



Government of **Western Australia**  
Department of **Mines and Petroleum**  
Resources Safety

## **Guide to blast plan preparation, including mining operations**

**In accordance with the Dangerous Goods Safety (Explosives) Regulation 2007  
and the Mines Safety Inspection Regulation 1995**

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Level 1, 303 Sevenoaks Street (cnr Grose Ave), Cannington WA 6107

Postal address: Mineral House, 100 Plain Street, East Perth WA 6004

Telephone: (08) 9358 8002 Facsimile: (08) 9358 8000

[ResourcesSafety@dmp.wa.gov.au](mailto:ResourcesSafety@dmp.wa.gov.au)

[www.dmp.wa.gov.au](http://www.dmp.wa.gov.au)      [www.wa.gov.au](http://www.wa.gov.au)

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## Introduction

The Dangerous Goods Safety (Explosives) Regulations 2007 (Explosives Regulations) require the preparation of a blast plan and written blast records before an explosive is used to blast rock or similar solid material, or to damage, destroy or demolish anything, whether on or under land or water.

This guide and its associated templates will assist the mining industry and other blasting operations to prepare a blast plan and records about the blast that address the key requirements of regulations 129, 130 and 134 of the Explosives Regulations. They are based on sections A2 and A3 of Australian Standard AS 2187.2 *Explosives – Storage and use – Use of explosives*.

*Note: The Explosives Regulations are invoked in regulation 8.1A of the Mines Safety and Inspection Regulations 1995. Comments related directly to the use of explosives in mining have been italicised in brown in this guide.*

There are five templates available from the Resources Safety website in the dangerous goods templates section. One is for general blasting and the others have mining applications.

*Note: One blast plan may relate to multiple proposed uses of explosives if it is intended that they occur simultaneously or in rapid succession at one site.*

*In mining, most blasts are conducted in a way that is substantially the same for each application. For example, in any given blast in underground development, the same drilling pattern and load factors would be used each time a face of that particular size and type is fired. Consequently, there is repeated use of what is essentially the same blast plan.*

*In order to minimise non-productive administrative work, a series of templates has been developed for surface and underground mining applications of various types. There are three sections to the mining blast plan templates covering:*

- *details of the generic, fundamental, unchanged elements of a blast (e.g. purpose, authorisation, design, load factors)*
- *details of the elements that may change from blast to blast (e.g. position, firing time, responsibility)*
- *a record of the blast.*

## What is the purpose of the blast plan?

The purpose of a blast plan is to:

- detail the objectives for the project or task
- identify risks, hazards and controls
- identify site-specific requirements
- introduce blasting as part of the overall task
- control the blast process from design to initiation, evaluation and misfire treatment
- implement a review process to ensure that the objectives are met
- assure the safety of the public, site personnel and surrounding properties.

It is a regulatory requirement that the blast plan be followed. Components of the blast plan may be submitted to one or more competent persons within the organisation responsible for authorising the blast.

By maintaining written records of the use of explosives as part of the blast plan, details surrounding the conduct of the blast and post-blast analysis are documented. This will be important should there be a complaint or incident in relation to the blast.

## Who prepares a blast plan and records the blast?

Regulation 129 states that *before* an explosive is used, the following people must prepare a blast plan or ensure that one is prepared:

- shotfirer

- person for whom the shotfirer is working
- person who has control and management of the work that necessitates the use of the explosive
- person who has the control and management of the place where the explosive is used.

Within seven days of the use of an explosive, the shotfiring licence holder must make a proper written record of the blast.

*In mining applications, the manager of the mine would have control and management of the mining operations under the principal employer at the mine. It is thus the responsibility of the manager and principal employer to ensure that the relevant legislative requirements under the Mines Safety and Inspection Act 1994, Mines Safety and Inspection Regulations 1995, Dangerous Goods Safety Act 2004 and Explosives Regulations are met.*

## What are the benefits of using this guide and templates?

Use of the blast plan templates is *not mandatory* and organisations may already have a blast plan that complies with the relevant regulations. However, familiarity with this guide and templates will ensure awareness of the statutory obligations and assist in determining the type and level of information required.

The templates comprise two or three sections, depending on the blast type. Section 1 of the general purpose template is equivalent to Sections 1 and 2 of the mining templates.

- **Section 1** of the general purpose blast plan or **Sections 1 and 2** of the appropriate mining template are to be completed by the relevant people (or their delegates) before an explosive is used. When completed, it will include the necessary information for a blast management plan as required by regulations 129 and 130. *For the mining template, Section 1 contains the generic information that applies to each blast of any given type, while Section 2 contains particular information about a particular blast (including deviations from the generic information).*
- **Section 2** of the general purpose template or **Section 3** of the appropriate mining template is to be completed by the shotfirer only, and will provide a record about a blast as required by regulation 134.

*Note: Although a blast plan may be prepared with the assistance of this guide, additional information, evidence or verification may be required in some situations.*

## How to use the guide and templates?

Appendix 1 is a blast plan template and Appendix 2 is a template for record of use of explosives.

*Note: In mining blast plans, the order in which issues are dealt with may vary, as some will be generic and others will relate to specific individual blasts.*

Some items may not be applicable to your particular circumstances. If this is the case, do not leave the item blank but insert "NA" (not applicable) to indicate that it has been considered.

If there is insufficient space for descriptions, please attach additional information (e.g. papers, reports, plans) to the template as required. Where you judge that a documented procedure or activity already exists that complies with the regulations, make a note alongside the item and attach the document to the template.

## What happens to the blast plan?

Regulation 134(3) specifies that a blast plan and a proper written record of the use of an explosive are to be kept by:

- holder of a shotfiring licence (unless the holder was employed under a contract of service when using the explosive)
- person for whom the shotfirer was working when using the explosive, whether under a contract for services or a contract of service
- person who has the control and management of the work that necessitated the explosion

for two years after the use of the explosive. *In mining operations, the manager of the mine or the principal employer at the mine would be required to hold copies or originals.*

The blast plan is not submitted to Resources Safety for authorisation. However, as indicated above, it must be kept because either an inspector of mines may require the document to be produced at any time or the Chief Officer under the *Dangerous Goods Safety Act 2004* may, at any time, make a written request for a copy before a specified date.

## Appendix 1 – Blast plan

(TO BE COMPLETED BEFORE AN EXPLOSIVE IS USED)

### Brief blast summary

The following elements of appendix A section A2 of Australian Standard AS 2187.2 are covered in the table below:

- Appendix A section A2.2(x) – Proposed dates and times of blasting
- Appendix A section A2.2(a) – Location of the proposed blasting
- Appendix A section A2.2(b) – Description of the proposed blasting

<b>Blast date</b>	
<b>Blast time</b>	
<b>Address where blast conducted</b>	
<b>Brief description of blast</b>	<p>To consider :</p> <ul style="list-style-type: none"> <li>• summary of the type of initiation and explosives that are to be used</li> <li>• whether the blast is taking place in a built up area or a remote location</li> <li>• timing of the blast</li> <li>• number of people and equipment involved (e.g. MPUs in use)</li> <li>• layout of the blast pattern</li> <li>• access to the blast area.</li> </ul>
<b>Objectives for the blast</b>	<p>To consider :</p> <ul style="list-style-type: none"> <li>• whether blast designed for demolition, extraction of ore, civil works or other</li> <li>• key safety considerations</li> <li>• key environmental considerations</li> </ul>

### Details of key appointments and responsibilities for the blast

Regulation 129 and the following elements of appendix A section A2 of AS 2187.2 are covered in the tables below:

- AS 2187.2 Appendix A section A2.2(d) – Identification and position of the person responsible for the project including project safety and security
- AS 2187.2 Appendix A section A2.2(e) – Identification and position of person who has given approval to use explosives on the project
- AS 2187.2 Appendix A section A2.2(f) – Key appointments and responsibilities
- AS 2187.2 Appendix A section A2.2(g) – Shotfirer's details

### Details of blast plan author and category

<b>Name and category</b>	[Insert name(s) of blast plan author as required by regulation 129 and, where appropriate, type of shotfirer permit or other authority that allows the person to be in possession of explosives]		
<b>Company name &amp; address</b>			
<b>Position</b>			
<b>Contact details</b>	Ph:	Fax:	Mobile:
<b>Email</b>			

**Details of person responsible for the blast, including safety and security (if different from above)**

<b>Name</b>			
<b>Position</b>			
<b>Company name &amp; address</b>			
<b>Contact details</b>	Ph:	Fax:	Mobile:
<b>Email</b>			

**Details of person who gave approval to use explosives (if different from above)**

<b>Name</b>			
<b>Position</b>			
<b>Company name &amp; address</b>			
<b>Contact details</b>	Ph:	Fax:	Mobile:
<b>Email</b>			

**Details of shotfirer (if different from above)**

<b>Name</b>			
<b>Position</b>			
<b>Company name &amp; address</b>			
<b>Contact details</b>	Ph:	Fax:	Mobile:
<b>Email</b>			

**Details of any other key people involved in the blast and their responsibilities**

<b>Name</b>			
<b>Position</b>			
<b>Responsibility</b>			
<b>Company name &amp; address</b>			
<b>Contact details</b>	Ph:	Fax:	Mobile:
<b>Email</b>			
<b>Blast crew name</b>			
<b>Security card no</b>		Expiry date:	
<b>Blast crew name</b>			
<b>Security card no</b>		Expiry date:	

**Location of blast and permits or licences**

The following elements of appendix A section A2 of AS 2187.2 are covered in the table below:

- Appendix A section A2.2(a) – Location of the proposed blasting
- Appendix A section A2.2(y) – Details of the exclusion zone (see appendix L)
- Appendix A section A2.2(i) – Details of adjacent structures or services that influence the blast design
- Appendix A section A2.2(c) – Permits/licences required for the project
- Appendix A section A2.2(j) – Details of reports, drawings and records consulted

<b>Blast location</b>		
<b>Exclusion zone (metres)</b>		
<b>Distance (metres) to</b>	Nearest dwelling:	Nearest structure:
	Nearest personnel:	Nearest public access:
	Nearest services (e.g. water , electricity):	
<b>Do you have required blast permits / licences</b>	YES / NO	
<b>Provide details (including town blast permit where required)</b>	For town blasting, approval is required and the quantities may be limited for the blast. Shotfirers have unique licence numbers. Demolition requires special approval. Regulation 131 indicates the requirements to be addressed for a town blasting permit.	
<b>Provide details of reports, drawings and records consulted</b>		

*For underground blasting operations, other details would be required, such as ventilation considerations and return air routes to avoid incursion of blasting fumes into other areas of the mine.*

## Blast risk management

The following element of appendix A section A2 of AS 2187.2 is covered in the table below:

- Appendix A section A2.2(h) – Details of the risk management assessment

Identified risk	Risk reduction methods	Details to reduce risks to an acceptable level
Suggested items to consider:		
Unauthorised access to blast location	<ul style="list-style-type: none"> <li>• Security considerations</li> <li>• Access to authorised persons only</li> </ul>	<ul style="list-style-type: none"> <li>• Access cards – manned gate, personnel or guard with secured off area</li> </ul>
Training and competency	<ul style="list-style-type: none"> <li>• Employment of trained, licences shotfirers</li> <li>• Staff training in explosives products and blast design</li> </ul>	<ul style="list-style-type: none"> <li>• Training and development</li> <li>• Licensed shotfirers</li> <li>• Tools such as model blast pattern technology to test the blast</li> <li>• Procedures developed and implemented</li> </ul>
Use of contractors	<ul style="list-style-type: none"> <li>• Competency and training</li> </ul>	<ul style="list-style-type: none"> <li>• Review of competency and training</li> <li>• Minimum standards</li> <li>• Clear contractual arrangements</li> </ul>
Blasting procedure	<ul style="list-style-type: none"> <li>• Blasting procedures developed and implemented</li> </ul>	<ul style="list-style-type: none"> <li>• Involvement of key personnel with appropriate competencies in the development of procedures</li> <li>• Authorisation of procedures</li> </ul>
Consistency in explosives performance	<ul style="list-style-type: none"> <li>• Reliable supplier</li> <li>• Testing of explosives</li> </ul>	<ul style="list-style-type: none"> <li>• Procedures for use of explosives</li> <li>• Licensed shotfirers</li> <li>• Experienced shotfirers</li> </ul>
Initiation methods	<ul style="list-style-type: none"> <li>• Approved initiators</li> <li>• Testing of safety fuse (where used)</li> <li>• Testing of exploder and other equipment</li> <li>• Equipment maintenance</li> </ul>	<ul style="list-style-type: none"> <li>• Authorised procedures</li> <li>• Maintenance contracts</li> </ul>



Identified risk	Risk reduction methods	Details to reduce risks to an acceptable level
Damage to structures	<ul style="list-style-type: none"> <li>• Procedures for blasting</li> <li>• Competency of shotfirer</li> </ul>	
Flyrock	<ul style="list-style-type: none"> <li>• Quantity of explosives</li> <li>• Stemming</li> <li>• Capping</li> <li>• Blast mats</li> </ul>	<ul style="list-style-type: none"> <li>• How quantities are calculated to ensure flyrock is minimised.</li> </ul>
Unauthorised access to explosives store or portable magazine at site	<ul style="list-style-type: none"> <li>• Security at blast location</li> <li>• Magazine storage</li> </ul>	
Hot ground causing premature initiation	<ul style="list-style-type: none"> <li>• Initiation methods, types of explosives</li> <li>• Pre-testing</li> </ul>	<ul style="list-style-type: none"> <li>• Obtaining an understanding of the ground type in the planning stages of the blast</li> </ul>

## Security arrangements and warning details

The following elements of appendix A section A2 of AS 2187.2 are covered in the table below:

- Appendix A section A2.2(s) – Security procedures for the site and the blast, including explosives
- Appendix A section A2.2(u) – Details of communication systems
- Appendix A section A2.2(v) – Warning procedures
- Appendix A section A2.2(w) – Traffic management plan
- Appendix A section A2.2(z) – Method of notification to owners and occupiers of structures, and providers of services adjacent to the blast

<b>Describe security procedures for the site and the blast, including explosives</b>	To consider : <ul style="list-style-type: none"> <li>• for a regular location, such as a mine site, how access is gained</li> <li>• gate manned and/or card access</li> <li>• closed circuit television (CCTV)</li> <li>• manned access in a civil location and how prevent unauthorised access</li> </ul>	
<b>Detail communication system(s) between people involved or in the vicinity of the blast</b>	To consider : <ul style="list-style-type: none"> <li>• two-way communication</li> <li>• siren system</li> <li>• communication to neighbours in a built up area</li> </ul>	
<b>Advanced warning</b>	YES / NO	N/A (provide details): (e.g. sirens, communication prior)
<b>Audible warning</b>	YES / NO	N/A (provide details): (e.g. sirens, use of verbal sequence for firing)
<b>Sentries period</b>	YES / NO	N/A (provide details) (including number of sentries):
<b>Signs</b>	YES / NO	N/A (provide details):
<b>Traffic management</b>	YES / NO	N/A (provide details):

*In underground operations, other means of securing a blast site may be required, e.g. complete clearance of the mine. This may be expedient for security reasons if multiple blast locations are fired simultaneously or may be required for other reasons such as avoidance of rockfall or rockburst injury in seismically active ground conditions.*

## Initiation method

The following elements of appendix A section A2 of AS 2187.2 are covered in the table below:

- Appendix A section A2.2(n) – Method of initiation
- Appendix A section A2.2(o) – Type of firing equipment and procedures

*Mains firing circuits may be found in underground operations. These should be subject to professional electrical engineering design and tested regularly. A means of ensuring that stray electrical currents or self-potential or potential gradients within the rock cannot inadvertently fire charges must be assured. A means of electrically isolating each individual firing circuit and of indicating whether a particular firing circuit is connected to the main circuit should be provided.*

<b>Safety fuse</b>		
<b>Burn time (per metre)</b>		Length:
<b>Electrical</b>		
<b>Continuity</b>	YES / NO	Resistance:
<b>Signal tube</b>		
<b>Electronic</b>		Continuity: YES / NO
<b>Delays</b>	YES / NO	
<b>Type</b>		Number:
<b>Initiation equipment exploder</b>	(provide details of the make and model of the exploder or the initiation method to be used)	

## Explosives used and charging details

The following elements of appendix A section A2 of AS 2187.2 are covered in the table below:

- Appendix A section A2.2(l) – Detonation sequence/effective charge mass per delay (MIC)/powder factor
- Appendix A section A2.2(m) – Type of explosive to be used and quantity required
- Appendix A section A2.2(p) – Drilling procedures
- Appendix A section A2.2(q) – Explosive loading and charging procedures
- Appendix A section A2.2(r) – Explosive storage and handling procedures

<b>Premier (type)</b>		
<b>Detonating cord</b>		
<b>Quantity of initiator</b>		
<b>Quantity of packaged type</b>		
<b>Quantity of bulk type</b>		
<b>Total quantity of explosives used</b>		
<b>Effective charge mass per delay (MIC)</b>		Powder factor:
<b>Do you have drilling procedures?</b>	YES / NO	N/A (provide details):
<b>Do you have explosive loading and charging procedures?</b>	YES / NO	N/A (provide details):
<b>Do you have explosive storage and handling procedures?</b>	YES / NO	N/A (provide details):

## Blast design

The following element of appendix A section A2 of AS 2187.2 is covered in the table below:

- Appendix A section A2.2(k) – Layout plan for the blast including drilling pattern and hole depth

<b>Type of ground</b>	To consider : <ul style="list-style-type: none"> <li>hard rock</li> <li>soft rock, sandy type soils</li> <li>hot ground</li> <li>reactive ground</li> </ul>	
<b>Number of holes</b>		Diameter of holes:
<b>NEQ per hole</b>		Burden:
<b>Spacing of hole</b>		Depth of hole:
<b>Height of stemming</b>		Type of stemming:
<b>Delay per hole</b>		Number of rows:
<b>Orientation</b>		Decking: YES / NO
<b>Blast mat / cover over site</b>	YES / NO	N/A (provide details):

## Signatures

This part allows for the signatures of key persons responsible for the preparation of the blast plan and conduct of the blast to ensure the plan has considered all elements relevant to the circumstances of the blast and, where appropriate, the plan has been approved for use.

The following element of AS 2187.2 Appendix A section A2 is covered in the table below:

- Appendix A section A2.2(gg) – Signature spaces for the plan author, shotfirer and person who approves the plan

<b>Blast plan author</b>	<b>Shotfirer</b>	<b>Approver of the plan</b>
Name:	Name:	Name:
Signature:	Signature:	Signature:
Date:	Date:	Date:

## Appendix 2 – Record of use of explosives

(TO BE COMPLETED BY THE SHOTFIRER WITHIN 7 DAYS AFTER ANY USE OF EXPLOSIVE)

### Weather conditions at the time of the blast (as applicable mainly to surface operations)

The following elements of appendix A sections A2 and A3 of AS 2187.2 are covered in the table below:

- AS 2187.2 Appendix A section A2.2(aa) – Influence of weather
- AS 2187.2 Appendix A section A2.2(bb) – Loading in poor light conditions of reduced visibility
- AS 2187.2 Appendix A section A2.2(cc) – Cessation of explosive-related activities during electrical storms
- AS 2187.2 Appendix A section A3(a) – Environmental conditions at the time of the blast

<b>Weather</b>	Temperature:	Wind direction:	Wind speed:
Dry <input type="checkbox"/> Overcast <input type="checkbox"/> Wet <input type="checkbox"/> Sunny <input type="checkbox"/> Sultry <input type="checkbox"/> Thunder / lightning <input type="checkbox"/> Windy <input type="checkbox"/>			
<b>Describe how weather conditions affected blasting operation, including cancellation of the blast (if required)</b>	To consider : <ul style="list-style-type: none"> <li>• lightning activity when electrical firing</li> <li>• wind direction with flyrock</li> <li>• cyclone activity or warnings</li> </ul>		

*Such considerations will not generally be relevant underground, although lightning activity can have an influence and should be included for underground operations in areas that may be prone to lightning strike on surface.*

### Environmental monitoring equipment

The following elements of appendix A sections A2 and A3 of AS 2187.2 are covered in the table below:

- Appendix A section A2.2(t) – Environmental considerations for airblast overpressure, ground vibration (see appendix J) and for flyrock (see appendix E)
- Appendix A section A3(b) – Monitoring equipment including type, serial number and location

*These considerations will generally be less relevant in underground mining operations, although ground vibration may be an important factor in influencing the propensity for rockfalls or rockbursts.*

*Airblast over-pressure can also be important in terms of its effect on underground mine structures such as ventilation doors and fill barricades, which can be knocked down by pressure variations transmitted via the underground development openings.*

*Where such effects may be of concern, provision should be made for their inclusion in the documentation.*

<b>Monitoring equipment used</b>	Type:	Serial no:	Location:
<b>Monitoring equipment used</b>	Type:	Serial no:	Location:
<b>Details of measurements recorded during the blast</b>	To consider : <ul style="list-style-type: none"> <li>• quality of air</li> <li>• vibration measurements</li> <li>• noise measurements.</li> </ul>		
<b>Describe environmental considerations for airblast overpressure, ground vibration</b>	Particular environmental considerations for the location of the blast could include: <ul style="list-style-type: none"> <li>• built-up area</li> <li>• proximity to residential or sensitive use areas such as schools, hospitals and aged care hostels.</li> </ul>		

## Post-blast analysis

The following elements of AS 2187.2 Appendix A sections A2 and A3 are covered in the table below:

- Appendix A section A2.2(dd) – Misfire management system
- Appendix A section A2.2(ee) – Post blast assessment and inspection procedures
- Appendix A section A2.2(ff) – Provision for post-blast comments
- Appendix A section A3(c) – Details of measurements recorded during the blast
- Appendix A section A3(d) – Details of flyrock or fly
- Appendix A section A3(e) – Details of incidents and complaints
- Appendix A section A3(f) – Comments on the results of the blast
- Appendix A section A3(g) – Proposed modification to the blast plan for future shots

<b>Misfire</b>	YES / NO	N/A (provide details):
<b>Do you have misfire management system</b>	YES / NO	N/A (provide details): (Where procedures, worksheets or similar are prepared reference them. Copies may be attached to the blast plan. Consider time lag prior to re-entry and assessment conducted by authorised personnel for general or other access)
<b>Flyrock / fly</b>	YES / NO	N/A (provide details): (Size, distance travelled, damage)
<b>Area safe</b>	YES / NO	N/A (provide details): (Consider how the assessment was made and where necessary communicated for return to either authorised only or general access to the area)
<b>Do you have post-blast assessment and inspection</b>	YES / NO	N/A (provide details):
<b>Incidents / complaints</b>	YES / NO	N/A (provide details): (Records and actions taken to rectify where necessary. Notification to Resources Safety for incidents causing injury or harm)
<b>Stock reconciliation details</b>		
<b>Was blast satisfactory (Did it meet the objectives?)</b>	YES / NO	N/A (provide details):
<b>Proposed changes to future blasts (include any proposed modifications for future shots)</b>		
<b>Post-blast comments</b>		

## Blast layout plan

(INCLUDE ORIENTATION INFORMATION, HOLE LAYOUT / SPACING, DELAYS, INITIATION POINT, FIRING LINES)

The following element of appendix A section A2 of AS 2187.2 is covered in this part:

- AS 2187.2 Appendix A section A2.2(k) – Layout plan of the blast including drilling pattern and hole depth

*Provision should be made for the entering of additional information, such as the inclusion of additional holes or charges in a “generic” blast of often-repeated general type. Similarly, in underground development blasting, it may be necessary to note the position of the cut in the face if this is rotated from left to right or from up to down in successive blasts which are otherwise identical.*

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## Signature of shotfirer

Name:
Signature:
Date: