



Guidance Note GNC-011

NSW DPI Guidance Note High Risk Activity: Use of Non-Flameproof (Fire Protected) Vehicles in Underground Coal Mines

***Coal Mine Health and Safety Act 2002
Coal Mine Health and Safety Regulation 2006***

July 2007 (version DRAFT GNC011 DR070710.doc)

**Note: This version was submitted to the Coal Safety Advisory Committee (CSAC) on 17 July 2007. Any comments should be forwarded to the CSAC secretary Glyn McDonald at:
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NSW DPI Guidance Note: High Risk Activity: Use of Non-Flameproof (Fire Protected) Vehicles in Underground Coal Mines

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1.0 PURPOSE

The purpose of this guidance note is to provide practical and general guidance to operators' of underground coal operations on:

- The assessment and control of risks associated with the introduction of fire protected (non-flameproof) vehicles in underground parts of a coal mine, and
- Information to be provided to the DPI upon notification of the intended use of a fire protected (non-flameproof) vehicles on the first occasion.

2.0 SCOPE

This guidance note applies to coal operations in New South Wales which are governed by the *Coal Mine Health and Safety Act 2002* and covers the use of fire protected (non-flameproof) vehicles in non hazardous zones in an underground coal mine.

This guidance note does not apply to the use of vehicles on the surface of an underground coal mine.

Fire protected (non-flameproof) vehicles must not be used in a hazardous zone.

3.0 DUTIES

3.1 Definitions

hazardous zone means (*CMHS Regulation*):

- (a) a return airway in a mine, or
- (b) that part of an intake airway in a ventilation district in a mine that is on the return side of such points as are:
 - (i) 100 metres outbye the most inbye completed line of cutthroughs, or
 - (ii) 100 metres from, and on the intake side of, a longwall or shortwall face, or
- (c) a part of a mine in which there is a methane concentration of 1.25 per cent or greater in the general body of air, or
- (d) a part of a mine Gazetted as a hazardous zone.

'Control' of risk means (*OHS Regulation*):

- (1) An obligation to **control** a risk to health or safety (in any case in which the elimination of the risk is not reasonably practicable) is an obligation to take the following measures (in the order specified) to minimise the risk to the lowest level reasonably practicable:
 - a) firstly, substituting the hazard giving rise to the risk with a hazard that gives rise to a lesser risk,
 - b) secondly, isolating the hazard from the person put at risk,
 - c) thirdly, minimising the risk by engineering means,
 - d) fourthly, minimising the risk by administrative means (for example, by adopting safe working practices or providing appropriate training, instruction or information),

- e) fifthly, using personal protective equipment.
- (2) A combination of the above measures is required to be taken to minimise the risk to the lowest level reasonably practicable if no single measure is sufficient for that purpose.

Use plant means (*OHS Regulation*) work from, operate, maintain, inspect or clean plant

3.2 High Risk Activity

3.2.1 Non-flameproof (fire-protected) diesel engine

Clause 49 of the *CMHS Regulation* specifies that;

'The introduction for the first time of a vehicle with a non-flameproof (fire-protected) diesel engine to an underground part of a coal operation that is not a hazardous zone',

is considered a high risk activity for the purpose of Section 53 of the *CMHS Act*.

3.2.2 Notification

Section 54 of the *CMHS Act* specifies that the operator must ensure that a high risk activity is not carried out at or in relation to the coal operation unless, before the activity is commenced:

- a) The operator has given notice of the activity to the Chief Inspector, an industry check inspector and the site check inspector for the coal operation, and
- b) The waiting period has elapsed.

3.2.3 Waiting Period

The prescribed waiting period for this activity is 3 months from receipt of notification by the Chief Inspector and industry check inspector.

Note: Section 54 (1A) of the *CMHS Act* provides for the Chief Inspector may vary the waiting period after consultation with the industry check inspector who has been notified of the activity

3.2.4 Form of Notification

Clause 49(3) of the *CMHS Regulation* requires that a notice must in a form that contains at least the following:

- a) The nature of the activity,
- b) The intended commencement date, and
- c) The information on *'how the risk of introduction has been assessed and the resulting controls put in place, together with procedures to be followed in the case of failure of a control.'*

This guidance note provides guidance on meeting these requirements and on the safe use of non-flameproof (fire protected) vehicles in an underground coal mine.

3.3 Risk Management

The management of the risks associated with the use of non-flameproof (fire protected) vehicle(s) must be consistent with the *OHS Regulation*, AS 4360 and MDG 1010.

3.4 Risk Assessment

The Coal Operator must carry out a specific risk assessment and implement appropriate risk control measures for each type non-flameproof (fire protected) vehicle intended to be used in the underground parts of the coal operation.

The risk assessment must be consistent with the *National Minerals Industry Safety and Health Risk Assessment Guideline*, AS 4024.1301 and AS 4024.1302, AS/NZS 3931, or other similar recognised standards.

The risk must consider and address each of the following (but not limited to):

- a) Identify and document the design registration number of each diesel engine system(s) being introduced.

Note: If an alternative non-flameproof (fire protected) vehicle is used at a later stage a new notification and waiting period is required.

- b) Identify and document on a mine plan each area(s) where the non-flameproof (fire protected) vehicles are to operate.

Note: If the area designated varies at a later stage a new notification and waiting period is required.

- c) Identify and document of a mine plant all areas where methane exists or has been detected in the mine previously.

Note: Documentation should include drainage lines and the extent of methane existence. If this varies at a later stage a new notification and waiting period is required.

- d) Determine the risk (likelihood and consequence) of methane entering the area (environment) where the non-flameproof (fire protected) vehicle(s) are designated to operate, with consideration to:

- (i) Human error,
- (ii) Ventilation management,
- (iii) Barometer changes,
- (iv) Seal failures,
- (v) Leaking seals,
- (vi) Goaf falls,
- (vii) Damage to methane drainage pipeline,
- (viii) Failure of methane drainage system,
- (ix) Ventilation control failures from collisions underground,
- (x) Methane engulfment, and
- (xi) Other equipment or system failures.

- e) Determine the risk (likelihood and consequence) of a fire protected (non-flameproof) vehicle entering any non-designated area of operation in the mine with consideration to:

- (i) Human error, and

- (ii) Equipment or control system failures
- f) Identify the minimum acceptable category level or safety integrity level for the control system(s) to prevent the fire protected (non-flameproof) vehicle from entering a hazardous zone or other area likely to be contaminated with methane gas.
- g) Determine the risk (likelihood and consequence) of a non-flameproof (fire protected) vehicle failing to shutdown upon detection of methane and/or igniting methane, (in the event of either methane in the designated area or the vehicle entering a non-designated area) with consideration to, but not limited to:
 - (i) The reaction time for methane detection and subsequently the following engine shutdown,
 - (ii) The speed of the vehicle at the time of detection,
 - (iii) The rate of methane engulfment over the non-flameproof (fire protected) vehicle,
 - (iv) Methane detection and engine shutdown failures, and
- h) The provision and implementation of appropriate engineering risk control measures including appropriate systems of work to ensure that:
 - (i) A fire protected (non-flameproof) vehicle cannot enter a hazardous zone or other area likely to be contaminated with methane gas, or
 - (ii) The designated area (environment) in which the fire protected (non-flameproof) vehicle travels always contains less than 0.25% methane.

These risk controls measures must automatically shut down the diesel engine and must be analysed in accordance with clause 3.6.4 *Control System*.

- i) The provision of appropriate fire protection (prevention, detection and suppression) as outlined in AS 5062.
- j) The requirements of AS/NZS 4871.
- k) Emergency procedures, including:
 - (i) The use of a fire protected (non-flameproof) vehicle for escape in a methane related event or other non-methane related event, and
 - (ii) Automatic shutdown of the diesel engine following methane detection
- l) Development of a safe system of work, including:
 - (i) Appropriate inspections and checks of the mine ventilation system and of control system(s) of non-flameproof vehicle,
 - (ii) Competency for vehicle operators,
 - (iii) Competency for people carrying out safety related inspections and maintenance of the control system and vehicle,
 - (iv) Identification of records that must be kept, and
 - (v) Identification of catalysts for risk assessment review.
- m) Identify minimum airflow requirements and diesel pollutant control measures (including particulate matter).

A copy of the risk assessment, including risk control measures, which covers each of the above items, must be provided with the submission.

3.5 Mechanical and Electrical Engineering Managements Plans

The lifecycle aspects of the non-flameproof (fire protected) vehicle must be incorporated into the coal operator's mechanical and electrical engineering management plans.

In particular all vehicles must comply with clauses 13(e) & (f), clause 19 and clause 20 of the *CMHS Regulation 2006*.

3.6 Fit For Purpose Equipment

3.6.1 Design Registration

All fire protected (non-flameproof) vehicles must include a design registered;

- (i) Diesel engine system, and
- (ii) Transport braking system

in accordance with clause 107 of the *OHS Regulation 2001*.

3.6.2 Item Registration

Each fire protected (non-flameproof) diesel engine must item registered in accordance with clause 113 of the *OHS Regulation 2001*. A baseline emissions test will be recorded.

3.6.3 Plant requirements

Prior to the use of the fire protected (non-flameproof) vehicle, each vehicle must be assessed for compliance with the gazettal '*Requirements before use of plant*' as specified under clause 76 '*Plant requirements*' of the *CMHS Regulation*.

A competent person is to record in writing that the fire protected (non-flameproof) vehicle is safe to use.

3.6.4 Control System

Any control system used to maintain the fire protected (non-flameproof) vehicle in a safe environment and/or designated area must be:

- a) Analysed to determine the required safety integrity level or category level in accordance with the criticality of the safety function (analysis to be provided with submission), and
- b) Quantitatively assessed for failure upon demand of the safety function, and
- c) Meet the requirements of AS 65108, AS 62061, AS 4024.1501 & AS 4024.1502 or any other equivalent or like internationally recognised standards, and
- d) Validated or verified for compliance by a qualified engineer.

3.7 Safe Systems of Work

Each coal operator is to implement risk management systems that address the outputs from the risk assessment to provide systems of work necessary for the safe use of the fire protected (non-flameproof) vehicle.

One output will be a documented set of operating and maintenance procedures to ensure compliance with all controls identified in the risk assessment.

3.8 Competent People

Each mine or user is to develop training material for operators and maintenance people carrying out safety inspections and tests and personnel to ensure the fire protected (non-flameproof) vehicle is safe to use and compliant with all risk controls identified in the risk assessment.

All operators and maintenance personnel must be trained in the operating and maintenance procedures and assessed as competent before being appointed to operate, maintain or inspect and test fire protected (non-flameproof) vehicles.

3.9 Safe Operating Environment

It is stressed that separation of a fire protected (non-flameproof) vehicle from a hazardous zone or areas likely to be contaminated with flammable gas is of the utmost importance.

Reliance on procedures or other soft barriers alone to control the risk is not consistent with the *OHS Regulation*. Fit for purpose engineering methods to control the risks must be implemented. Appropriate Safety Integrity Levels (SIL) and/or category levels must be specified.

The operating procedures that document the use of fire protected (non flameproof) vehicles will clearly show:

- a) The operating areas in which the equipment will be used, and
- b) The specific design registration numbers of the equipment that will be used.

Any change to this zone of operation or the specified design registration number will be subject to formal risk review and notification to the CICM or his delegate.

3.10 Monitoring & Review

The operator will use risk management procedures to regularly review the operation of fire protected (non flameproof) vehicles and compliance with operating and maintenance procedures. Change management will be a key feature of ongoing monitoring and review. Any changes to the operating environment must be identified and properly assessed.

A review of the risk assessment and systems of work must occur:

- a) After 12 months of operation from introduction of first non-flameproof diesel engine,
- b) If there is an incident when the non-flameproof diesel engine enters an area where it is not designated to go, and
- c) A period no greater than 3 years.

3.11 Audit

An audit of the operation of the fire protected (non-flameproof) vehicle must be carried out at regular intervals. The audit must include assessment of the site practices against the documented system for the use of fire protected (non-flameproof) vehicles. The first audit should be carried out within 12 months from introduction of the first vehicle.

3.12 Reporting

The coal operator must provide the following reports to the Chief Inspector and industry check inspector:

- a) A 2 yearly review of complete operating and maintenance procedures, within 1 month,
- b) Any review of operating or maintenance procedures which results in a change to those procedures, within 1 week,

3.13 Notification

The Chief Inspector is to be notified on all occasions where:

- a) A fire protected (non-flameproof) vehicle enters any non-designated area of safe operation in the mine and the control system fails to shut down the diesel engine automatically, or
- b) The diesel engine shuts down either automatically or manually by the operator due to methane in excess of 0.25% being detected in the roadway to which a fire protected (non-flameproof) vehicle travels, or
- c) Where methane in excess of 0.25% is detected in the designated area where a fire protected (non-flameproof) vehicle may operate.

These notifications are condition of design and item registration and must be made within 24 hours.

4.0 REFERENCES

4.1.1 Applicable legislation

Occupational Health and Safety Act 2000, (OHS Act)

Occupational Health and Safety Regulation 2001, (OHS Regulation)

Coal Mine Health and Safety Act 2002, (CMHS Act)

Coal Mine Health and Safety Regulation 2006, (CMHS Regulation)

4.1.2 Standards referenced:

AS/NZS 3931	<i>Risk analysis of technological systems – Application guide</i>
AS 4024.1301	<i>Safety of machinery – Risk Assessment – Principles of Risk Assessment</i>
AS 4024.1302	<i>Safety of machinery – Risk assessment – reduction of risks to health and safety from hazardous substances emitted by machinery – Principles and specification for machinery manufacturers</i>
AS 4024.1501	<i>Safety of machinery – Design of safety related parts of control systems – general principles for Design</i>
AS 4024.1502	<i>Safety of machinery – Design of safety related parts of control systems – general principles for Design - Validation</i>
AS4360	<i>Risk management</i>
AS/NZS 4871	<i>Electrical equipment for underground coal mines</i>
AS 5062	<i>Fire protection for mobile and transportable equipment</i>
AS 65108	<i>Functional safety of electrical/electronic/programmable electronic safety-related system</i>
AS 62061	<i>Safety of machinery – Functional safety of safety-related electrical, electronic and programmable electronic control systems</i>

5.0 ATTACHMENTS

Guidance Note Coal – 011: *High Risk Activity: Use of Non-Flameproof (Fire Protected) Vehicles in Underground Coal Mines*

5.1 Check List

Notification documentation must include the following:

- Provided to the Chief inspector, Industry check inspector and sit check inspector.
- The intended commencement date.
- Identify the design registration number of each diesel engine system being introduced.
- Identify all areas of the mine where the vehicles are to operate.
- Identify all areas where methane exists or has been detected in the mine previously.
- Information on the risk management process covering the use of the vehicles
- A risk assessment and appropriate risk control measures which clearly covers items d) to m) in 3.4.
- Inclusion of non-flameproof (fire protected) vehicle in the mechanical and electrical engineering management plans as outlined in 3.5
- Use of appropriate design and item registered equipment in accordance with registration conditions as outlined in 3.6.1 and 3.6.2
- The assessment of the control system as outlined in 3.6.4
- Safe systems of work as outlines in 3.7
- Competent people as outlined in 3.8
- A safe operating environment as outlined in 3.9
- A monitoring and review system as outlined in 3.10
- An audit system as outlined in 3.11
- a reporting system as outlined in 3.12
- A notification system as outlined in 3.13



6.0 FEEDBACK SHEET

Your comments will be very helpful in reviewing and improving this Guidance Note.
Please copy and complete the Feedback Sheet and return it to:

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(Optional) Name: _____ **Phone:** _____

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