LICENSEE EVENT REPORT (LER)

Facility Name (1)	Docket Number (2)	Page (3)
QUAD-CITIES NUCLEAR POWER STATION, UNIT ONE	0 5 0 0 0 2 5 4	1 of 0 6

Title (4) CONTROL ROOM VENTILATION ISOLATION DUE TO CHLORINE MONITOR PROBLEMS CAUSED BY DEFECTIVE PROCEDURES OR CORROSION

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)
										QUAD CITIES UNIT TWO	0 5 0 0 0 2 6 5
0 6	2 9	8 7	8 7	---	0 1 3	0 0	0 7	2 0	8 7		0 5 0 0 0

OPERATING MODE (9)	4	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10CFR (Check one or more of the following) (11)			
POWER LEVEL (10)	1 0 0	___ 20.402(b)	___ 20.405(c)	X 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)
		___ 20.405(a)(1)(iii)	___ 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
Gary E. Knapp, Tech Staff Engineer, Extension 2153.	AREA CODE 3 0 9 6 5 4 - 2 2 4 1

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 I	M O N	X 9 9	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 June 29, 1987, Quad Cities Units One and Two were both in the RUN mode at 100 percent core thermal power. At 1835 hours, the control room heating, ventilation, and air conditioning (HVAC) system automatically changed to the 100 percent recirculation mode (isolated). Similar events occurred on July 9 and July 14, 1987 at 0715 hours and 1915 hours respectively. Appropriate NRC notification via the Emergency Notification System (ENS) was completed for each event.

The events were caused by either a defective functional test procedure (June 29 and July 14) which allowed residual chlorine to remain in the probe vicinity or corrosion caused by the caustic electrolyte solution used in the probe (July 9). A significant contributing cause was the elevated temperature and humidity present in the analyzer panel.

Corrective actions for these events include the following: Removal of the moisture and residual chlorine in the probe vicinity and replacement of the corroded probe. A new functional test procedure is being developed to prevent further chlorine contamination. The Technical Staff and Station Nuclear Engineering Department (SNED) are considering the installation of a Control Room HVAC room cooler or panel cooler. A setpoint change is also being considered. This report is provided to comply with 10CFR50.73(a)(2)(iv)

PLANT AND SYSTEM IDENTIFICATION:

General Electric - Boiling Water Reactor - 2511 MWt rated core thermal power. Energy Industry Identification System (EIIS) codes are identified in the text as [XX].

EVENT IDENTIFICATION: The Control Room Ventilation System isolated three times due to problems with the chlorine monitor portion of the toxic gas analyzer.

A. CONDITIONS PRIOR TO EVENT:

Unit: One, Two
Reactor Mode: 4
Event Date: June 29, 1987
Mode Name: RUN
Event Time: 1835
Power Level: U1 100%
U2 100%

This report was initiated by Deviation Report D-4-1-87-060.

RUN Mode(4) In this position the reactor system pressure is at or above 825 psig, and the reactor protection system is energized, with APRM protection and RBM interlocks in service (excluding the 15% high flux scram).

B. DESCRIPTION OF EVENT:

On June 29, 1987, Quad Cities Units One and Two were both in the RUN mode at 100 percent of their rated core thermal powers respectively. At 1835 hours, the control room [NA] received a "Control Room Standby Heating, Ventilation, and Air Conditioning (HVAC) System [VI] Major Trouble" alarm. The Control Room's HVAC system then changed to 100 percent recirculation (isolated). This is an Engineered Safety Feature (ESF) [JE] actuation. Immediate investigation by Operating personnel revealed that the alarm was due to a trip of the Control Room HVAC Toxic Gas Analyzer [VI]. The Analyzer's chlorine monitor sensed a high level of 1.25 parts per million (ppm). The trip point of the monitor is set at 1.00 ppm.

Technical Specification 3.2.F.2 notes that the toxic gas detection instrumentation shall consist of a chlorine, ammonia, and sulphur dioxide analyzer with each trip setpoint set at:

a. Chlorine concentration $\leq$ 5 ppm.
b. Ammonia concentration $\leq$ 50 ppm.
c. Sulphur Dioxide concentration $\leq$ 3 ppm.

Instrument Maintenance was immediately dispatched to the Control Room Toxic Gas Analyzer to determine if an instrument error was the cause of the alarm. NRC telephone notification via the Emergency Notification System (ENS) was made at 2125 hours as required by 10CFR50.72.

At 0715 hours on July 9, 1987, a similar event occurred causing the Control Room HVAC System to go to 100 percent recirculation. This actuation was also due to a trip of the chlorine monitor on the Toxic Gas Analyzer.

Instrument Maintenance was immediately dispatched to investigate the problem with the analyzer. NRC telephone notification via ENS was made at 0830 hours as required by 10CFR50.72.

At 1915 hours, on July 14, 1987, a third event causing the Control Room HVAC system to go to 100 percent recirculation occurred. This event was also caused by a trip of the chlorine monitor in the Toxic Gas Analyzer.

Instrument Maintenance was once again dispatched to the analyzer to investigate the occurrence. NRC telephone notification via ENS was made at 2307 hours as required by 10CFR50.72.

C. APPARENT CAUSE OF EVENT:

This report is submitted to comply with the requirements of 10 CFR 50.73(a)(2)(iv), which requires the reporting of any event or condition that resulted in manual or automatic actuation of any Engineered Safety Feature (ESF).

Upon investigation by Instrument Maintenance, it was determined that the cause of the June 29th event was an accumulation of condensation in the vicinity of the chlorine monitoring probe. Probe malfunction due to physical defects was ruled out because a functional test (a temporary procedure based on QIS 79-2, Chlorine Analyzer Functional Test Procedure) was successfully performed on the probe at 1500 hours, just 3.5 hours prior to the event. This test utilized vapors from a five percent sodium hypochlorite solution to trip the probe. Minute amounts of sodium hypochlorite residue that remained on the probe combined with the warm, moist air passing the probe, and collected in the immediate area of the detector. This caused the detector to sense the higher level of chlorine and tripped the Toxic Gas Analyzer. The root cause of the event is a defective temporary functional test procedure which failed to provide steps toward the cleaning of the probe and it's holder after the testing. The probe is a model M-17 manufactured by Anacon Incorporated.

Another problem identified is the Toxic Gas Analyzer's instruments are subjected to the undesirable atmospheric conditions of high heat and humidity during summer months. The extreme conditions adversely affect the reliable operation of these instrument's electronics. Inadequate panel and/or room cooling allows temperatures to rise above the recommended temperature of 105 degrees Fahrenheit for these instruments.

The event which occurred on July 9 was due to a physical defect in the probe itself. Due to unstable readings, a defective probe was immediately suspected. After removal, the probe was inspected and it was discovered that a winding in the probe was corroded and had broken through. The root cause of the corrosion could not be positively determined, however, it is likely that the electrolyte used in the probe, which is somewhat caustic, contributed to the failure.

After an investigation by Instrument Maintenance, it was determined that the July 14th event was not caused by a defective probe. The probe was demonstrated to work properly by removing the probe from the sample line and observing the probe's readings drop to normal levels and then return to high levels once it was reinserted back into the line. Instrument Maintenance reported that a small accumulation of condensation had built up in the proximity of the probe. A sample of this condensation was collected and sent to chemistry for analysis. The analysis revealed that the condensation contained approximately 50 ppm of chlorides, a sufficient amount to trip the probe. The root cause for this event is the same as that for the June 29th event.

D. SAFETY ANALYSIS OF EVENT:

The control room ventilation is designed to automatically switch from the normal air circulation mode (which utilizes outside air) to the recirculation mode when a trip setpoint is reached (noted in Section B of this report). The recirculation mode prevents the intake of toxic gases from the outside air supply. When the chlorine monitor tripped the Toxic Gas Analyzer, the ventilation system went into the recirculation mode as designed. Therefore, the potential for toxic gas entry into the control room via the outside air supply was prevented and no significant adverse effect to safe plant operation resulted from this event.

E. CORRECTIVE ACTIONS:

After the June 29th event, the immediate corrective action was to remove the moisture in the area of the chlorine monitoring probe housing. This was completed at 2022 hours and the Control Room HVAC system was restored to normal.

Corrective action for the July 9th event was to replace the defective probe with a like-for-like replacement and perform a functional test to verify operability. This was completed at 1830 hours on July 10 and the Control Room HVAC was returned to normal.

Corrective action for the July 14th event consisted of flushing the sample line with freon and then with water. A functional test was performed on the probe and the Control Room HVAC was returned to normal at 0220 hours on July 16.

Instrument Maintenance is developing a new functional test procedure utilizing a Toxic Gas Generator to create test conditions. This method should help prevent the future contamination of the probe with chlorine vapor residue. This item will be tracked by Action Item Number 25418087013C1.

The Technical Staff and Station Nuclear Engineering Department (SNED) are addressing the problem of high heat and humidity in the analyzer panel and the Control Room HVAC room itself, by considering the installation of a room cooler or panel cooler. It is felt that this will adequately address the apparent problem of high heat and humidity. This item will be tracked by Action Item Number 25418087013C2.

As noted in Section B of this report, this monitor's trip setpoint is 1.00 ppm while the Technical Specification limit is less than or equal to 5.0 ppm. This excessive conservatism is being addressed by the initiation of QAP 400-T1, Instrument Setpoint Change, to consider a recommendation to raise the trip setpoint to 3.0 ppm. If approved, this should prevent unnecessary challenges to the system but still not affect safe plant operation. This item will be tracked by Action Item Number 25418087013C3.

F. PREVIOUS EVENTS:

Licensee Event Report	Description
254/86-029	Control Room Ventilation isolated (went into recirculation mode) due to ammonia analyzer failure (broken belt on timing mechanism).
254/87-010	Control Room Ventilation Trip due to power loss to Toxic Gas Analyzer - Design deficiency.

G. COMPONENT FAILURE DATA:

Manufacturer	Nomenclature	Model Number	Mfg. Part Number
Anacon, Inc.	Chlorine probe Range 0-50 ppm	M-17	170155-.05
Anacon, Inc.	Electrolyte Solution	N/A	170078

Commonwealth Edison

DEVIATION REPORT

DVR NO. 04- 1 - 87 - 060
STA UNIT YEAR NO.

Supplement 2

PART 1 TITLE OF DEVIATION

TOXIC GAS ANALYZER CL₂ MONITOR TRIP

OCCURRED 7-14-87 (DATE) 1915 (TIME)

SYSTEM AFFECTED: 9400

PLANT STATUS AT TIME OF EVENT: MODE 1 Run, 2 Run, POWER (%) 98%, 99%

WORK REQUEST NO. 058635

TESTING: ☐ YES ☒ NO

DESCRIPTION OF EVENT

The Control Room Ventilation 'A' Train tripped to the 100% Recirculation Mode. Upon investigation the Toxic Gas Analyzer CL₂ Monitor was found to be tripped and reading a solid 1 ppm CL₂. Rad. Protection sampled for chlorine with a portable analyzer and found no problems. CL₂ Monitor declared inop.

POTENTIALLY SIGNIFICANT EVENT PER NSD DIRECTIVE A-07 ☐ YES ☒ NO

10CFR50.72 NRC RED PHONE NOTIFICATION MADE: 50.72(b)(2)(ii) ☐ 1 HOUR ☒ 4 HOUR 2307 (TIME) ☐ NO

C. Hebel (RESPONSIBLE SUPERVISOR) 7-14-87 (DATE)

PART 2 OPERATING ENGINEER'S COMMENTS

Control Room was left on recirc. while the toxic gas analyzer was repaired. It is suspected that the trip occurred due to contamination in the sampling lines.

☐ NON REPORTABLE EVENT

☒ 30 DAY REPORTABLE/10CFR 50.73 (a)(2)(iv)

☐ 5 DAY REPORT PER 10CFR21

☐ ANNUAL/SPECIAL REPORT REQUIRED

A.I.R. #

L.E.R. # 87-013

NOTIFICATION ______ REGION III ______ DATE ______ TIME

______ NSD ______ DATE ______ TIME

☐ CECO CORPORATE NOTIFICATION MADE IF ABOVE NOTIFICATION IS PER 10CFR21

TELECOPY ______ CECO CORPORATE OFFICER ______ DATE ______ TIME

PRELIMINARY REPORT COMPLETED AND REVIEWED: J. Swales (OPERATING ENGINEER) 7-17-87 (DATE)

INVESTIGATION REPORT & RESOLUTION ACCEPTED BY STATION REVIEW: [signatures] R.A. [signature] for AITS

RESOLUTION APPROVED AND AUTHORIZED FOR DISTRIBUTION: [signature] (STATION MANAGER) 7-24-87 (DATE)

Commonwealth Edison
Quad Cities Nuclear Power Station
22710 206 Avenue North
Cordova, Illinois 61242
Telephone 309/654-2241

RLB-87-180

July 15, 1987

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

Reference: Quad-Cities Nuclear Power Station
Docket Number 50-254, DPR-29, Unit One

Enclosed please find Licensee Event Report (LER) 87-013, Revision 00, for Quad-Cities Nuclear Power Station.

This report is submitted in accordance with the requirements of the Code of Federal Regulations, Title 10, Part 50.73(a)(2)(iv), which requires the reporting of any event or condition that resulted in manual or automatic actuation of any Engineered Safety Feature.

Respectfully,

COMMONWEALTH EDISON COMPANY
QUAD-CITIES NUCLEAR POWER STATION

R. L. Bax
Station Manager

RLB/MSK/ekb

Enclosure

cc: I. Johnson
R. Higgins
INPO Records Center
NRC Region III

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