

U.S. Nuclear Regulatory Commission
November 3, 1999
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XC:

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LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Catawba Nuclear Station Unit 1	DOCKET NUMBER (2) 05000413	PAGE (3) 1 of 5
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TITLE (4)
Control Room Ventilation System Inoperability due to Spurious Closure of Intakes Resulting in an Entry into Technical Specification 3.0.3

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 NAME	DOCKET NUMBER(S)
4	08	1999	1999	- 006	- 01	11	03	1999	Catawba Unit 2	05000414

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) 100	<input type="checkbox"/>	20.2201(b)	<input checked="" type="checkbox"/>	20.2203(a)(2)(v)	<input type="checkbox"/>	50.73(a)(2)(i)	<input type="checkbox"/>	50.73(a)(2)(viii)		
	<input type="checkbox"/>	20.2203(a)(1)	<input type="checkbox"/>	20.2203(a)(3)(i)	<input type="checkbox"/>	50.73(a)(2)(ii)	<input type="checkbox"/>	50.73(a)(2)(x)		
	<input type="checkbox"/>	20.2203(a)(2)(i)	<input type="checkbox"/>	20.2203(a)(3)(ii)	<input type="checkbox"/>	50.73(a)(2)(iii)	<input type="checkbox"/>	73.71		
	<input type="checkbox"/>	20.2203(a)(2)(ii)	<input type="checkbox"/>	20.2203(a)(4)	<input type="checkbox"/>	50.73(a)(2)(iv)	<input type="checkbox"/>	OTHER (Specify in Abstract below and in Text, NRC Form 366A)		
	<input type="checkbox"/>	20.2203(a)(2)(iii)	<input type="checkbox"/>	50.36(c)(1)	<input type="checkbox"/>	50.73(a)(2)(v)	<input type="checkbox"/>			
<input type="checkbox"/>	20.2203(a)(2)(iv)	<input checked="" type="checkbox"/>	50.36(c)(2)	<input type="checkbox"/>	50.73(a)(2)(vii)	<input type="checkbox"/>				

LICENSEE CONTACT FOR THIS LER (12)

NAME M.S. Purser, Regulatory Compliance	TELEPHONE NUMBER AREA CODE (803)	831-4015
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COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
B7g	VI	DET	Wallace/Tiernan/	yes					

SUPPLEMENTAL REPORT EXPECTED (14)

YES (if yes, complete EXPECTED SUBMISSION DATE)	x	no	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
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ABSTRACT (Limit to 1400 spaces, i.e. approximately fifteen single-space typewritten lines) (16)

On April 8, 1999, at approximately 1506 hours, a spurious high chlorine alarm closed the Unit 2 Control Room Area Ventilation System (CRAVS) intake. A Maintenance technician had been working on the Unit 1 chlorine detector and mistakenly thought this was the detector in alarm. At approximately 1514, the technician reset the Unit 1 alarm, shutting the Unit 1 intake, placing both units in Technical Specification (TS) 3.0.3. The Unit 1 intake was re-opened and TS 3.0.3 was exited at 1515 hours on April 8, 1999.

On April 9, 1999 at approximately 0428 hours, a spurious high chlorine alarm closed the Unit 1 CRAVS intake. The Unit 2 intake was still closed for investigation of the spurious closure of April 8, 1999. Both units entered TS 3.0.3. The Unit 2 intake was sampled for chlorine and the detector was calibrated. The Unit 2 intake was opened and TS 3.0.3 was exited at 0526 hours on April 9, 1999.

The root cause for the first event was failure to stop when unusual system conditions were encountered and failure to follow expectations that work should be performed by the guidance of a work order or procedure. This event has been covered with Maintenance personnel. The root cause of the spurious failures (second event) of the chlorine detectors is still being investigated. The apparent cause may be insufficient cleaning of the electrodes. A long-term solution to the detector failures is being evaluated by Engineering. Both units were at 100% power during the events.

**LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION**

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503

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Background

Catawba Nuclear Station Unit 1 and Unit 2 are four loop Westinghouse pressurized water reactors. The Control Room Area Ventilation System (CRAVS) [EIIS:VI] provides a protected environment from which operators can control the unit following an uncontrolled release of radioactivity or high chlorine gas. The CRAVS system consists of two independent redundant trains that recirculate and filter the control room air. The outside air is continuously monitored for the presence of smoke, radiation and chlorine. The CRAVS system has two outside air intakes. Each intake line has two isolation valves [EIIS: ISV], 1(2)VC5B and 1(2)VC6A in series. There are two chlorine detectors for each intake with one detector interlocked with each valve. Downstream of these valves the intakes join to form a common header which serves the Control Room. Chlorine detectors are in place to close the intake isolation valves when a high chlorine condition is detected.

Technical Specification 3.7.10 "Control Room Area Ventilation System (CRAVS)" requires two CRAVS trains to be operable in Modes 1,2,3,4,5,6 and during movement of irradiated fuel assemblies and during core alterations. With one CRAVS train inoperable the required action is "...to restore it to operable status within seven days". With two CRAVS trains inoperable in Modes 1,2,3, or 4 the required action is "...to enter Technical Specification 3.0.3 immediately".

At the time this condition was identified, Catawba Units 1 and 2 were operating in Mode 1 at approximately 100 percent power. No structures systems or components were out of service at the time that contributed to this event. Both incidents are being reported as operation outside the Technical Specifications, 10CFR50.73(a)(2)(i)(B) and Technical Specification Limiting Conditions for Operation not met, 10CFR50.36(c)(2).

Event Description

4-8-99

1304 Operations entered CRAVS Chlorine Detector Train B 1VCMT5150 in the Technical Specification Action Item Log to perform an Analog Channel Operational Test (ACOT) per Procedure IP/0/A/3162/005, "Control Room Ventilation System (CRAVS) Chlorine Detectors", Section 10.2.

1505 Maintenance technicians placed Chlorine Detector 1VCMT5150 back in service, but not out of TSAIL.

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- 1506 The Control Room received an annunciator alarm for Unit 2 high chlorine and noted that valve 2VC6A had closed. The Maintenance technicians entered the Control Room to inform the operators that 1VCMT5150 was back in service.
- 1507 The Maintenance technicians were paged to contact the Control Room. They looked at the panel which has indicating lights for control valves and noted a valve closed, but did not verify which one.
- 1509 The Control Room Operator told the Maintenance technician that the chlorine detector had gone into alarm and closed valve 2VC6A. The ensuing conversation between the Control Room Operator and the Maintenance technician was less than effective in ensuring appropriate actions were taken to address the situation.
- 1512 The Maintenance technician went to the Work Control Center (WCC) and the WCC Senior Reactor Operator (SRO) stated that the chlorine detector had gone into alarm and closed valve 2VC6A. The Maintenance technician again stated that he had just worked on detector 1VCMT5150. Again, the ensuing conversation did not cue the Maintenance technician that the valve that closed should not have been related to the detector being worked on.
- 1514 The technician returned to Chlorine Detector 1VCMT5150 and noted that the alarm light was not lit. Previous experience with this light being burned out and thinking that the valve associated with this detector was already closed, led the technician to reset 1VCMT5150. This action put 1VCMT5150 into alarm and closed valve 1VC5B. Operations entered TS 3.0.3 because both CRAVS intake paths were closed.
- 1515 The Maintenance technician realized that he had caused valve 1VC5B to close. Valve 1VC5B was reopened and TS 3.0.3 was exited. Valve 2VC6A was left closed.
- 1555 Operations dispatched personnel to sample for chlorine in the Unit 2 CRAVS intake area. No chlorine was noted in the area.
- 4-9-99
0428 The Control Room received an alarm for Hi-chlorine on the Unit 1 intake which caused 1VC5B to close. The Unit 2 intake was already

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closed due to earlier spurious alarms on the chlorine detector associated with 2VC6A. Both units entered TS 3.0.3.

0526 Personnel performed a sample at the Unit 2 intake and no chlorine was detected. The Unit 2 intake was opened and CRAVS Train A was declared operable since two successful ACOTs had been performed on the Unit 2 chlorine detector and no chlorine had been found at the Unit 2 intake. Both units exited TS 3.0.3.

Causal Factors

The root cause of the incident on April 8, 1999, where the Maintenance technician inadvertently closed the Unit 1 chlorine detector which controls valve 1VC-5B was determined to be the failure of the Maintenance technician to follow expectations that field actions should be performed by the guidance of a work order or procedure. The Control Room operator told the Maintenance technicians that valve 2VC-6A had closed due to the chlorine detector going into alarm. The ensuing conversation between the Control Room Operator and the Maintenance technician was less than effective in ensuring appropriate actions were taken to address the situation. The Maintenance technicians performed additional work that was not part of the work package by resetting the detector. The Maintenance technician did not stop work and discuss the situation with his supervisor. Assumptions that the indicating light bulb was burned out instead of questioning the valve position was inappropriate. A contributing factor was poor communication between the Control Room operator and the Maintenance technician.

On April 9, 1999 a spurious failure of the Unit 1 chlorine detector caused valve 1VC5B to close. Valve 2VC-6A remained closed from the failure on the previous day. Both units again entered TS 3.0.3 due to no intake source. An evaluation of the electrode and circuit board of the chlorine detector by site personnel has failed to identify a root cause. An offsite organization has been retained to perform a detailed failure analysis. The apparent cause may be attributed to inadequate cleaning of the electrode.

There have been several recent failures of the chlorine detectors on both units and an engineering evaluation is in progress to determine a long-term solution.

There are eight instances that have been identified over the past two years where maintenance workers did not correctly follow required procedures, documents or drawings indicating a recurring problem.

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The chlorine detector failure has been determined to be EPIX reportable.

Corrective Actions

Immediate

1. In each event, a CRAVS intake was re-opened to restore the system to operable status and exit TS 3.0.3.

Subsequent

1. In house testing was performed on the detectors to investigate the cause of the failures. The results were inconclusive.
2. The circuit board and electrode from 1VCMT5150 were replaced and sent off site for evaluation.
3. Maintenance personnel involved in this event were reminded of the need to stop when unusual system conditions are encountered and discuss the situation with a supervisor.

Planned

1. An Engineering evaluation is in progress to address the root cause and to determine long term options for the chlorine detectors.
2. This event will be discussed with Maintenance, Operations and Chemistry personnel to ensure personnel understand that field actions must be directed by procedure or work order guidance.

Safety Analysis

The short duration of the event combined with the low frequency of events that might result in a significant release of fission products suggests a very low probability that the operators would have been subjected to a dose in excess of the regulatory limits. At no time were the health and safety of the public at risk.