

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1) Limerick Generating Station Unit 1	DOCKET NUMBER (2) 0 5 0 0 0 3 5 2 8 6	LER NUMBER (3)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
		86	043	010	0	2	OF 05

TEXT (if more space is required, use additional NRC Form 306a (1))

Unit Conditions Prior to the Event:

Operating Mode 1 (Power Operation)
Reactor Power 100%

Description of the Event:

On July 28, 1986 at approximately 1615 hours, one of the two Main Control Room toxic gas detectors was declared "inoperable" after it erroneously indicated a high level of vinyl chloride in the outside air intake. A review of data collected by the instruments by the manufacturer's field service representative on August 1, 1986 concluded that the high vinyl chloride reading on the Foxboro MIRAN 981 'A' Toxic Gas Detector (S/N 111) was caused by the presence of water vapor due to high humidity in the sample. Prior to this time it was not known that humidity would adversely impact the readings provided by the detectors which operate using infrared spectrometry (the gases of concern are detected based on their characteristic wavelengths). At 1615 hours on August 1, 1986 the station personnel declared the 'B' toxic gas detector (S/N 110) also to be "inoperable" pending further investigation.

In accordance with Technical Specification Limiting Condition for Operation 3.3.7.8.2 Action b. which states "With both toxic gas detection subsystems inoperable, within 1 hour initiate and maintain operation of at least one control room emergency filtration system subsystem in the chlorine isolation mode of operation", the control room was placed in the chlorine isolation mode.

The detector assemblies of the two monitors were returned to the manufacturer for diagnostic laboratory testing on August 6, 1986. The purpose of this testing was to determine the probable cause of the high vinyl chloride reading and evaluate the potential effects of water vapor.

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TEXT (if more space is required, use additional NRC Form 204a (1))

The manufacturer's test results indicated that the detector's erroneous readings may have been caused by water vapor and carbon dioxide present in the sample. The 'B' detector (S/N 110) was found to be slightly overcompensated for water vapor and carbon dioxide. This overcompensation caused the detector to read zero (or slightly negative) for all ranges of humidity and carbon dioxide. This nonconservative operation created a situation such that the detector may not have alarmed until vinyl chloride concentrations slightly exceeded the Technical Specification set point. The second detector, 'A' (S/N 111), was found to be undercompensated for water and carbon dioxide. This undercompensation caused the detector to interpret high humidity and high carbon dioxide levels as an elevated vinyl chloride indication which is a conservative error.

The manufacturer reprogrammed the water vapor and carbon dioxide correction factors of the two detectors to provide slight undercompensation. This would yield conservative (above zero) vinyl chloride readings during periods of high humidity. However, Philadelphia Electric Company (PECO) review of the test data returned with the detectors determined that under certain humidity conditions the error exhibited by the vinyl chloride channel remained non-conservative and thus unacceptable.

The detectors were returned to the manufacturer on August 20, 1986 for recalibration. At PECO's request, in conjunction with Foxboro concurrence, an alternate wavelength (for photodetection) was used for the vinyl chloride detection channel. The use of the alternate wavelength has improved performance of the vinyl chloride channel such that carbon dioxide compensation is no longer required.

Following the receipt of a letter from PECO engineering and a review of the sequence of events, nonconservative operation was confirmed on August 26, 1986.

Both detectors were returned to service and the isolation reset on August 29, 1986 at 1145 hours.

The EIIS code for the Toxic Gas Detection System is VI.

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NOTE: If more space is required, use additional NRC Form 206a (1)

Consequences of the Event:

The consequences of the event were minimized by the redundant design of the Toxic Gas Detection System. Although the 'B' detector was calibrated in the nonconservative direction, the 'A' detector was conservative and as such would have alarmed below the actual setpoint for vinyl chloride maximum concentrations. In the event that the 'A' detector had been out of service an alarm would have been received at a level slightly higher (3PPM) than the 10 PPM setpoint specified in the Technical Specification. While this concentration would have been higher than the Technical Specification limit it would be well below a level which would adversely affect control room personnel. The nonconservative conditions would only exist during those times when specific humidity and carbon dioxide concentrations existed.

Cause of the Event:

CAUSE CODE: Component Calibration Error (B99)

The root cause of the event is a design deficiency in that the 'B' Toxic Gas Detector was not capable of providing accurate results over the range of humidity and carbon dioxide levels which could be experienced in the Main Control Room air intake.

The initial cause of the event was discovered due to the undercompensated (conservative) 'A' (S/N 111) Toxic Gas Detector which falsely indicated an elevated vinyl chloride concentration due to the presence of high humidity/high carbon dioxide levels. This caused operations personnel to begin an investigation of the 'A' and 'B' detectors thereby determining that the 'B' detector was operating in an overcompensated (nonconservative) condition for an unknown period of time.

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Corrective Actions:

Upon the discovery of the 'A' Toxic Gas Detector giving erroneously high readings on the vinyl chloride channel it was declared "inoperable". Subsequent discussion with the manufacturer's representative led PECO personnel to suspect that the 'B' detector could also be incorrectly compensated for the presence of water vapor and carbon dioxide. At this time the 'B' detector was also declared "inoperable" and the Main Control room Ventilation System was isolated in accordance with the Technical Specification Action Statement.

Testing by the manufacturer, in conjunction with PECO engineering, resulted in recalibration and satisfactory performance of the detectors when they were returned to service.

Action Taken to Prevent Recurrence:

Corrective actions already taken in addition to an increased awareness of the nature of this problem by PECO personnel will preclude the need for any additional action to prevent recurrence.

Previous Similar Occurrences:

LER 85-065 details a calibration problem with the phosgene gas channel of the Toxic Gas Detection System due to a different cause.

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September 25, 1986

Docket No. 50-352

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Washington, DC 20555

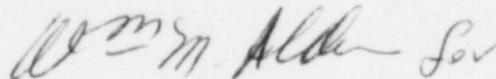
SUBJECT: Licensee Event Report
Limerick Generating Station - Unit 1

This LER concerns the Toxic Gas Detection System vinyl chloride channel operating in a nonconservative condition for the Main Control Room Ventilation System due to calibration problems.

Reference: Docket No. 50-352
Report Number: 86-043
Revision Number: 00
Event Date: August 1, 1986
Discovery Date: August 26, 1986
Report Date: September 25, 1986
Facility: Limerick Generating Station
P.O. Box A, Sanatoga, PA 19464

This LER is being submitted pursuant to the requirements of 10 CFR 50.73 (a)(2)(i)(B).

Very truly yours,



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Superintendent
Nuclear Generation Division

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July 21, 1986