

# SAFETY ALERT

## Misfire of explosives

### INCIDENT

There was a series of three misfires at an underground colliery using permitted explosives during the full-face shotfiring of a dyke.

### CIRCUMSTANCES

The mine had been operating a roadheader in developing new entries. Upon hitting a dyke the decision was made to use full-face shotfiring. The initial shotfiring proceeded without incident, but as the job was nearing completion there was a series of three misfires where, despite correct initiation of all detonators, unexploded cartridges or parts of cartridges were found during inspection / mucking out.

### INVESTIGATION

An investigation was carried out assisted by the explosives manufacturer / supplier. The investigation reviewed issues such as the position of the detonator in the primer, decoupling of the explosives from the primer (that is where there is a gap between the primer and the rest of the charge caused by inadequate tamping) and the quality of the explosives. The investigation found no evidence to support these potential causes.

It was found that the most likely cause was desensitisation of the explosives. Desensitisation can occur through transmission of the shockwave from an earlier firing hole, as well as physical deformation of the shothole from the earlier firing hole.

There is a greater risk of desensitisation:

- when full-face firing – the energy is not dissipated to a free face
- on softer ground – where plastic deformation can occur
- with overcharged faces – where hole spacing is too close
- with a poorly designed burn cut that does not provide adequate relief.

The finding in this case was that the most likely cause was a tight shottfiring pattern with high energy levels. This would also have been impacted by the changing ground conditions which resulted in softer ground at the time of the misfires.

## RECOMMENDATIONS

- All mines should ensure shottfiring patterns are designed or reviewed by personnel with the relevant technical expertise and knowledge of blasting in underground coal mines. This is particularly important with full-face firing.
- Mines should implement an audit system to ensure that the drilled face matches the design of the shot.

**NOTE:** Please ensure all relevant people in your organisation receive a copy of this Safety Alert, and are informed of its content and recommendations. This Safety Alert should be processed in a systematic manner through the mine's information and communication process. It should also be placed on the mine's notice board.

**Signed**



**Rob Regan**  
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