

SIGNIFICANT INCIDENT REPORT NO: 111

MINE RESCUE TEAM MEMBERS COLLAPSE DURING EXERCISE UNDERGROUND

INCIDENT

Soon after a mine rescue team commenced an underground exercise one of its members collapsed into unconsciousness and another felt dizzy and unwell. The other team members assisted them to remove their masks and the two casualties quickly regained their faculties. No further symptoms were evident.

CAUSES

Analysis of the contents of the oxygen supply cylinders indicated significant quantities of nitrogen. This would have caused the breathing atmosphere within the Drager BG4 sets to become progressively lower in oxygen percentage until it reached critical levels where the users collapsed into unconsciousness.

Further investigation suggests that the local compressed gas supplier mistakenly refilled the cylinders with compressed air.

The potential consequences of such an error are obvious. In this case, the affected team members were fortunate that they were not in an irrespirable atmosphere and were able to safely have their breathing apparatus removed.

The following quotation from "A Manual on Mines Rescue, Safety and Gas Detection" by J Strang and P MacKenzie-Wood, Weston and Co Publishers Pty Ltd, serves to highlight the issues.

"Although nitrogen has no appreciable physiological effect when used in mines rescue conditions, it can accumulate in the circuit of closed-circuit breathing apparatus with dangerous and sometimes fatal results.



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If impure oxygen is used or if the wearer inhales from the outside atmosphere whilst wearing the set, then the nitrogen will eventually accumulate in the breathing circuit, the oxygen from the source supply (compressed gas cylinder) will be absorbed into the body of the wearer and the carbon dioxide from the wearer's lungs will be absorbed by the chemical absorbent (soda lime). This will give rise to a "nitrogen rich" atmosphere with no carbon dioxide to stimulate the respiratory centre and thus collapse will eventually occur without warning."

RECOMMENDATIONS

Owners of any Oxygen Re-breather Closed Circuit Mine Rescue Apparatus must ensure that companies, suppliers or employees tasked with refilling the oxygen cylinders understand that (medical grade) oxygen of a minimum purity of 99.5% must be used.

- **Do not** fill the Oxygen cylinder with compressed air or any other gas or gas mix.
- Ensure the validity of the Oxygen source.

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