

Consolidated report

Explosives control plan

Stage 1

Metalliferous mines and quarries, surface and underground

July 2021 to August 2023



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Executive summary

A crucial part of the NSW Resources Regulator’s Incident prevention strategy for mines and petroleum sites involves:

- targeted assessments and planned inspection programs - focusing on assessing an operation’s control of critical risks through evaluating the effectiveness of control measures in the mine’s safety management system
- priority programs - proactively assessing a topic that is an emerging risk across the industry, which is driven primarily from incident data as well as evolving industry trends. Although these topics may also be contained within the Regulator’s planned inspection programs, the aim of compliance priority programs is to gather further information and knowledge about how the industry is managing and controlling a specific issue.

The Regulator has developed a bowtie hazard management framework and standardised assessment checklist for each program plan. Under each program plan, the effectiveness of the safety management system at each mine site is assessed against a standard set of control supports and critical controls.

The explosives control plan at metalliferous mines and quarries, above surface and underground manages the hazards to people exposed to harm by explosives detonation. These types of hazards can occur within surface and underground mining environments and have the potential to cause serious and/or fatal injuries to workers if not controlled effectively. An inspection program was developed to assess how mines are prepared to manage that risk.

Explanatory notes on the assessment system are also listed in Appendix A.

For the **33** metalliferous mines and quarries (consisting of 18 surface mines and quarries and 15 underground mines) there were 1,452 individual assessment findings and of those 95 assessment findings required enforcement action to be taken. The assessment program was conducted between July 2021 and August 2023.

There were **65** compliance notices in total issued to **31** of the 33 sites in relation to this assessment program.

The types of compliance notices issued consisted of **29** WHS(MPS)A s23 notices of concern and **36** WHSA s191 improvement notices.

Assessment criteria

Critical controls were identified by the Regulator and control supports were assigned to each potential threat.

A tabulation of the threat, critical control and control support for the explosives control plan is provided in Table 1.

Table 1. Threats and critical controls assessed for the planned inspection program explosives control plan - stage 1 – coal mines.

Threat	Critical control	Control support
1. Unplanned detonation of explosives	PC 1.1 Explosives safety and security	01 People who handle explosives hold the required authorisations, licences and security clearances for their work
2. Person in close proximity to a blast		02-19 Explosives magazine, storage, reload or manufacturing facility
3. Noxious fume airborne dust generation		20-25 Explosives transport materials
		26-32 Loading blast holes
	PC 1.2 Explosives suitable for application	

Findings

Overall, the findings were:

- 33 site assessments were reviewed for this report
 - 14 construction materials surface sites
 - 3 industrial minerals surface sites
 - 1 metalliferous surface site
 - 15 metalliferous underground sites
- 1,452 individual findings
 - 95 findings with enforcement action recorded
- 65 compliance notices in total issued to 31 sites
 - 29 *WHS(MPS)A s23* notices of concern
 - 36 *WHS s191* improvement notices

The overall assessment findings by threat, critical control and control supports is **95%** (Figure 1):

Figure 1. Summary assessment findings overall results by threat and critical control and control supports

Threat					Grand Total
1. Unplanned detonation of explosives 2. Person in close proximity to a blast 3. Noxious fume airborne dust generation					
PC 1.1			PC 1.2		
Explosives safety and security			Explosives suitable for application		
PC 1.1 - 01	PC 1.1 - 02-19	PC 1.1 - 20-25	PC 1.1 - 26-32	PC 1.2	
People who handle explosives hold the required authorisations, licences and security clearances for their work	Explosives magazine, storage, reload or manufacturing facility	Explosives transport materials	Loading blast holes	Explosives suitable for application	

■ Green (=100%)
■ Yellow (>= 80% and <100%)
■ Orange (>= 65% and <80%)
■ Red (<65%)

The overall assessment findings by critical control and control supports (refer Figure 2 to Figure 6)

Figure 2. Summary assessment findings overall results by critical control and control support – PC 1.1-01

Critical control number	Control support number	Criteria text	Explosives safety and security
			PC 1.1 - 01
			People who handle explosives hold the required authorisations, licences and security clearances for their work
PC 1.1	01	People who handle explosives hold the required authorisations, licences and security clearances for their work.	
Grand Total			

■ Green (=100%)
■ Yellow (>= 80% and <100%)
■ Orange (>= 65% and <80%)
■ Red (<65%)

Figure 3. Summary assessment findings overall results by critical control and control support – PC 1.1-02-19

Critical control number	Control support number	Criteria text	Explosives safety and security
			PC 1.1 - 02-19
			Explosives magazine, storage, reload or manufacturing facility
PC 1.1	02	Access to areas where explosives are stored is controlled.	96%
	03	Explosives storage structures are securely fastened to the ground.	100%
	04	Explosive storage areas are clearly marked.	78%
	05	Explosives quantities match register records.	97%
	06	Quantities of stored explosives do not exceed licence conditions.	97%
	07	Magazines are compliant with AS2187.1.	63%
	08	High explosives and detonators are stored in separate magazines.	100%
	09	Lightning protection is installed to AS 1768.	89%
	10	Explosive storage areas are used only for tasks related to explosive storage.	100%
	11	A 5m firebreak clear of all combustible material is maintained around storage facilities.	92%
	12	Areas within 8m of a storage facility are clear of undergrowth.	93%
	13	Naked flames and smoking materials remain outside fenced compounds and further than 6m from any vehicle containing explosives.	96%
	14	Firefighting requirements identified by risk assessment are in place.	91%
	15	Copper based alloys are not used where they may contact ammonium nitrate.	97%
	16	SSAN storage is separated from storage of companion substances.	100%
	17	SSAN spillage is managed.	86%
	18	Explosives storage areas are not used and remain securely locked during thunderstorms.	94%
	19	Explosives magazines are safely operated.	74%
	Grand Total		

- Green (=100%)
- Yellow (>= 80% and <100%)
- Orange (>= 65% and <80%)
- Red (<65%)

Figure 4. Summary assessment findings overall results by critical control and control support – PC 1.1-20-25

			Explosives safety and security
			PC 1.1 - 20-25
Critical control number	Control support number	Criteria text	Explosives transport materials
PC 1.1	20	Explosives are secure or are under direct supervision.	 100%
	21	Vehicles are locked when unattended.	 100%
	22	An explosives record is maintained on the vehicle.	 100%
	23	Explosives signs and placarding are in place.	 93%
	24	Explosives are protected from heat and other ignition sources.	 95%
	25	Spillage is controlled.	 84%
Grand Total			 97%

■ Green (=100%)
■ Yellow (>= 80% and <100%)
■ Orange (>= 65% and <80%)
■ Red (<65%)

Figure 5. Summary assessment findings overall results by critical control and control support – PC 1.1-26-32

			Explosives safety and security
			PC 1.1 - 26-32
Critical control number	Control support number	Criteria text	Loading blast holes
PC 1.1	26	Explosives are secure or are under direct supervision.	 100%
	27	A charging record is maintained.	 100%
	28	Access to the area is controlled.	 100%
	29	Confirm explosives are protected from impact hazards.	 100%
	30	Explosives are protected from static electricity hazards.	 100%
	31	Nonel initiation systems are protected from slap, snap and shoot risks.	 100%
	32	Electric initiation systems are protected from sources of extraneous electricity.	 98%
Grand Total			 100%

■ Green (=100%)
■ Yellow (>= 80% and <100%)
■ Orange (>= 65% and <80%)
■ Red (<65%)

Figure 6. Summary assessment findings overall results by critical control and control support – PC 1.2

Critical control number	Control support number	Criteria text	Explosives suitable for application
			PC 1.2
			Explosives suitable for application
PC 1.2	01	Explosives are stored according to the suppliers' recommendations.	94%
	02	Explosives are stored in licenced storage facilities.	97%
	03	Explosives storage facilities are maintained to standard.	92%
	04	The oldest explosives are used first.	92%
	05	Explosives beyond their nominated life span are quarantined and disposed of.	86%
	06	Operators are familiar with the operation of explosives manufacturing plant and have access to operating instructions.	100%
	07	Sampling or testing such as density tests are conducted to verify components of explosives are correctly mixed.	98%
	08	Explosives are transported in vehicles approved for that purpose.	98%
	09	Explosive cartridges and detonators are transported in a manner that prevents damage.	96%
	10	The shotfirer is familiar with the blast management plan and elements of the mine ECP and associated procedures relevant to the blast.	91%
	11	The condition of explosives is checked before use.	100%
	12	The shotfirer ensures the intended explosive products are loaded.	98%
Grand Total			95%

- Green (=100%)
- Yellow (>= 80% and <100%)
- Orange (>= 65% and <80%)
- Red (<65%)

The overall analysis of assessment findings ratings were assessed to be documented and implemented assessed at 65.8%.

Implemented but not documented assessed at 3.0%.

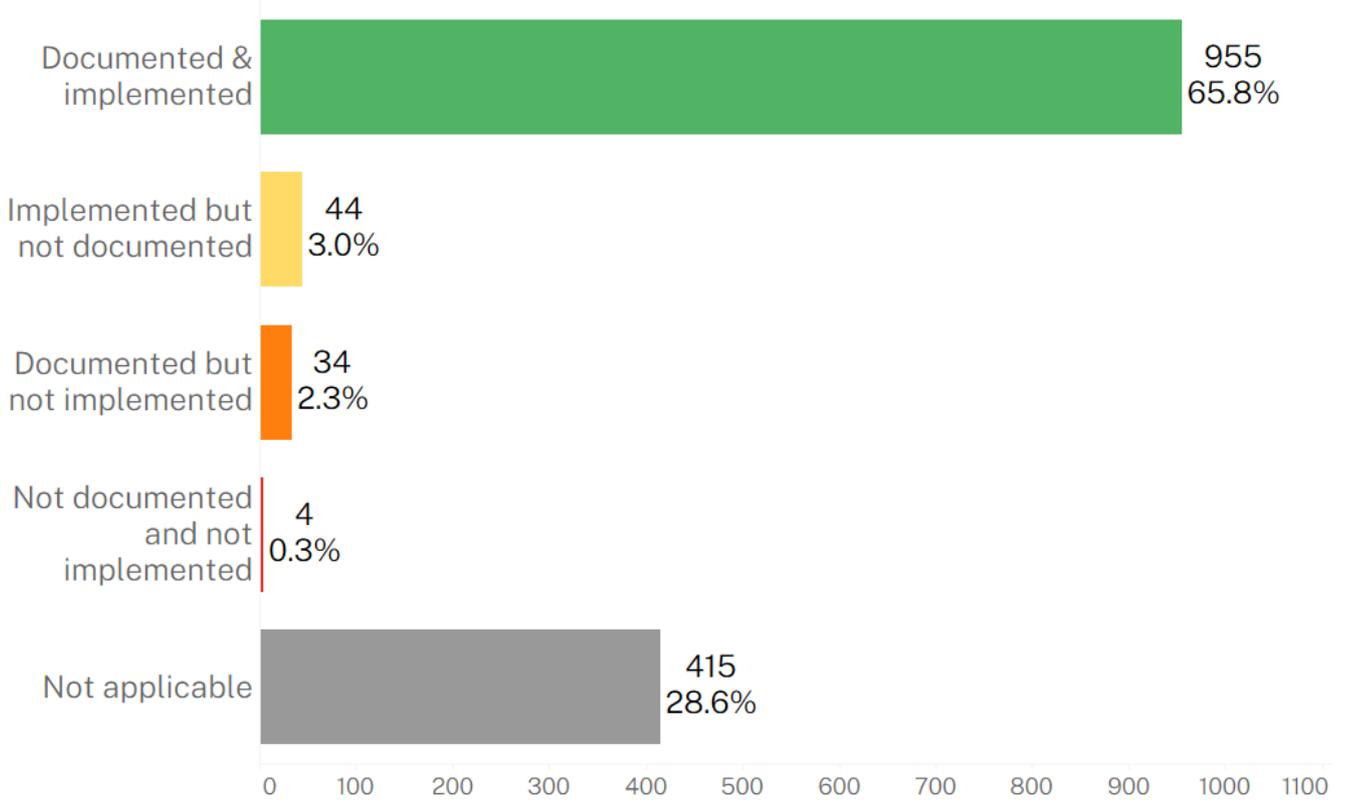
Documented and not implemented was found to be 2.3%.

Not documented and not implemented was found to be 0.3%.

Not applicable was 28.6%.

The analysis of the overall assessment findings ratings is summarised in Figure 7:

Figure 7. Overall assessment findings ratings



Notices issued

There were **65** compliance notices in total issued to **31** mines and quarries in relation to this assessment program.

The notices issued for explosives control plan were reviewed and Table 2 lists the notices issued by type and number.

Table 2: Notices issued for the planned inspection program – explosives control plan -stage 1 -metalliferous mines and quarries

NOTICE TYPE	TOTAL ISSUED	NUMBER OF SITES
s.23 notice of concerns	29	25
s.191 improvement notice	36	28
Total	65	31

Note: some mines were issued multiple notices

Recommendations

Based on the findings outlined in the report, in particular control support findings ranking **95%** or less, and with respect to the numbers and types of compliance notices issued during the program, metalliferous mine and quarry operators should review the following recommendations:

- Review the explosives control plan related to management of people who handle explosives to validate they hold the required authorisations, licences and security clearances for their work:
 - Control support No.01 ranked **93%**: people who handle explosives must hold the required authorisation, licences and security clearance for tasks undertaken with explosives
- Review the explosives control plan related to management of risk controls associated with explosives magazine storage, reload or manufacturing facilities:
 - Control support No. 04 ranked **78%** – explosives storage areas are clearly marked
 - Control support No. 07 ranked **63%** – magazines are compliant with AS2187.1
 - Control support No. 09 ranked **89%** – lightning protection is installed to AS 1768
 - Control support No. 11 ranked **92%** – a 5m firebreak clear of all combustible material around storage facilities
 - Control support No. 12 ranked **93%** - areas within 8m of a storage facility are clear of undergrowth
 - Control support No. 14 ranked **91%** - firefighting requirements identified by risk assessment are in place
 - Control support No. 17 ranked **86%** - SSAN spillage is managed
 - Control support No. 18 ranked **94%** - explosives storage areas are not used and remain securely locked during thunderstorms
 - Control support No. 19 ranked **74%** - explosives magazines are safely operated
- Review the explosives control plan related to management of risk controls associated with explosives transportation:
 - Control support No. 23 ranked **93%** - explosives signs and placarding are in place whilst being transported
 - Control support No. 25 ranked **84%** - spillage is controlled during transport
- Review the explosives control plan related to management of risk controls associated with explosives suitable for application:
 - Control support No. 01 ranked **94%** - explosives are stored according to suppliers recommendations
 - Control support No. 03 ranked **92%** - explosives storage facilities are maintained to standard
 - Control support No 04. ranked **92%** - the oldest explosives are used first
 - Control support No. 05 ranked **86%** - explosives held beyond nominated life span are quarantined and disposed of

- Control support No. 10 ranked **91%** – the shotfirer is familiar with the blast management plan and elements of the mines ECP and associated procedures relevant to the blast

Further information

For more information on safety assessment programs, the findings outlined in this report, or other mine safety information, please contact the NSW Resources Regulator:

CONTACT TYPE	CONTACT DETAILS
Email	cau@regional.nsw.gov.au
Incident reporting	To report an incident or injury call 1300 814 609 or log in to the Regulator Portal
Website	www.resourcesregulator.nsw.gov.au
Address	NSW Resources Regulator 516 High Street Maitland NSW 2320

Appendix A – Assessment criteria rating

Each assessed criteria is rated from 1 through 4 based on evidence supporting the expected control supports identified at the mine site:

Evidence supporting expected control supports

Expected control supports	Rating	Evidence supporting rating / comments				
	<table border="1"> <tr> <td style="background-color: #90EE90;">4</td> <td style="background-color: #FFFF00;">3</td> </tr> <tr> <td style="background-color: #FFD700;">2</td> <td style="background-color: #FF0000;">1</td> </tr> </table>	4	3	2	1	
4	3					
2	1					

Assessment findings results are calculated based on the total points allocated to the assessed ratings as a percentage of the maximum possible points for each criteria group, and any findings rated as ‘Not applicable’ were excluded from the calculation.

Criteria assessed ratings and points

Assessed as	Rating	Points
Documented & implemented	4	4
Implemented but not documented	3	2
Documented but not implemented	2	1
Not documented and not implemented	1	0
Not applicable		

Findings results (points) with colours assigned as follows:

- Green (=100%)
- Yellow (>= 80% and <100%)
- Orange (>= 65% and <80%)
- Red (<65%)