is considered to be of no significance with respect to the health and safety of the public. If there are any questions on this report, please contact A. Jones-Young at (803) 831-3051.

Sincerely,

James R. Morris

Attachment

IE22

NRR

xc (with attachment):

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NRC FORM 366 (9-2007) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 08/31/2010

Estimated burden per response to comply with this mandatory collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Catawba Nuclear Station, Unit 1	05000 413	1 OF 8

4. TITLE

Control Room Area Chilled Water System Inoperable in Excess of Technical Specification Requirements due to Unanticipated Component Interactions

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
									Catawba Unit 2	05000 414
10	30	2007	2007	- 004 -	00	12	19	2007	FACILITY NAME	DOCKET NUMBER 05000

9. OPERATING MODE	1
10. POWER LEVEL	100%

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)

	20.2201(b)		20.2203(a)(3)(ii)		50.73(a)(2)(ii)(B)		50.73(a)(2)(ix)(A)
	20.2201(d)		20.2203(a)(4)		50.73(a)(2)(iii)		50.73(a)(2)(x)
	20.2203(a)(1)		50.36(c)(1)(i)(A)		50.73(a)(2)(iv)(A)		73.71(a)(4)
	20.2203(a)(2)(i)		50.36(c)(1)(ii)(A)		50.73(a)(2)(v)(A)		73.71(a)(5)
	20.2203(a)(2)(ii)	X	50.36(c)(2)		50.73(a)(2)(v)(B)		OTHER Specify in Abstract below or in NRC Form 366A
	20.2203(a)(2)(iii)		50.46(a)(3)(ii)		50.73(a)(2)(v)(C)		
	20.2203(a)(2)(iv)		50.73(a)(2)(i)(A)		50.73(a)(2)(v)(D)		
	20.2203(a)(2)(v)	X	50.73(a)(2)(i)(B)		50.73(a)(2)(vii)		
	20.2203(a)(2)(vi)		50.73(a)(2)(i)(C)		50.73(a)(2)(viii)(A)		
	20.2203(a)(3)(i)		50.73(a)(2)(ii)(A)		50.73(a)(2)(viii)(B)		

12. LICENSEE CONTACT FOR THIS LER

NAME	TELEPHONE NUMBER (Include Area Code)
A. Jones-Young, Regulatory Compliance	803-831-3051

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

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX

14. SUPPLEMENTAL REPORT EXPECTED				15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
	YES (If yes, complete 15. EXPECTED SUBMISSION DATE).	X	NO				

16. ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On October 30, 2007 with Unit 1 operating in Mode 1 at 100% power and with Unit 2 operating in Mode 5 (Cold Shutdown), it was discovered that both trains of the Control Room Area Chilled Water System (CRACWS) were inoperable. Technical Specification (TS) Limiting Condition for Operation (LCO) 3.0.3 was immediately entered. During Engineered Safety Features (ESF) Blackout and Loss of Coolant Accident (LOCA) testing, Train B Chiller of the CRACWS failed to restart. After troubleshooting this condition, it was determined that the failure of the chiller to restart was the result of the thrust bearing module reset value being set below the normal bearing oil operating temperature. The resistance of the redundant fuse FU-4 installed in the bearing temperature monitoring circuit changed the bearing module reset value. Train A CRACWS Chiller has identical bearing temperature monitoring circuitry. This condition has existed on both trains since April 10, 2007. In consequence, both CRACWS chillers were inoperable for a period of time in excess of TS requirements.

The apparent cause of this event is attributed to unanticipated interaction of fuse FU-4 with the thrust bearing module circuitry. Corrective actions included removing the redundant fuses from the bearing module circuitry. This event did not adversely affect the health and safety of the public. This report does not involve a safety system functional failure.

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NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)* **(17)**

BACKGROUND

This event is being reported pursuant to 10 CFR 50.73(a)(2)(i)(B), Any operation or condition which was prohibited by the plant's Technical Specifications and 10 CFR 50.36 (c)(2)(i), Limiting Condition for Operation not met.

Catawba Nuclear Station (CNS) Units 1 and 2 are Westinghouse four-loop Pressurized Water Reactors (PWR) [EIIS: RCT]. Unit 1 was operating in Mode 1 (Power Operation) and Unit 2 was operating in Mode 5 (Cold Shutdown) at the time of this event.

The CRACWS provides temperature control for the control room and the control room area. The CRACWS consists of two independent and redundant trains that provide cooling to the control room and control room area [EIIS: VI]. Each train consists of a chiller package, a chilled water pump, and air handling units with cooling coils. Chilled water [EIIS: KM] is passed through the cooling coils of the air handling units to cool the air. Electric duct heaters are then used to control the supply air temperature. The CRACWS provides both normal and emergency cooling to the control room and control room area. A single train will provide the required temperature control to maintain the control room at approximately 74 degrees F. The CRACWS trains are shared between the Catawba units.

The CRACWS chiller controls are designed such that if control power is removed from the thrust bearing module, the module output contacts will open. The module output contacts will stay open if the module sensor input is above the module reset value. In order for the module output contacts to close, the module sensor input has to decrease below the module reset value. Normally, the setpoint of the bearing module is 240 degrees F. with a reset of 200 degrees F. Fuse FU-4 introduced a 45 degrees F offset into the chiller control circuit which changed the setpoint to 195 degrees F and changed the reset to 155 degrees F. Fuse FU-4 was identified as redundant to another fuse in the circuit and determined to be not required for equipment/device protection.

TS LCO 3.7.11 requires two CRACWS trains to be operable in Modes 1, 2, 3, 4, 5, 6 and during movement of recently irradiated fuel assemblies. Condition A specifies that with one CRACWS inoperable in Modes 1, 2, 3, or 4, restore the inoperable train to OPERABLE status within 30 days.

If the required action and associated completion time is not met, then be in Mode 3 within 6 hours and be in Mode 5 within 36 hours. Condition E specifies that with two CRACWS trains inoperable in Modes 1, 2, 3, or 4, TS LCO 3.0.3 must be immediately entered. LCO 3.0.3 requires action to be initiated within 1 hour to place the unit(s), as applicable, in Mode 3 within 7 hours, Mode 4 within 13 hours, and Mode 5 within 37 hours.

EVENT DESCRIPTION

On January 31, 2007 and on April 10, 2007, fuse FU-4 was replaced in Train B and Train A of the CRACWS chillers control circuitry, respectively, based on Operating Experience regarding a failed fuse in the chiller control circuitry. The fuse replacement was performed as a maintenance activity under the work order process because Engineering personnel believed the replacement was a one for one replacement.

On October 25, 2007, during ESF Blackout and LOCA testing, Train A chiller failed to restart. A Train CRACWS started and the chilled water pump started but the chiller did not. The Diesel Load Sequencer and A Train CRACWS were reset. A Train CRACWS was secured and B Train was started.

Initial troubleshooting on A Train revealed that valve 1YC358 (CRA-C-1 Oil Cooler Inlet Throttle) was closed too far which resulted in a higher supply oil temperature to the thrust bearing. Engineering personnel speculated that the thrust bearing oil temperature increased very close to the thrust bearing module trip setpoint just prior to shutdown during the ESF Blackout and LOCA test. Upon shutdown, residual heating of the oil occurred which drove the thrust bearing oil temperature up enough to cause alarms. When the Diesel Load Sequencer attempted to restart the chiller it was locked out due to the high thrust bearing temperature alarm being present. Maintenance personnel adjusted valve 1YC358 to ensure proper flow to the oil cooler. A Train chiller was declared operable.

On October 27, 2007, during ESF Blackout and LOCA testing, Train B chiller failed to restart. Unit 1 Control Room annunciator alarms received included "1AD-18 E/11 CRA Chiller B OFF" and "E/12 CRA Chiller

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B Critical Trouble." Non-Licensed Operators (NLOs)were dispatched to the chiller and they reported to the control room that local alarms received on the B Train Chiller Panel included "CONDENSER HIGH REFRIGERANT PRESS" and "COMP'R HIGH BEARING OIL TEMP". The chiller controls are designed such that if the bearing module senses a high temperature then the permissive is met to de-energize two relays which will cause both the "CONDENSER HIGH REFRIGERANT PRESS" and "COMP'R HIGH BEARING OIL TEMP" alarms on the local chiller panels to illuminate. As a result of the NLOs report, Control Room personnel entered AP/0/A/5500/039 (Control Room High Temperature). A Train Control Room Area Ventilation/Chilled Water System was started per procedure (OP/0/A/6450/011, Enc. 4.7) and AP/0/A/5500/039 was exited. Control Room personnel made entry (C0-07-02438) into Technical Specification Action Item Log (TSAIL) for the B Train chiller.

During additional troubleshooting, a calibration check of the bearing module and the temperature sensor determined that the setpoint of the bearing module was found to be 240 degrees F with a reset value of 200 degrees F. The temperature sensor was found to agree with the temperature given on the thrust bearing oil temperature gauge. Engineering personnel also determined that fuse FU-4 was providing input to the temperature reading that actually lowered the temperature sensed by the bearing module. With the input from the fuse, the bearing module setpoint became 195 degrees F with a reset value of 155 degrees F. Normal operating bearing oil temperature is approximately 155 degrees F.

During ESF Blackout and LOCA testing, when Train B Chiller was load shed and control power was removed from the bearing module, the module output contacts opened. When the control power was restored, the bearing oil temperature was above the module reset value. This prevented Train B Chiller from starting when the Diesel Load Sequencer start signal was received.

The A Train Chiller has an identical bearing temperature monitoring circuit as the B Train Chiller, with the same setpoints and fuse FU-4 resistance.

On October 30, 2007, Engineering personnel determined that A Train Chiller was inoperable due to the same problem identified on B Train

Chiller. TS LCO 3.0.3 was immediately entered because both chillers were inoperable.

Engineering change (CD-201603) replaced fuse FU-4 in the B Train Chiller control circuit with a jumper. This removed the 45 degrees F offset such that the reset value of the bearing module would be approximately 200 degrees F which is above the normal operating temperature of the bearing. Post modification testing verified operability of B Train and B Train was declared operable. TS LCO 3.0.3 was exited.

Engineering change (CD-101604) replaced fuse FU-4 in the A Train Chiller control circuit with a jumper. After post modification testing verified operability of A Train, A Train Chiller was declared operable.

CAUSAL FACTORS

The failure of the CRACWS chillers to restart during ESF Blackout and LOCA testing has been attributed to the unanticipated interaction of fuse FU-4 with the Bearing Module sensing circuit. The resistance of fuse FU-4 introduced a 45 degrees F offset into the chiller control circuit which changed the bearing module setpoint and reset values. The reset value created by the fuse was equal to the normal operating temperature of the bearing. Therefore, when the Diesel Load Sequencer start signal was received, the chillers would not start because the bearing oil temperature was not below the reset value.

This condition has existed since the fuse replacement that occurred in B Train Chiller circuitry on January 31, 2007 and in A Train Chiller circuitry on April 10, 2007. The fuse replacement was initiated based on Operating Experience regarding a failed fuse in the chiller control circuitry. The fuse replacement involved only the redundant fuses and was performed as a maintenance activity under the work order process because Engineering personnel believed the replacement was a one for one replacement. Routine maintenance activities do not require post modification testing; however, a functional task is performed to verify that the chiller starts and operates.

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CORRECTIVE ACTIONS

Immediate:

1. An extent of condition review was performed and determined that the failure mode of B Train Chiller was transportable to A Train Chiller.
2. TS LCO 3.0.3 was immediately entered due to both trains of the CRACWS being inoperable.
3. Implemented Engineering Changes (CD-101604 and CD-201603) which replaced fuse FU-4 with a jumper in the Bearing Module Temperature Monitoring circuits for A and B Train Chillers, respectively.

Subsequent:

1. None

Planned:

1. Engineering personnel will insert an editorial note into the manufacturer's manual for the bearing module to denote that fuses can introduce resistance into the circuitry and that resistances of replacement fuses should be taken into account prior to installation.

The planned corrective actions are being addressed within the Catawba Corrective Action Program. There are no NRC commitments contained in this LER.

SAFETY ANALYSIS

The CRACWS provides temperature control for the control room and the control room area. The only function of the system that was affected

by the identified condition was the ability of the chillers to restart following a Blackout.
The CRACWS and specifically the CRACWS chillers are not modeled in the Level One Probabilistic Risk Assessment (PRA) Model. Therefore, the risk from CRACWS inoperability has not been quantitatively determined. Since the CRACWS is not modeled in the PRA, there can be no contribution to the Core Damage Frequency (CDF) or the Large Early Release Frequency (LERF). The safety significance of the CRACWS is low because of the opportunity to mitigate the consequences with plant Abnormal Procedures (APs). When control room temperature becomes elevated, the Control Room operators will enter AP/0/A/5500/039 (Control Room High Temperature). This procedure will direct Control Room personnel to monitor and take actions necessary to cool the control room via opening doors and placing forced air fans at strategic locations. As a result, the loss of the CRACWS has been screened out of the Catawba PRA as either an initiating event or as a support system failure, since it is a slow moving transient due to the preplanned actions previously described.

If quantified, the increase in risk would be expected to be much less than 1E-06 for CDF and much less than 1E-07 for LERF.

In conclusion, the overall safety significance of this event was determined to be low and there was no actual impact on the health and safety of the public.

ADDITIONAL INFORMATION

Within the last three years, five other events occurred that involved operating conditions prohibited by TS. They are as follows:

LER 414/2004-001 involved the unit operating in a condition prohibited by TS due to Reactor Coolant System pressure boundary leakage that resulted from small cracks found in the Steam Generators 2C and 2D Channel Head Bowl drain lines. This condition was attributed to a phenomena called Pressurized Water Stress Corrosion Cracking.

LER 413/2004-001 involved the Centrifugal Charging pumps operating in a condition prohibited by TS due to gas accumulation in the suction piping. This condition was attributed to relief valve failure.

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LER 413/2006-003 involved a TS violation associated with the Hydrogen Ignition System and was attributed to a lack of monitoring and oversight of engineering worker practices associated with modifications. A contributing factor to this condition was that the measuring and test equipment process did not adequately integrate critical operating characteristics important to the accuracy of the test instrumentation.

LER 413/2007-002 involved TS violations associated with Divider Barrier integrity. This condition was attributed to design deficiencies.

LER 414/2007-001 involved a failure to comply with an action statement in TS 3.3.1 for loss of a channel of the Solid State Protection System. This condition was attributed to human error.

None of these events involved the CRACWS and the specific cause of these five events were unrelated. Therefore, this event was determined to be non-recurring.

Energy Industry Identification System (EIIS) codes are identified in the text as [EIIS: XX]. This event is not considered reportable to the Equipment Performance and Information Exchange (EPIX) program.

This event is not considered to be a Safety System Functional Failure.

There were no releases of radioactive materials, radiation exposures, or personnel injuries associated with this event.