DEPARTMENT OF MINERAL RESOURCES

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MINE HEALTH AND SAFETY ACT, 1996 (ACT NO 29 OF 1996)

GUIDELINE FOR THE COMPILATION OF A MANDATORY CODE OF PRACTICE FOR THE PREVENTION OF FLAMMABLE GAS AND COAL DUST EXPLOSIONS IN COLLIERIES

I, **DAVID MSIZA,** Chief Inspector of Mines, under section 49(6) of the Mine Health and Safety Act, 1996 (Act No. 29 of 1996) and after consultation with the Council, hereby issues the guideline of a mandatory code of practice for the prevention of flammable gas and coal dust explosions in collieries in terms of the Mine Health and Safety Act, as set out in the Schedule.

D MSIZA
CHIEF INSPECTOR OF MINES

SCHEDULE

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DEPARTMENT OF MINERAL RESOURCES

MINE HEALTH AND SAFETY INSPECTORATE

GUIDELINE FOR THE COMPILATION OF A

MANDATORY CODE OF PRACTICE FOR

THE PREVENTION OF FLAMMABLE GAS AND COAL DUST EXPLOSIONS IN COLLIERIES

CHIEF INSPECTOR OF MINES

mineral resources
Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

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PART A: THE GUIDELINE

1. FOREWORD

1.1. 2018 version of this guideline

1.1.1. Following a request from MOHAC, a tri-partite working committee was convened in 2017 to review the guideline for the compilation of a mandatory **COP** for the prevention of **flammable gas** and coal dust explosions in collieries. The brief of this working committee was to review and validate the 2002 guideline and, where necessary, to propose amendments that would align the new guideline with intervening developments in the technical sphere of gas and coal dust ignition prevention.

1.2. 2002 version of this guideline

1.2.1. Throughout the history of coal mining, ignitions of **flammable gas** and coal dust have been major causes of death. Investigations following explosions have shaped the legislation for mines and have influenced the development of equipment and mining techniques. Despite improved standards of ventilation, technical developments and a greater awareness, ignitions are probably the most feared hazard underground. Most coal dust explosions are preceded by an ignition of **flammable gas**.

1.2.2. Due to the increased use of mechanical miners, which increases the risk of ignitions, the extent of the hazard has increased in recent years, since these machines open large areas of virgin ground in a short time period.

1.2.3. Following the Report of the Leon Commission of Inquiry into Safety and Health in the Mining Industry, MRAC appointed a task group to advise on measures to be taken to minimize the risk of **flammable gas** and coal dust ignition and/or explosions at collieries in South Africa. This guideline is a result of the work of that task group.

1.2.4. This guideline and the **COP** to which it refers, will deal with good ventilation practices and the prevention of ignitions and explosions of **flammable gas** as well as the inertisation of coal dust to prevent the ignition and/or propagation of coal dust explosions. This guideline is applicable to all coal mines. However, the measures to be taken for the prevention of coal dust explosions are only applicable to mines mining **bituminous coal**.

2. LEGAL STATUS OF GUIDELINES AND COPs

2.1. In accordance with section 9(2) of the **MHSA**, an employer must prepare and implement a mandatory **COP** on any matter affecting the health and safety of employees and other persons who may be directly affected by activities at the mine if the **CIOM** requires it. These **COPs** must comply with any relevant guidelines issued by the **CIOM** [section 9 (3)]. Failure by the employer to prepare or implement a **COP** in compliance with this guideline is a breach of the **MHSA**.

3. THE OBJECTIVE OF THIS GUIDELINE

3.1. The objective of this guideline is to assist the employer of every coal mine to compile a **COP**, which, if properly implemented and complied with, would considerably reduce the risk of an ignition of **flammable gas** and will ensure the inertisation of coal dust to prevent the ignition and/or propagation of a coal dust explosion.

4. DEFINITIONS AND ACRONYMS

In this guideline for a **COP** or any amendment thereof, unless the context otherwise indicates:

1) **"Abandoned area"** means an area where coal mining or stonework has, temporarily or permanently, been stopped but which has not been sealed off.

2) **"Accessible workings"** means all workings other than:

- **Goafed** areas, the limits of which must be defined by the employer; and
- Abandoned workings that have had all entrances barricaded off to prevent in advertent access.

3) **"Bituminous coal"** means coal in which the percentage by mass of volatile matter content calculated on a dry ash-free basis, exceeds 14%.

4) **"Booster fan"** means a fan that is designed to circulate air around a defined ventilation district of the mine in parallel or semi-parallel configuration with the surface fans.

5) **"CIOM"** means Chief Inspector of Mines.

6) **"Conductor"** means any metal object or cable that is connected to a source of electrical energy that has a potential to transmit electrical current.

7) **"Containment wall"** means a seal which is designed to withstand a static pressure of 140 kPa.

8) **"Continuous monitoring"** means continuous electronic monitoring or regular monitoring with handheld gas testing or other instruments.

9) **"Contraband"** means any device for the creation of any spark or flame and / or any pipe, cigar, cigarette or tobacco other than chewing tobacco, but excluding any device designed specifically for the intentional creation of a spark for the lighting of welding or cutting torches taken underground with the written permission of the employer.

10) **"COP"** means Code of Practice.

11) **"DMR"** means Department of Mineral Resources.

12) **"Explosion proof apparatus"** means electrical equipment, switchgear and reticulation systems that are flame-proof and distribution, control and communication systems that is intrinsically safe. Reference in this respect must be made to the use of such equipment in hazardous areas as defined under SANS 10108 and the SANS 60079 series of standards related to the use of equipment in hazardous atmospheres.

13) **"Explosion proof seal"** means a seal which is designed to withstand a static pressure of 400 kPa.

14) **"Explosive range"** means the range between Lower Explosive Limit and Upper Explosive Limit of a **flammable gas** [or a mixture thereof] which is determined by an appropriate methodology which is fit for purpose such as USBM triangle, Coward triangle, and/or Le Chatelier's rule.

15) **"Face area"** means an area within 180 m from the coal face being worked.

16) **"Flammable gas"** means either methane, hydrogen, hydrocarbons or a mixture of any of these gases.

17) **"Flammable gas warning device (SANS 1515 compliant)"** means a portable battery operated, continuous-duty device designed to give a clearly audible and a clearly visible alarm, should it be placed in an atmosphere containing a concentration of **flammable gas**, which equals or exceeds the set alarm level. The device may not have a facility allowing the user to turn the device off or to disable its operation in the working place and must be able to monitor and alarm even if the lamp, if fitted, is turned off.

18) **"Flammable gas measuring instrument"** means **flammable gas measuring instruments** and **flammable gas** warning devices and instruments which comply with the South African Bureau of Standards specification SANS 1515.

19) **"Float coal"** means coal dust consisting of particles of coal that can pass through a sieve having an aperture of 100 micrometres.

20) **"General atmosphere"** means any point outside a radius of 500mm away from the source if the velocity is more than 0.1m/s past the point of emission of **flammable gas**.

21) **"Goaf"** means the planned collapse of roof strata which normally occurs due to pillar extraction or high extraction rates.

22) **"Last through road"** means the closest access to the working faces between two companions, that carry a unidirectional flow of air from the intake to the return.

23) **"MHSA"** means Mine Health and Safety Act, 1996 (Act 29 of 1996) as amended.

24) **"Permanent walls"** means a robust airtight wall constructed of bricks and cement or similar materials.

25) **"SANAS"** means South African National Accreditation System.

26) **"Sealed area"** means an area which is isolated from the ventilation district with **containment walls** or **explosion proof seals** in accordance with this mandatory **COP**.

27) **"Simple apparatus"** means a device which does not generate more than 1.5 Volts, 100 mA and 25 mW as per SANS IEC: 1999 60079-11 as amended.

28) **"Specialist flammable gas measuring instrument"** means an intrinsically safe instrument that complies with the requirements of SANS 1515.

5. SCOPE

This guideline defines topics which need to be addressed in the **COP** to significantly reduce the risk of **flammable gas** or coal dust explosions in collieries. The aspects to be addressed include at least the following:

(a) The significant risks associated with **flammable gas**.

(b) Ventilation arrangements.

(c) Ventilation methods.

(d) Ventilation design.

(e) Application of ventilation methods and design;

(f) The significant risks associated with coal dust (spontaneous combustion and explosions).

(g) Limiting the formation and dispersion of coal dust.

(h) Inertisation of coal dust.

(i) Application of barriers to prevent the propagation of explosions.

(j) Control of **abandoned areas**.

(k) Control of sealed-off areas.

This guideline supersedes previously issued directives and/or instructions by the **DMR** dealing with:

(a) Mechanical Miner Ventilation.

(b) Guideline for the compilation of a mandatory code of practice for the prevention of coal dust explosions in underground coal mines [GME 7/4/118-AC1].

6. MEMBERS OF THE TASK GROUP

The members who were involved in the review of the latest version of this guideline were the following:

- N. Mokhonoana (State)
- P. Huma (State)
- G. Mthombeni (State)
- M. Biffi (Employer)
- I. Labuschagne (Employer)
- A. Thomson (Employer)
- E. Harvey (Employer)
- M. Grant (Organised Labour)
- A. Letshele (Organised Labour)

PART B: AUTHOR'S GUIDE

1. The **COP** must, where possible, follow the sequence laid out in Part C: Format and content of the mandatory **COP**. The pages as well as the chapters and sections must be numbered to facilitate cross referencing.

2. Wording must be unambiguous and concise.

3. It should be indicated in the **COP** and on each annex to the **COP** whether:

3.1. The annexure forms part of the **COP** and must be complied with or incorporated in the **COP** or whether aspects thereof must be complied with or incorporated in the **COP**; or

3.2. The annexure is attached for consideration in the preparation of the **COP** (i.e. compliance is discretionary).

4. When annexures are used, the numbering should be preceded by the letter allocated to that annex and the numbering should start at one again. (E.g. 1,2,3,.....A1, A2, A3...)

5. Whenever possible illustrations, tables, graphs and the like, should be used to avoid long descriptions and/or explanations.

6. Relevant Safety in Mines Research Advisory Committee projects must also be considered when assessing risks. A list of relevant projects is included as Annexure F of the guideline. (Annexure F is attached for information)

7. When reference has been made in the text to publications or reports, these sources must be included in the text as footnotes or side notes as well as in a separate bibliography.

PART C: FORMAT AND CONTENT OF THE COP

1. TITLE PAGE

The **COP** should have a title page reflecting at least the following:

1.1. Name of mine;

1.2. The heading of the **COP** (for example, mandatory **COP** for the prevention of **flammable gas** and coal dust explosions);

1.3. A statement to the effect that the **COP** was drawn up in accordance with guideline **DMR 16/3/2/4-A7** (cross referenced to **DMR 16/3/2/4-A5** and **DME 16/3/2/1-A1**) issued by the **CIOM**;

1.4. Other relevant guidelines' reference numbers and dates of issue;

1.5. The mine's reference number for the **COP**;

1.6. Effective date; and

1.7. Revision dates.

2. TABLE OF CONTENTS

The **COP** must have a comprehensive table of contents.

3. STATUS OF THE COP

Under this heading the **COP** must contain statements to the effect that:

3.1. The mandatory **COP** was drawn up in accordance with guideline **DMR 16/3/2/4-A7** (cross referenced to **DMR 16/3/2/4-A5** and **DME 16/3/2/1-A1**) issued by the **CIOM**;

3.2. This is a mandatory **COP** in terms of sections 9(2) and (3) of the **MHSA**;

3.3. The **COP** may be used in an accident investigation/inquiry to ascertain compliance and to establish whether the **COP** is effective and fit for purpose;

3.4. The **COP** supersedes all previous relevant **COPs**; and

3.5. All managerial instructions, recommended procedures (voluntary **COPs**) and standards on the relevant topics must comply with the **COP** and must be reviewed at least every five years to ensure compliance.

4. MEMBERS OF THE DRAFTING COMMITTEE

4.1. In terms of section 9(4) of the **MHSA** the employer must consult with the health and safety committee on the preparation, implementation or revision of any **COP**. Refer to Annexure H for an example.

4.2. It is recommended that the employer should, after consultation with the employees in terms of the **MHSA**, appoint a committee responsible for the drafting of the **COP**.

4.3. The members of the drafting committee assisting the employer in drafting the **COP** must be listed giving their full names, designations, qualifications, affiliations and experience. The committee must include competent persons sufficient in number to effectively draft the **COP**.

5. GENERAL INFORMATION

Relevant information relating to the mine must be stated in this paragraph. The following minimum information must be provided:

5.1 A brief description of the mine and its location;

5.2 The mining methods;

5.3 A brief description of the ventilation system used on the mine;

5.4 A determination of the **flammable gas** content of the coal seams being mined;

5.5 A determination of the **flammable gas** release rates of the coal being mined;

5.6 A history of the **flammable gas** and/or coal dust ignitions which have occurred on the mine;

5.7 A brief description of the systems used to relate to the prevention of coal dust explosions;

5.8 The volatile content of the coal;

5.9 The explosibility index of the coal; and

5.10 Other relevant **COPs**.

6. TERMS AND DEFINITIONS

Any word, phrase or term of which the meaning is not clear or which will have a specific meaning assigned to it in the **COP**, it must be clearly defined. Existing and/or known definitions should be used as far as possible. The drafting committee should avoid jargon and abbreviations that are not in common use or that have not been defined. The definitions section should also include acronyms and technical terms used.

7. RISK MANAGEMENT

7.1. Section 11 of the **MHSA** requires the employer to identify hazards, assess the health and safety risks to which employees may be exposed while they are at work, record the significant hazards identified and risks assessed.

7.2. The **COP** must address how the significant risks identified in the risk assessment process must be dealt with, having regard to the requirements of section 11(2) and (3) that, as far as reasonably practicable, attempts should first be made to eliminate the risk, thereafter to control the risk at source, thereafter to minimise the risk and thereafter, insofar as the risk remains, to provide personal protective equipment and institute a programme to monitor the risk.

7.3. To assist the employer with risk assessment all possible relevant information such as accident statistics, research reports, manufacturer's specifications and approvals should be obtained and considered.

7.4. In addition to the periodic review required by section 11(4) of the **MHSA**, the **COP** must be reviewed and updated after every ignition or explosion of **flammable gas** or coal dust or if significant changes are introduced to procedures, mining and ventilation layouts, mining methods, equipment and material.

7.5. Relevant Safety in Mines Research Advisory Committee projects must also be considered when assessing risks (in this regard see Annexure F which is attached merely for information).

8. ASPECTS TO BE ADDRESSED IN THE COP

The **COP** must set out how the significant risks identified and assessed in terms of the risks assessment process referred to in paragraph 7.1 will be addressed. The **COP** must cover at least the aspect set out below unless there is no significant risk associated with that aspect at the mine. The **COP** must indicate who is responsible for undertaking each task and what should be achieved. See paragraph 1.1 of Part Failure by the employer to prepare or implement a **COP** in compliance with this guideline is a breach of **MHSA**.

8.1. Preventing the accumulation of an explosive concentration of flammable gas

To prevent an accumulation of an explosive concentration of **flammable gas**, the **COP** should cover at least the following:

8.1.1. Ventilation of production sections

The ventilation layout for all production sections or changes in ventilation systems should include:

8.1.1.1. Listing of areas of the mine where **flammable gas** may be present;

8.1.1.2. Sequence of the ventilation related work and respective completion dates;

8.1.1.3. Mining sequence that complements the ventilation flow;

8.1.1.4. The required ventilation controls;

8.1.1.5. Air quantities, velocities and airflow patterns;

8.1.1.6. The approval thereof by the employer, or delegated manager or delegated competent person;

8.1.1.7. Special precautions where two or more sections are situated in the same ventilation district; and

8.1.1.8. Any other special measures to be adhered to such as holing into other areas and barrier pillars sizes.

8.1.2. Mining near or through dykes, burnt coal or geological discontinuities

When mining near or through dykes, burnt coal or geological discontinuities, the **COP** should describe special measures in addition to the requirements stipulated in 8.1.1, based on but not limited to the following aspects

8.1.2.1. The most appropriate mining methods (drilling and blasting or mechanical mining).

8.1.2.2. The availability of correct geological information.

8.1.2.3. The prevention of dangerous accumulations of **flammable gas**.

8.1.2.4. Adequate supervision.

8.1.2.5. Suitable monitoring and control of environmental conditions.

8.1.3. Secondary mining

When secondary mining i.e. top/bottom coaling or total extraction methods is applied, in addition to the requirements stipulated in 8.1.1, the **COP** should describe measures to ensure there is a system for the ventilation of **goafs** and bleeder roads.

8.1.4. Other areas

The **COP** should describe measures for the ventilation of underground dams, **abandoned areas**, accessible seals, workshops, substations, transformers, pump stations, staple pits, shaft bottoms, boxholes, underground and surface bunkers and ancillary workings, which conform to the requirements of 8.1.1.

8.1.5. Intake airways, return airways and belt roads

The **COP** should describe measures to ensure that:

8.1.5.1. Intake airways, return airways and belt roads remain unrestricted, accessible and that safe roof and side wall conditions prevail; and

8.1.5.2. Adequate air velocities will prevent the accumulation of dangerous gases while preventing dust from becoming airborne.

8.1.6. Main fans

The **COP** should describe measures to ensure that:

8.1.6.1. Records shall be kept of the operation, monitoring, maintenance and inspection of main and **booster fans**; and

8.1.6.2. The health and safety of persons who may be affected by the unplanned stoppage of main and **booster fans**.

8.1.7. Barometric pressure

The **COP** should describe measures to:

8.1.7.1. Ensure the monitoring and recording of the fluctuations in the barometric pressure; and

8.1.7.2. Be taken to reduce the significant risks associated with such fluctuations.

8.1.8. Abandoned areas

The **COP** should describe measures to ensure that:

8.1.8.1. **Abandoned areas** remain ventilated to prevent a build-up of an explosive concentration of **flammable gas**, or are sealed off;

8.1.8.2. When **abandoned areas** are being sealed off; the sealing process is in accordance with accepted procedures; ventilation rates are maintained at prescribed levels; stone dust is applied in accordance with the **COP** and the presence of any **flammable gas** is monitored continuously until final sealing has been completed;

8.1.8.3. Prior to an abandoned area being sealed off, electrical **conductors**, earthing and bonding of electrical equipment and accumulations of coal, shall be removed and any borehole sealed off (rehabilitated). Record of these actions shall be kept until mine closure;

8.1.8.4. Working conditions for employees working near **abandoned areas** are safe; and

8.1.8.5. The monitoring of the atmosphere within the abandoned area is done according to the risk assessment.

8.1.9. Sealed areas

The **COP** should set out measures to ensure:

8.1.9.1. That **containment walls** built for containment of **flammable gas** are provided with the means for the monitoring of the atmosphere behind such walls;

8.1.9.2. The risk posed by walls/seals built before the coming into effect of this guideline in 2002 is addressed;

8.1.9.3. That **explosion proof seals** are used where the atmosphere of **sealed areas** stabilises within the **explosive range**; and

8.1.9.4. Safe working conditions for employees working near **sealed areas**.

8.1.10. Opening of sealed areas

The **COP** should set out a procedure for the reopening of **sealed areas**.

8.1.11. Stoppage, change or reversal in ventilation

The **COP** should set out a procedure to be followed in the event of a stoppage, noticeable change or reversal in the ventilation. This procedure should include the safe return of persons to the working place after restoration of the ventilation.

8.2. Providing for the early detection of flammable gas

Refer to applicable and relevant sections of Annexure 1: Guidance note for lamproom practice (for information purposes only).

The **COP** should set out a procedure for the early detection of **flammable gas** covering at least:

8.2.1. An appropriate gas testing and gas monitoring strategy including the type/s of instruments to be used;

8.2.2. That employees are competent to test for **flammable gasses** and dangerous accumulations of any explosive mixture of **flammable gasses** in accordance with Section 10 (2)(c);

8.2.3. The maintenance, calibration and record keeping in respect of gas testing instruments and gas monitoring systems;

8.2.4. Details of any user's pre-use tests and checks of the **flammable gas** warning devices and measuring instruments, including on-board monitoring devices, in accordance with a procedure drawn up by the employer;

8.2.5. Testing for the presence of **flammable gas** or dangerous accumulations of any explosive mixtures of **flammable gasses**, identify the frequency, the responsible persons and localities for such testing;

8.2.6. Steps to be followed whenever **flammable gas** is detected and for the clearance thereof;

8.2.7. The determination of sufficient numbers of gas detection instruments;

8.2.8. The compliance of all **specialist flammable gas measuring instruments** used for the detection and measurements of **flammable gasses** with the **OEM** specification;

8.2.9. Recording and reporting of **flammable gas** intersections above specified legal limits;

8.2.10. Addressing any unexpected increase in **flammable gas** emissions and by allocating requisite mitigating actions to competent persons; and

8.2.11. The mine ventilation and rescue plan indicating all known **flammable gas** sources.

8.3. Preventing the ignition of flammable gas

*Refer to Annexure 2: The guidance note for the prevention of **flammable gas** and coal dust explosions in collieries (for information purposes only)*

The **COP** should set out measures to ensure that the ignition of **flammable gas** is prevented, covering at least the following:

8.3.1. The method, frequency and procedure for the examination and changing of cutter picks.

8.3.2. The provision of a continuous flow rate of water and adequate pressure of water supply to mechanical miners.

8.3.3. Control measures to minimise the risk of ignitions from occurring, during **goafing** considering both partial or total extraction.

8.3.4. Control measures to prevent **flammable gas** ignitions, that includes operator pre-use checks, operational checks, maintenance programmes, and any other means of preventing a frictional ignition for mechanical miners.

8.3.5. Preventing that the use of electricity or electrical equipment does not create the risk of igniting **flammable gas** by including procedures covering the following:

8.3.5.1 The use of explosion protected apparatus wherever required in defined hazardous areas (as defined in SANS 1018);

8.3.5.2 Identification of electrical equipment that poses a significant risk and definition of measures to deal with that risk;

8.3.5.3 The interlocking of on board scrubber fans and other electrical equipment used within relevant areas;

8.3.5.4 The positioning of switchgear with respect to prevalent air flow;

8.3.5.5 The performing of **flammable gas** tests before starting or stopping electrical equipment; and

8.3.5.6 The restoration of electrical power after a power failure e.g. no automatic re-starting of fans, safety precautions necessary to prevent a **flammable gas** ignition, the level of supervision for each activity.

8.3.6 Where lightning could ignite **flammable gas**, compliance with SANS 10313 Specifications must be considered.

8.3.7 Where spontaneous combustion could ignite **flammable gas**, measures for the inspection of all work areas and monitoring of **abandoned areas** and atmospheres behind **containment walls** must be stipulated.

8.3.8 Where explosives are used, these do not create an additional risk of igniting **flammable gas**.

8.3.9 Prevention of **contraband** from being taken underground.

8.3.10 Prevention of **flammable gas** ignitions when using any welding, flame cutting, flame heating, grinding, vulcanising, soldering, pick sharpening, electronic instrumentation and photography video or audio taping, etc. Measures shall include the following:

8.3.10.1 The training of competent persons to perform such work;

8.3.10.2 Issuing and control of flint lighters;

8.3.10.3 The construction, ventilation, physical characteristics and orderly maintenance of the workshop and cutting bays so that work can be performed in a safe and healthy manner;

8.3.10.4 Precautions to be taken when working outside approved workshops or cutting bays;

8.3.10.5 The ventilation, inertisation, fire prevention and the gas testing procedure before, during and on completion of such work;

8.3.10.6 The precautions and devices utilized to quench flashback and to prevent back feeding of gas;

8.3.10.7 The proper transport, storage and use of gas cylinders and flammable liquid containers; and

8.3.10.8 The issuing, safekeeping and examination of both equipment and devices used.

8.3.11 Prevention of holing excavations into any adjacent area which may contain an accumulation of **flammable gas**.

8.3.12 Measures to prevent ingress, and ignition of high-pressure **flammable gas** into existing.

8.3.13 Identification of the potential sources of static electricity and of details related to the prevention and control measures.

8.4. Reporting of flammable gas

The **COP** should set out a procedure to ensure that **flammable gas** intersections are reported. The internal and official reports should describe the recorded presence of any **flammable gas** concentration exceeding one comma four parts per hundred by volume in the **general atmosphere** or any ignition of **flammable gas** as per **MHSA** Regulation 23.4 (g).

8.5. Clearance of flammable gas

Refer to Annexure B: The Guidance Note for the Prevention of **Flammable Gas** and Coal Dust Explosions in Collieries

The **COP** should set out a procedure to ensure that the clearance of **flammable gas** accumulations, including roof layers, is done safely addressingat least the following:

8.5.1. The dilution, removal and dispersion of **flammable gas**, including roof layering;

8.5.2. Isolating electricity; and

8.5.3. Withdrawal of employees.

8.6. Limiting the formation and dispersion of coal dust

Refer to Annexure B: The Guidance Note for the Prevention of **Flammable Gas** and Coal Dust Explosions in Collieries

The **COP** should set out measures for the limiting of the formation and dispersion of coal dust covering at least the following:

8.6.1. Limiting of formation of coal dust at coal mining faces, conveyor belts and transfer points, tramming and travelling routes and any other identified high-risk areas. Such measures must stipulate the design specifications of such dust suppression systems that will be in use on each coal winning or transporting machinery.

Note: *Such measures should comply with Section 21 of the* ***MHSA****.*

8.6.2. The regular clean-up and removal of coal accumulations in **face areas** before stone dust applications, as well as along conveyor belt roads and travelling roads, at

transfer points, in return airways, on equipment and at any other identified high-risk areas (e.g. decommissioned production panels).

8.7. Inertisation of coal dust

Refer to Annexure C: Stone Dust Inertisation Standard, Compliance Sampling and Analysis of Samples

The **COP** should set out measures that will ensure compliance with requirements relating to effective achievement of coal dust inertisation at least as set out in Annexure C which include:

8.7.1. Inertisation of coal dust by using water;

8.7.2. Inertisation of coal dust by the application of stone dust;

8.7.3. The extent of stone dust application;

8.7.4. Estimating qualitatively the degree of in-situ inertisation achieved; and

8.7.5. Frequency for the application of stone dust.

8.8. Compliance with requirements relating to sampling and analysis of samples

The **COP** should set out measures to ensure that compliance with requirements relating to sampling and analysis of stone-dust samples is achieved covering at least the content as set out in Annexure C.

8.9. Compliance with requirements relating to the design of barriers to prevents the propagation of coal dust explosions

The **COP** should set out measures to ensure that compliance with requirements relating to the design of explosion propagation barriers to prevent the spread of coal dust explosions is achieved based on at least the contents of Annexure D.

8.10. Explosions in pit, tank, vessel, container or chamber likely to contain noxious or flammable fumes or gases or an atmosphere deficient in oxygen

The **COP** should set out measures to prevent the accumulation and ignition of **flammable gas** and/or explosive mixtures in confined spaces on surface such as beneficiation plants, silo's, containers and bunkers must be stipulated.

PART D: IMPLEMENTATION

1. IMPLEMENTATION PLAN

1.1. The employer must prepare an implementation plan for the **COP** that makes provision for issues such as organizational structures, responsibilities of functionaries and programmes and schedules for the **COP** that will enable proper implementation of the **COP**. (A summary of, and a reference to, a comprehensive implementation plan may be included.).

1.2. Information may be represented graphically to facilitate easy interpretation of the data and to highlight trends for risk assessment.

2. COMPLIANCE WITH THIS COP

2.1. The employer must institute measures for monitoring and ensuring compliance with the **COP**.

3. ACCESS TO THIS COP AND RELATED DOCUMENTS

3.1. The employer must ensure that a complete **COP** and related documents are kept readily available at the mine for examination by any affected person.

3.2. A registered trade union with members at the mine, or where there is no such union, a health and safety representative on the mine, or if there is no health and safety representative, an employee representing the employees on the mine, must be provided with a copy of a written request to the employer. A register must be kept of such persons or institutions with copies to facilitate updating of such copies.

3.3. The employer must ensure that all employees are fully conversant with those sections of the **COP** relevant to their respective areas of responsibility.

ANNEXURE 1: Guidance Note for lamproom practice

DEPARTMENT: MINERALS AND ENERGY
Minerals and Energy for Development and Prosperity
Mine Health and Safety Inspectorate

GUIDANCE NOTE FOR LAMPROOM PRACTICE

CHIEF INSPECTOR OF MINES

Date first issued: ……..……..……

Effective date: …..……..

CONTENTS **PAGE NO**

1. INTRODUCTION

These guidance notes have been primarily prepared to assist the employer in ensuring that gas detection instrumentation, self-contained self-rescuers and portable lamps are in proper working order prior to going on shift.

2. LEGAL STATUS

2.1. This guidance note has been compiled to assist employers in preparing a Code of Practice for Lamproom Practice.

2.2. A guidance note sets out good practice and will be widely distributed by the Mine Health and Safety Inspectorate within the industry. As is the case with all other documents setting out accepted good practice, the application of inferior practices without justification could amount to negligence.

3. DEFINITIONS

3.1. **"Equipment"** means gas detection instrumentation, self-contained self-rescuers and portable lamps.

3.2. Gas detection Instrumentation

3.2.1. **"Flammable gas measuring instruments and flammable gas warning devices"** means only those instruments and devices which comply with the South African Bureau of Standards specification SANS ~~101515~~.1515

3.2.2. "**Carbon monoxide warning devices"** means only those devices which are battery operated portable personal units, capable of continuously sensing and able to give either a clearly audible or a clearly visible warning or both a clearly audible and a clearly visible warning should they be used in an atmosphere containing 100 ppm or more of carbon monoxide.

3.3. **"Self-contained self-rescuers"** means body–worn device, which complies with the South African Bureau of Standards specification SANS ~~101737~~.1737

3.4. **"OEM"** means original equipment manufacturer.

4. COMPETENT PERSON

4.1. Appointment

The Manager shall appoint a competent person who shall have successfully completed a training programme drawn up by the manager, and clearly define all his duties and responsibilities in writing.

4.2. Training

i. The Manager, in consultation with the OEM of the equipment in use on the mine, shall draw up a mine specific training programme.

ii. Refresher courses to be conducted annually and retraining done in the event of any change in specification of any equipment.

5. CERTIFICATION OF SPECIFICATION COMPLIANT

5.1. Gas detection instrumentation

The following is recommended for all specification compliant equipment in the lamproom:

5.1.1. Flammable gas

Copies of the SANS 1515-1 test certificates and the list showing the relevant serial numbers of all specification compliant instruments and devices in use should be displayed in the lamproom.

5.1.2. Carbon monoxide

Copies of the SANS 1515-3 test report for explosion protection for all battery powered portable personal warning devices in use shall be displayed in the lamproom.

5.2. Self-contained self-rescuers (SCSRs)

Copies of SANS 1737 batch test certificates for units purchased after 1 September 2002 of all makes of SCSRs in use on the mine should be displayed in the lamproom.

5.3. Portable lamps

Copies of all schedules giving full details and specifications of all portable lamps in use, on the mine shall be displayed in the lamproom.

6. ALLOCATION OF EQUIPMENT IN COMPLIANCE WITH SABS SPECIFICATIONS

6.1. Gas detection instrumentation

6.1.1. Flammable gas

Every designated person who is required to conduct tests or monitor for **flammable gas** is to be allocated a personal **flammable gas measuring instrument** or a personal **flammable gas** warning device as the case may be.

6.1.2. Carbon monoxide

Every designated person who is required to monitor carbon monoxide is to be allocated a personal carbon monoxide warning device.

6.1.3. Sensor for oxygen deficiency (please suggest a description for other gases).

6.2. Self-contained self-rescuers

Every person who is required to be equipped with a self-contained self-rescuer under Regulation 16 of the MHSA Act No. 29 of 1996 shall be allocated such for their sole use.

7. STORAGE OF EQUIPMENT

(i) Equipment should be stored in accordance with OEM recommendations.

(ii) Storage area to be clean, oil free, free of silicone-based cleaners, well ventilated and well illuminated.

(iii) Due to the nature of the reactive chemicals contained in SCSRs, any unit which has been activated, vandalised, damaged, or which has failed the routine inspection including redundant units, should be immediately withdrawn from service and sealed in an impervious plastic bag and kept in an area away from other equipment. For safe disposal of these particular units it is recommended that they be returned to the OEM concerned.

8. EQUIPMENT CONTROL

8.1. Checking/testing

(i) The appointed competent persons shall test and check equipment in accordance with a procedure drawn up by the manager in consultation with the OEM to verify that the equipment is in proper working order prior to each shift.

(ii) With regard to SCSRs a special monitoring test programme by an approved testing authority should be implemented in accordance with Regulation16.4 (1) of the Mine Health and Safety Act (Act 26 of 1996)

8.2. Calibration of portable gas detection instruments

Calibration of portable instruments should be done in accordance with a procedure drawn up by the employer in consultation with the OEM.

8.3. General maintenance

8.3.1. Gas detection instrumentation and portable lamps

(i) Separate rooms for gas detection instrumentation and portable lamps should be dedicated for maintenance purposes.

(ii) Portable lamp repairs may be effected by the appointed competent person but in the case of gas detection instrumentation only the OEM or their accredited authorities may carry out any repair.

8.3.2. Self-contained self-rescuers

Repairs and/or refurbishment shall be effected only by the OEM or by their accredited authorities.

8.4. Battery charging programme (gas detection instrumentation and portable lamps)

Batteries are to be charged in accordance with a procedure drawn up by the manager in consultation with the OEM.

8.5. Records

(i) A record shall be kept for a period of 12 months in the lamproom of specific persons to whom equipment are issued in order that the user can at any time be identified from the records.

(ii) With regard to SCSRs a comprehensive record system should be implemented in accordance with Regulation 16.4(2) of the Mine Health and Safety Act (Act 26 of 1996).

(iii) In the case of gas detection instrumentation records of individual instruments and devices showing a history of testing, calibration and maintenance, shall be kept.

9. REPORTING

(i) The lampsman shall on a monthly basis report in writing to the Manager on all matters pertaining to the control of equipment.

(ii) Copies of these reports shall be kept for a period of one year.

10. COMPLIANCE TESTS

Tests and checks of equipment shall be made by the designated user in accordance with a procedure drawn up by the manager. A means of acknowledgement by the designated user shall be instituted to verify that such tests and checks have been conducted prior to going on shift and recorded.

ANNEXURE 2: Guidance Note for the prevention of flammable gas and coaldust explosions in collieries

DEPARTMENT: MINERALS AND ENERGY
Minerals and Energy for Development and Prosperity
Mine Health and Safety Inspectorate

GUIDANCE NOTE FOR THE PREVENTION OF FLAMMABLE GAS AND COALDUST EXPLOSIONS IN COLLIERIES

CHIEF INSPECTOR OF MINES

Date first issued: ……..……

Effective date: ….……..

CONTENTS

1. INTRODUCTION

The introduction of mechanical miners on a large scale in South African Coal Mines has highlighted the need for improved methods of environmental protection to ensure safe and healthy working conditions.

When using this type of rapid advance modern coal winning equipment, a particular concern is the generation of large quantities of coal dust and **flammable gas**. Recent research has also highlighted the dangers of the lowering of the lower explosion limit when hybrid mixtures (coal dust and **flammable gas**) exist.

These guidance notes have been primarily prepared to assist the employers in complying with the requirements of the guideline for the compilation of a mandatory Code of Practice for the prevention of **flammable gas** and coal dust explosions in collieries.

2. LEGAL STATUS OF THE GUIDANCE NOTE

2.1. This guidance note has been compiled to assist employers in preparing a mandatory Code of Practice for the Prevention of **Flammable gas** and Coal Dust Explosions in Collieries.

2.2. A guidance note sets out good practice and will be widely distributed by the Mine Health and Safety Inspectorate within the industry. As is the case with all other documents setting out accepted good practice, the application of inferior practices without justification could amount to negligence.

3. DESIGN OBJECTIVES

3.1. Only criteria based on empirical and proven scientific design applications should be considered.

3.2. Dust should be effectively controlled where generated, and not be permitted to escape from the heading uncontrolled and untreated so as to exceed acceptable levels.

3.3. **Flammable gas** should be diluted to acceptable levels by providing sufficient fresh air.

DEFINITION:

Acceptable Levels

Dust Concentration (for less than 5% quartz content)

Personal sampling - a respirable eight-hour TWA concentration of less than **2 mg/m^3** as per airborne pollutant sampling programme

Acceptable levels

Flammable gas concentration

A **flammable gas** concentration of less than 1,4%.

Last through road

The **last through road** in a coal mine will constitute the closest holing to the working faces between two companions, which carry a unidirectional flow of air from the intake to the return of the section.

Recirculation

When any amount of air which has been delivered by a particular ventilation system, ventilating a heading, re-enters the inlet of that system.

Return air

Air which has scrubbed the face of a heading.

4. PREVENTING THE ACCUMULATION OF AN EXPLOSIVE CONCENTRATION OF FLAMMABLE GAS

4.1. Ventilation system

4.1.1. Primary ventilation

The purpose of primary (general section) ventilation is to ensure that ventilation systems are in place to ensure that sufficient air reaches the **last through road**/longwall or shortwall face to prevent the possibility of secondary ventilation systems recirculating.

To achieve this objective, the following is required:

4.1.1.1. Mechanical miner sections

4.1.1.1.1. The average air velocity in the **last through road** should be at least 1 m/s, with a minimum velocity not less than 0,6 m/s.

4.1.1.1.2. Relative to the heading where the machine is cutting, a minimum velocity of 1 m/s should be maintained in the split that is upstream with regard to the ventilation flow.

4.1.1.1.3. The auxiliary force fan should not recirculate and should be so positioned to discharge fresh air directly on to the working face.

4.1.1.1.4. Sufficient air flow shall be provided to ensure compliance with specified gas and dust concentrations.

4.1.1.2. Conventional drill and blast sections

4.1.1.2.1. The average air velocity in the **last through road**, measured in each split, should be at least 0,6 m/s.

4.1.1.2.2. The auxiliary force fan should not recirculate and should be so positioned to discharge fresh air directly on to the working face.

4.1.1.2.3. Sufficient air flow shall be provided to ensure compliance with specified gas and dust concentrations.

4.1.1.3. Longwall and shortwall sections

4.1.1.3.1. The average air velocity measured along the face should be at least 1 m/s.

4.1.1.3.2. Sufficient air flow shall be provided to ensure compliance with specified gas and dust concentrations.

4.1.2. Secondary ventilation

Secondary ventilation may be defined as the air moving mechanisms (auxiliary fans, spray fans and dust scrubber fans) being utilised in a coal winning heading or face. It is in this working place where all three ingredients required for an explosion (fuel, source of ignition and oxygen) may be present, and hence it is this part of the section into which effective ventilation should be directed.

Of the three ingredients only one is required to be removed from the equation to prevent an explosion from occurring. This is achieved by efficient ventilation systems.

To satisfy the objectives mentioned above, the secondary ventilation system in mechanical miner sections should aim:

4.1.2.1 At diluting the **flammable gas** and the dust generated to acceptable levels.

4.1.2.2 At rendering the **flammable gas** and dust generated harmless and to remove them in a controlled manner.

4.1.2.3 At capturing the dust and convey it to a cleaning mechanism.

The system which is employed should ensure that acceptable levels (dust and **flammable gas**) are maintained in the heading at all times.

On board force system e.g. spray fans and on board or off board dust scrubber units should be in operation prior to the commencement of any mining with a mechanical miner.

The secondary ventilation auxiliary fan e.g. force or exhaust fans should be in place prior to the commencement of any mining. These systems should be put into operation once the heading has advanced a distance of 12 m from the **last through road**.

Mining should immediately cease should any of the above requirements not be complied with.

Dust scrubber units are to be designed to ensure a minimum airflow of 0.4 m/s past the operator's position. Maximum recirculation factor of 50% is permitted for on board scrubbers.

NB: It is imperative to ensure that delivered fresh air from the **last through road** scrubs the working **face area**.

All non-coal winning headings in an advancing section should be positively ventilated so as to ensure that **flammable gas** does not accumulate.

5. PREVENTING THE IGNITION OF FLAMMABLE GAS

The management of a mechanical miner's section should be of such a nature that the prevention of an explosion should have priority over production requirements.

In order to accomplish the above mentioned requirement, the following should be addressed:

5.1. Examination and making safe

At the commencement of each shift and at specified intervals during the shift the competent person should:

5.1.1. Determine and record the **last through road**/face velocities, the operation status of the secondary ventilation system, any relevant distances to the face and whether all headings are being ventilated as per the code of practice.

5.1.2. Record and sign for all **flammable gas** measurements taken at specified intervals during the shift.

No mining is to commence or continue should the section not be ventilated as per the code of practice.

5.2. Pre-operational checks

All face machinery is to be inspected, prior to the commencement of every shift, according to an official check list authorised by the employer. The results of these inspections are to be recorded and signed for by the authorised competent person immediately after the completion of such inspection. This checklist is to include inter-alia:

- Flameproof enclosures

- Pick condition
- Condition of water spray nozzles
- Adequacy of the water supply to the mechanical miner
- Continuous **flammable gas** detecting device
- Trailing cable condition
- Dust scrubber system condition
- Condition of dust suppression system at tip

No mining may commence prior to the completion of such inspections and no sub-standard machine may be utilised.

5.3. Safeguards

5.3.1. Monitoring

The **last through road**/face velocity is to be monitored. Should a situation occur, where the velocity does not comply with the code of practice, no further mining should proceed until the situation is rectified.

5.3.2. Electrical interlocks

5.3.2.1. The **automatic isolation of the electrical power to the cutting drum** of the mechanical miner should be made possible should any one of the following occur:

5.3.2.1.1. **Flammable gas** be detected in an amount in excess of the legislated maximum.

5.3.2.1.2. The water supply to the mechanical miner be adversely affected.

5.3.2.1.3. Any component of the secondary ventilation system ceases to operate

5.4. Water sprays

Water through a system of sprays should be directed effectively onto the face whilst cutting to allay the dust, and to direct air onto the cutting zone.

5.5. Ventilation planning

A formal system of ventilation planning should be established whereby any change from standard ventilation arrangements should be set out in advance and be approved by the appointed manager after consultation with the section 12.1 of the Mine Health and Safety Act (Act 26 of 1996) appointee.

A ventilation change over should be properly and sequentially controlled. Production should not commence unless authorisation to do so has been obtained from the appointed manager, after consultation with the section 12.1 of the Mine Health and Safety Act (Act 26 of 1996) appointee who has ascertained the prevailing conditions in the section.

NB: No alterations to ventilation system should be allowed unless authorized by the manager in consultation with the section 12.1 of the Mine Health and Safety Act (Act 26 of 1996) appointee.

5.6. Change in production arrangements

No unauthorised change in the approved mining layouts/sequence is to be permitted. Only the appointed manager, after consultation with the section 12.1 of the Mine Health and Safety Act (Act 26 of 1996) appointee, may authorise such change.

5.7. Mining sequence

The mining sequence is to be so planned so as to complement environmental control conditions.

5.8. Burnt coal and geological anomalies

Mining with a mechanical miner in burnt coal is not to be permitted unless the mechanical miner is equipped with a system that will prevent frictional ignition. The precautions to be taken when approaching such areas should be well documented in the code of practice.

Special precautions should be stipulated to prevent any dangerous situation developing. This may include additional gas detection and or additional ventilation.

5.9. Flammable gas emission rate

The **flammable gas** emission rate should be ascertained so as to assist in the design and planning of an effective ventilation system. Special precautions shall be instituted by the manager to maintain the concentration of **flammable gas** in the atmosphere to within acceptable limits.

5.10. Continuous flammable gas detection devices

Continuous monitoring for **flammable gas** should be done in the heading being mined by the mechanical miner. (use of continuously operating devices)

This unit should effectively monitor the **flammable gas** concentration present and should be in compliance with the SANS 101515 specification.

5.11. Maintenance

It is imperative that on-going maintenance throughout the shift be done and records be kept. This would inter-alia include the following:

5.11.1. Changing of blunt picks.

5.11.2. Installing picks where they are missing.

5.11.3. Rectifying defective flame proof enclosures.

5.11.4. Installing water spray nozzles where they are missing.

5.11.5. Ensuring that all sprays are in effective operation.

5.11.6. Replace/repair damaged ventilation ducting.

5.11.7. Cleaning of clogged dust filters/scrubbers.

5.11.8. Cleaning of water filters

5.11.9. Replace/repair leaking water hoses.

5.11.10. Updating secondary ventilation appliances.

5.11.11. Updating primary ventilation appliances.

5.11.12. Replacing suspect trailing cables.

5.11.13. Replacing defective **flammable gas** monitoring equipment.

6. COMPLIANCE TEST

This test is primarily instituted to assist the manager in determining, from the results, the effectiveness of the ventilation system employed as well as the efficacy of operation of the ventilation appliances installed.

To measure this efficiently one gravimetric dust (respirable) sample per day is required from each mechanical miner. The sampling is to be conducted on a full production shift. *Refer to the CM dust sampling directive*

ANNEXURE 3: Stone dust inertisation standard, compliance sampling and analysis of samples

*(This annexure must be complied with and incorporated in the **COP**)*

1. STONE DUST SAMPLING PROGRAMS

A sampling program that will ensure compliance with the requirements of incombustible matter content and the taking of samples must be set out as follows:

1.1. Inertisation of coal dust

1.1.1. Degree of Inertisation

In order to ensure adequate inertisation of coal dust, the **COP** must cover at least the following:

1.1.1.1. Inbye of the **face area**, intake airways must be maintained at a minimum percentage by mass of incombustible matter content of 80%;

1.1.1.2. Outbye the **face area**, intake airways must be maintained at a minimum of 65% incombustible matter content. Workshops, sub-stations, battery charging stations and other similar places where work is done or equipment is maintained, situated in intake air must nevertheless be maintained at a minimum of 80% incombustible matter content;

1.1.1.3. In return airways, a minimum percentage by mass of incombustible matter content of 80% must be maintained up to a minimum distance of 1000 m from the face. Beyond this distance, a minimum percentage by mass of incombustible matter content of 65% must be maintained. Where barriers are installed, the incombustible matter content by mass, outbye the **face area** and outbye of the barriers must be maintained at not less than 65%;

1.1.1.4. All accessible roads within a 250m radius from areas in the process of being sealed off, must contain a minimum percentage by mass of incombustible matter content of 80%;

1.1.1.5. In conveyor roads, a minimum percentage by mass of incombustible matter content of 80% must be maintained up to a minimum distance of 180m from the face. Beyond this distance, a minimum percentage by mass of incombustible content of 65%. The installation of stone dust/water barriers is mandatory; and

1.1.1.6. Before any area is sealed off, the roof, sides and floor, as far as reasonably practicable, must be stone dusted to ensure a minimum percentage by mass of incombustible matter content of 80%.

1.1.2. Inertisation of coal dust by using water

To ensure the inertisation of coal dust of using water the **COP** must cover at least the following:

1.1.2.1. The areas of the mine to be treated by this method;

1.1.2.2. The method of applying water;

1.1.2.3. The frequency of application;

1.1.2.4. Methods for the determination that sufficient water has been applied; and

1.1.2.5. Responsible persons to ensure that these requirements are adhered to.

1.1.3. Inertisation of coal dust by the application of stone dust

To ensure the inertisation of coal dust by the application of stone dust the **COP** must cover at least these measures to ensure that the suppliers of stone dust comply with the following minimum quality requirements:

1.1.3.1. Stone dust must preferably be pulverized limestone or dolomite and light in colour;

1.1.3.2. It contains not less than 95% by mass of incombustible matter, and with a density similar or equal to pulverised limestone;

1.1.3.3. It contains not more than 5% by mass of free silica, or any other toxic substance in concentrations detrimental to health;

1.1.3.4. It is of such fineness that, when dry, all will pass through a sieve of 600 micrometres aperture and at least 50% by mass through a sieve of 75 micrometres aperture;

1.1.3.5. Unless directly wetted by water, it does not cake and will readily disperse into the air;

1.1.3.6. Test each batch delivered and issue a certificate showing the results of these; and

1.1.3.7. Should any other incombustible dust be used, compliance with the ability to stop flame propagation of a coal dust explosion must be tested and approved for use at a **SANAS** accredited institution.

1.1.4. Extent of stone dust application

To ensure the correct extent of stone dust application the **COP** must cover at least the measures below to ensure that the underground workings of a **bituminous coal** mine are protected by the application of stone dust within 12m from all the working faces, unless such workings:

1.1.4.1. Are inaccessible, unsafe to enter; or

1.1.4.2. Extend to the face from and including the **last through road**, in which the coal dust is too wet to propagate an explosion during the cutting process.

1.1.5. Frequency for the application of stone dust

To ensure the correct frequency for the application of stone dust is adhered to, the **COP** must cover at least the following:

1.1.5.1. Face area

Stone dust must be applied, and re-applied, as often as is necessary, to maintain the incombustible matter content by mass at a minimum of 80%. The frequency rate of application must not be less than once in every four production shifts, unless a risk assessment, which includes rates of deposition of **float coal**, or other sampling indicates otherwise. This also applies to roads within the **face area** including roads carrying return air.

1.1.5.2. Pillar extraction operations

In pillar extraction operations, stone dust must be applied on a retreat basis at the same frequency rate as in paragraph 1.1.5.1 above.

1.1.5.3. Total extraction operations

In total extraction operations, stone dust must be injected regularly into the mined areas before the occurrence of the initial **goaf**, so as to render inert the dust cloud that will be raised when it occurs.

1.1.5.4. Return Airways

In both longwall and shortwall mining, stone dust must be introduced, during coal winning, into the return airways.

1.2. Compliance sampling

1.2.1. Samples must be systematically collected from the roads of all **accessible workings** of a colliery;

1.2.2. The workings of a colliery must be divided into the **face areas** and zoned back areas and these areas must be clearly demarcated on a plan;

1.2.3. The sample of the dust on the roof and sides must be taken separately from the sample of dust on the floor;

1.2.4. In the case of dust on the roof and sides the sample must be taken to a depth not exceeding 6 mm and in the case of dust on the floor to a depth not exceeding 25 mm;

1.2.5. Every sample taken must be representative of the whole surface of the roof and sides as well as the floor of the length of road being sampled and must be collected by a method of strip sampling by which the dust is collected from a succession of transverse strips, 100 mm wide and equally spaced not more than 5 m apart.

Intersections must be sampled diagonally across to include a sample from at least two pillar corners;

1.2.6. Where it appears that the roof and sides or the floor, as the case may be, are wet, the sample must nevertheless be collected. Excess water must be drained off by placing the sample on a 2 mm aperture sieve, for at least one minute; and

1.2.7. Areas where water has collected in pools on the floor, need not be sampled but must be recorded as such.

1.3. Sampling of face and back area

1.3.1. Face area

1.3.1.1. Samples from **face areas** must be taken at intervals not exceeding 14 working days, or at lesser intervals, if so determined by risk assessment;

1.3.1.2. In the **face area**, a composite sample must consist of the combined material, collected from 5 equally spaced transverse strips (except where measurements are affected by diagonal sampling at intersections), over a measured distance of 20 m. The dust on the roof and sides must be taken separately from the samples of dust on the floor and the two sets of results reported separately;

1.3.1.3. A series of three composite samples must be collected from all return airways, the belt road, and at least one intake airway, over a distance not less than 60m length of roadway, commencing at a location approximately 15m from the face. Similarly, a series of composite samples must be collected over the full length of the **last through road**; and

1.3.1.4. In the case of either longwall or shortwall mining, a series of 5 composite samples must be collected from all gate roads over not less than 100m length of roadway, commencing at the face.

1.3.2. Back area requirements

1.3.2.1. The workings of a colliery outbye of the **face area** must be divided into zones not exceeding 1 200m in length. These zones must further be divided into sub-zones, not exceeding 100m in length, from which representative samples must be taken at intervals not exceeding 30 days;

1.3.2.2. In the back area, a composite sample must consist of the combined material collected from 11 equally spaced transverse strips (except where measurements are affected by diagonal sampling at intersections) over a measured distance of 100m. Samples from the roof and sides should be treated separately from those obtained from the floor;

1.3.2.3. Samples from sub-zones must comprise of composite samples taken from at least one return airway, the belt road and one other intake airway; and

1.3.2.4. Sampling of zones must be scheduled so that each sub-zone is sampled at least once per year.

1.4. Analysis samples

1.4.1. Samples must be analysed by either the colourimetric method or by a laboratory determination of mass of incombustible matter, or by both methods. Samples may also be analysed using a portable stone dust analyser. Only laboratories accredited by **SANAS** and analysers approved by a certification body accredited by **SANAS** may be used for laboratory determination.

1.4.2. Dust collected at a mine must without delay be processed and the incombustible matter content of the samples determined. Descriptions of the two methods are set out in 1.4.2.1 and 1.4.2.4. below.

1.4.2.1. Colourimetric method

1.4.2.1.1. Analysing of samples by using the colourimetric method can be done on surface or underground. In both cases the method described remains the same. For the underground option drying facilities and adequate lighting must be provided. This option evaluates the degree of inertisation in the shortest possible time, permitting immediate remedial action. (Moisture correction is not considered in this option);

1.4.2.1.2. The colour of a sample of dust must be compared with that of a scientifically prepared standard colour sample, known to contain eighty percent, or sixty five percent of incombustible matter content. When on such comparison, the colour of the sample is found to be the same colour or lighter than that of the standard sample, the incombustible matter content in the dust must be taken to comply with the prescribed percentage of the total incombustible matter content;

1.4.2.1.3. Any sample that appears to be below the prescribed ten percent of incombustible matter content must be analysed using the laboratory method described below; and

1.4.2.1.4. In addition to (c) above, at least 10 percent of the remaining samples must be analysed using the laboratory method.

1.4.2.2. A separate standard colour sample must be prepared for each geographical/working area of a mine in the following manner:

1.4.2.2.1. Grind some dry coal dust from the seam in each area for which the standard colour sample is being prepared so that it passes through a 250 micrometres sieve;

1.4.2.2.2. Determine the ash content of the sieved coal dust. The ash content must not exceed 20 percent by mass on a dry basis;

1.4.2.2.3. Pass through 250 micrometres sieve some dry-stone dust of the type used in the mine;

1.4.2.2.4. Weigh quantities of the sieved coal dust and sieved stone dust in proportions that will give the desired incombustible matter content i.e. 65% and 80%;

1.4.2.2.5. Mix the dust thoroughly by stirring, shaking or rolling but do not grind the mixture;

1.4.2.2.6. Using the approved laboratory method, determine the incombustible matter content of the mixture and verify that it is not less than the required;

1.4.2.2.7. Whenever there is change in the colour/reflectivity of the stone dust supplied to the mine, and whenever the colour of the coal seam changes distinctly, new standard samples must be prepared; and

1.4.2.2.8. At intervals of not more than three months, re-test the standard and keep a record of the results of these tests. If the standard has an incombustible matter content which is less than that required, replace the standard with a new one.

1.4.2.3. The procedure for the preparation and evaluation of collected dust samples is as follows:

1.4.2.3.1. Split the sample and retain one half of the sample, if required, for laboratory analysis. Air-dry the portion to be compared if necessary. Sieve the sample through a 250 micrometres sieve and mix the sample thoroughly but do not grind it;

1.4.2.3.2. Compare the colour of the mixed sieved sample with that of the standard colour sample. The comparison must be made under good and even illumination. When conditions permit, and if by choice, this comparison is done underground, it must take place at a designated site. The comparison must be done in a suitably designed light box. The person performing this duty must be trained to prepare the samples and to conduct the colourimetric test. Furthermore, his ability to distinguish between the colour ranges, must have been determined; and

1.4.2.3.3. If any sample fails the comparison test, this must be reported without delay to the employer who must ensure that the area concerned is properly inertised timeously.

1.4.2.4. Laboratory method

Analysis of samples in a laboratory must be carried out by the following method or by other methods approved by the laboratory concerned.

1.4.2.4.1. The residue of a weighed quantity of dust, after that quantity has been dried at a temperature not exceeding 140°C, and the loss of mass attributable to moisture ascertained, must be heated in an open vessel to a temperature not less than 480°C, and not more than 520°C, until the coal is completely burnt away. The incinerated residue must be weighed; and

1.4.2.4.2. The sum of the masses of moisture and incinerated residue must be recorded as incombustible matter and be expressed as a percentage of the total mass of the dust; and 1.4.2.3 where samples were air dried before analysis by the laboratory method, a correction may be made to the incombustible matter content of the dust

sample analysed by laboratory method. The corrected total incombustible content is equal to M+I (100 - M/100) where M is the percentage loss of mass during air-drying and I is the percentage of total incombustible matter in the dust as determined by the method described in the preceding paragraph.

1.5. Keeping of records

1.5.1. The certificates showing the quality of stone dust supplied to the mine must be retained for two years; and

1.5.2. A record of the stone dust sampling analysis must be kept for two years of the date, places sampled and results of the analysis of the mine dust sampling program. Failure of more than 20% of the number of samples of a given area is unacceptable and requires immediate remedial action. Resampling of the sub-standard area must be done after corrective action was taken and the records must be retained for two years.

ANNEXURE 4: Design, installation, maintenance and monitoring of barriers to prevent the propagation of coal dust explosions
*(This annexure must be complied with and incorporated in the **COP**)*

1. STONE DUST BARRIER

1.1. Construction of stone dust barriers

Stone dust barriers referred to as the Polish design are constructed as detailed below:

1.1.1. Shelves consisting of loose, lightweight boards are placed on a frame, which is supported by suitable means. Frames must be installed horizontally in such a manner that the shelves will be readily displaced by the pressure wave;

1.1.2. The shelves must be installed as close as possible to the roof and sides, so that the apex of the stone dust on the shelf must be within 30cm, but not closer than 10cm, from the roof;

1.1.3. The height of the frame, supporting the boards, must be at least 20cm and the width must not be more than 30cm;

1.1.4. Lightly loaded shelves must be not more than 40cm wide with a load of approximately 30kg per meter of shelf length. (average pyramidical height of 14cm); and

1.1.5. Heavily loaded shelves must be not more than 50cm wide with a load of approximately 60kg per meter of shelf length. (average pyramidical height of 20cm).

1.2. Types of stone dust barrier

The two types of stone dust barriers are referred to as light and heavy.

1.2.1. Light barriers

Loading of 100kg of stone dust per square meter of roadway. Each shelf must carry 180kg. Spacing between each must be not nearer than 1,5m and not more than 2m apart.

1.2.2. Heavy barriers

Loading of 400kg of stone dust per square meter of roadway. Heavy barriers contain one-third light shelves (180kg) and two-thirds heavily loaded shelves. Shelves are to be spaced not closer than 1,5m and not more than 2m apart.

1.3. Siting of stone dust barriers

1.3.1. Conveyor belt road: A barrier must be provided in every production section in the road carrying a conveyor belt. Either a light barrier or a heavy barrier must be used;

1.3.2. Light barriers must be sited not closer than 80m and not further than 180m from the **last through road**;

1.3.3. Heavy barriers must be sited not closer than 120m and not further than 360m from the **last through road**;

1.3.4. Single entries: Every single entry must be protected with a barrier, in the same way as for conveyor roads; and

1.3.5. Return airways: Return airways must be protected by either elevated levels of incombustible matter i.e. a minimum of 80% incombustible matter content for the first 1 000m outbye of the face or by a light barrier, not closer than 80m and not further than 180m from the **last through road**. Outbye of the **face area**, the minimum incombustible matter could then be reduced to 65%.

2. WATER BARRIERS

2.1. The use of water barriers

2.1.1. The use of concentrated water barriers is an alternative to employing stone dust barriers or bagged stone dust barriers.

2.1.2. The minimum quantity of water must be 200 l/m^2 of cross sectional roadway area or 5 l/m^2 of roadway volume over the length of the barrier, whichever is the largest. The distance between the first and last row of troughs must be at least 20m but not more than 40m.

2.1.3. All troughs must be fitted with lids to prevent ingress of foreign material and minimise evaporation. Troughs and lids must be constructed from a material of such composition as to be readily shattered by the action of the pressure wave. The minimum quantity of water for large troughs (90 litres capacity) must be 80 litres and for small troughs (45 litres capacity) 40 litres. An indication must be provided to show the minimum water level in the trough.

2.1.4. Troughs should be placed with the longer sides of the trough at the right angles to the line of the roadway. Exceptionally, one trough in a group may be placed longitudinally. The design of troughs further requires that:

2.1.4.1. The troughs remain serviceable for as long as possible under the effect of heat,

2.1.4.2. The water contained in the troughs is released and dispersed under the effects of the dynamic blast pressure of the explosion;

2.1.4.3. The trough material is flame resistant to a defined flame application. It must not continue to burn independently after removal of the flame;

2.1.4.4. The material must not allow any static electrical charge, capable of igniting mixtures of air and **flammable gas**, or firing electrical detonators, to build up or be discharged from the surface of the trough; and

2.1.4.5. The composition of the material in normal use will not have characteristics detrimental to health.

2.1.5. Troughs may be suspended from the roadway support or mounted on equipment within the roadway. The sides of any troughs inside or mounted on cross-members of frames must not have more than 5cm of their height covered by such cross-members.

Where troughs are mounted on equipment, a form of retaining lip must be provided which must be not less than 3cm.

2.1.6. With reference to the sketch below, the following is applicable when troughs are installed in a single layer:

2.1.6.1. For roadways, up to 10 m^2, X+Y+Z must cover at least 35% of W.

2.1.6.2. For roadways up to 15 m^2, X+Y+Z must cover at least 50% of W.

2.1.6.3. For roadways in excess of 15 m^2 X+Y+Z must cover at least 65% of W.

2.1.6.4. Distance of A or B or C or D must not exceed 1,2m.

2.1.6.5. The total distance of A+B+C+D etc must not exceed 1,5m.

2.1.6.6. Distance V1 must not be less than 0,8 m and must not exceed 2,6m.

2.1.6.7. Distance V2 should not exceed 1,2m. Whenever this distance is exceeded, additional troughs must be placed above and they may be more than 2,6m above floor level, but there should not be more than 1,2m between the base of layers of troughs.

2.1.7. Where more than one layer of troughs is required the following will apply:

2.1.7.1. When troughs are arranged in rows less than 1,2m apart, measured along the roadway, troughs in one row must not conceal troughs in the adjacent row from the blast effect.

2.1.7.2. No trough must have any part sheltered from the effect of a blast wave by a rigid installation in the roadway.

2.1.7.3. In circumstances where the dispersion of water over the cross-sectional area of the roadway might be obstructed by equipment, additional troughs must be installed to improve distribution.

2.2. Siting of water barriers

2.2.1. Conveyor belt roads

A barrier must be provided in every production section in the road carrying a conveyor belt. The barrier must not be sited closer than 120m and not further than 360m from the **last through road**.

2.2.2. Single Entries

Every single entry must be protected with a barrier, sited as above.

2.2.3. Return Airways

Unless the incombustible matter content by mass of the dust is maintained at a minimum of 80% up to 1 000m from the face, a barrier must be provided in each road carrying return air.

The barrier must be installed not closer than 120m and not more than 360m from the **last through road**.

3. BAGGED STONE DUST BARRIERS

3.1. The use of bagged stone dust barriers

The use of bagged stone dust barriers is an alternative to employing shelve (polish) stone dust barriers or water barriers.

3.2. Minimum requirements of bagged barriers

3.2.1. Each plastic bag must contain either 5kg for low seams or 6kg for high seams of dry stone dust complying with the specifications specified previously.

3.2.2. The quality, hook and ring as well as the rupture characteristics of the plastic bags used in bagged stone dust barriers must comply with the specifications of the products tested at the GP Badenhorst research facility. Documentary evidence as to the source and quality at each batch of bags purchased must be kept at the mine.

3.2.3. **COPs** must detail how the bags are to be closed so as to exude water when bags are installed in barriers underground.

3.2.4. **COPs** must clearly specify how the bags are to be suspended below the roadway roof.

The system must ensure that the vertical distance between suspended bags and the roof, and the horizontal distance between bags and between the outer bags and sidewalls, are to be maintained at all times.

3.3. Construction of bagged stone dust barriers

The following requirements on the construction of a bagged stone dust barrier apply:

3.3.1. The horizontal distance between the hooks of the bags on a plane must be not less than 0,4m and not greater than 1m when measured across the roadway width.

The actual distances are determined by the total mass of stone dust that needs to be incorporated into a barrier which is itself determined by the roadway dimensions. To cover a range of workings heights, the following requirements apply:

3.3.1.1. For roads in the height range of less than 3,0m, each row must have a single level of bags suspended below the roof;

3.3.1.2. For roads in the height range 3m to 3,5m, each row must have a single level of bags suspended not more than 0,5m below the roof;

3.3.1.3. For roads in the height range 3,5m to 4,5m, each row must have two levels of bags suspended at approximately 3m and 4m above floor level;

3.3.1.4. For roads in the height range of more than 4,5m but less than 6m, each row must have three levels of bags suspended at approximately 3m, 4m and 5m above floor level;

3.3.1.5. The distance between the bags and the side of the pillar must not be nearer than 0,5m and not further than 1m.

3.3.1.6. The distance measured along the road between rows of bags within the barrier must be not less than 1,5m and not greater than 3m;

3.3.1.7. If MA is the mass of stone dust based on cross-sectional area and MV is the mass based on volume, then MA must be at least 100kg per square meter of cross-section area and MA must be at least 1kg of stone dust per cubic meter of roadway volume; and

3.3.1.8. The total mass of stone dust to be used in a barrier must be based on the greater of MA and MV.

3.4. Layout of the stone dust barrier

A full-bagged stone dust barrier must consist of four sub-barriers installed over a minimum distance of 100m of continuous roadway.

Three complete sub-barriers must be in position at all times, while the fourth sub-barrier may be in the process of being moved ahead as the section advances. The following distances must be maintained:

3.4.1. The first sub-barrier, closest to the last road, must not be installed closer than 60m and not further than 120m from the **last through road**;

3.4.2. The fourth sub-barrier, furthest from the **last through road**, must be installed not more than 120m from the first sub-barrier;

3.4.3. The two intermediate sub-barriers must be equidistant between the first and fourth sub-barriers;

3.4.4. The presence of splits must be ignored in determining distances; and

3.4.5. The maximum distance between sub-barriers must not exceed 30m.

3.5. Siting of bagged stone dust barriers

3.5.1. Conveyor belt roads

An inertisation barrier must be provided in every production section in the road carrying a conveyor belt. The construction of the barrier will be based on the dimensions of the belt roads.

3.5.2. Single entries

Every single entry must be protected with a barrier the same as per conveyor belt roads.

3.5.3. Return airways

Must be protected either by high level of incombustible matter (80%) for the first 1000 m out bye of the **face area** or by a barrier to be installed and moved forward in line with the conveyor belt road barrier. Thereafter a 65% of incombustible matter must be maintained.

4. Active roadway barrier

4.1. Electronic activation of inertisation material for the purpose of stopping flame propagation from a coal dust explosion can be installed in the place of a stone dust barrier based on risk assessment.

ANNEXURE 5: References
(For information purposes)

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3. Cook P.M. “The inhibition of coal dust explosions with stone dust in a large scale explosion gallery” - Prepared for the DME by the Division of Energy Technology, CSIR. 1992.

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17. Meyer C.F. “Improving underground ventilation conditions in coal mines” - Contract Col 029A. Coal Mining Division, Miningtek, CSIR. November 1993.

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22. Phillips H.R. “Coal mine explosions - the South African experience.” A paper prepared by Prof. H. R. Phillips, Head of the Department of Mining, University of the Witwatersrand.

23. Powell F. “Ignitions of **flammable gas** - air during roof falls” - A paper published in the Colliery Guardian. January 1994.

24. “Report of the Leon Commission on the inquiry into Safety and Health in the mining industry”.

ANNEXURE 6: Relevant SIMRAC reports
(For information purposes)

1.	COL010	Assessment of explosion barriers.
2.	COL027	HB handbook to reduce the exposure of workers to dust.
3.	COL027ES	Reduction of worker exposure to dust in collieries.
4.	COL029a	Improving underground ventilation conditions in coal mines.
5.	COL031	Prevention, detection and control of underground fires in coal mines.
6.	COL104	Simulation of coal dust explosions.
7.	COL115	Assessment of the design of refuge bays in coal mines.
8.	COL116	The suitability of using jet fans to ventilate CM miner headings in collieries.
9.	COL226	Identify methods to reduce the risks of frictional ignition hazards.
10.	COL236	Assessment of dispersed barrier systems.
11.	COL310	Design scrubber systems to enhance dust capture efficiency.
12.	COL322	Systems to limit coal dust and methane explosions in collieries.
13.	COL431	Training aids to assist employees to recognise frictional ignition hazards.
14.	COL443	Alternative inerting materials for coal mine explosions.
15.	COL446	Expand and enhance the use of stone dust barriers for different conditions.
16.	COL465	Determination frictional resistance factors for bord and pillar coal mines.
17.	COL467	Reduction of risks due to dust generation on strip mine haul roads.
18.	COL501	To test dispersed stonedust barriers for effectiveness in bord and pillar.
19.	COL502	The design, construction and testing of underground seals.
20.	COL518	Mechanical miner environmental control.
21.	COL 601	Remote **flammable gas** detection/measuring device.
22.	SIM 04 04 03	Role of static electricity in the ignition of **flammable gas** and mine fires.

23. SIM 02 04 04 Ranging path remote methane detector.

24. GEN 705 Ranging open path remote **flammable gas** detection/monitoring device.

ANNEXURE 7: SANS references

1. SANS 1018 2015 1.04 Electric cables for motor vehicles - Ignition cables for motor vehicles.

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4. SANS 1515-2 2014 2.00 Gas measuring equipment primarily for use in mines Part 2: Fixed, transportable, and vehicle-mounted **flammable gas** measuring and warning sensor heads, devices and instruments.

5. SANS 1515-3-1 2015 1.00 Gas measuring equipment primarily for use in mines Part 3-1: Battery- operated, portable, toxic gas measuring instruments and warning devices.

6. SANS 1515-3-2 2015 1.00 Gas measuring equipment primarily for use in mines Part 3-2: Fixed, transportable, and vehicle-mounted toxic gas measuring and warning sensor heads, instruments and devices.

7. SANS 1515-3 2014 1.00 Gas measuring equipment primarily for use in mines Part 3: Gas performance requirements for toxic gas measuring instruments and warning devices.

8. SANS 1515-4-1 2015 1.00 Gas measuring equipment primarily for use in mines Part 4-1: Battery- operated portable, oxygen-deficient/oxygen enriched measuring instruments and warning devices.

9. SANS 1515-4 2015 1.00 Gas measuring equipment primarily for use in mines Part 4: Gas performance requirements for oxygen-deficient/oxygen enriched measuring instruments and warning devices.

10. SANS 1515-5 2016 1.00 Gas measuring equipment primarily for use in mines Part 5: Fire detectors.

11. SANS 1737 2017 1.04 Body-worn escape type breathing Apparatus.

12. SANS 60079-0 2012 5.00 Explosive atmospheres Part 0: Equipment – General requirements (IEC 60079-0:2011, IDT, Ed.6).

13. SANS 60079-1 2015 5.00 Explosive atmospheres Part 1: Equipment protection by flameproof enclosures "d" (IEC 60079-1:2014, IDT, Ed. 7).

14. SANS 60079-2 2015 4.00 Explosive atmospheres Part 2: Equipment protection by
15. pressurized enclosure "p" (IEC 60079-2:2014, IDT).

16. SANS 60079-5 2016 4.00 Explosive atmospheres - Part 5: Equipment protection by
17. powder filling "q" (IEC 60079-5:2015, IDT, Ed. 4).

18. SANS 60079-6 2009 3.00 Explosive atmospheres Part 6: Equipment protection by oil (immersion "o" IEC 60079-6:2007, IDT, Ed. 3).

19. SANS 60079-7 2007 3.00 Explosive atmospheres Part 7: Equipment protection by increased safety "e" (IEC 60079-7:2006, IDT, Ed. 4).

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21. SANS 60079-10-2 2009 1.00 Explosive atmospheres Part 10-2: Classification of areas - Combustible dust atmospheres (IEC 60079-10-2:2009, IDT, Ed. 1).

22. SANS 60079-11 2012 4.00 Explosive atmospheres Part 11: Equipment protection by intrinsic safety "i" (IEC 60079-11:2011, IDT, Ed. 6).

23. SANS 60079-13 2011 2.00 Explosive atmospheres Part 13: Equipment protection by pressurized room "p" (IEC 60079-13:2010, IDT, Ed. 1).

24. SANS 60079-14 2014 5.00 Explosive atmospheres Part 14: Electrical installations design, selection and erection (IEC 60079-14:2013, IDT, Ed. 5).

25. SANS 60079-15 2010 4.00 Explosive atmospheres Part 15: Equipment protection by type of protection "n" (IEC 60079-15:2010, IDT, Ed. 4).

26. SANS 60079-16 1990 1.00 Electrical apparatus for explosive gas atmospheres Part 16: Artificial ventilation for the protection of analyzer(s) houses (IEC 60079-16:1990, IDT, Ed. 1).

27. SANS 60079-17 2014 5.00 Explosive atmospheres Part 17: Electrical installations inspection and maintenance (IEC 60079-17:2013, IDT, Ed. 5).

28. SANS 60079-18 2017 4.00 Explosive atmospheres Part 18: Equipment protection by encapsulation "m" (IEC 60079-18:2014, IDT, Ed. 3).

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30. SANS 60079-25 2010 2.00 Explosive atmospheres Part 25: Intrinsically safe electrical systems (IEC 60079-25:2010, IDT, Ed. 2).

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34. SANS 60079-29-2 2017 2.00 Explosive atmospheres Part 29-2: Gas detectors - Selection, installation, use and maintenance of detectors for **flammable gases** and oxygen (IEC 60079-29-2:2015, IDT, Ed. 1).

35. SANS 60079-29-3 2015 1.00 Explosive atmospheres - Part 29-3: Gas detectors - Guidance on functional safety of fixed gas detection systems (IEC 60079-29-3:2014, IDT, Ed. 1).

36. SANS 60079-29-4 2012 1.00 Explosive atmospheres - Part 29-4: Gas detectors - Performance requirements of open path detectors for **flammable gases** (IEC 60079-29-4:2009, IDT, Ed. 1).

37. SANS 60079-30-1 2007 1.00 Explosive atmospheres Part 30-1: Electrical resistance trace heating - General and testing requirements (IEC 60079-30-1:2007, IDT, Ed. 1).

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39. SANS 60079-31 2014 2.00 Explosive atmospheres Part 31: Equipment dust ignition protection by enclosure "t” (IEC 60079-31:2013, IDT, Ed. 2).

40. SANS 60079-33 2013 1.00 Explosive atmospheres Part 33: Equipment protection by special protection "s” (IEC 60079-33:2012, IDT).

41. SANS 60079-35-1 2013 1.00 Explosive atmospheres Part 35-1: Caplights for use in mines susceptible to firedamp - General requirements – Construction and testing in relation to the risk of explosion (IEC 60079-35-1:2011, IDT, Ed. 1).

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ANNEXURE 8: Appointment of members of a drafting committee for a mandatory COP
(For information purposes)

Guideline for the Compilation of a Mandatory Code of Practice for the Prevention of **Flammable gas** and Coal Dust Explosions in Collieries.

In terms of Paragraph 4.1 and 4.2 consultation for the preparation, implementation or revision of this **COP** was done with the Health and Safety Committee and Employees.

NAME	DESIGNATION	AFFILIATION (UNION OR EMPLOYER OR EMPLOYEE)	DATE	SIGNATURE

In terms of Paragraph 4.1 and 4.2 of this Guideline, the following members are appointed as the Drafting Committee for this **COP**.

NAME	DESIGNATION	QUALIFICATION	EXPERIENCE	AFFILIATION	DATE	SIGNATURE

_____ _____

Employer representative **Date**
(PRINT NAME AND SIGNATURE)

(MHSA Section 4.1 Appointee)