

# MSHAC – RCS control workshop

## Key learnings from coal industry

**Fritz Djukic**

**Senior Inspector of Mines (Occupational Hygiene)**

**Coal Inspectorate**

# In the beginning.....

**89.(1)** A coal mine's safety and health management system must provide ways of ensuring—

- (a) each coal mine worker's exposure to respirable dust at the mine is kept to an acceptable level; and
- (b) the worker does not breathe an atmosphere at the mine containing respirable dust exceeding an average concentration, calculated under AS 2985,<sup>17</sup> equivalent to the following for an 8 hour period—

- (i) for coal dust—3 mg/m<sup>3</sup> air;
- (ii) for free silica—0.1 mg/m<sup>3</sup> air.

**(2)** If a person works a shift of more than 8 hours at the mine, the system must provide ways of ensuring the person's dosage of respirable dust is not more than the equivalent dosage for a person working an 8 hour shift.

**(3)** The system must provide for the supply of personal protective equipment for use by persons in the work environment if the average concentration of respirable dust in the atmosphere can not be reduced to the levels stated in subsection (1).

**(4)** The system must provide ways of suppressing excessive airborne dust so a person's safety is not threatened, including, for example, by reduced visibility.

**(5)** The system must provide for—

- (a) monitoring and recording concentrations of respirable dust and free silica in the atmosphere of the work environment; and
- (b) keeping the record in a location that is easily accessible by each coal mine worker at the mine.

# DUST Monitoring is Important but.....

1. It doesn't control exposure
2. It may be useless if not conducted by skilled persons and part of a robust risk based plan.
3. It is pointless if it isn't analysed, reviewed and if action isn't taken to respond to exposures.

# Risk Based Regulation

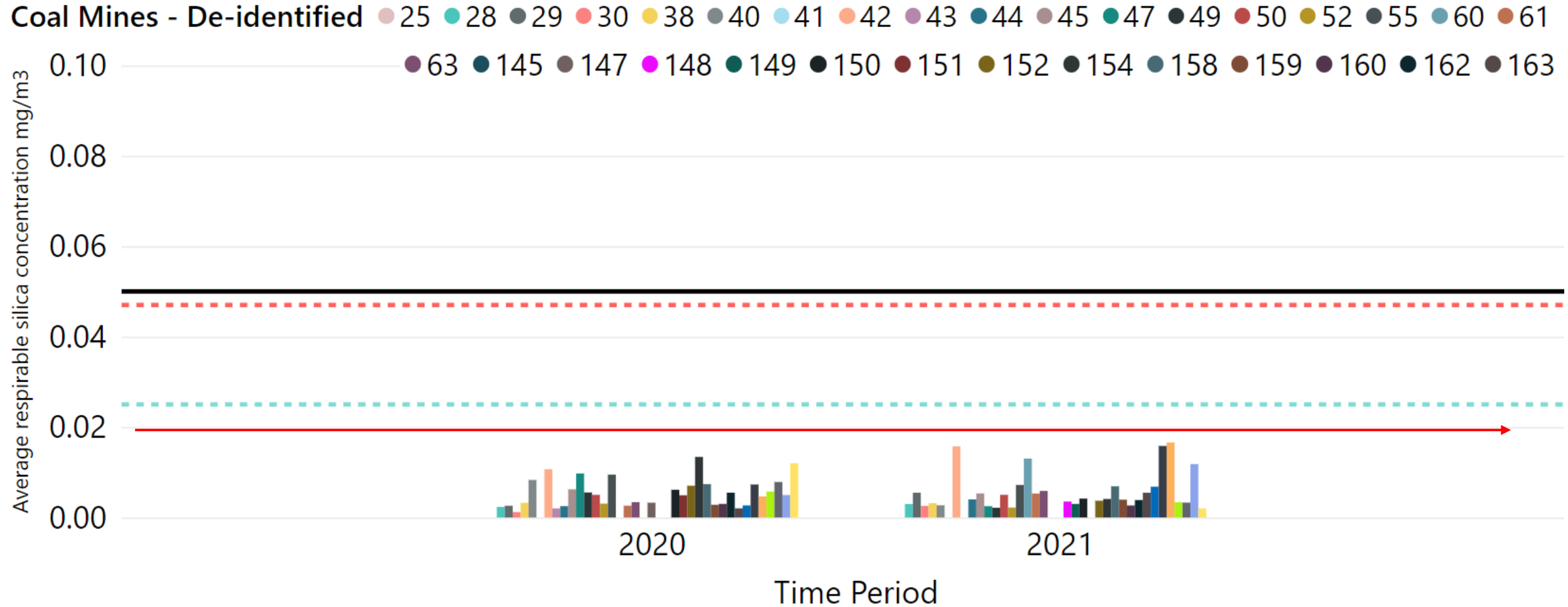
## Using our coal industry data to identify:

1. High intensity exposures
2. Large population of unprotected workers potentially at risk to moderate level chronic dust exposures.

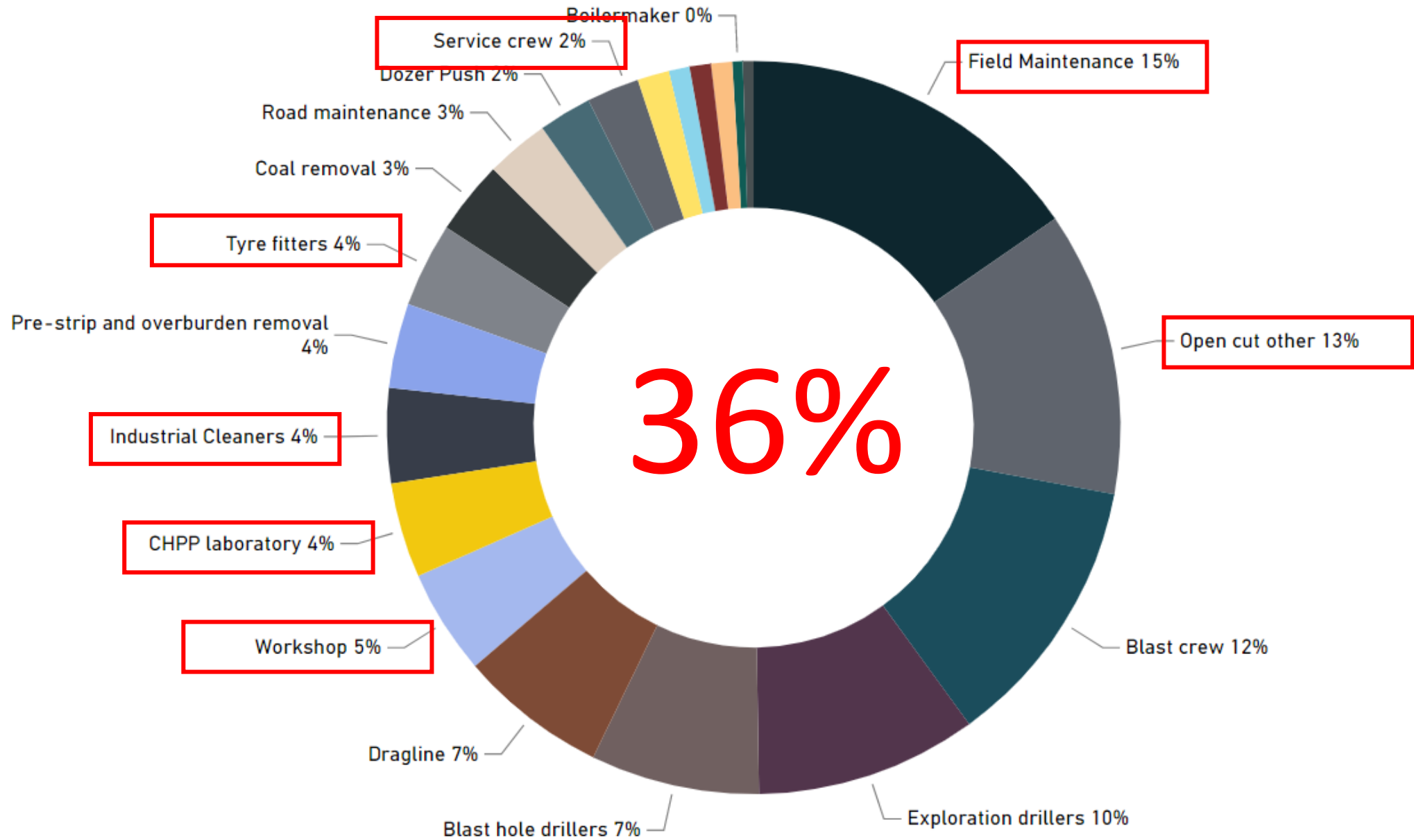
## Purpose:

Protecting coal mine workers health and future proofing industry for change...

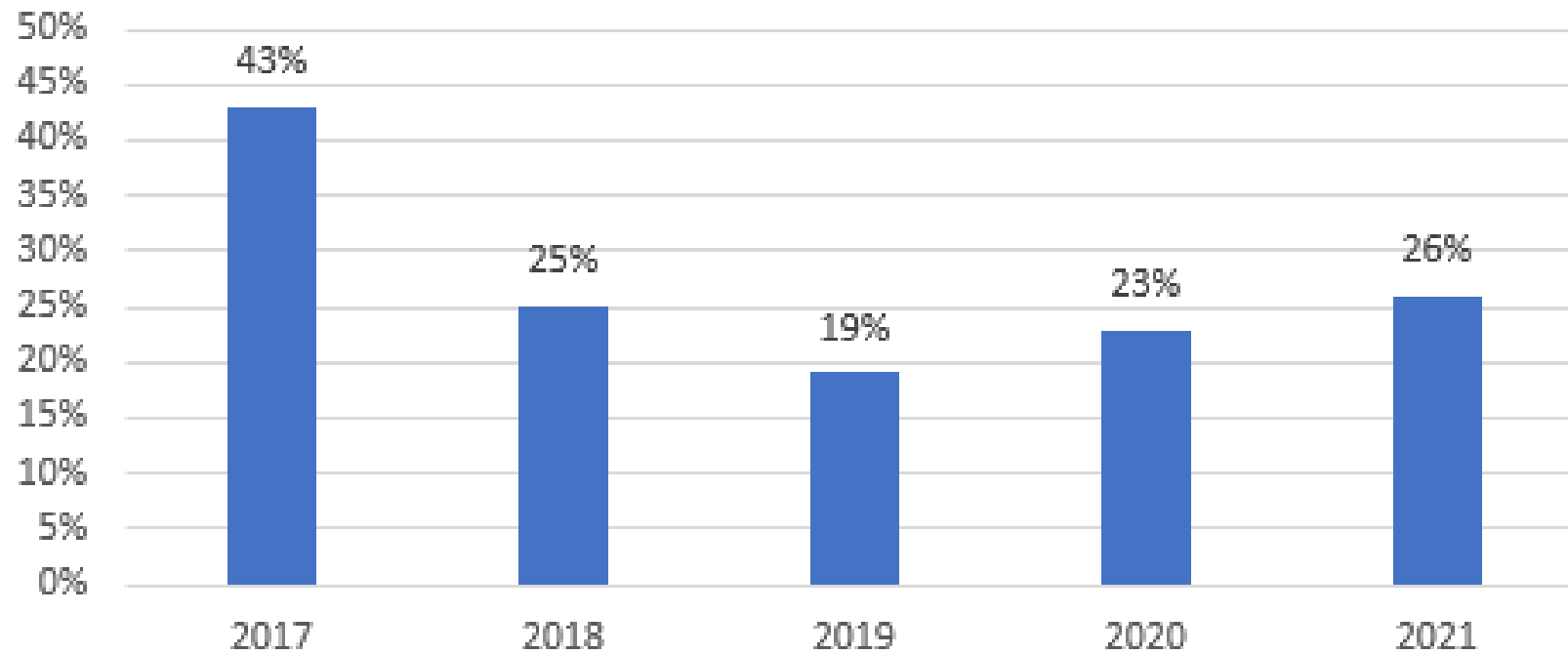
# Respirable Crystalline Silica - Field Maintenance



# Single exceedances (RCS) - Compressed air use



### Number of exceedances resulting from compressed air use / total number of exceedances for that year



# Surface mine Exceedance data 2017 - 2021

Contaminant	Exceedance exposure range (mg/m <sup>3</sup> )	Average (mg/m <sup>3</sup> )	Median (mg/m <sup>3</sup> )
<b>RCS</b>	0.044 – 1.1	0.22	0.14





# CONTEXT

## What is a 'blow out'?

- Removal of settled dust from electric cabinets using compressed air

## Why do we 'blow out'?

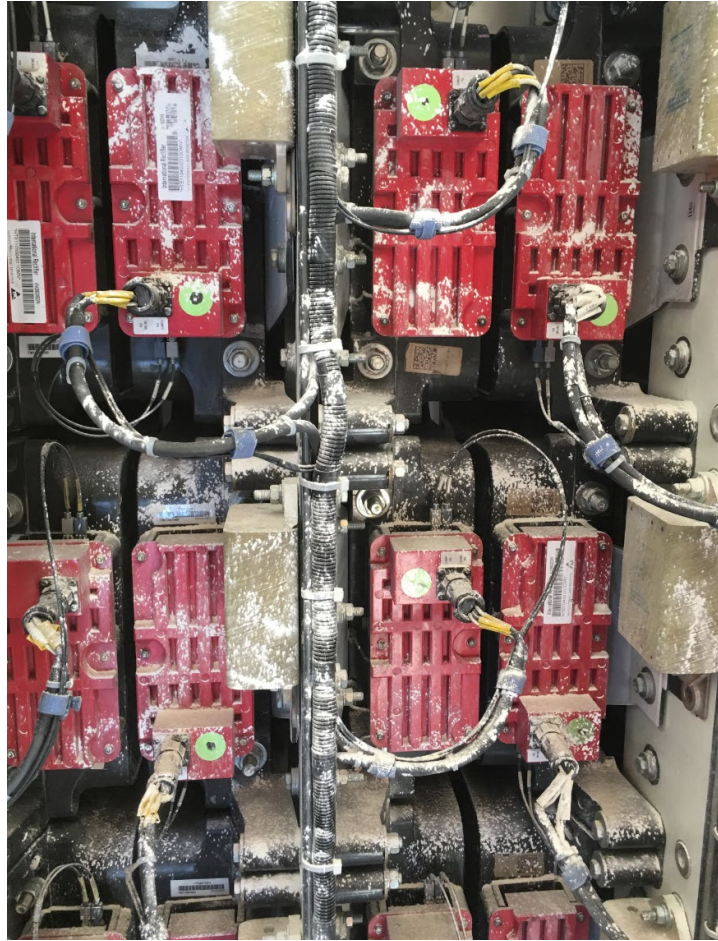
- Electrical components attract dust due to their inherent charge
- Dust build up on electrical components can lead to failures
- Water and electricity don't mix
- Regular blow outs improve equipment reliability

# The BLOW OUT

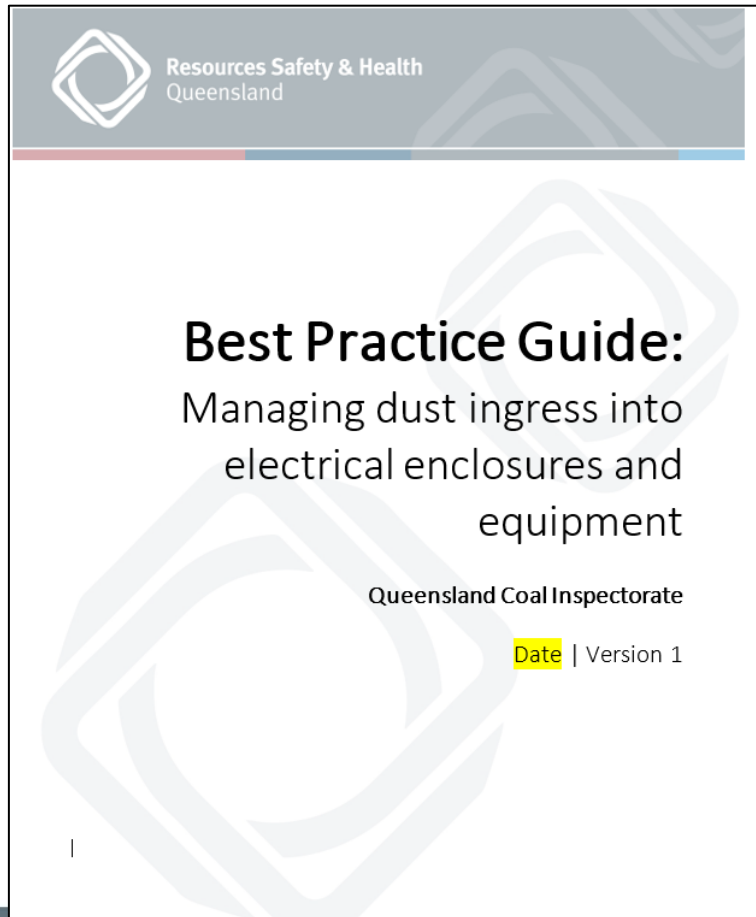




# The Blow Out before and after



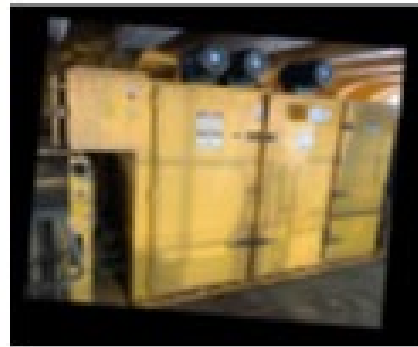
# Best Practice Guide – Managing Dust Ingress into electrical enclosures



- RSHQ
- Anglo
- BMA
- BUMA
- Glencore
- Corondo
- ETU
- CFMEU



Prevent dust generation



Prevent entry into enclosure



Separation (Interrupt Pathway)



Respiratory protection (RPE)

Decreasing control effectiveness

Increasing exposure risk



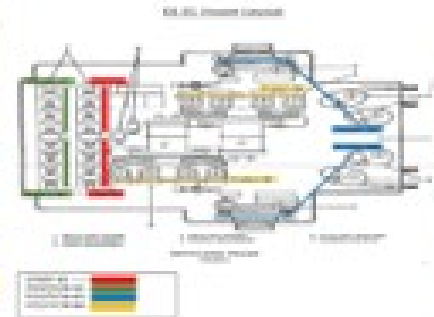
Prevent dust generation



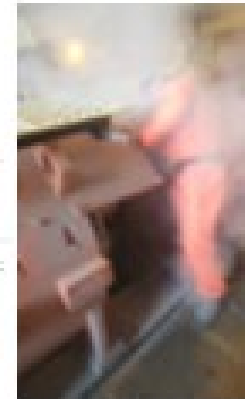
Prevent entry into the house



Separation (remote cleaning)



Administration (sequencing)

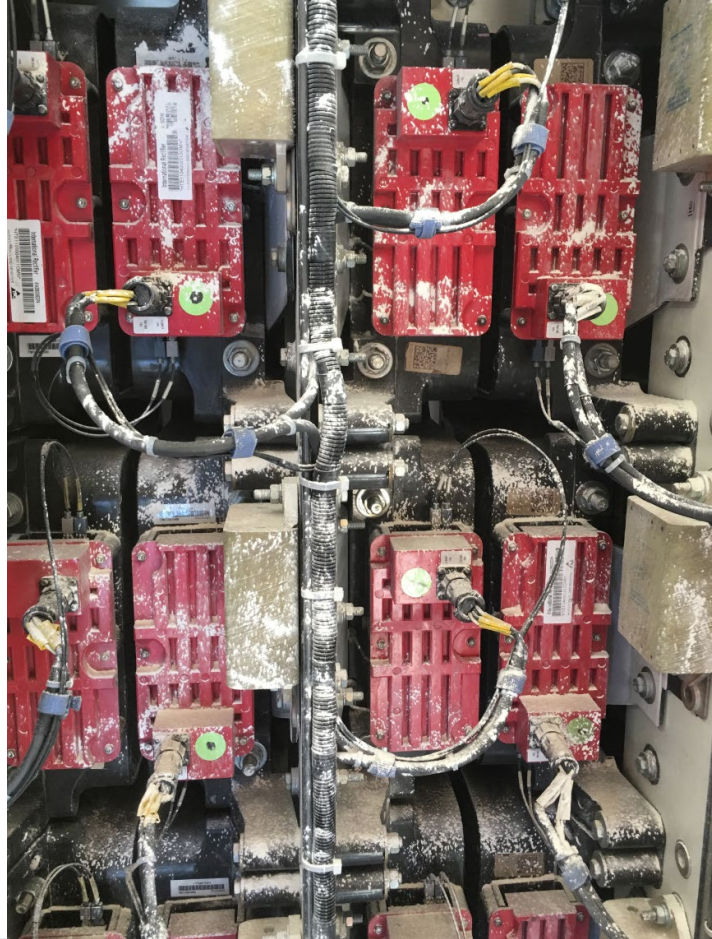


RPE





# HV cabinet on electric drive rear dump.



# Job sequencing and PAPR (Administration/ PPE)



# Separation and exhaust !!





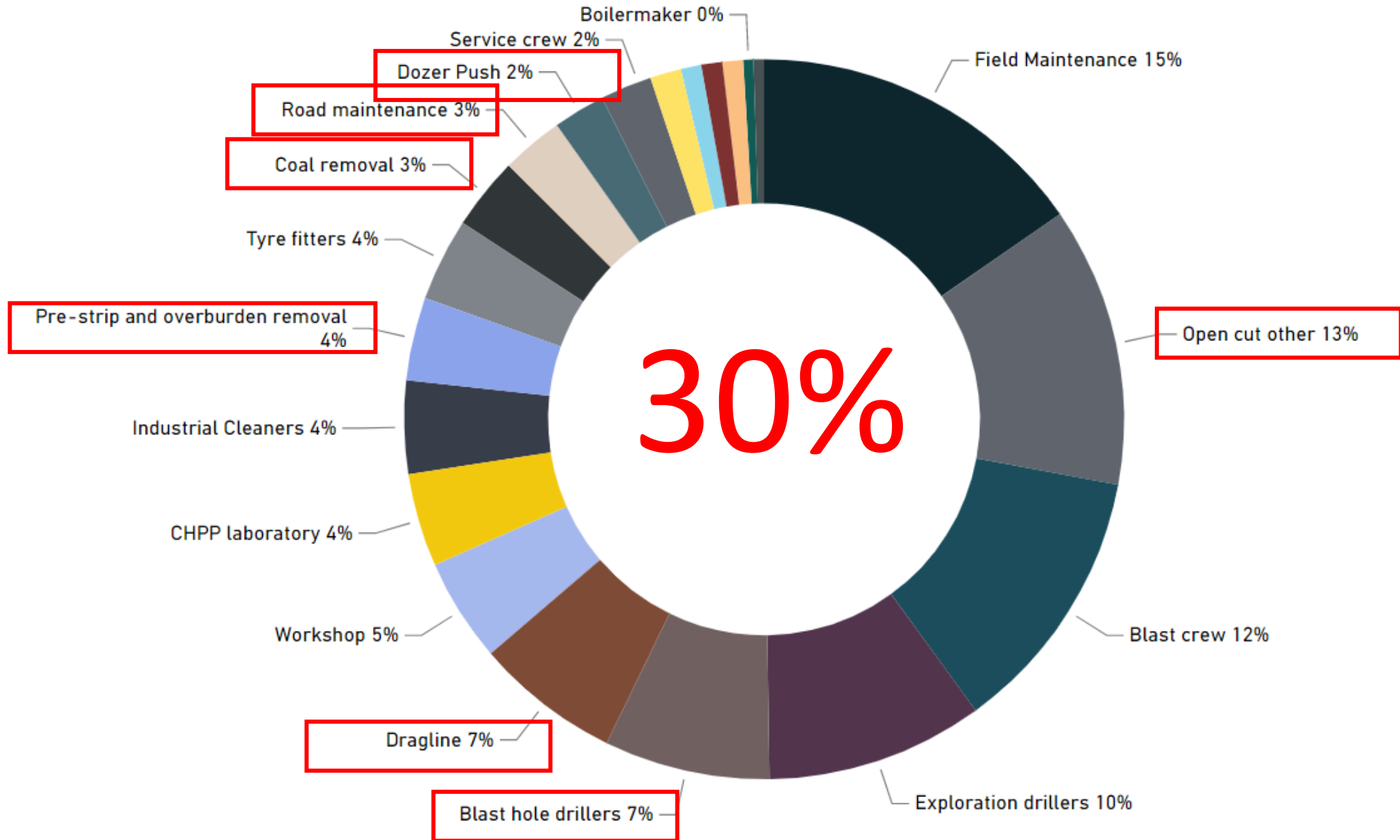
# Elimination !!!



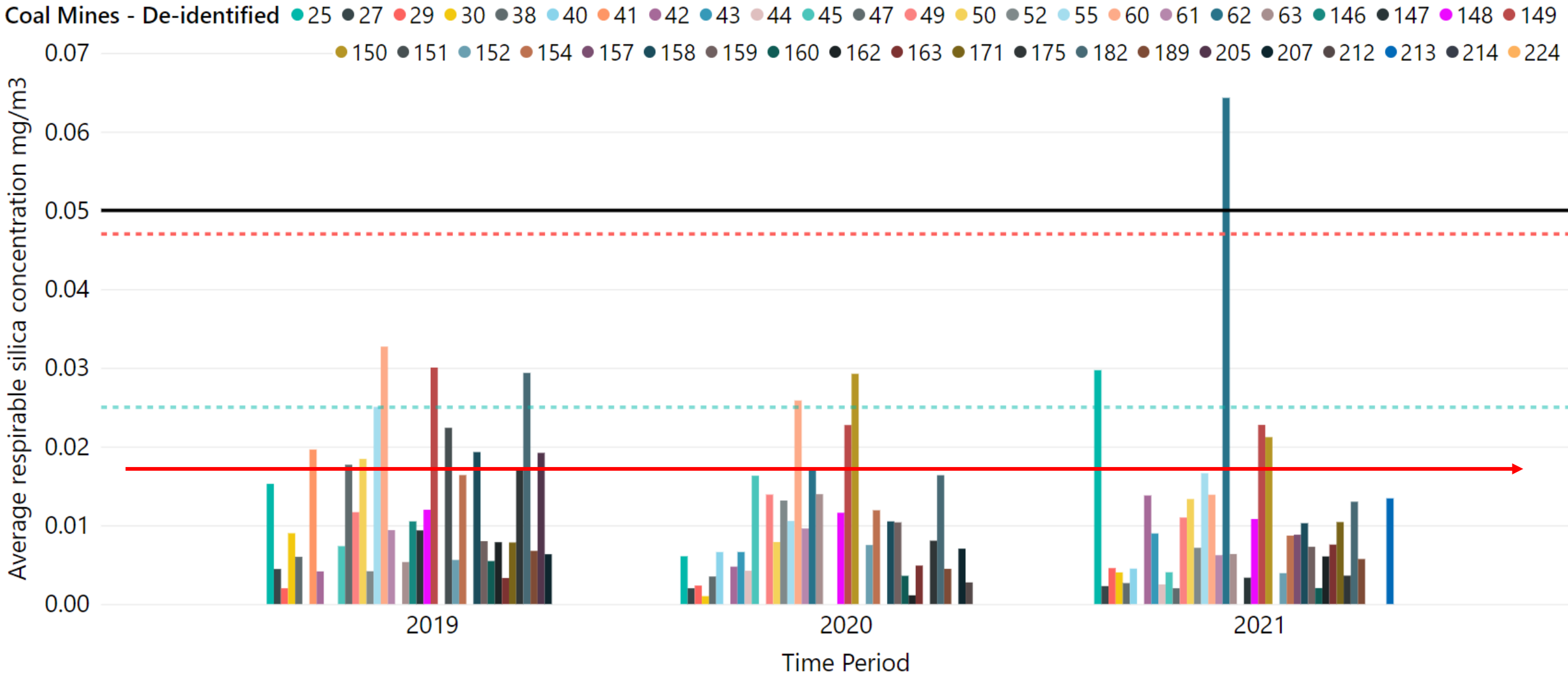
# Cabin Ventilation systems



# Enclosed cabins – RCS exceedances

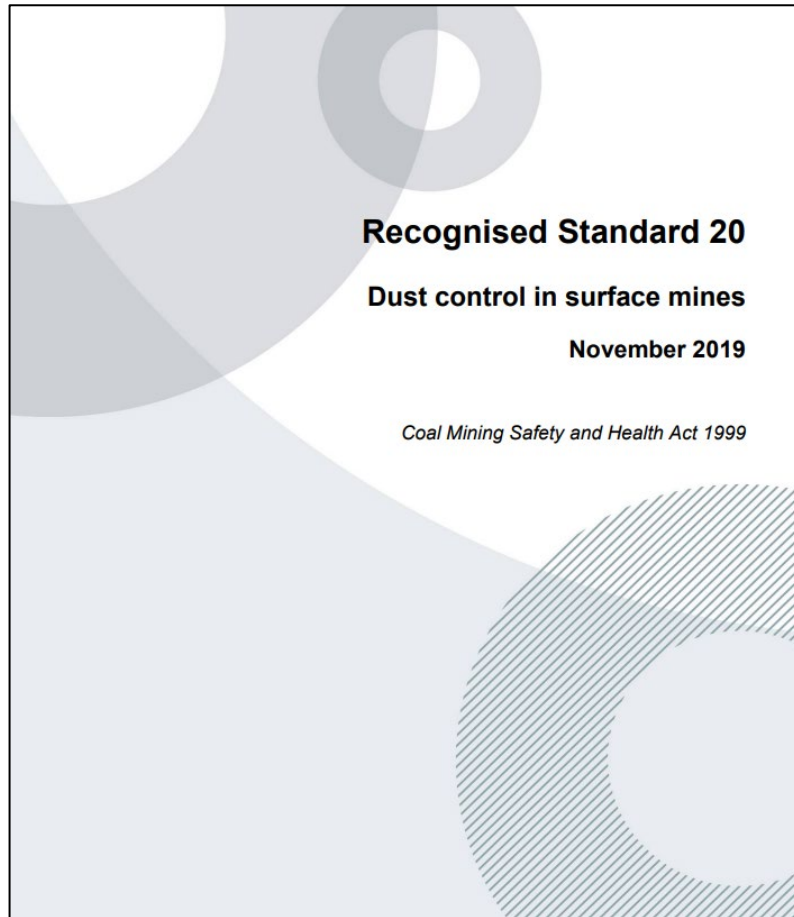


# Respirable Silica - Blast Hole Drillers





# Recognised Standard 20 – Cabin ventilation systems



## 6.5 Fixed and mobile cabin design

Generally conventional HVAC systems are not adequate to handle high volumes of dust for long periods of time. It is also likely that standard cabin filters do not sufficiently protect operators from airborne mine dust.

Fit for purpose cabins on mobile and fixed plant can provide a means for thermal comfort and primary dust control. For cabins that are used in potentially high concentrations of airborne dust, it is critical that these systems are capable of preventing the ingress of very fine airborne dust particles. The majority of cabins used on surface coal mines are on mobile plant. When selecting equipment or undertaking major overhauls on existing mobile plant, the SSE shall give consideration to ensuring the following capabilities:

- the ability to supply pre-cleaned and filtered air to the cabin that passes through a high efficiency particulate air (HEPA) filter of minimum Class of H13.
- The ability to pressurise the cabin to sufficient levels to prevent inward ingress of dust. Some studies show significant cab environmental benefits when cab pressures exceed 20 Pascals (Pa). Some commercial systems currently available constantly adjust to maintain 35 Pa positive pressure.
- The ability to continuously monitor cabin pressure with a system that alarms when the pressure is not adequate.

Further guidance on the use of HEPA filtration in fixed and mobile cabins can be obtained from:

- British Standard EN ISO 16890:2016 – Air filters for general ventilation

The EN Standard 14695-1: 2017 states "*The air delivery system shall cause a positive differential pressure within the cabin.*"

- (a) 50 Pa minimum; or
- (b) 20 Pa minimum, if a device informing the operator when the pressure drops below 20 Pa is provided.

# Positive pressure/ HEPA filtered air





# RS20 Audits – Cabin ventilation systems



Filter breakthrough due to poor sealing



Non compliant coarse filter



Dust deposited inside duct work of AC system



# RS20 Audits – Cabin ventilation systems



No pre-cleaner or pressuriser



Poor sealing. Dust bypassing filter



Dust ingress into ductwork and cabin air space



# Recognised Standard 20 – Audit Campaign

Over **33%** of surface coal mines audited/inspected. Inconsistent implementation of RS 20 and cabin ventilation systems generally do not comply.

## Key issues –

- Typically intake filters are engine grade or lower (not HEPA)
- Typically recirculation filters are coarse grade with no classification.
- Cabins are often not pressurised.
- NO alarming function.

# Now..... Design Standards

Priority	P1 – High	P2 – Medium	P3 – Low
Mobile Equipment Type	<ul style="list-style-type: none"> <li>• Blast Hole Drills</li> <li>• Hydraulic Excavators / Shovels (&gt;100T)</li> <li>• Tracked Dozers</li> </ul>	<ul style="list-style-type: none"> <li>• Excavators / Shovels (&lt;100T)</li> <li>• Scrapers</li> <li>• Loaders</li> <li>• Wheeled Dozers</li> <li>• Forklifts / Telehandlers (if required through WRAC)</li> </ul>	<ul style="list-style-type: none"> <li>• Graders</li> <li>• IT Carriers</li> <li>• Haul Trucks</li> <li>• Water Tankers</li> <li>• Service trucks</li> <li>• EME Floats</li> </ul>
Mandatory Requirement From:	30/09/2022	30/06/2023	<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px;">Only Required for Machines Procured After:</div> <div style="margin-left: 10px; color: orange; font-weight: bold;">01/01/2020</div> </div>

Note that for the P3 priority group, data indicates there are sufficiently low dust exposure levels to allow us to wait until asset replacement, unless the equipment was procured after the 1<sup>st</sup> of January 2020. All new equipment will require cabin pressurisation that adheres to **Recognised Standard 20**.