PRINCIPAL HAZARD MANAGEMENT PLAN (PHMP)

GRO-10-PHMP-Spontaneous Combustion

Coal Mining Safety and Health Act 1999 Section 63

Coal Mining Safety and Health Regulation 2017 Section 149

GRO-10-PHMP-Spontaneous Combustion Version 9.0 Sign Off			
Role	**Name**	**Signature**	**Date**
Document Owner	Wouter Niehaus		
EEM / MEM / VO (as required)	NA		
Underground Mine Manager	Wouter Niehaus		
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1 Purpose

The purpose of this Principle Hazard Management Plan (PHMP) is to provide a documented process at Grosvenor Coal Mine for the control of Spontaneous Combustion to ensure the operations at Grosvenor Mine are conducted at levels of risk that are within acceptable limits and as low as reasonably achievable.

2 Scope

This PHMP applies to the Grosvenor Coal Mine and to all coal mine workers engaged in activities referred to in this document.

This PHMP meets the requirements of Section 63 of the Coal Mining Safety and Health Act, and Section 149 of the Coal Mining Safety and Health Regulations 2017.

This PHMP meets the requirements of Section 149 of the Coal Mining Safety and Health Regulations 2017. Specific Longwall Sealing related Spontaneous Combustion hazards are addressed in panel specific sealing management plans.

It is important to note that the longwall operations at Grosvenor Mine are suspended at the time of this PHMP being reviewed and that LW104 has been sealed as part of the management of the spontaneous combustion event. Anglo American have announced that longwall operations are not expected to re-commence until H2 2021. The risk assessment and PHMP for Spontaneous Combustion will be reviewed prior to longwall operations re-commencing. An action to this effect has been assigned from the Risk Assessment.

2.1 Grosvenor Mine Spontaneous Combustion Characteristics[1]

Testing has been undertaken of the Goonyella Middle seam, outlined in reports CB3 Mine Services Technical Report – 2014/TR009 and CB3 Mine Services Technical Report – 2014/TR014. Testing includes propensity to spontaneously combust as outlined above and gas evolution with temperature. Reports outlining the results are kept on the Document Control system.

Adiabatic testing of coal samples from Grosvenor Mine has resulted in R70 values that range from 0.18 to 0.40^{o} C/h. These R70 values indicate that the coal has a low reactivity to oxygen and the intrinsic spontaneous combustion reactivity rating for the samples is low based on Queensland conditions. The R70 values are consistent with the rank and type of coal and are similar to results obtained for Moranbah North and Moranbah South.

[1] CB3 Mine Services Technical Report – 2014/TR009, pg.32

Calculated index values for minimum self-heating temperature and crossing point temperature indicate the samples have a low spontaneous combustion propensity rating. The relative ignition temperature values for the samples confirm the intrinsic spontaneous combustion reactivity rating obtained from the R70 values.

The leaving of a coal roof due to seam thickness and the presence of seam splits and rider seams above and below the Goonyella Middle Seam may increase the potential for incidents of spontaneous combustion.

2.2 Coal Quality and Rank

A summary of the coal quality analysis for the sample tested is contained the table below. The ASTM rank of the sample is medium volatile bituminous based on the volatile matter of the coal.

Analytical and rank data for SponComGAS™ sample from borehole GSC0004 Grosvenor Mine

105/592 662G4	
PROXIMATE ANALYSIS (air-dried basis)	
Moisture (%)	1.3
Ash (%)	14.0
Volatile Matter (%)	27.1
Fixed Carbon (%)	57.6
Calorific Value (MJ/kg)	30.25
ULTIMATE ANALYSIS (dry ash-free basis)	
Carbon (%)	86.3
Hydrogen (%)	5.47
Nitrogen (%)	2.01
Sulphur (%)	0.70
Oxygen (%)	5.5
COAL RANK PARAMETERS	
VM (%, dmmsf)	30.4
CV (Btu/lb, dmmsf)	15694
Suggate rank	14.2
VM (%, dmmf)	30.9
CV (Btu/lb, mmmf)	na
ASTM rank	mvb

Note – the above table will be subject to review prior to re-commencing longwall operations in 2021

2.3 Prediction and Prevention

Prediction seeks to determine the more likely scenarios that could develop into a heating. History has shown that many factors can influence the likelihood of spontaneous combustion occurring including:

- Pressure differentials across the goaf;
- Pressure differentials between sealed and unsealed areas;

- Pressure differentials across pillars in ventilated areas;
- High ventilation pressure differentials across VCDs;
- Cracking in coal around VCDs;
- Insufficient or inadequately targeted ventilation;
- Slow extraction rates (note – only applicable to LW production);
- Coal left in the goaf (note – only applicable to LW production);
- Gas monitoring and establishment of baseline conditions;
- Stowage, particularly when left against stoppings; and
- Leakage of air into sealed areas, through VCDs, fractured strata or boreholes.

Mine design is a major influence on the likelihood of a spontaneous combustion event occurring. At Grosvenor the following factors have been incorporated into the mine design to minimise the likelihood of spontaneous combustion.

- Overall ventilation practice including minimising pressure differentials;
- Large roadway areas aiming to minimise mine resistance and minimise pressure differentials across pillars, VCDs and goafs;
- Ventilation control devices including final seals are built to a certified engineering standard to ensure, as a minimum, compliance with Schedule 4 of the Coal Mining Safety and Health Regulation 2017;
- The use of parallel intake roadways where practicable;
- Ability to inert longwall blocks during extraction and after sealing using an Inert Gas Generator;
- Final sealing of longwall blocks as soon as practicable after the completion of mining;
- Separation of longwall blocks with long term stable pillars as determined by geo-technical design; and
- All seals around the edge of the goaf are fitted with sampling points and a means of determining the pressure differential (ΔP) across the seal.
    a. In the event that a satisfactory balance cannot be achieved or maintained, a method of pressure balancing using pressure balancing chambers and connecting pipes will be evaluated and considered.

Management strategies of surface / in seam air ingress into sealed areas include:

- Spontaneous Combustion TARP's which includes the provision of inspections in response to trigger levels;
- Goaf Drainage management TARP's which define operating conditions for use of post drainage to minimise risk of oxygen ingress;
- Where surface leakage is detected or suspected, controls will be implemented that may include additional gas monitoring, balancing to atmospheric pressure, surface sealing and or inertisation;
- Methane Drainage holes drilled underground, in seam, (excluding short rib capture holes unless they provide a potential leakage path around ventilation control devices), will be capped. It shall be the responsibility of the Technical Services Department to check that the materials are available to facilitate this process each time it is required;
    a. All holes will be shown on hazard plans from data held in the exploration, seam gas and environmental data base;
- The provision of emergency seals at all the portal entrances which comply with sections 156 and 157 of the Coal Mining Safety and Health Regulation 2017;
- The provision and testing of inertisation points for the MIU to comply with sections 156 and 157A of the Coal Mining Safety and Health Regulation 2017; and
- The Permit to Mine system includes consideration and management of spontaneous combustion.

2.4 Historical Context

MINE	DATE	OUTCOME
Box Flat	1972	17 men killed - 13 men underground and 4 at the Conveyor Drift underground Mine explosion kills mines rescue teams as they attempt to control a fire developed from a spontaneous combustion of waste workings- the ventilation reversed back over the fire and an explosion occurred.
Kianga	1975	13 men killed underground Mine explosion – men were building seals and had put brattice up first so ventilation was effectively stopped into goaf and an explosion occurred.
South Blackwater	1975	Spon com developed in solid coal of the main headings between the intake and main return.
Leichhardt	1978	Mine fire in slack coal in an uncleared coal face – fire is extinguished by mines rescue teams
New Hope No.5	1989	The mine was emergency sealed and closed to extinguish a spontaneous combustion presumed to be from pyritic minerals in waste workings.
Ulan	1991	Goaf fire resulted in pit closure for many months
Moura No.2	1994	11 men killed - Mine explosion occurs after a suspected spontaneous combustion was sealed to extinguish it. The freshly sealed goaf developed an advanced spontaneous combustion and gas monitoring indicated that the area reached the lower explosive limit and then exploded. A second subsequent explosions also occurred.
North Goonyella	1997	A spontaneous combustion developed in the adjacent goaf due to flooded tailgate roadways and leakage of seals. The Longwall was sealed and injected with inert gases to control the spontaneous combustion.
Newlands	1998	A spontaneous combustion developed in solid coal adjacent the main exhaust fans.
Moranbah North	1999	H_2, C_2H_6, elevated CO discovered in the first Longwall. C2H6 is not an indicator of spontaneous combustion and hydrogen was due to new generation of GC capable of low detection (Moranbah North had the first microGC – previously detection limit was ~50ppm)
Southland	2003	Spontaneous combustion developed in an adjacent sealed goaf to the Longwall. The mine was temporarily closed. The mine is emergency sealed and flooded with inert gas. The mine was recovered several months later.

MINE	DATE	OUTCOME
Newstan	2005	A heating took place in a sealed longwall goaf that was remote from current operations. Mineshield was used to inject nitrogen into the goaf and stabilise the heating.
Dartbrook	2005	Longwall goaf fire – Mineshield inertisation at 4t.min – 10500 tonnes
Moranbah North	2005	The mine was evacuated after CO TARPs were exceeded. A ventilation change has drawn goaf gas against goaf seals in rich proportions and created a false alarm.
Dartbrook	2006	Heating in active Longwall block
Cook Colliery	2007	Mine was evacuated after a spontaneous combustion occurred in old workings
Moranbah North	2008	The mine was evacuated after CO TARP's were exceeded. Regulators had been installed adjacent to goaf seals to attempt to improve control of oxidation of the goaf. The change has drawn goaf gas against goaf seals in rich proportions and created a false alarm.
Carborough Downs	2012	Elevated levels of CO reported in the active goaf. Significant amount of coal left in the goaf due to negotiating the LW through faulted ground and
Moranbah North	2013	LW109 high CO reported to tube bundle point on seal at TARP 3 level. Inertisation turned onto seal to control site.
North Goonyella	2014	An accelerated oxidation event developed behind a face shield in the goaf due to the longwall being stood for over 3 months. Low level ethylene less than 5ppm was detected in the goaf stream and TG General body. The Longwall was sealed and injected with inert gases to control the accelerated oxidation event
North Goonyella	2018	Spontaneous Combustion event during LW recovery causing emergency sealing of the mine.
Grosvenor	2020	An accelerated oxidation event developed in LW104. It is important to note that the longwall operations at Grosvenor Mine are suspended at the time of reviewing this PHMP and that LW104 has been sealed as part of the management of the spontaneous combustion event. Anglo American have announced that longwall operations are not expected to re-commence until H2 2021. This Risk Assessment and the PHMP will require review prior to longwall operations re-commencing. An action has been assigned to ensure this occurs.

3 Definitions

The following definitions are specific to this PHMP. Generic definitions are addressed in **GRO-190-FS-Glossary of Terms**.

Term	Definition
Heating	situation where the dissipation of heat energy resulting from spontaneous combustion is insufficient to restrain coal oxidation from becoming self-sustaining and for an ongoing temperature rise of the surroundings to occur (this is analogous to the term 'spontaneous heating' which may be found in the literature). i.e., the uncontrolled progression of spontaneous combustion
Principal Hazard	a hazard at the coal mine with the potential to cause multiple fatalities
SHE Integrated Risk Management Database	Database used for capture of safety, health and environmental hazards, incidents, inspections, monitoring, investigations and actions (e.g. Enablon or Isometrix)
Spontaneous combustion	Oxidisation of coal is a normal process and this produces heat and certain gases (all coal oxidizes). Spontaneous combustion is the process by which certain materials can ignite as a result of internal heat which arises spontaneously due to reactions liberating heat faster than it can be lost to the environment
Spontaneous combustion risk	the set of risks to people and/or property which may arise from spontaneous combustion where the rate of oxidation is, or is likely to, increase and result in undesirable temperature increase
Trigger Action Response Plan (TARP)	a documented set of escalating actions that are to be taken in the event that certain criteria are met

4 Principle Hazards Summary

4.1 Principle Hazard Identification

Gas Management is defined as a Principle Hazard under Section 149 of the *Coal Mining Safety and Health Regulations 2017.*

4.2 Risk Assessment Methodology

A Workplace Risk Assessment and Control (WRAC) ***GRO-1367-RA-Spontaneous Combustion*** was conducted on the 06/08/2020 following the principles outlined in ***GRO-201-PLAN-Risk Management***.

- A representative cross-section of affected coal mine workers were involved and identified hazards that exposed personnel to an unacceptable level of risk.
- The proposed controls have been deemed to provide an acceptable level of risk.
- No hazards identified were deemed unquantifiable.
- No non-consensus issues were raised during the risk assessment.

4.3 Risk Summary

The following hazards and unwanted events have been identified during the Workplace Risk Assessment and Control (WRAC).

Issue	Describe the Energy Hazard	Describe the Potential Unwanted Event
Prevention		
General	LTA understanding of the coal's propensity	Failure to recognise and plan for Spontaneous Combustion potential
Fuel - Broken Coal	LTA management of stowage (poor maintenance, poor strata failure recovery / face road clean up, unauthorised placement)	Build-up of stowage
Fuel - Broken Coal	Coal spillage from conveyors, in seam drill cuttings, dried out roadways, coffin seals, airborne coal dust	Build-up of coal spillage
Fuel - Broken Coal	Coal left in goaf, barrier pillars, chain pillars, rider seams Inability to extract full seam Faults and rolls	Build-up of remnant coal post extraction
Fuel - Broken Coal	Pillar crush, rib spall, pillar cracks, perimeters of VCDs, in seam boreholes, geological structures	Exposed coal in strata from working seam
Fuel - Broken Coal	Floor heave, roof fractures, roof fall, interconnecting boreholes	Exposed coal in strata from overlying / underlying seams
Oxygen	Oxygen always present and available in ventilated areas e.g. pressure differential issues across pillars, bottom of upcast shaft	Pressure differential cause by ventilation system causing oxygen leakage pathways
Oxygen	Leakage through seals / pillars / surface cracking / boreholes / pipe ranges, adjacent goaf interactions, open pathways through seals, faults, gas suction system	Excessive oxygen ingress into sealed goaf
Heat	Inadequate ventilation to manage low pressure differentials across open networks, high pressure differentials across restricted	Slow moving / low air flows

	networks, barometric pressure operating across a goaf, UIS hole, SIS hole etc.	
Heat	Inadequate ventilation to manage ambient temperature, exothermic reaction from PUR, inherent strata temperatures, heat from electrical installations	Extraneous heat sources
Monitoring System	Failed / damaged monitoring equipment, incorrect calibration, leak in sample lines, discrepancies between hand held and fixed monitoring systems	Delay / failure to respond to event triggers
Monitoring System	LTA TARP triggers, LTA response time, incorrect data, LTA monitoring, unrepresentative results, LTA sampling regime, LTA access to gather samples	Delay / failure to respond to event triggers
Mitigation / Recovery		
Production of Gases	Consumption and depletion of Oxygen and other gas generated that can be used for interpretation and analysis	Unable to analyse data for fire ratio calculations or indication of fire temperatures / rates
Production of Gases	Irrespirable / Toxic Atmosphere	Exposure to irrespirable atmosphere
Production of Gases	Flammable source	Fire / Explosion
Production of Gases and Production of Heat	Accelerated Oxidation / Incipient Heating	Uncontrolled accelerated oxidisation
Production of Heat	Ignition Source	Fire / Explosion
Production of Heat	Progress to Open Fire	Fire / Smoke / Haze
Explosion / Ignition	Spontaneous Combustion	Injury to personnel

5 Principle Control Summary

5.1 Risk Assessment Controls

The series of controls identified in the WRAC are further expanded in the appropriate Principle Hazard Management Plans, Hazard Management Plans, Standard Operating Procedures and Trigger Action Response Plans, as defined below. The responsible owner for each of these documents is provided in the Grosvenor Management Structure, a copy of which is available on the Mine Record.

Principle Hazard Management Plans

- GRO-8-PHMP-Explosions
- GRO-1440-PHMP-Irrespirable Atmosphere
- GRO-14-PHMP-Gas Management
- GRO-15-PHMP-Ventilation
- GRO-5351-PHMP-Fire Management
- GRO-3172-PHMP-Strata Control

Hazard Management Plans

- GRO-42-HMP-Mine Inspection System
- GRO-9202-HMP-Fire Prevention
- GRO-3052-PLN-Stowage Management Plan
- GRO-34-HMP-Management of Conveyors

Standard Operating Procedures

- GRO-77-SOP-Underground Workplace Inspections
- GRO-76-SOP-Installation and Monitoring of Strata Support
- GRO-57-SOP-Mine Ventilation Control Devices

Trigger Action Response Plans

- GRO-6953-TARP-Active Goaf Spontaneous Combustion
- GRO-9736-TARP-Sealed Goaf Spontaneous Combustion
- GRO-1430-TARP-Goaf and UIS Gas Drainage Management
- GRO-750-TARP-General Body Contaminants

- GRO-10850-TARP-LW104 Goaf
- GRO-3442-TARP-Evacuation Triggers for Underground

5.2 Monitoring and Early Detection of Spontaneous Combustion Indicators

The gaseous indicators of spontaneous combustion are well established while the temperatures at which they are given off are mine location and seam dependant.

The gas evolution testing conducted by CB3 Mine Services has shown that, for the Goonyella middle seam, the following gaseous indicators are evolved at the temperatures shown below. These are the most relevant indicators as they are either not normally seam gases or are found in only minor quantities at normal temperature:

- Carbon monoxide CO – increases at approximately 60°C;
- Hydrogen H_2 – increases at approximately 60°C; and
- Ethylene C_2H_4 – first appears at approximately 100°C.

The following methods are used for the early detection of spontaneous combustion indicators at Grosvenor:

1. Gas monitoring, alarm points and interpretation of results;
2. Monitoring of goaf stream and goaf temperature
3. Additional gas sampling and analysis once a trigger level has been reached; and
4. Physical indicators, reporting and investigation.
5. Raytek Gun or Thermographic camera for hot spot identification of seals or coal around seals and stowage when required

5.3 Gaseous Indicators Monitoring, Alarm Points and Interpretation of Results

The mine has the following instruments for the detection of gases:

- Hand held gas detectors for CH_4, CO, O_2, CO_2 and NOx;
- Handheld tube detectors with tubes for a range of common mine gases;
- A tube bundle system for the monitoring of CH_4, CO, CO_2 and O_2. The results are displayed in the Control Room along with CO make, Grahams Ratio and CO / CO_2 where appropriate;
- Real time monitors for CO, CO_2, O_2 and CH_4. The results are displayed in the Control Room along with CO make, Grahams Ratio and CO / CO_2 where appropriate;
- A gas chromatograph to analyse air samples for He, CO, CO_2, CH_4, H_2, O_2, N_2, C_2H_4 and C_2H_6. These can be collected in sample bags from designated locations underground or from the tube bundle points terminating at the surface tube bundle room.

- Goaf skids CH_4, CO, O_2, CO_2

The best indicator for the early onset of a heating is carbon monoxide and this is monitored on site by the gas detectors outlined above.
As a minimum these instruments and monitoring points are installed to comply with Part 7 Gas Monitoring section of the Coal Mining Safety and Health Regulation 2017.

The gaseous triggers are outlined in the Spontaneous Combustion TARP's which are based on historical data and used to set the CO and other relevant gas and CO make alarm set points. A report on potential gas triggers utilising longwall gas monitoring data was prepared by MSIA as a guidance for developing initial TARP triggers for Grosvenor, *Grosvenor TARP Triggers Dec 2015.* Subsequent TARP reviews have been completed mid-block for LW 101 and reviewed prior to each LW Seal up and as part of the Second Working Risk Assessments for each LW.

5.4 Roadway Atmosphere Monitoring and Sampling

For the purpose of detecting a spontaneous combustion heating, the following monitoring points will be established:

- The outbye end of the longwall return (tube bundle and real time);
- The inbye end of the longwall return (tube bundle and shiftly bag samples);
- The outbye end of any sealed goaf (tube bundle), low pressure side (breathes out the most);
- The outbye end of the return roadway of all development panels (real time);
- The return side of all underground drive head installations (real time);
- The upcast shaft entries (tube bundle and real time);
- The surface tube bundle shed atmosphere as a control point (tube bundle);
- Each goaf gas drainage installation on surface (real time) plus bag samples;
- Monitoring and sampling via surface to seam boreholes.

5.5 Physical Indicators, Reporting and Investigation

Physical indicators are those indicators that can be detected by underground personnel by their normal senses of sight, smell, hearing, taste and touch. These are used as another early warning system for Spontaneous Combustion.
The physical indicators of spontaneous combustion with respect to increased temperature are well established as being:

- Heat;

- Smell;
- Sweating;
- Haze;
- Smoke; and
- Fire.

All mine workers are made aware of these during their induction as well as the requirement to report anything unusual. Mine workers are also retrained in spontaneous combustion during the first response training and following a Level 3 Spontaneous Combustion event.

ERZ controllers are also trained in spontaneous combustion as well as the processes to follow once an indicator has been reported. These are also outlined in the spontaneous combustion TARPs.

ERZ controllers conduct inspections and complete reports on the condition of the mine in accordance with ***GRO-77-SOP-Underground Workplace Inspections*** which includes the following items relevant to spontaneous combustion management:

- Adequacy of ventilation;
- The presence of gas;
- Condition of VCD's, particularly goaf seal integrity; and
- Indications of any heating or fire.

6 Resources

The resources required and the responsibilities to provide and maintain these resources for control of this Principle Hazard are listed below.

Resource	Responsibility
Cutting equipment with pick lacing design and picks to minimise coal fines	Mechanical Engineering Manager
Water sprays to contain air borne dust from cutting face	Mechanical Engineering Manager
Conveyor design and water suppression to control dust generation	Mechanical Engineering Manager
Gas Monitoring System - real time and tube bundle (second workings)	Ventilation Officer
Portable multi gas detectors	Electrical Engineering Manager

Resource	Responsibility
Designated rubbish facilities	Operations Manager
Temperature monitoring and detection devices	Mechanical Engineering Manager
Fire and overpressure rated VCDs	Ventilation Officer
Reticulated fire water	Mechanical Engineering Manager
Fire Fighting equipment	Underground Mine Manager
Auto and manual fire suppression systems	Mechanical Engineering Manager
Designated underground escapeways	Underground Mine Manager
Self-escape facilities (cache, aids)	Underground Mine Manager
Designated places of safety equipped with communication	Underground Mine Manager
Self-contained breathing apparatus for self-escape	Underground Mine Manager
MIU, airlock and sealing	Underground Mine Manager
First aid facilities	Underground Mine Manager
Blast relief for fan	Underground Mine Manager
Back-up generator for fan	Mechanical Engineering Manager
Gas Chromatograph	Ventilation Officer
Inertisation Generator	Electrical Engineering Manager
Foam Table	Mechanical Engineering Manager
Tomlinson Boilers	Mechanical Engineering Manager

7 Communications

Information pertaining to this plan shall be communicated to all coal mine workers at the Grosvenor mine as per ***GRO-205-PRO-Communication, Consultation and Involvement.***

8 Competencies and Authorisations

Training shall be conducted in accordance with the ***GRO-204-PRO-Training Scheme***. The training needs of the Plan are to be mapped to those personnel with responsibilities under the Plan.

9 Audit and Actions

The PHMP shall be subject to a program of auditing to determine whether the mine activities conform to the PHMP, and whether the arrangements in the PHMP are adequate, implemented and effective.
This program shall include completion of the Appendix 1 audit tool as detailed in ***GRO-210-PRO-Monitoring, Auditing and Reviews***. Other internal and external audits of this PHMP will be identified in ***GRO-8016-SCH-Grosvenor SHMS Audit Schedule***.

The audit findings shall be acted upon through the corrective action process and review mechanisms as defined by ***GRO-2543-PRO-Corrective and Preventative Actions***.

10 Roles and Responsibilities

Specific responsibilities and accountabilities associated with the control of this principal hazard are defined in the Hazard Management Plans, Standard Operating Procedures and TARPS listed section 5.
In addition, the Management Structure clearly defines the responsibilities and competencies required for senior positions in the structure that manage and control this Principal Hazard Management Plan.

11 Records

The records required to demonstrate implementation of this PHMP and the role responsible for maintaining them are listed below.

Record	**Responsibility**
Critical Control Monitoring Activities, Internal / External Audits	HSE Manager
Statutory inspections	Underground Mine Manager
Continuous telemetric and tube-bundle gas monitoring results	Ventilation Officer
Test and calibration results for all gas monitoring and detecting equipment	Ventilation Officer and MEM
Introduction to site equipment inspections	MEM and EEM
Equipment verification dossiers	MEM and EEM
Equipment commissioning records	MEM and EEM
Plant inspection, maintenance and test records	MEM and EEM
Spontaneous Combustion Propensity Test Results	Ventilation Officer
Fire Gas Evolution Curves	Ventilation Officer

Record	Responsibility
Atmosphere Sample Results from sealed areas	Ventilation Officer
Atmosphere Sample Results from active goafs	Ventilation Officer
Data to define “Normal” background atmosphere readings	Ventilation Officer
Borehole Intersection Notices	Technical Services Manager
Firefighting equipment test and inspection records	Underground Mine Manager
Records of testing airlocks, seals and gag connection	Underground Mine Manager
Stone dust sampling and reapplication records	Underground Mine Manager
Records of inspection and test of self-contained breathing equipment	Underground Mine Manager
Goaf gas composition and trend analysis	Ventilation Officer
VCD Installation / Alteration and Removal Permits	Ventilation Officer
Shift Gas Alarm Log	Underground Mine Manager
UPEE register	EEM
Permits (mining, hot work, explosives)	Underground Mine Manager

12 Internal References

12.1 Grosvenor Coal Mine SHEMS

In addition to Section 5, the following documents should be referenced in conjunction with this procedure:

- GRO-3385-PRO-Permit To Mine
- GRO-201-PRO-Risk Management
- GRO-205-PRO-Communication, Consultation and Involvement
- GRO-210-PRO-Monitoring, Auditing and Reviews
- GRO-2543-PRO-Corrective and Preventative Actions
- GRO-206-PRO-Document and Data Control
- PRO-188-PRO-Incident Reporting Investigation
- GRO-204-PRO-Training Scheme

12.2 Other Internal References

- Anglo American Group Technical Standards
- Anglo American Golden Rules

13 External References

13.1 Legislation

- Coal Mining Health and Safety Act 1999
- Coal Mining Health and Safety Regulation 2017

13.2 Other

- QMD 96 7386/C Approved Standard for Mine Safety Management Plans, Part B Guidelines for Development of Principal Hazard Management Plans, Spontaneous Combustion, dated 20th Jan 1998
- MDG 1006 Spontaneous Combustion Management Guideline, May 2011
- MDG 1006-Technical Reference Technical Reference for Spontaneous Combustion Management Guideline
- United Kingdom, HSE 'The prevention and control of fire and explosion in mines'.
- Chief Inspectors Hazard Database - http://mines.industry.qld.gov.au/safety-and-health/publications-guides.htm
- Grosvenor TARP Triggers (MSIA) Brady 2016
- Wardens Inquiry reports for Box Flat, Kianga and Moura No.2
- CB3 Mine Services Technical Report – 2014/TR009 and CB3 Mine Services Technical Report – 2014/TR014

14 Review Criteria

This document shall be developed and reviewed in accordance with:

- ***GRO-205-PRO-Communication, Consultation & Involvement.***
- ***GRO-206-PRO-Document and Data Control***.

15 Record of Consultation

The record of consultation and any objections shall be maintained in accordance with:

- ***GRO-206-PRO-Document and Data Control.***

16 Document Control

Ensure the description of change reflects information regarding whether the document review was full or partial.

Note – Administrative changes do not require Change Management Requests.

Version	Issue Date	Description of Change	Change Management Title	Approver
1	10/10/2013	New Anglo Grosvenor document.	N/A	PM
2	24/03/2014	Revised Document	N/A	NS
4	13/05/2015	Critical Control Review	N/A	PM
5	24/03/2016	Review for second workings LW101	N/A	MB, MW
6	19/07/2016	Inclusions of Internal Document Audit in appendix	N/A	Justin Joubert SHE Manager
7	19/09/2017	Revision of content, update to tables and document references. Post PHMP Bow-Tie Reviews (GRO-1367-RA-Spontaneous Combustion)	N/A	Cec Ivers (UMM)
8	07/10/2019	Revised Document	N/A	Wouter Niehaus (UMM)
9	10/08/2020	Full review post spontaneous combustion event in June 2020	**GRO-XXXXX-CMR-<Insert name of CMR>**	Wouter Niehaus Trent Griffiths

APPENDIX A Internal Document Audit

GRO-8016-SCH-Grosvenor SHMS Audit Schedule is used to determine the frequency of which the internal audit document is to be completed. An action plan is developed and assigned in Enablon for each scheduled audit.

Following the completion of the audit the below section must be signed and uploaded to Enablon when closing out the relevant action.

Note: The development of the measurement tool in the below table is to be completed by the Document Owner

Guided reference material for the development of the internal document audit is available on the second tab of ***GRO-8016-SCH-Grosvenor SHMS Audit Schedule****.*

AUDIT DATE:		**AUDIT TIME:**		**AUDITOR/S:**	
DEPARTMENT:		**LOCATION/S:**			
SPECIFIC TASK:				**DOCUMENT OWNER:**	

MEASUREMENT AND EVALUATION					
Measurement					**Findings and Comments**
Review *(Office Based)*	1. TARPs have been developed and implemented for Spontaneous Combustion and Goaf Drainage. - Validate these TARPs are in place and review the content (trigger points and actions) for quality and alignment with the PHMP control strategies. Are there any areas for improvements? - Check that the TARPs have been maintained and are up to date.				
	Compliant ☐	Non-Compliant ☐	Requires Improvement ☐	N/A ☐	
	2. All potential oxygen ingress points from surface to underground connections have been identified and located.				

	- Validate risk control strategies have been implemented to eliminate oxygen ingress. - If leakage is detected or suspected, what risk control strategies are available and are they effective?				
	Compliant ☐	Non-Compliant ☐	Requires Improvement ☐	N/A ☐	
	3. A Stowage management plan has been developed and implemented. - Validate that the plan is being used, up to date and maintained.				
	Compliant ☐	Non-Compliant ☐	Requires Improvement ☐	N/A ☐	
	4. An effective permit system has been implemented for stowage. - Obtain a sample of some recent permits and review them for content, completeness and signoff / approval.				
	Compliant ☐	Non-Compliant ☐	Requires Improvement ☐	N/A ☐	
	Compliant ☐	Non-Compliant ☐	Requires Improvement ☐	N/A ☐	
Audit *(Field Based)*	1. All coal mine works are trained in the physical indicators of spontaneous combustion (e.g. first response training, identification etc.). - Validate the knowledge of 3 x CMW regarding the physical indicators of spontaneous combustion and confirm their understanding of what they should do if spontaneous combustion is identified.				
	Compliant ☐	Non-Compliant ☐	Requires Improvement ☐	N/A ☐	
	Compliant ☐	Non-Compliant ☐	Requires Improvement ☐	N/A ☐	
	-				
	Compliant ☐	Non-Compliant ☐	Requires Improvement ☐	N/A ☐	

	ACTIONS REQUIRED	ASSIGNED TO	DUE DATE	ENABLON TASK NUMBER
1				
2				
3				
4				
5				

AUDIT COMPLETED BY

Name:		Role:		Signature:	
Name:		Role:		Signature:	

DOCUMENT OWNER

Name:		Role:		Signature:	