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WESTERN AUSTRALIA

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SAFETY BULLETIN NO: 54

BLAST INITIATION WITH SAFETY FUSE

PRELIMINARY

Fuse initiation is as old as blasting, with the advent of gunpowder several centuries ago.

By the decades of the sixties and seventies the product manufactured in Australia and known as Yellow Sump Safety Fuse had reached a high standard of consistency and reliability in performance, given correct storage, handling and usage.

Since then that product has been replaced by a series of fuses imported by suppliers from various overseas sources, some of which have compared unfavourably in performance with the original fuse, which had been an industry standard for decades.

Recent critical incidents involving the use of safety fuse in blasting in mines in several States have impelled the Department's Mining Inspectorate to issue this Bulletin in which the risks associated with fuse firing are outlined, and recommendations made on the limitations and controls which should be applied in its future use at mines in Western Australia, with the final objective of its elimination.

HAZARDS IN THE USE OF FUSE INITIATION

Apart from the decrement to performance (including burning rate), caused by sub-standard handling and storage, and some limitations in use in adverse conditions, there are two major hazards intrinsic to fuse initiation.

The Time Lag to Initiation

Once the fuse is lit the blast is committed. It is not possible, without incurring an unacceptable risk, to stop the firing.

During the period for which the fuse burns (which is typically 5 to 10 minutes to allow a safe retreat), inadvertent and uncontrolled entry of persons to the blasting area can arise, and has arisen. Mining has a history of death and serious injury under these circumstances.

Electric or other means of immediate initiation at a precise moment affords a much higher degree of control and margin for safety, if exposure of personnel to the blast area is detected or suspected for any reason. Such incursions in open pit operations in particular are normally visible from the firing point.

Erratic Burning Rate of the Fuse

A number of factors (other than the recognised variability in manufacture) can alter the burning rate of fuses, including excessive flexing and bending in handling and use, and damage to the fuse carcase. However, the major risk is that of excessively rapid burning, particularly where the person lighting the fuse is directly exposed in the blast area.

There have been several critical incidents of this type in the past 18 months, fortunately not resulting in death or injury, but the potential is massive, and the exposure risk of persons using this practice is totally unacceptable.

A further hazard with safety fuse is the potential for premature ignition of the detonator by a discharge of static electricity from the person lighting the fuse. The static discharge travels via the powder core and initiates the priming charge in the detonator, in the same way that the fuse “spit” is designed to do.

This effect was first identified in Canada in the sixties and has been the suspected cause of some premature explosions since then.

In September 1999, a person was seriously injured in Victoria in the course of demolition blasting. Several fuses burned normally but one charge exploded immediately the fuse was lit.

The finding of the investigation was that the most probable cause was static electricity discharge.

CONSIDERATIONS ON CURRENT PRACTICE WITH FUSE FIRING

The use of fuse in initiating blasts in some underground mines continues on the basis of operating convenience and perceived cost saving.

The extension and maintenance of firing lines and use of bell wire is avoided by use of fuse firing.

As is apparent from the hazards discussed above this practice involves an unacceptable level of risk to the person firing the charge. Moreover, it increases the possibility of inadvertent entry of other persons, either to the immediate blast area, or into adjacent areas where the risk of rock falls triggered by the blast is high.

These risks are largely eliminated by electric firing from designated secure areas, in conjunction with a high integrity clearance check system for all personnel in the mine.

New technology currently developed and in use in mines in Australia offers remote initiation from the surface by transmission of signals through the rock to blast initiation units placed in appropriate locations. Alternatively, the initiation signal may be sent via a leaky feeder cable system to units within range of the cable network. Intrinsic safety is very high.

Advice from suppliers is that stocks of igniter cord, fuse connectors, and electric initiators are no longer carried. In the past these accessories provided a safe and reliable means of remote initiation of fuses.

The widespread, almost universal adoption of non-electric (shock tube) initiation systems has resulted in a great reduction in the supplier stocks of electric detonators. For shock tube initiation, delays are not required and instantaneous electric detonators are adequate. Moreover, they are cheaper than delay detonators.

The shock tube system offers a high level of reliability and intrinsic safety, but this is gravely compromised by the use of a fuse at the face to initiate the blast.

Some mining companies have prohibited the use of fuse firing in both underground and surface operations in the light of the risk factors outlined above.

Advice from suppliers and manufacturers of explosives is to the effect that they are trying to discourage customers from fuse initiation, as more intrinsically safe methods are now available, at an increased cost margin which is more than offset by risk reduction.

RECOMMENDATION

All mining operators are enjoined to:

1. Review current blast initiation practices, taking account of the information in this Bulletin, as well as advice and information from suppliers and manufacturers.

2. Eliminate the use of fuse from blasting completely (unless the fuse is remotely initiated from a safe location), and consult with manufacturers and suppliers on initiation systems with an intrinsically high level of safety.

In determining safe systems of work the obligations of the duty of care in the Mines Safety and Inspection Act should be met. In particular, the test for practicability is most relevant to this issue.

"Practicable" *means reasonably practicable having regard, where the context permits to –*

(a) the severity of any potential injury or harm to health that may be involved and the degree of risk of such injury or harm occurring; and

(b) the state of knowledge about –

(i) the injury or harm to health referred to in paragraph (a); and

(ii) the risk of that injury or harm to health occurring; and

(iii) means of removing or mitigating the potential injury or harm to health; and

(c) the availability, suitability, and cost of the means referred to in paragraph (b) (iii).

This Bulletin should be read in conjunction with the *Safety Alert* issued by Queensland DME on 11 May 2000, titled *"Safety Fuse Yellow Waterproof (WASAG Chemie Manufacture*)".

J M Torlach
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ThinkSafe MineSafe