

Ethylene and carbon monoxide fed into sealed areas of a mine

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What happened?

Nitrogen generators use screw compressors to force air through a membrane system to separate nitrogen from oxygen, producing an inert gas with only 3% residual oxygen, which is injected into sealed areas of underground coal mines to inertise potentially explosive atmospheres. The recent failure of a screw compressor on a nitrogen generator led to significant quantities of ethylene and carbon monoxide being injected into sealed areas of the mine. Detection of carbon monoxide and ethylene in underground coal mines is frequently used to signal the onset of spontaneous combustion and can trigger an evacuation of the mine.

How did it happen?

The air end side of one screw compressor experienced a bearing failure due to lack of lubricating oil in the air end. This resulted in partial combustion of the remaining oil due to heat from the failed bearing. Ethylene and carbon monoxide combustion products from the compressor were fed into the nitrogen generator production stream; their detection resulting in several Trigger Action Response Plan (TARP) responses at underground nitrogen injection points. Residual levels of ethylene were being detected in the sealed areas up to four weeks after the event had taken place.

Recommendations

This hazard highlights the need to monitor nitrogen generators for more than just oxygen levels, to prevent combustion products being inadvertently injected into underground mines. It is recommended that all underground coal mines operating nitrogen generators, and suppliers of nitrogen generating equipment, review their equipment and installations to include monitoring to prevent the inadvertent injection of combustion products during a similar failure.

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Issued by the Queensland Department of Natural Resources and Mines

Placement: Place this announcement on noticeboards and ensure all relevant people in your organisation receive a copy.