



Queensland Coal Mining Industry Compliance Framework For Methane Abatement Solutions

COAL MINE METHANE ABATEMENT
SAFETY SEMINAR 4 - 6 SEPTEMBER 2012

Ken Singer Deputy Chief Inspector of Coal Mines

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**Heat- Ignition
source**
- LHD

Fire Triangle



Fuel
- Methane
- Coal/ Diesel/
rags/paper

Oxygen
- Ventilation

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Duty of persons in charge of dangerous things

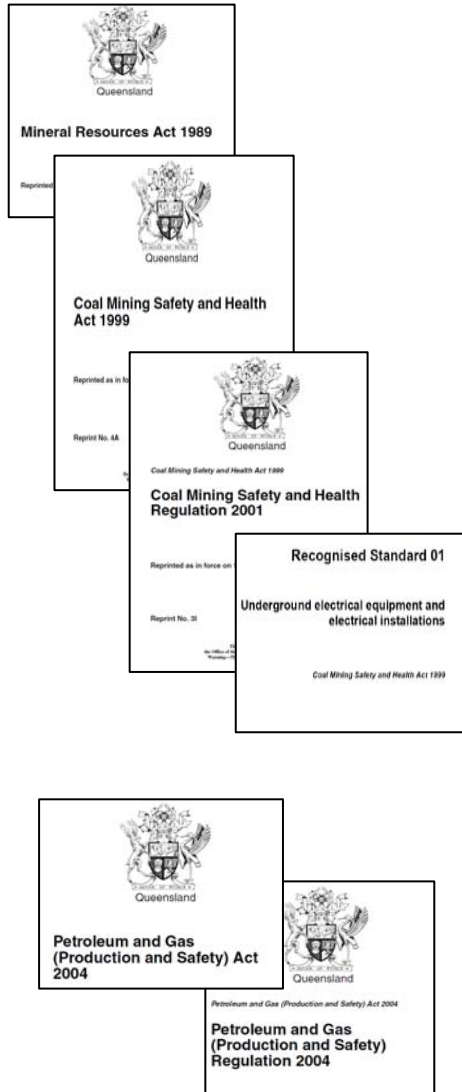
It is the duty of every person who has in the person's charge or under the person's control anything, whether living or inanimate, and whether moving or stationary, of such a nature that, in the absence of care or precaution in its use or management, the life, safety, or health, of any person may be endangered, to use **reasonable care and take reasonable precautions** to avoid such danger, and the person is held to have caused any consequences which result to the life or health of any person by reason of any omission to perform that duty.



S366 Withdrawal in case of Danger

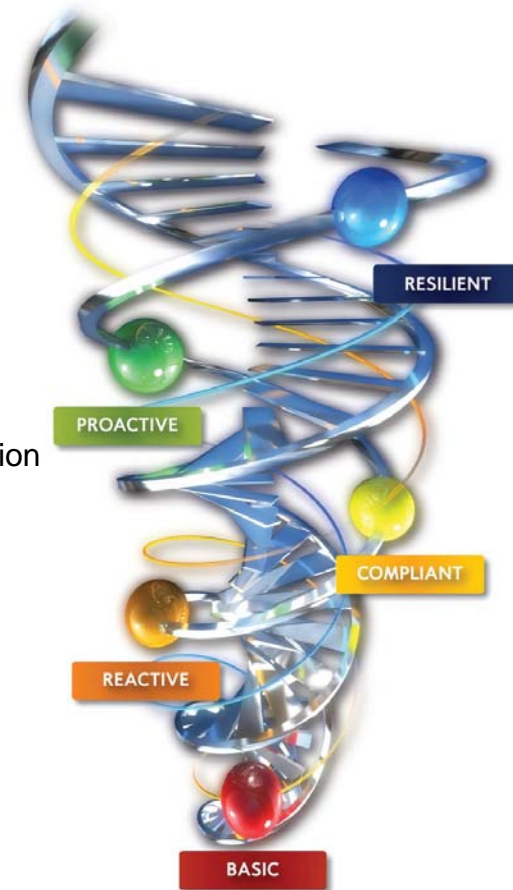
s273 Withdrawal in case of Danger

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High Trust

- Objects (s6, s7)
 - No Safety Case
 - Few Activity Based Notifications
 - No exemptions
 - No approvals
- Mining Advisory Committee (s75)
- Risk Based (s6, s29, s30, s41, s62)
- Cooperation and consultation (s13, s31)
- Seeks not only a technical solution but a holistic solution (Safety and Health Management System s62)
- Risk Mitigation (r35)
- Proper Diligence (s38)
- Standard Operating Procedures (r10)
- Obligations (s34-47)
- Functions of an inspectors (s128)
- Directives (s164-s172)





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r6 Basic elements

A coal mine's safety and health management system must provide for the following basic elements—

- (a) risk identification and assessment;
- (b) hazard analysis;
- (c) hazard management and control;
- (d) reporting and recording relevant safety and health information and data.

s39 Obligations of persons generally

s41 Obligations of coal mine operators

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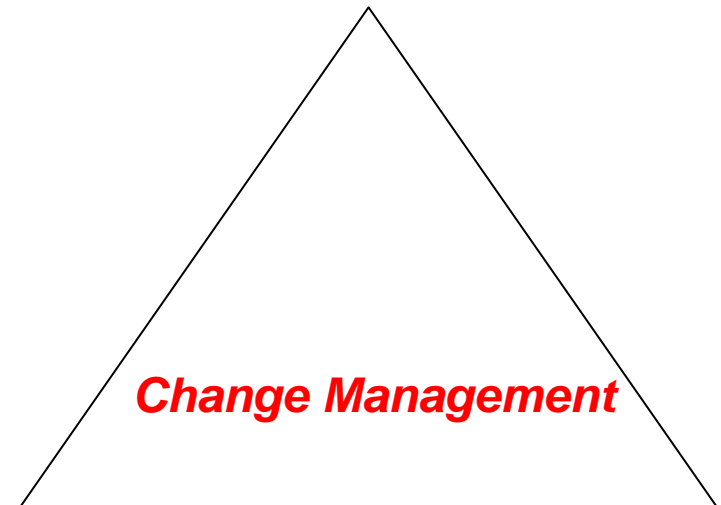
29 What is an acceptable level of risk

(1) For risk to a person from coal mining operations to be at an ***acceptable level***, the operations must be carried out so that the level of risk from the operations is—

- (a) within acceptable limits; and
- (b) as low as reasonably achievable.

(2) To decide whether risk is within acceptable limits and as low as reasonably achievable regard must be had to—

- (a) the likelihood of injury or illness to a person arising out of the risk; and
- (b) the severity of the injury or illness.



s149 Principal hazard management plan
r12B Principal hazard management plan
S62 Changes to Principal Hazard Management Plan
AS 4024.1 Series 2006 (Safety of Machinery)
AS 61508 Series 2011 (Electrical.. Safety)



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30 How is an acceptable level of risk achieved

- (1) To achieve an acceptable level of risk, this Act requires that management and operating systems must be put in place for each coal mine.
- (2) This Act provides that the systems must incorporate risk management elements and practices appropriate for each coal mine to—
 - (a) identify, analyse, and assess risk; and
 - (b) avoid or remove unacceptable risk; and
 - (c) monitor levels of risk and the adverse consequences of retained residual risk; and
 - (d) investigate and analyse the causes of serious accidents and high potential incidents with a view to preventing their recurrence; and
 - (e) review the effectiveness of risk control measures, and take appropriate corrective and preventive action; and
 - (f) mitigate the potential adverse effects arising from residual risk.
- (3) Also, the way an acceptable level of risk of injury or illness may be achieved may be prescribed under a regulation.

15 Investigating accidents and incidents

273 Withdrawal of persons in case of danger



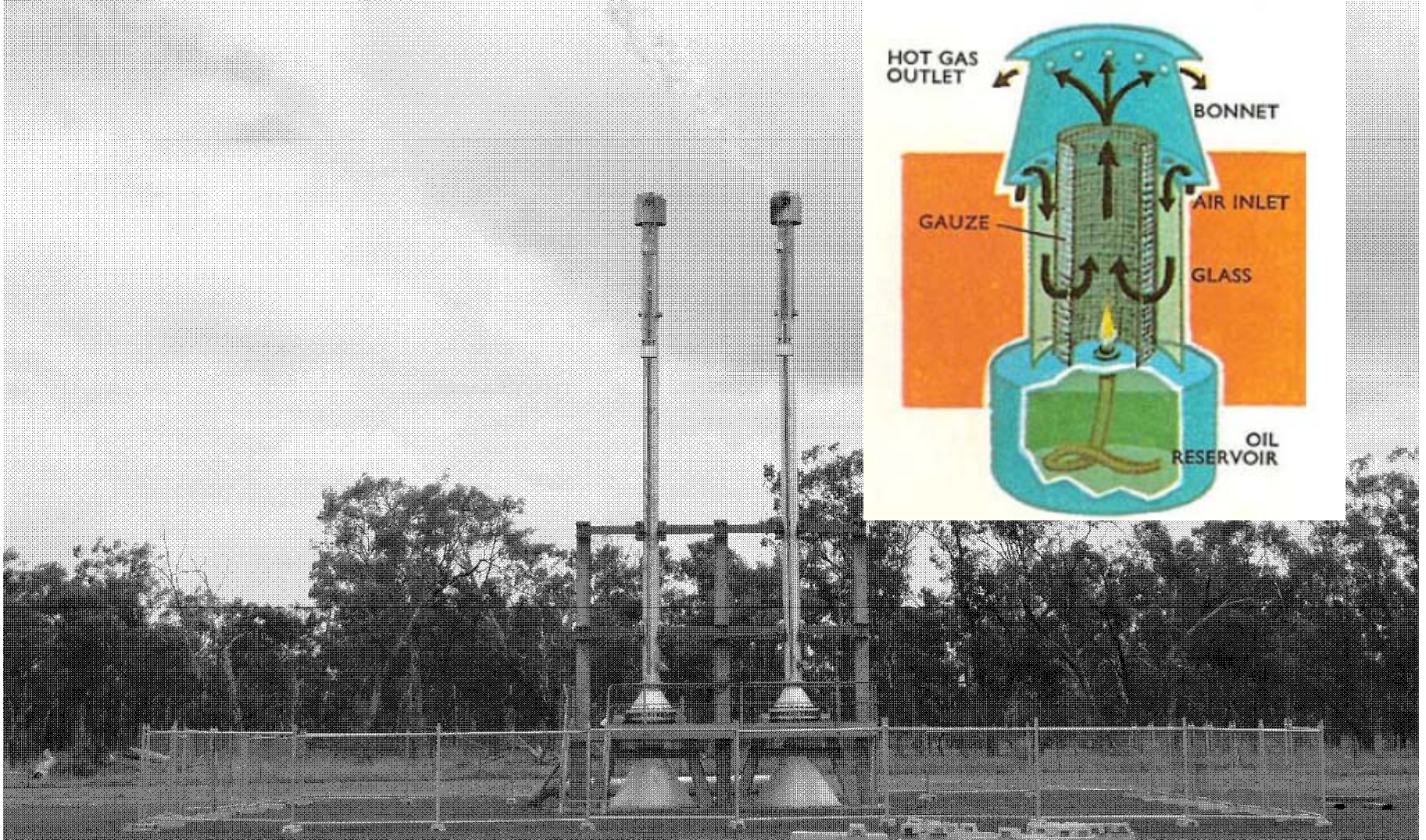
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38 How obligations can be discharged if no regulation or recognised standard made

- (1) This section applies *if there is no regulation or recognised standard* prescribing or stating a way to discharge the person's safety and health obligation in relation to a risk.
- (2) The person may *choose an appropriate way* to discharge the person's safety and health obligation in relation to the risk.
- (3) However, the person discharges the person's safety and health obligation in relation to the risk only if the person takes reasonable precautions, and exercises *proper diligence*, to ensure the obligation is discharged.

Discoverable documents
What ought to be known about a matter

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The explosion was the result of failures of basic safety systems identified and codified to protect the lives of miners.



Maybe not as simple as the Swiss Cheese Model?

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44 Obligations of designers, manufacturers, importers and suppliers of plant etc. for use at coal mines

- To ensure the plant is designed so that, when used properly, the risk to persons from the use of the plant is at an acceptable level.
- Is constructed so that, when used properly, the risk to persons from the use of the plant is at an acceptable level.
- to ensure the plant undergoes appropriate levels of testing and examination to ensure compliance with the obligation imposed above
- To take all reasonable steps to ensure appropriate information about the safe use of the plant is available, including information about the maintenance necessary for the safe use of the plant;

The Life Cycle Stages of a Project

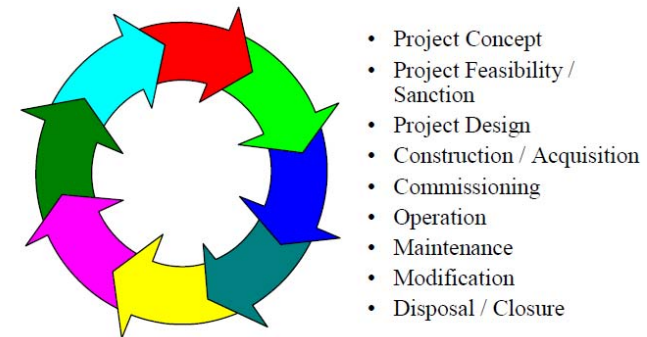
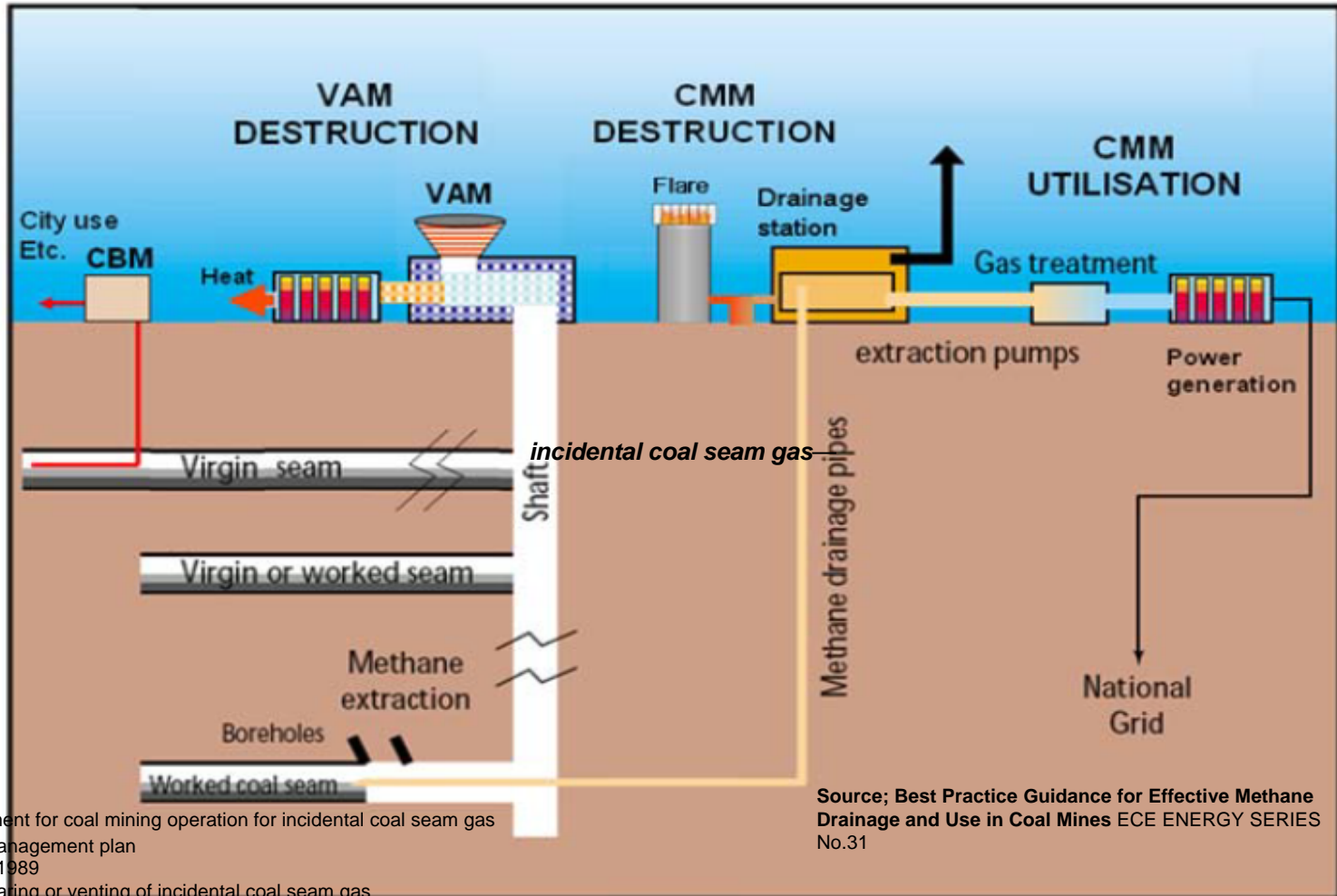


Figure 3.1 The life cycle stages of a project

8 → The Life Cycle illustrates the various stages in any project. The most cost effective timing for risk assessment is in the concept / design phase. **THIS IS A KEY ISSUE.** Risk Assessments should, at least, be done at the earliest possible point in each life cycle stage.

Figure 6.1 Optimising Energy Recovery with Near-Zero Methane Emissions Mining



- 62A Additional requirement for coal mining operation for incidental coal seam gas
- 12B Principal hazard management plan
- Mineral Resources Act 1989
- 318CO Restriction on flaring or venting of incidental coal seam gas
- 52A Notice about underground gasification activities
- 6A Potential hazard guide—coal seam gas or petroleum



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Establishing and identifying explosion risk zones

r286 Risk assessment

The site senior executive must ensure a risk assessment is carried out to identify the location and type of each ERZ at the mine.

r287 ERZ0

- (1) An underground mine, or any part of it, where the general body concentration of methane is known to be, or is identified by a risk assessment as likely to be, greater than 2%, is an ERZ0.
- (2) To remove any doubt, it is declared that, if the general body concentration of methane in a part of the mine that is an ERZ1 or NERZ becomes greater than 2%, the part becomes an ERZ0.

r288 ERZ1

- (1) An underground mine, or any part of it, where the general body concentration of methane is known to range, or is shown by a risk assessment as likely to range, from 0.5% to 2% is an ERZ1.

r181 ERZ0

Recognised Standard 1

AS/NZ 60079.10.1

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4.5 Protection Techniques

PROTECTION TECHNIQUES FOR ELECTRICAL EQUIPMENT AND ELECTRICAL INSTALLATIONS IN EXPLOSION RISK ZONES		
Description of protection technique	Relevant Australian/IEC Standard and designated symbol	Remarks
EXPLOSION RISK ZONE 0 (ERZ0)		
Intrinsically safe	AS/NZS 60079.11 Ex ia	
Special protection	AS/NZS 1826 Ex s	In accordance with the requirements for Australian Standard Zone 0
Caplights for use in mines susceptible to firedamp	AS/NZS 62013.1 Ex I	
EXPLOSION RISK ZONE 1 (ERZ1)		
Intrinsically safe	AS/NZS 60079.11 Ex ib	
Special protection	AS/NZS 1826 Ex s	In accordance with the requirements for Australian Standard Zone 1
Flameproof enclosure	AS/NZS 60079.1 Ex d	
Encapsulated	AS/NZS 60079.18 Ex m	
Pressurized rooms or enclosures	AS 2380.4 / AS/NZS 60079.2 Ex p	In accordance with the requirements for Australian Standard Zone 1
Increased safety	AS/NZS 60079.7 Ex.e	Additional mechanical protection may be required
Ventilation	AS 1482 Ex v	In accordance with the requirements for Australian Standard Zone 1

Recognised Standard 01

Underground electrical equipment and electrical installations

Coal Mining Safety and Health Act 1999

r20 Competency

Equipment suitable for use in ERZ0 can also be used in ERZ1. Equipment suitable for use in an ERZ1 can also be used in a Negligible-Explosion Risk Zone (NERZ). **ERZ0, ERZ1** and **NERZ** are as defined in the Coal Mining Safety and Health Regulation 2001.



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152 Limit to external surface temperature of equipment used underground

a person must not use equipment underground if its external surface temperature is more than 150°C.

232 Main exhausting fan

(1) The ventilating air passing through a main exhausting fan must be monitored by at least 1 automatic methane detector to detect the air's general body concentration of methane.

(2) The detector must automatically activate a visible alarm when the concentration exceeds the percentage stated in the mine's principal hazard management plan for ventilation as the percentage that must not be exceeded before the detector activates the alarm.

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Directives

169 Directive to suspend operations

If an inspector **believes** there is not an effective safety and health management system for a coal mine or part of a coal mine, the inspector may give a directive suspending operations in all or part of the mine.

s164-162

