

# EXPLOSIVES SAFETY

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## INTRODUCTION

It has long been known and often stated that in any competent risk management process, hazards need to be identified, assessed and properly managed so that safety of employees and the broader community can be assured.

In relation to most mines and quarries, one such hazard which should come easily to mind is 'explosives', which are, an essential tool for this industry.

It is the enormous power generated by blasting explosives that make them both extremely efficient tools and devastatingly, destructive dangers, and hence, despite what might be regarded as a low probability of any unexpected explosives incident, the risk posed to the mine or quarry by the presence of explosives must always be rated as high. On site controls will therefore need to be in place to address this high-risk hazard.

## CONTROL MEASURES

In attempting to control the high risk posed by explosives, much will have already been done prior to any explosives arriving at a mine or quarry site.

(a) *Authorisation.* Any explosive which is to be used or handled in Queensland must first go through a process of 'authorisation', where the supplier is required to provide, inter alia, formulations and explosives characteristic details to the regulatory authority for assessment. This enables unstable, overly sensitive or otherwise dangerous formulations to be eliminated. Further, the supplier is required to carry out testing of their product to enable each to properly categorised or 'classified'. The classification, carried out using internationally agreed tests, is the basis then on what controls and obligations are imposed by explosives legislation.

(b) *Manufacture/Import.* Whether the product is locally manufactured or imported, the relevant operation needs to be licensed under the explosives legislation. The

products are monitored by the Explosives Inspectorate to ensure that authorisation has taken place, the product is properly packaged and labelled to reflect the nature of the contents, information is available to allow safe use of the product and that the supplier is aware of its obligations in providing a product 'fit for use'.

(c) *Storage.* Any explosives stored for a period prior to delivery to a mine or quarry, must be done so only at a site authorised under the explosive legislation. Again, these storage sites are monitored by the Explosives Inspectorate to ensure, not only security of storage, but also suitability of storage to provide for continued quality of explosives product.

(d) *Transport.* Explosives delivered to any mine or quarry site must be transported by means authorised under the explosives legislation. Such authorisation requires that the vehicles be appropriately designed, equipped and placarded, that the driver of those vehicles be trained in the safe transport of explosives, and be aware of their obligations while transporting same.

And so, the explosives are ready to present their high-risk status to a mine or quarry site. It has been indicated previously (1) that it is generally the administrative or procedural controls on site that will provide for explosives safety and that the explosives life on site should be tracked so that appropriate procedures can be applied to control the high risk.

Some areas of activity were identified, including,

- Purchase of explosives (supplies, types)
- Receipt of explosives
- Transport of explosives
- Storage
- Manufacture
- Use (including design)
- Disposal of explosives
- Decontamination of equipment prior to maintenance/disposal
- Blasting contractors

While legislative controls will continue to assist safety on a mine or quarry site, it is essential that the systems and procedures for handling explosives are

- comprehensive
- clear
- competent
- complied with

## DEFICIENCIES

The following is a list of examples where the Explosive Inspectorate considered deficiencies existed in the safety systems or procedures on sites leading to uncontrolled high-risk situations. It is accepted that assessments are to some extent subjective, however this merely confirms the need to ensure explosives competence on the part of any person or team reviewing the explosives procedures on a site.

### (a) Purchase of explosives

Situation: Inappropriate explosives purchased and loaded into reactive round conditions. Resultant premature explosives provided dangerous conditions for a blast crew who had to subsequently address the shot.

### (b) Receipt of explosives

Situation 1: A large tonnage of explosives was kept for a long period (hours) in heavily populated, administrative area of a mine, uncontrolled and unattended, awaiting delivery to a work area. This presented an unnecessary and unacceptable risk to a large number of the mine community.

Situation 2: A delivery vehicle with a large quantity of explosives on board was sent to the bench where some explosives required for a shot were unloaded. This presented an unnecessary and unplanned risk to the driver and load of explosives, and to the blast crew.

### (c) Storage of explosives

Situation 1: Underground operator drove a vehicle into a magazine to deposit a pallet of explosives. As he manoeuvred the vehicle it struck a wall on which several hundred signal detonators were suspended. Several hundred exploded in a

chain reaction but fortunately the high explosives were not initiated.

Situation 2: Explosives storages not designed or operated to national standards (AS 2187, Part 1) present an unacceptable risk to the broader community. E.g.

- Anyone on mine can draw explosives from the magazine.
- Explosives taken from a magazine are allowed to remain outside the control of a magazine, on unmanned vehicles, etc.

### (d) Transport of explosives

Situation 1: Detonators and high explosives transported together in the same compartment on a vehicle.

Situation 2: Explosives left in the rear of an open back vehicle, in populated areas of mine e.g. outside the canteen.

Situation 3: Because vehicles may be required to carry explosives – all vehicles marked with the word 'Explosives' whether carrying explosives or not.

Situation 4: Explosives thrown from the rear of a vehicle to positions near holes on the bench.

Situation 5: Detonators carried loose on the dash of vehicles.

### (e) Manufacture of explosives

Situation 1: Explosives manufacturing vehicles designed and constructed without reference to relevant national standards and without reference to explosive suppliers who are/should be aware of the hazards and the protective measures necessary for their products. e.g. pump systems, augur designs, etc.

Situation 2: Dye not being used in the manufacture of ANFO to identify level of mixing and to enable

differentiation between ammonium nitrate and ANFO.

- Situation 3: Persons operating emulsion pumping equipment with insufficient training on hazards and equipment.
- Situation 4: Vehicles and/or equipment taken to workshops for repair work without being properly decontaminated. ('Empty' vehicles can contain many hundred kilograms of product).
- Situation 5: Explosives related equipment e.g. pumps being maintained by persons without appropriate procedures or training.
- Situation 6: Insufficient or inappropriate training of explosives personnel indicated, inter alia, by a belief that emulsions are safe.

(f) Use of explosives

- Situation 1: Persons placed on a blast crew with little or no knowledge about the products being handled.
- Situation 2: Some benches being loaded with large numbers of personnel on the shot.
- Situation 3: Vehicles driving over loaded (and even hooked up) shots.
- Situation 4: Persons designing shots, on the basis of history, while admitting 'no idea what I'm doing'.
- Situation 5: Designs of shots not taking into account the loading equipment being used.
- Situation 6: Boosters being dropped down holes (against directions on the Technical Data Sheets) even though the sensitive part of the initiation system is on the bottom of the detonator/booster combination. ["This is the way we've always done it"]
- Situation 7: Ill-defined responsibilities on site between contractors and mine

personnel, resulting in confusion in relation to who does what.

(g) Disposal of explosives

- Situation 1: Licensed Shotfirer, disposing of emulsion explosives by burning, did not follow proper procedure. Explosives detonated during burning, fortunately only injuring one person.
- Situation 2: Mine or quarry closes and does not clear the magazine of explosives.
- Situation 3: Unwanted explosives, or explosives from a misfire, returned to supplier without authorisation. This has resulted in high explosive plugs, with detonators inserted therein, being returned to Government Explosives Reserves. Safety during transport and at Reserves compromised as a result.

(h) Explosives Contractors

- Situation 1: Insufficiently defined roles and responsibilities to enable clarity of tasks, procedures and outcomes for safety of operations.

As indicated previously the above situations are real examples of systems and procedures being either missing or inadequate to allow for acceptable safety. It is to be hoped they may provide some guidance as to potential high risk areas that may exist on any sites and that reviews will be carried out to implement appropriate safety-based control measures where such situations and their like may be identified. It is not acceptable for the mining or quarrying industry to regard explosives as just another tool.

As indicated earlier the Explosives legislation will continue to assist in the promotion of explosives safety on mine sites. The following notice outlines the status of the current legislation, its availability and the significant recent changes.

**REFERENCES**

- (i) Explosives – Hazard Management, Queensland Mining Industry Health and Safety Conference, 1998.

## CHANGES TO EXPLOSIVES LEGISLATION IN QUEENSLAND

The purpose of this notice is to provide advice on changes that have happened and changes that are going to happen regarding the Explosives Act, Explosives Regulations and other associated standards and codes of practice.

### 1. EXPLOSIVES ACT

The new Explosives Act, known as the *Explosives Act 1999*, has now been proclaimed and came into force on **11 June 1999**. The *Explosives Act 1999* replaces the *Explosives Act 1952*.

A summary of the approach adopted and major changes to the Explosives Act is presented on pages 3 & 4 of this notice in Section 5.

Copies of the *Explosives Act 1999* can be purchased from GOPRINT ph 32463399 or 1800 679 778 (from outside Brisbane). The *Explosives Act 1999* can also be accessed on the Internet at no cost at <http://www.legislation.qld.gov.au>.

### 2. EXPLOSIVES REGULATION

The *Explosives Regulation 1955* will be replaced by new explosive regulations within the next 12 months. The *Explosives Regulation 1955* will continue to remain in force until replaced by the new Explosives Regulations. This will occur before the end of June 2000.

The new Explosives Regulation will be drafted over the next 12 months. Consultation will be widespread during the drafting of the regulation. Your contributions, views and comments will be most welcomed in shaping the new regulations. Please forward your input to:

**Chief Inspector of Explosives, GPO Box 194, Brisbane 4001 by 31 August 1999**

Copies of the *Explosives Regulation 1955* can be purchased from GOPRINT ph 32463399 or 1800 679 778 (from outside Brisbane). The *Explosives Regulation 1955* can be accessed on the Internet at no cost at <http://www.legislation.qld.gov.au>.

### 3. AUSTRALIAN EXPLOSIVES CODE

The Australian Code for the Transport of Explosives by Road and Rail (AEC) is a national document to provide a uniform basis for the land transport of explosives in Australia. The first edition of the AEC is called up in the *Explosives Regulation 1955*. Currently, the AEC is being revised and the second edition will be released around November 1999. When the second edition is released, all operators will be given a transition period of six months to implement any changes necessary to systems and procedures so that they may comply fully with the new edition. During this period, operators must comply with either the first edition or the second edition. After six months, all operators should have made the transition and they must then fully comply with the second edition.

Copies of the AEC may be purchased from the Commonwealth Government Bookshop ph 07 32296951, 07 32296822 or toll free ordering on ph 132447. The Internet contact is <http://www.ausinfo.gov.au>.

## Australian Standards

Standards Australia have published and released four specific documents that satisfy requirements under the *Explosives Regulation 1955*. These documents are parts of Australian Standard AS 2187 Explosives – Storage, Transport and Use. These parts are:

- AS 2187.0-1998 Part 0: Terminology. This replaces AS 2189-1983, Explosives- Glossary of Terms;
- AS 2187.1- 1998 Part 1: Storage. This replaces AS 2187.1-1984, Explosives- Storage Transport and Use, Part 1: Storage and land transport and AS 2188-1988, Explosives- Relocatable magazines for storage;
- AS2187.2-1993 Part 2: Use of Explosives;
- AS 2187.4-1998, Part 4: Pyrotechnics- Outdoor displays.

Australian Standards are available from Standards Australia, 232 St Pauls Terrace, Fortitude Valley Q 4006 ph 07 32161355 or Customer Service Centre 1300 654646. The Internet contact is <http://www.standards.com.au>.

#### **4. SUMMARY OF APPROACH ADOPTED AND MAJOR CHANGES TO EXPLOSIVES ACT**

*The Explosives Act has considered the following issues:*

- Identifying all explosives and explosives activities;
- Setting standards for acceptable explosives and explosives activities and obligations on those involved;
- Employing a system of authorities to grant approval for, and allow policing of, acceptable activities;
- Providing for an inspectorate with the necessary powers to effectively monitor and enforce compliance with requirements;
- Being part of a network of national and international controls on explosives;
- Limiting the provisions of the legislation to safety and not to the business activities of the explosives industries;
- Adopting a cradle to grave type approach covering a comprehensive range of activities including development, manufacture, importation, storage, transport, sale, use, disposal and export;
- Ensuring the term 'explosives' represents a broad class of materials including blasting explosives, fireworks, ammunition, reloading powders, flares, toys such as caps for toy guns and practical devices such as airbag actuators for cars;
- Recognising co-regulation where standards and codes of practice are developed by both government and industry representatives;
- Recognising community service obligations for explosives safety;
- Ensuring its provisions are complementary with other legislation and does not duplicate requirements established elsewhere; and
- Recognising that explosive materials posing a significant risk to the community and such risk being properly managed.

– **Major Changes to Explosives Act**

- The majority of the changes to the Explosives Act resulted from consideration of the following matters:
  - fundamental legislative principles;
  - current drafting guidelines; and
  - an easy to read style.
- The significant changes to the Act are as follows:
  - The explosives legislation has general application and applies uniform requirements throughout Queensland. The only exemption applies to the control of military explosives covered under the Explosives Act 1961 (Commonwealth).
  - The *Explosives Act 1999* in Part 7 provides for appeals to a Magistrates Court and outlines how such appeals may be processed. In this manner, the powers to grant, refuse, amend, suspend or otherwise deal with authorities under the Bill are subject to, and are seen to be subject to, appropriate external review. The *Explosives Act 1952* provided for appeals against decisions to be made firstly to the Chief Inspector and then to the Minister whose decision was final.
  - Given the nature of the explosive materials, the consideration of a person's suitability to hold an authority, granting access to and use of explosives includes the need to consider the mental and physical state of the applicant.
  - Protection is provided in the *Explosives Act 1999* Part 8 (Section 125) to doctors and psychologists who provide information to the Chief Inspector about a patient's mental or physical condition, and applies despite any duty of confidentiality owed by the doctor or psychologist to the patient. This is similar in the Weapons Act.
  - Penalties have been increased significantly from \$6300 (84 penalty units) to \$30000 (400 penalty units) in the Act for an individual to maintain an effective deterrent value and to reflect relativity with other legislation e.g. Weapons Act, Workplace Health and Safety Act. For a corporation these penalties are increased five fold.
  - The *Explosives Act 1999* imposes requirements on import and export of explosives from other countries only. The import and export provisions of the *Explosives Act 1952* applied to explosives moving interstate as well as to or from overseas.
  - The obligation to report "explosives incidents" has been broadened.
    - The *Explosives Act 1999* Part 5 defines an 'explosives incident' to be any of the following events involving explosives:
      - an explosive is, or appears to have been lost or stolen;
      - an accidental explosion, fire or spillage;
      - a death, injury or unexpected damage; or
      - an unexpected event, with the potential to cause any of the above.

Information gained from the investigation of all explosives incidents, including "near misses", should and will be used to further improve safety with explosives.