

The Reduction of Post-Blast Fumes to Improve Productivity and Safety: A Review Paper

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Abstract : The gold mining industry has predominantly used ammonium nitrate fuel oil (ANFO) explosives for decades, although these are known to be “gassier” and their detonation results in toxic fumes, for example, carbon monoxide (CO), nitrogen oxides (NOx) and ammonia. Re-entry into underground workings too soon after blasting can lead to fatal exposure to toxic fumes. It is, therefore, required that the polluted air be removed from the affected areas within a reasonable period before employees' re-entry into the working area. Post-blast re-entry times have therefore been described as a productivity bottleneck. The known causes of post-blast fumes are water ingress, incorrect fuel to oxygen ratio, confinement, explosive additives etc. To prevent or minimize post-blast fumes, some researchers have used neutralization, re-burning technique and non-explosive products or different oxidizing agents. The use of commercial explosives without nitrate oxidizing agents can also minimize the production of blasting fumes and thereby reduce the time needed for the clearance of these fumes to allow workers to re-enter the underground workings safely. The reduction in non-production time directly contributes to an increase in the available time per shift for productive work, thus leading to continuous mining. However, owing to its low cost and ease of use, ANFO is still widely used in South African underground blasting operations.

Keywords : post-blast fumes, continuous mining, ammonium nitrate explosive, non-explosive blasting, re-entry period

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