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**Gary R. Peterson**  
Vice President  
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April 24, 2002

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

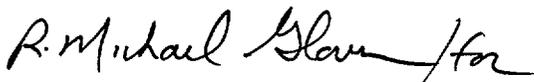
Subject: Catawba Nuclear Station, Units 1 and 2  
Docket Nos. 50-413 and 50-414  
Licensee Event Report 413/02-001

Attached is Licensee Event Report 413/02-001 titled "Both Trains of Control Room Area Chilled Water System Were Inoperable Simultaneously as a Result of Inadequate Troubleshooting Follow-Up."

There are no regulatory commitments contained in this letter or its attachment.

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 L.J. Rudy at (803) 831-3084.

Sincerely,

  
Gary R. Peterson

Attachment

JE22

Document Control Desk  
Page 2  
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xc (with attachment):

Mr. Luis A. Reyes  
Regional Administrator, Region II  
U.S. Nuclear Regulatory Commission  
61 Forsyth Street, S.W., Suite 23T85  
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**LICENSEE EVENT REPORT (LER)**

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

Estimated burden per response to comply with this mandatory information 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 Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@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 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.

<b>1. FACILITY NAME</b> Catawba Nuclear Station, Unit 1	<b>2. DOCKET NUMBER</b> 05000 413	<b>3. PAGE</b> 1 OF 8
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**4. TITLE**  
Both Trains of Control Room Area Chilled Water System Were Inoperable Simultaneously as a Result of Inadequate Troubleshooting Follow-Up

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
02	24	2002	2002	- 001 -	00	04	24	2002	Catawba Unit 2	05000414
									FACILITY NAME	DOCKET NUMBER

<b>9. OPERATING MODE</b> 1	<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §:</b> (Check all that apply)									
	20.2201(b)		20.2203(a)(3)(ii)		50.73(a)(2)(ii)(B)		50.73(a)(2)(ix)(A)			
<b>10. POWER LEVEL</b> 100%	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)			
[REDACTED]	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)		50.36(c)(2)		50.73(a)(2)(v)(B)		OTHER			
	20.2203(a)(2)(iii)		50.46(a)(3)(ii)		50.73(a)(2)(v)(C)		Specify in Abstract below			
	20.2203(a)(2)(iv)		50.73(a)(2)(i)(A)		X 50.73(a)(2)(v)(D)		or in NRC Form 366A			
	20.2203(a)(2)(v)		X 50.73(a)(2)(i)(B)		50.73(a)(2)(vii)		[REDACTED]			
	20.2203(a)(2)(vi)		50.73(a)(2)(i)(C)		50.73(a)(2)(viii)(A)		[REDACTED]			
20.2203(a)(3)(i)		50.73(a)(2)(ii)(A)		50.73(a)(2)(viii)(B)		[REDACTED]				

**12. LICENSEE CONTACT FOR THIS LER**

NAME L.J. Rudy, Regulatory Compliance	TELEPHONE NUMBER (Include Area Code) 803-831-3084
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**13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT**

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
B5	KM	YCCH0002	C147	Yes					

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

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

From February 24, 2002 at 1735 hours until February 27, 2002 at 2255 hours, both trains of the Control Room Area Chilled Water System (CRACWS) were inoperable simultaneously, resulting in Units 1 and 2 being unknowingly in Technical Specification (TS) 3.0.3. At the time, CRACWS Train B was out of service for preventive maintenance. It was retroactively determined that during the early morning hours of February 21, 2002, the CRACWS Train A chiller had become inoperable due to relay leads that had loosened over time and had made intermittent contact. The leads eventually disconnected. The problem with the leads was not identified prior to taking CRACWS Train B out of service as a result of inadequate troubleshooting follow-up. This event resulted in a violation of TS 3.0.3, as well as a violation of TS 3.7.11 for the CRACWS.

Corrective actions taken in response to this event include communicating the troubleshooting aspects of this event to appropriate station personnel so that suspected problem causes are validated prior to considering equipment operable.

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Catawba Nuclear Station, Unit 1	05000413	2002	- 001	- 00	2	OF 8

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

**BACKGROUND**

This event is being reported under 10CFR50.73(a)(2)(i)(B), any operation or condition which was prohibited by the plant's Technical Specifications, and 10CFR50.73(a)(2)(v)(D), any event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to mitigate the consequences of an accident.

Catawba Nuclear Station Units 1 and 2 are Westinghouse Pressurized Water Reactors (PWRs) [EIIS: RCT]. Units 1 and 2 share a common Control Room Area Chilled Water System (CRACWS) [EIIS: KM], which provides temperature control for the control room and the control room area. This function is accomplished by providing chilled water through the cooling coils of the air handling unit supply fans. The CRACWS consists of two independent and redundant trains with each train consisting of a chiller package, a chilled water pump, and air handling units with cooling coils.

Technical Specification 3.7.11 governs the CRACWS. Limiting Condition for Operation 3.7.11 requires that two CRACWS trains be operable in Modes 1, 2, 3, 4, 5, and 6, during movement of irradiated fuel assemblies, and during core alterations. With one CRACWS train inoperable, Required Action A.1 mandates restoration of the inoperable train to operable status within 30 days. In the event that this is not accomplished with the unit(s) in Mode 1, 2, 3, or 4, Required Actions B.1 and B.2 mandate that the unit(s) be in Mode 3 within 6 hours and in Mode 5 within 36 hours, respectively. With two CRACWS trains inoperable with the unit(s) in Mode 1, 2, 3, or 4, Required Action E.1 mandates immediate entry into LCO 3.0.3. For modes and conditions other than Modes 1, 2, 3, and 4, Technical Specification 3.7.11 mandates other required actions when one or both CRACWS trains are inoperable, which include placing the operable train in operation and/or suspending core alterations and the movement of irradiated fuel assemblies.

There are two relays [EIIS: RLY] in the control circuitry for the CRACWS chillers [EIIS: CHU] whose function is relevant to this event. They are designated as K101 and K106. The purpose of K101 is to reset certain downstream relays that could become deenergized during events involving a loss of control power to the chillers. The proper

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

functioning of K101 is required for chiller operability. In the event that power is lost to the chiller control panel, K101 must reenergize when a start is attempted, or the remainder of the control circuit will not receive power and the chiller will not start. One of the relays downstream of and reset by K101 is K106. The purpose of K106 is to provide indication for loss of cooler flow and compressor low oil pressure conditions. K106 affects indication only and proper functioning of this relay is not required for chiller operability. Refer to Figure 1a on Page 8 of this LER for a simplified diagram of the control circuitry for the CRACWS chillers.

When this event was discovered, Units 1 and 2 were operating in Mode 1 at 100 percent power. With the exception of the CRACWS, no structures, systems, or components were out of service that had any significant effect on the event.

**EVENT DESCRIPTION**

(Certain event times are approximate)

Date/Time	Event Description
2/20/02/2013	CRACWS Train A chiller started for normal equipment train rotation. No abnormal indications were noted.
2/21/02/Early AM	CRACWS Train A chiller cooler low flow light was discovered illuminated and would not clear. A work request was initiated to investigate.
2/21/02/~1500	Personnel discovered that relay K106 was deenergized and concluded that CRACWS Train A chiller was operable, based on the fact that K106 affects indication only. Since the problem was believed to be limited to K106, the relay was to be investigated further according to normal established work priorities. Refer to Figure 1b on Page 8 of this LER for a depiction of the as-found CRACWS Train A chiller control circuitry.
2/24/02/1735	CRACWS Train B chiller was declared inoperable for annual preventive maintenance.

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

2/27/02/1857 CRACWS Train B chiller was started for functional verification and CRACWS Train A chiller was shut down. Critical trouble annunciator for CRACWS Train A chiller would not clear. A work request was initiated to investigate.

2/27/02/2255 CRACWS Train B chiller was declared operable.

2/27/02/2326 CRACWS Train A chiller was started. Critical trouble annunciator cleared.

2/28/02/Dayshift Personnel inspected CRACWS Train A chiller; found cooler low flow light energized; relay K106 was observed to be deenergized.

2/28/02/1557 CRACWS Train A chiller was shut down for troubleshooting.

2/28/02/Dayshift Personnel found disconnected wiring on relay K101 for CRACWS Train A chiller.

2/28/02/1948 CRACWS Train A chiller was declared inoperable for repair.

2/28/02/Nightshift Personnel initiated work request to inspect CRACWS Train B chiller for loose wiring. Personnel completed inspection of CRACWS Train A chiller for other loose wiring. No other terminal screws were discovered backed off by more than approximately one-quarter turn.

2/28/02/2218 CRACWS Train A chiller was started.

2/28/02/2333 CRACWS Train A chiller was declared operable.

3/5/02 Personnel completed inspection of CRACWS Train B chiller for loose wiring. No terminal screws were discovered backed off by more than approximately one-quarter turn.

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**CAUSAL FACTORS**

The root cause of this event was determined to be inadequate troubleshooting follow-up of the anomalous indication concerning the CRACWS Train A chiller prior to taking the CRACWS Train B chiller out of service for preventive maintenance. Had the suspected problem with relay K106 been validated, it would have become apparent that the problem was not with K106, but with K101 instead. K101 had relay leads which had become loose over time and had disconnected. The reason for the relay leads becoming loose could not be determined. No work activities were traced to this relay which could have resulted in the leads becoming loose. When the leads became disconnected, the ability of the chiller to be restarted automatically or manually in response to a loss of power event was lost, thus rendering the chiller inoperable.

During troubleshooting activities associated with the CRACWS Train A chiller on February 21, the problem with the leads was not discovered due to inadequate follow-up and validation/verification of the suspected problem. It is believed that the leads were making intermittent contact for a period of time prior to becoming disconnected. When relay K106 was discovered to be deenergized on February 21, the problem was believed to be limited to K106. If the problem were limited to K106, the design function of the chiller to restart following a loss of power event would not have been lost. As a result, the decision was made to take the CRACWS Train B chiller out of service on February 24 for preventive maintenance activities. Therefore, from February 24 at 1735 hours until February 27 at 2255 hours, both units were unknowingly in TS 3.0.3 and in violation of TS 3.7.11.

**CORRECTIVE ACTIONS**

Immediate:

None.

Subsequent:

1. Following the discovery of the disconnected wiring for relay K101 of CRACWS Train A chiller, other wiring associated with the chiller controls for both chillers was examined and checked for tightness.

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

Planned:

1. Engineering and Maintenance management will communicate to appropriate staff personnel the troubleshooting aspects of this event. Specifically, as part of troubleshooting activities, personnel suspecting failed components shall validate the suspicion prior to considering a structure, system, or component operable. Also, personnel shall consider that components providing input to a suspected failed component may themselves be failed, thereby affecting the end component.
2. The communications and expectations associated with troubleshooting activities in Planned Corrective Action 1 will be covered with Operations personnel via formal training to ensure that Operations is aware of this policy.

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

**SAFETY ANALYSIS**

The function of the CRACWS is to maintain the control room and control room area at temperatures required for the proper functioning of plant equipment. Although TS 3.7.11 and TS 3.0.3 were violated as a result of this event, at no time did control room or control room area temperatures exceed those required for the proper functioning of equipment. During the time period that CRACWS Train B was inoperable for preventive maintenance, CRACWS Train A was still operating and maintaining control room and control room area temperatures within required limits. Had a loss of power event occurred, CRACWS Train A might not have been capable, on an intermittent basis, of restarting in response to the event, due to the loose relay leads. However, control room operators would have recognized the failure of CRACWS Train A to restart and would have begun investigating the failure according to procedure. In addition, according to procedure, temporary cooling fans could have been brought into the control room and control room area if necessary to maintain temperatures in these areas within environmental qualification limits for the equipment served by the CRACWS.

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

The CRACWS plays no role in mitigating operator doses during and following accident conditions. This function is accomplished by the Control Room Area Ventilation System (CRAVS). During this event, the CRAVS was operable and capable of performing its required accident mitigating function.

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

**ADDITIONAL INFORMATION**

Within the last three years, one other LER occurred involving incomplete or inadequate troubleshooting activities. LER 413/01-001 involved a reactor trip resulting from a turbine trip. The root cause of this event (incomplete troubleshooting analysis) involved failure to note that a component in the main turbine protection system was not fully reset. Corrective actions from this event included developing troubleshooting guidelines associated with the main turbine controls and the main feedwater pump turbine controls. The corrective actions taken in response to this event could not have prevented this latest event from occurring. Therefore, this latest event is considered to be non-recurring in nature.

Energy Industry Identification System (EIIS) codes are identified in the text as [EIIS: XX]. This event is considered reportable to the Equipment Performance and Information Exchange (EPIX) program.

Although the safety impact of this event was minimal, this condition met the reporting criteria of 10CFR50.73(a)(2)(v) and therefore will be recorded under the NRC Performance Indicators for both units as a Safety System Functional Failure. There were no releases of radioactive materials, radiation exposures, or personnel injuries associated with this event.

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Figure 1a  
CRACWS Chiller Control Circuitry  
(Chiller Running/Normal Operation)

Figure 1b  
CRACWS Chiller Control Circuitry  
(Chiller Running/As-Found 2/21/02)

