

Consolidated report

Fire or explosion – explosion suppression – coal mines below surface

January 2023 to December 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 by evaluating the effectiveness of control measures in the mine’s safety management system
- priority programs – proactively assessing a topic that is an emerging risk throughout the industry, which is determined 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 controls to manage the risk of fire or explosion at underground coal mines includes explosion suppression systems. The control supports and criteria are identified in the Regulator’s explosion suppression bowtie.

Fire and explosions at underground coal mines have the potential to cause serious and/or fatal injuries to workers if not controlled effectively.

This report will consolidate assessment findings and provide analysis and recommendations for operators of underground coal mines.

An inspection assessment program was developed to assess how well underground coal mines are prepared to manage risks.

In total there were 97 assessments conducted at 24 underground coal mines. The majority of underground coal mines were assessed multiple times and a small number of coal mines were assessed 6 times during the 2023 calendar year.

In summary, there were 679 individual assessment findings and of those 45 assessment findings related to the management of explosion suppression systems that required enforcement action to be taken at the underground coal mine.

The assessment program was conducted between January 2023 and December 2023.

In summary, there were 45 compliance notices issued in total, comprising of:

- 16 x section 191 improvement notices issued to 10 underground coal mines
- 29 x section 23 cause for concern notices issued to 17 underground coal mines

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

Assessment criteria for all assessments

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

A tabulation of the control support and criteria for the assessment of explosion suppression systems at underground coal mines is provided in Table 1.

Table 1. Control supports and criteria for the assessment of explosion suppression systems at underground coal mines.

Control support	Criteria
MC1.2 - 01	Stone dust is applied at the rates and in the methods specified in the mine procedures. <i>Reference WHS(MPS) Regulation 2022 Sections 68(1)(d) including 68(1)(c)(i)(ii)(iii)(iv) and 68(1)(h)(i)(ii)</i>
MC1.2 - 02	Roadway dust samples are taken from the areas specified and analysed at the specified frequencies
MC1.2 - 03	Float dust is managed within the mine. <i>Reference WHS(MPS) Regulation 2022 Sections 68(3)(h)</i>
MC1.2 - 04	Identified substandard incombustible content levels are rectified within the specified time frames
MC1.2 - 05	Explosion barriers are installed at locations documented in the mine safety management system
MC1.2 - 06	Explosion barriers are inspected to confirm they comply with the standard outlined in the installation instructions
MC1.2 - 07	Explosion barriers comply with the standard outlined in the installation instructions

Assessment findings for underground coal mines

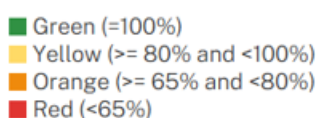
Overall, the assessment findings for underground coal mines were:

- 24 underground coal mines were assessed
- 679 individual findings for the assessed criteria
- 45 assessment findings with enforcement action were recorded that related to the explosion suppression systems at underground coal mines.

Figure 1 provides a summary assessment of the overall results by control support and criteria.

Figure 1. Summary assessment findings of overall results by control support and criteria

MC 1.2 - Explosion suppression							Grand Total
01	02	03	04	05	06	07	
Stone dust is applied at the rates and in the methods specified in the procedures 68(1)(d) including 64(1)(c)(i)(ii)(iii)(iv) and 68(1)(h)(i)(ii)	Roadway dust samples are taken from the areas specified and analysed at the specified frequencies.	Float dust is managed within the mine 68(3)(h)	Identified substandard incombustible content levels are rectified within the specified time frames.	Explosion barriers are installed at locations documented in the mine safety management system.	Explosion barriers are inspected to confirm they comply with the standard outlined by the installation instructions.	Explosion barriers comply with the standard outlined in the installation instructions.	



In summary the overall assessment findings by control support and criteria were assessed in total as 92%.

The lowest assessment finding was 78% (orange category) for control support 01.

(Criteria – Stone dust is applied at the rates and in the methods specified in the mine procedures. Reference WHS(MPS) Regulation 2022 Sections 68(1)(d) including 68(1)(c)(i)(ii)(iii)(iv) and 68(1)(h)(i)(ii).

All the other control supports 02 to 07 were assessed ranging from 83% to 100% (yellow and green categories).

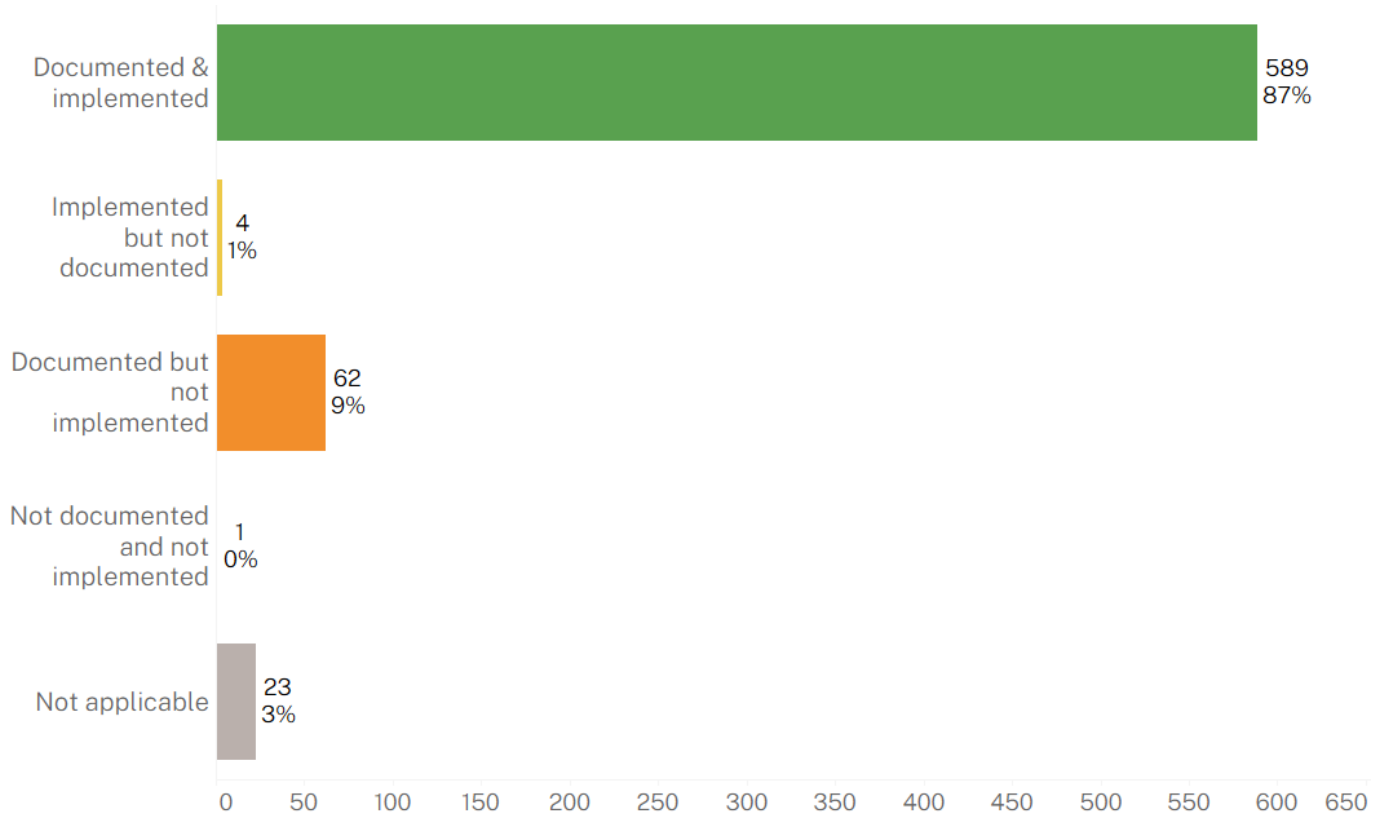
Assessment overall ratings for underground coal mines

In summary the overall assessment ratings for underground coal mines were:

- 87% rating for a documented and implemented finding
- 1% rating for an implemented but not documented finding
- 9% rating for a documented but not implemented finding
- 0% rating for a not documented and not implemented finding

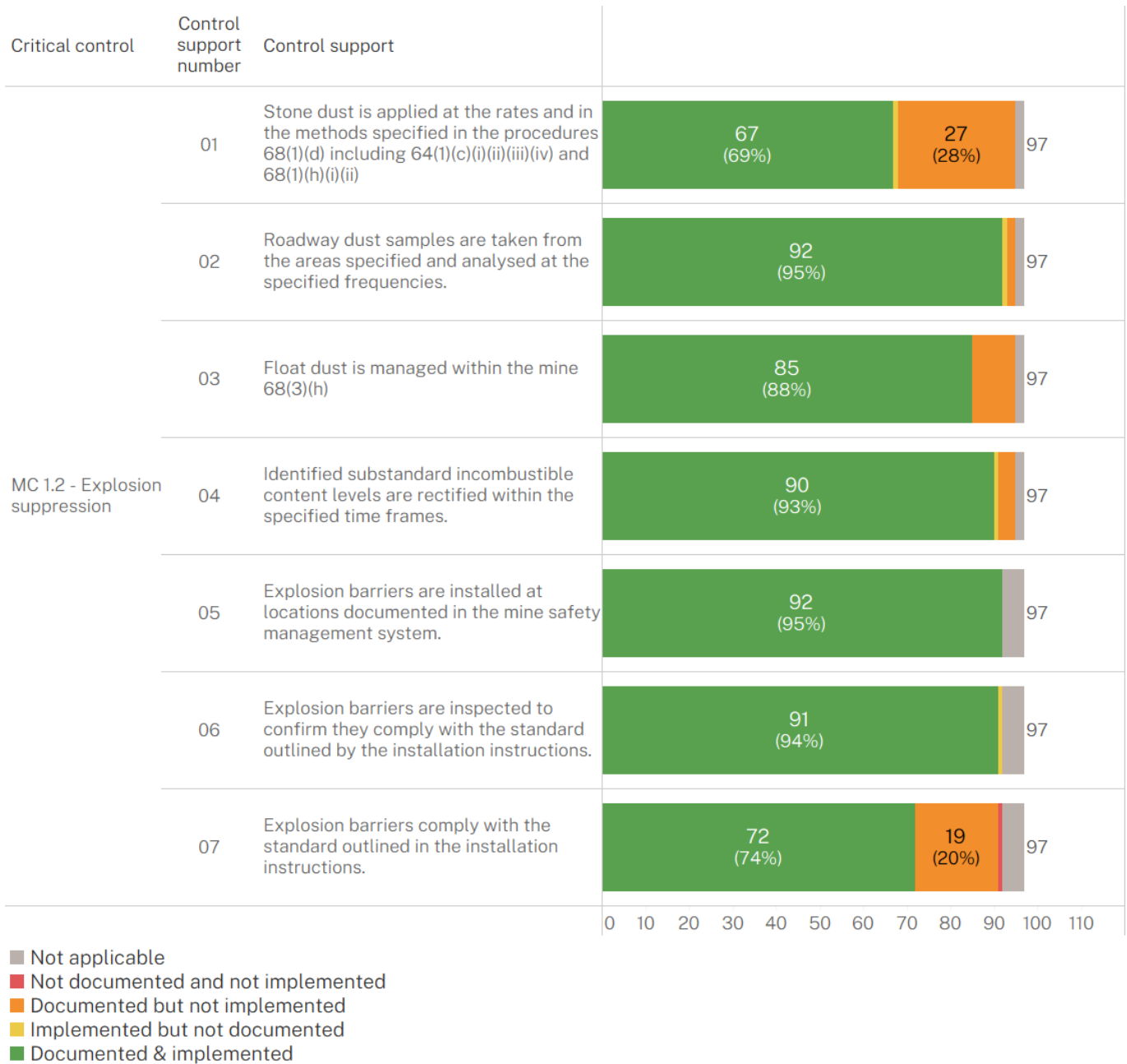
The assessment overall ratings for underground coal mines is shown in Figure 2.

Figure 2. Overall assessment findings ratings



The assessment overall ratings by control support and criteria for underground coal mines is shown in Figure 3.

Figure 3. Overall assessment ratings by control support and criteria



Notices issued to underground coal mines

In total there were 97 assessments conducted at 24 underground coal mines. The majority of underground coal mines were assessed multiple times and a small number of coal mines were assessed 6 times during the 2023 calendar year.

In summary, there were 679 individual assessment findings and of those 45 assessment findings related to the management of explosion suppression systems that required enforcement action to be taken at the underground coal mine.

The assessment program was conducted between January 2023 and December 2023.

In summary, there were 45 compliance notices issued in total, comprising of:

- 16 x section 191 improvement notices issued to 10 underground coal mines
- 29 x section 23 cause for concern notices issued to 17 underground coal mines.

Other compliance notices were issued but they were not directly related to the explosion suppression systems review.

The compliance notices issued for underground coal mines were reviewed and Table 2 lists the notices issued by type and number.

Table 2: Notices issued for underground coal mines

NOTICE TYPE	TOTAL ISSUED	NUMBER OF SITES
s.191 improvement notice	16	10
s.23 cause for concern notice	29	17
Total	45	24
Note: some mine sites were issued multiple notices		

Recommendations for underground coal mines

Based on the findings outlined in this report and with respect to the numbers and types of compliance notices issued during the assessment of explosion suppression systems at underground coal mines, it is recommended that the following issues should be reviewed by operators of underground coal mines:

- Stone dust is applied at the rates and in the methods specified in mine procedures including review of legislative requirements detailed in:
 - *WHS(MPS) Regulation 2022 Section 68 Coal Dust Explosion*
 - *WHS(MPS) Regulation 2022 Schedule 1 PHMP: Part 2 Mines & Petroleum sites: Section 9 Fire or explosion*
- Treatment of float dust on structures and surfaces that have been dusted with stone dust is managed in roadways of underground coal mines including review of legislative requirements detailed in:
 - *WHS(MPS) Regulation 2022 Section 68(3)(h)*

- Explosion barriers comply with the standards specified in mine procedures including review of the legislative requirements detailed in:
 - *WHS(MPS) Regulation 2022 Section 68 Coal Dust Explosion*
 - *WHS(MPS) Regulation 2022 Schedule 5: Water barriers in underground coal mines*

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 one to 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>4</td> <td>3</td> </tr> <tr> <td>2</td> <td>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 Compliant	4	4
Implemented but not documented Improvement needed	3	2
Documented but not implemented Significant improvement needed	2	1
Not documented and not implemented Non compliant	1	0
Not applicable (N/A)		

Findings results (points) with colours assigned as follows:

- Green (=100%)
- Yellow (>= 80% and <100%)
- Orange (>= 65% and <80%)
- Red (<65%)
- Not applicable