HAZARD MANAGEMENT PLAN (HMP)

Control of Frictional Ignition

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1 Purpose

The purpose of this Hazard Management Plan (HMP) is to provide a documented process at Grosvenor Coal Mine for control of frictional ignition during longwall operations, development drivage and bolting in known frictional ignition zones (as referred by the technical services department) in order to achieve an acceptable level of risk.

2 Scope

This HMP applies to all coal mine workers at the Grosvenor Coal Mine engaged in out of seam mining activities and all areas which are determined to be high risk frictional ignition zones.

2.1 Grosvenor Mine Incendive Potenital

Geochempet Services were engaged to assess the incendive potential of the underlying strata to the Goonyella Middle Seam (GMS) at the Grosvenor Mine. By examination of samples from the boreholes GSC0052A_FP001, GSC0052A_FP002, GSC0052A_FP003 and GSC0049A_FP001 the incendive sparking potential was calculated.

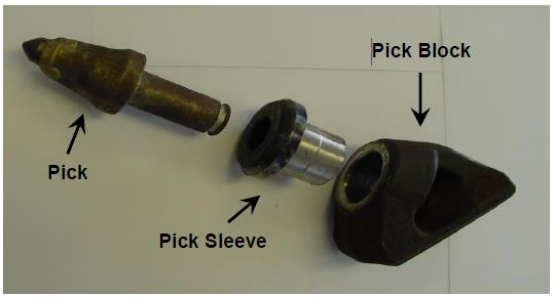
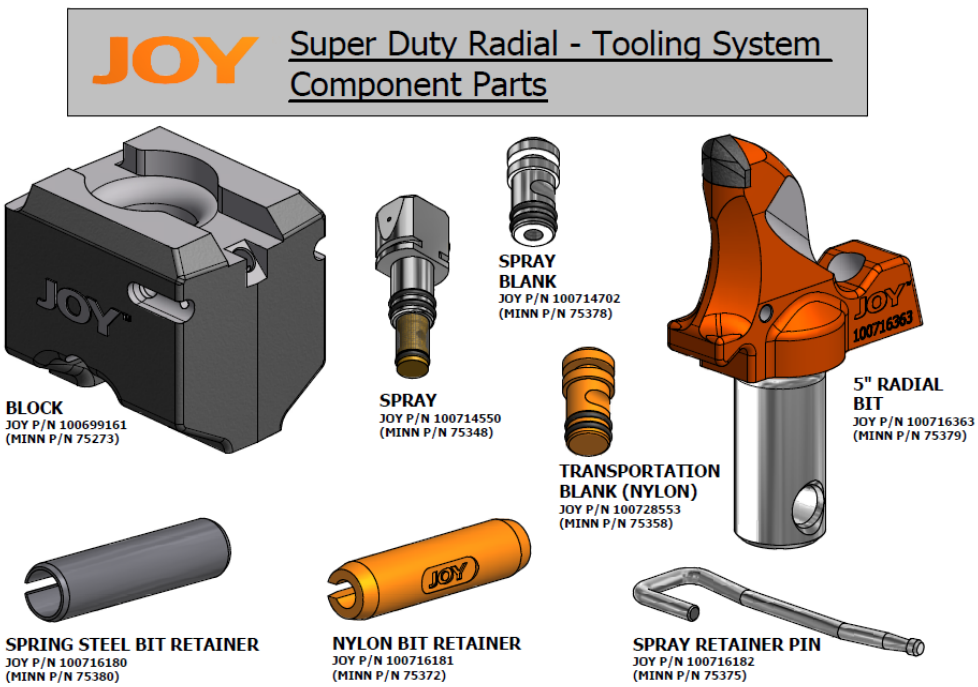
Samples have been given an IGCAT classification (1 represents the lowest potential, 5 the highest), identifying their inherent incendive potential:

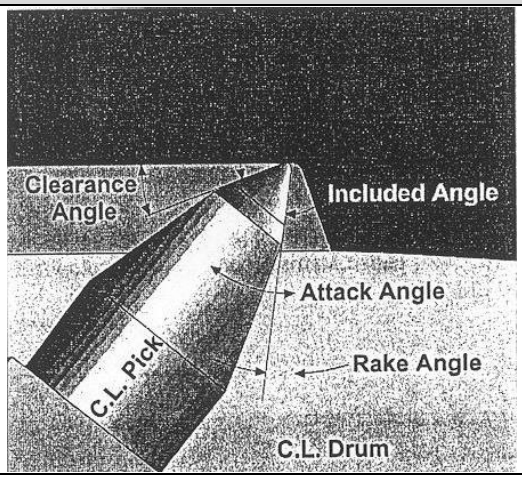
- Sample GSC0049A_FP001 at 360.7–361.05m. has an IGCAT value that places it within Zone 1
- Sample GSC0049A_FP002 at 361.24-361.44m has an IGCAT value that places it within Zone 1
- Sample GSC0049A_FP003 at 361.64-361.84m has an IGCAT value that places it within Zone 2
- Sample GSC0052A_FP001 at 374.40-374.69m has an IGCAT value that places it within Zone 1
- Sample GSC0052A_FP002 at 374.83-374.95m has an IGCAT value that places it within Zone 1
- Sample GSC0052A_FP003 at 375.27-375.39m has an IGCAT value that places it within Zone 2

3 Definitions

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

Term	Definition
Frictional Ignition	Frictional ignitions in development involve a metal cutting tool striking a material with the propensity for frictional sparking, including quartz rich sandstone, pyritic material, intrusive material or metal. The heat produced by the sparking has the potential to ignite a flammable methane atmosphere.
Incendive	Having enough energy to ignite a flammable mixture.
IGCAT	The ignition category (IGCAT) system is used to allocate ratings for the potential to generate incendive sparks with 5 being the highest potential and 1 being the lowest. It must be noted however that Low Frictional Ignition risk classification does not mean that frictional ignition cannot occur. The floor and roof are prone to localised changes in geology which can result in changes to frictional ignition risks. Identifying change and responding accordingly is key component to ensuring an acceptable level of risk

Term	Definition
	can be achieved.
Back Raking:	Is when the continuous miner is operated in the reverse direction, (away from the cutting face) whilst the cutter motors are running with the cutting picks touching on the roof or floor.
Roof Trimming:	Operating the continuous miner with the cutting picks closer than 150mm to the stone roof.
Zero Clearance	As a pick becomes blunt, the clearance angle reduces to zero or less and interface occurs between the pick body and the cut material.
Air Venturi	A device that uses compressed air or water pressure to generate ventilation movement to assist in diluting gas accumulations.
Cutter Head / Drum	The part of the cutting machine that houses (on a drum) picks, sleeves, blocks (otherwise referred to as a pedestal) and sprays that rotates for the purpose of cutting coal or stone.  Longwall Radial pick and parts listing 
Slider Tube	A ventilation tube that is inserted into the end of the main auxiliary ventilation ducting that can be extended as required to move ventilation closer to the working face.
Pick	The cutting tooth attached to the cutter head / drum.

Term	Definition
Terminology relating to pick design:	

4 Procedural Requirements

4.1 Risk Summary

A Workplace Risk Assessment and Control (WRAC) **GRO-3533-RA-Development and Longwall Frictional Ignition** was conducted on the **28/03/16** following the principles outlined in AS/NZS ISO 31000 format, and complying with the Anglo American Integrated Risk Management requirements.

- 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.

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

Describe the Energy Hazard that may be present	Describe the Potential Unwanted Event
Thermal energy by steel on steel – enough to ignite methane	• Enough thermal energy created in the presence of methane to cause an ignition at the development face. ○ Chuck / dolly on bolt / plate ○ Pick on gas drainage artefact ○ Pick on mesh / bolt
Thermal energy by steel on rock – enough to ignite methane	• Enough thermal energy created in the presence of methane to cause an ignition at the development face. ○ Pick on stone.

The rating of the potential consequences of the hazards contained in the site's hazard inventory and baseline WRAC, identified a frictional ignition as a Priority Unwanted Event with the potential to cause a single fatality. In accordance with **Anglo American GTS02 Integrated Risk Management Standard**, a Bow Tie Analysis was completed for this Priority Unwanted Event including the development of Critical Controls. A list of the Critical Controls that were developed from the Bow Tie Analysis are listed below:

Unwanted Event / Risk Description	Critical Control	Critical Control Responsibility	Critical Control Assurance Action	Assurance Frequency Months	Risk Owner
Flammable mixture/within flammable range/ Inadequate air quantity and velocities to dilute / flush accumulations Inability to direct ventilation velocities [current] to potential accumulations	Minimum ventilation quantity on longwall face of 40m3/sec	Longwall Superintendent	In-field audits to verify that the minimum ventilation quantity on longwall face of 40m3/sec	1 Monthly	Operations Manager
Ignition Source/mechanical energy/steel on rock	All picks and pick tips are in place and remain sharp	Longwall Superintendent	Inspections & maintenance to ensure all picks and pick tips are in place and remain sharp	1 Monthly	Operations Manager
Ignition Source/mechanical energy/steel on rock	All picks and pick tips are in place and remain sharp	Development Superintendent	Inspections & maintenance to ensure all picks and pick tips are in place and remain sharp	1 Monthly	Operations Manager
Ignition Source/mechanical energy/steel on rock	Effective water spray deluge on cutting heads, shearers, TG Drives, AFC Raceways, and shield canopies	Longwall Superintendent	Effective water spray deluge on cutting heads, shearers, TG Drives, AFC Raceways, and shield canopies	1 Monthly	Operations Manager

4.2 Development Ventilation and Gas Management Requirements

4.2.1 Face Ventilation

The ventilations standards in the advancing roadway are to be in accordance with the procedure for ventilating workplaces or as otherwise specified higher in this procedure;

- The minimum air velocity to be available, as measured at the rear of the Continuous miner or close by in the heading, is to be no less than 0.3m/sec (see following bullet point for greater than normal heading width roadways)
- For roadways driven at greater than normal heading width (such as when widening a Longwall installation roadway) a brattice screen may be set adjacent to the Miner to increase the air velocity.
- The minimum air velocity for a wider than normal heading width can be measured inbye of the continuous miner (the return side of the miner). The brattice wing is then to be used to ensure that the air properties that are measured on the return side of the miner are correctly directed over cutting face.
- When operating with the 12ED25 on-board ventilation, the ducting is to remain cleaned during FI operation. Visual inspection is to be conducted at the start of each shift and then visually monitored throughout the shift to ensure duct remains clear of stone / rock.

4.2.2 Ventilation Ducting Advance

- Ventilation ducting shall be suspended tightly into the upper corner of the roadway to allow maximum operational clearances;
- On the 12CM12, the ventilation ducting is to be advanced as far as safely practicable towards the face and care is to be taken to avoid interference with the continuous miner.

- When operating on the 12ED25, operations are to cease if flexible ducting drops out from the rigid tube ducting until ventilation is re-established.

4.2.3 Air Venturi

A compressed air operated venturi is to be operating at all times when trimming roof or floor stone to dilute any CH4 accumulations and when bolting under frictional ignition conditions.

- The venturi is to be located on the opposite side to the ventilation ducting on the 12CM12 and pointed in the opposite corner to the vent tube
- On the 12ED25, two venturi's are required to be installed and pointed to either corner of the cut roadway on the 12ED25.
- The venturi is to be mounted on either a roof or rib bolt or the miner and earthed to a steel roof or rib or earthed to the machine.
- The venturi is to be advanced as the ventilation ducting is advanced where practical to ensure effective dilution of CH4 accumulations
- For bolting using mobile bolters (I.e. QDS bolter or Air track) or all hand held bolters, the requirement for a venturi is to be assessed by the ERZC in control of the work considering the ventilation setup of the area.

The Continuous Miner Operator is to ensure that:-

- The venturi air mover is maintained in the correct position.
- The venturi is in operation when the continuous miner is cutting stone, either roof or floor.

4.2.4 Methane Monitoring

- Methane-monitoring systems are installed on the continuous miner. The calibration and inspection of these is covered in the mine's maintenance scheme.
- The Miner will be fitted with at least 1 automatic CH4 detector to detect the methane concentration near to the cutters as required by section 233 of the Regulations.

The Continuous Miner Operator is to regularly:

- Visually inspect the sensor heads and covers to ensure that the sensor heads are not blocked or otherwise damaged;
- Observe the methane readings displayed on the monitoring units to verify that the methane monitoring units are operational;
- Ensure that it is not positioned directly in line with the venturi air mover;

4.3 Miner Cutter Head Standards & Inspection

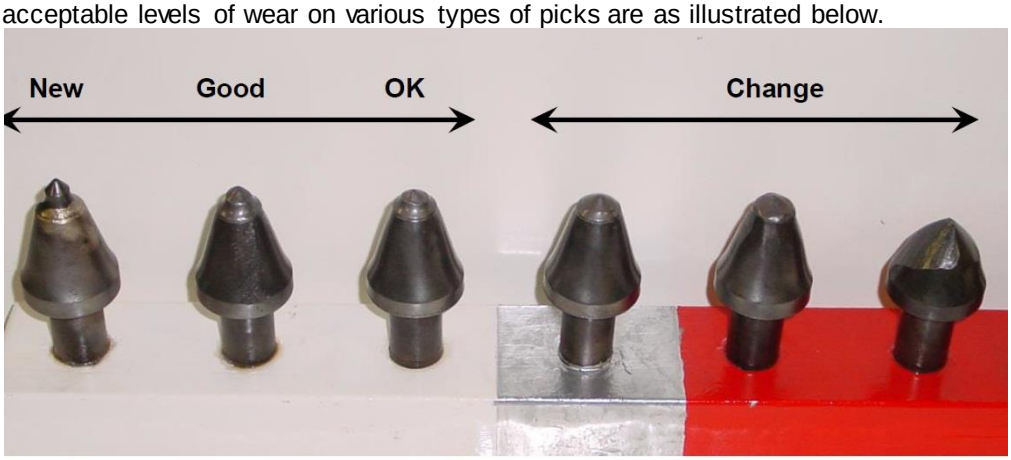
4.3.1 Water Sprays

- Water sprays that are directed onto the face and cutter head of the Miner are to be operational at all times while cutting;

- The static water pressure at the Miner, as indicated on a gauge fitted to the rear of the machine, is to be checked by the Miner Driver.
- The minimum water pressure will be 900kPa as read when the sprays are not turned on (static);
- Any significant reduction in static pressure is to be investigated as it may alter the effectiveness of the water sprays.

4.3.2 Picks & Sleeves

- The acceptable levels of wear on various types of picks are as illustrated below.



- All picks will be of the same standard. (That is either all coal cutting pick or all stone cutting picks.)
- Different types of picks may be installed on the cutter head provided that the total length of the pick and sleeve combinations is the same (that is the distance from the pick block to the point of the pick);
- When using picks that have tungsten carbide rings as shoulder protection and wear indicators, the picks will require replacement due to wear or damage on the tungsten carbide rings as shown in the picture below.

The picks used are to be assessed as being a FI pick type by holding at least 5 of the 7 recognised FI control features listed below:

- free to rotate;
- wears evenly;
- has hard-faced shoulders;
- maximises the gauge (that is the depth of cut);
- as sharp as practicable (noting that a blunt pick is more suitable for high impact stresses);

- has more than zero clearance;
- has a wear gauge / indicator

A pick sleeve is to be replaced when

- it is worn to the extent that the pick block is exposed to wear;
- the pick cannot be retained within the sleeve; or
- the sleeve cannot be retained within the block

In the event that a pick sleeve(s) cannot be retained within the pick block, the same standards and procedures applicable for missing pick blocks shall apply.

The condition of replaced picks will be audited from time to time by the Development Coordinator to assess under or over use of those picks. The findings of the audit are to be communicated back to the crews.

4.3.3 Pick Blocks

In the event of missing pick blocks the following standards and procedures shall apply;

- Any single damaged pick block that is in a position where it may strike the roof directly and therefore increase the risk of frictional ignition shall be removed or repaired;
- Where a pick block is missing and there is no chance that the pedestal will strike the face then production may continue until a suitable opportunity exists to replace the pick block. Basic form of risk assessment of the specific situation should be conducted such as a JSA. In this case, FI standards inspection of the cutter head is twice as often as the normal frequency.
- If any two-pick blocks are adjacent in cutting sequence and missing the ERZC must inspect the cutter head. ERZC to contact Undermanager and / or Shift Engineer to notify and explain findings and intensions.
- More than three single pick blocks missing ERZC to inspect the head. ERZC to contact Undermanger and / or Shift Engineer to notify and explain findings and intensions.

The Production ERZ Controller shall:

- Inspect the cutting head during the shift to determine if the missing pick blocks cause an increased risk of frictional ignition. Production may recommence if the missing pick blocks do not cause an increased risk of frictional ignition.

The Undermanager and/or Shift Engineer shall:

- Provide technical assistance where required.
- Inspect the head if panel ERZC requires.

4.3.4 Inspection & Maintenance

- During the normal cutting and bolting operations the Miner Driver should regularly complete a visual inspection of the cutter head by spinning the heads. The miner driver will look for pick condition and the operation and effectiveness of the sprays.
- If any obvious deficiency is observed then the face is to be secured and the issue with the cutter head is to be resolved (such as change picks or clean sprays);
- The GRO-7779-TARP- Frictional Ignition TARP for Stone Drivage will applies when cutting stone to ensure pick wear is routinely monitored and controlled.

4.4 Bolting Standards & Inspection

4.4.1 Drill tips

Drill tips are consumable items which are to be changed out periodically depending on the rate of wear. A blunt drill tip has a higher chance of blocking and creating heat than a sharp drill tip which will typically also prolong the life of the drill steels and produce a consistent and accurate hole diameter. Under frictional ignition conditions, the condition of drill tips is a key control.

Under frictional ignition conditions:

- Drill tips are to be changed out once per full production shift during the first quarter of the shift.
- Drill tips are to be checked for wear after drilling each hole
- If a change in drill tip wear rate is noticed, this is to be communicated to the ERZC and noted on statutory report.

4.4.2 Drill steel

Drill steels also form a role in prevention of a frictional ignition event whilst drilling. Bent or blocked or steels which are damaged at joins increase the risk of frictional ignition. Operators are to monitor the condition of the drill steel and dispose of the steels by leaving them in the empty bolt pods when the bolt pods are changed out on the miner. No drill steels should be left on the rib, behind mesh on the roof or on ground as this forms another hazard.

Some common symptoms of drill steels which are not fit for use are:

- Steels which have limited water flow or visible debris in the centre hole of the steel
- Steels which warps / do no rotate in a vertical line – likely bent
- Excessive leaking from the joins on the steel or between the join and the chuck.

If any of these symptoms or drill steel ware / damage are present, operator must stop and assess the requirement to change the steel out.

4.4.3 Recovering after blocking the drill steel whilst drilling

Under frictional ignition conditions whereby there is excessive gas migrating from bolt holes drilled in the roof, the most significant hazard is created by an operator blocking a drill steel, continuing to rotate the steel and / or applying feed pressure to the steel (causing tip and steel to heat up from friction between rock and steel). This hazard then has the potential to become an frictional ignition event when the drill steel is removed from the high methane environment (up the hole) to the base of the hole where the methane content is still in the explosive concentration range but also has an abundance of oxygen. At this point the fire triangle is complete with a fuel source, ignition source and oxygen.

To control this hazard under frictional ignition conditions if a blocked steel occurs:

- Operator is to stop drilling immediately after noticing loss of returns or the bending of drill steel
- Try to flush the steel by backing the steel down from the back of the hole and applying water only to the system
- If water does not report to the base of the hole after trying to flush, mobilise a hose and point hose at the bottom of the hole.
- Drop the drill steel down out of the hole slowly applying water to the bottom of the hole to remove the heat (ignition source).

Note: On the 12ED25 if water flow is lost, a fault is present and the rig stops therefore minimising the potential energy required heating a blocked drill tip / steel. If the water flow sensor is bypassed, the bypass system is to be followed and the risk associated with blocking steels is to be assessed around the present conditions. This function is not available on the 12CM12 manual rigs.

4.5 Longwall Ventilation and Gas Management Requirements

4.5.1 Longwall Face Ventilation Requirements

During each production shift, provided the Tailgate is safely accessible, it is a requirement to measure the ventilation quantity which shall be recorded on the Longwall ERZC statutory report.

A minimum quantity of forty cubic metres per second (40m^3/s) is to be available for production to take place. If at any time during the shift, the quantity available falls to below 40 m^3/s, production is to cease and, the Undermanger must be informed.

The Undermanager is a ventilation survey is conducted where the issue is not as a result of a roof fall or TG roadway obstruction the issue shall be investigated and rectified. Each split must be measured to identify the cause for the loss of ventilation. Where the reduction of ventilation is a result of a restricted air way and alteration of the ventilation regulators will not improve the ventilation an IMT shall be formed to develop a recovery plan.

4.5.2 Control of Ventilation on the Face

A brattice wing is to be maintained at the maingate end of the face at all times. (between No.1 shield and the chain pillar rib) to minimise leakage of ventilation into the goaf. This practice will reduce the amount of fresh air drawn into the goaf by the ventilation flow and then subsequently reports back to the face or tailgate corner.

4.5.3 Methane Monitoring

General body methane monitoring systems are installed at the Tailgate and Maingate of the longwall face and general body methane is monitored on the goaf side of the shearer drums.

The ERZ Controller shall, on each cutting shift, visually inspect each sensor head to ensure they are not damaged and check the methane readings recorded by the monitoring units against a personal gas detector Calibration and inspection of the longwall methane monitors is detailed within the LW Maintenance Strategy work orders.

If any deficiencies are suspected with one of the shearer methane monitors, the other shall be used and the unserviceable monitor shall be returned to service as soon as practicable. If both shearer methane monitors are defective the shearer shall be stopped and at least one monitor returned to service to allow production to recommence.

No changes shall be made to the alarm levels or position of the methane monitor fitted to the shearer without reference to a Risk Assessment and permission of the Underground Mine Manager or the Ventilation Officer.

4.5.4 Shearer Speed

The cutting drum rotation speed of 31rpm shall not be altered without prior consideration by Risk Assessment.

The maximum shearer haulage speed shall be prescribed by the Longwall Superintendent and shall be set in the shearer parameters. Alteration of the shearer speeds shall only occur with permission from the Longwall Superintendent.

4.5.5 Longwall Specific Fire Fighting Equipment

A fire extinguisher shall be located every 20 shields along the longwall face and there shall be two fire extinguishers located on the shearer. Where the extinguishers have been tagged with anti-tamper tags and have been inspected monthly during the fire officers checks, this shall be sufficient to verify that the fire fighting equipment is in intact and in date.

Wash down hoses shall be fitted to every shield throughout the longwall face with an attached hose with nozzle that allows the water to be directed at the face if required. The hoses are also to be of sufficient length to allow

water to be applied to the face in a range of 10 shields either side of the outlet. These hoses are to be kept in a serviceable condition and available at all times.

A fire depot shall be located at the inbye end of the longwall monorail.

Fire fighting appliances on the shearer shall be inspected during each production shift by the Shearer operator and ERZ Controller

4.6 Shearer Cutter Head Standards

4.6.1 Water Sprays

Ranging arm and shearer clear water sprays are to be operational.

The drum sprays are to working effectively and all damaged sprays that are causing a reduction in the spray effectiveness removed and replaced. Where the damaged spray cannot be removed it shall be plugged to maintain the performance of the remaining sprays and work planned to rectify the damaged as soon as is practical.

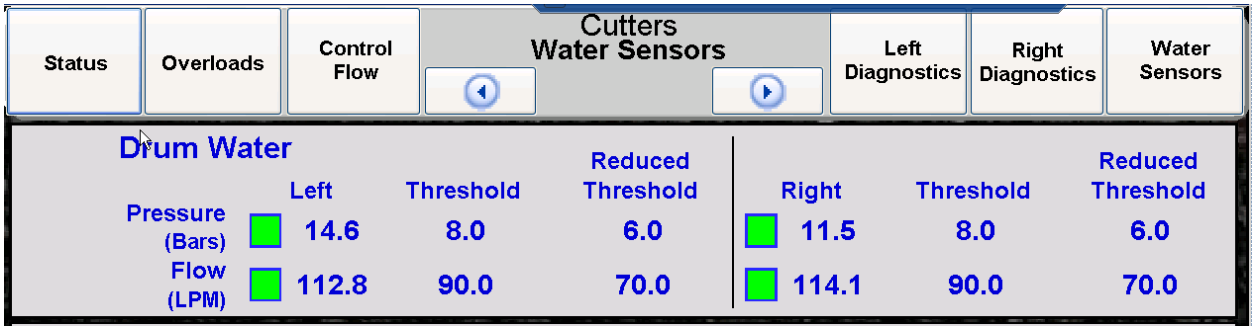
The shearer operator shall physically check the condition of the water sprays once per shift and shall visually monitor the sprays continuously during production. If any deficiencies become obvious, the operator shall stop at an appropriate location and correct the issues. The inspection and any actions taken shall be recorded on the Dust Suppression control

No more than three sprays per drum can be blocked. However if they are adjacent or sequential then they are to be changed.

The shearer operator will continuously monitor the shearer cutter spray performance and shall stop the shearer at the maingate as required to repair or replace any damaged sprays. Any stoppage as a result of low water flow on the cutter and lump breaker drums shall be thoroughly investigated to determine the cause and to ensure adequate water flow is being maintained.

4.6.2 Shearer water pressure

For correct operation the drum water pressure (as indicated on gauges and transducers on the shearer) is to be maintained in a manner to ensure that the pressure on each spray remains within the parameters as defined by the certification requirements for each spray system.



The effective water flow and pressure trip levels on the shearer control system are determined during commissioning when a gauge is connected to each drum vane. The water is then adjusted to the minimum required pressures and the corresponding readings off the shearer is taken to determine the trip levels.

Pick spray pressure readings and shearer water trip levels are to be verified at weekly intervals when mechanical gauges are connected to the drums. If either the required dynamic water pressure or flow can be achieved then it is acceptable to mine.

If the shearer water pumps stop for any reason, mining is to cease. Conduct shiftly inspection to confirm shearer trips.

The shearer is not to be operated with both the flow or pressure switches bridged out unless;

- A JSA has been completed; and approved by the mine manger and EEM.
- The shearer is being moved to an appropriate/safe location to rectify the issue or perform testing;
- This may include the need to cut a stable.

If the flow switch or pressure switch fails in service, the shearer can continue to be operated provided the other sensior in the respective circuit is operational and after completeion of a JSA and approval to bye pass the sensor has been approved by the UMM and EEM. The failed sensor shall be made operational at the earliest opportunity.

Manual control valves are fitted to the transducers at either end of the shearer and are to be tested weekly as a part of the shearer of line checks.The flow switches are to be tested by turning the manual valve off whilst the shearer sprays and cutter drums are operating.

4.6.3 Picks

The shearer operator must visually monitor the picks continuous during production while operating the shearer up and down the face and if any deficiencies become obvious, shall stop at an appropriate location and correct the issues.

Picks that are worn or missing must be replaced with new picks to ensure cutting integrity. Following figure shows examples of worn picks. Any picks not in the acceptable section or missing carbide bits are to be changed.

The shearer operator will inspect the state of the cutter drum and lump breaker picks shearer at least twice per shift. The number of picks and sprays changed shall be recorded on the dust & frictional ignit on check list work order. Any pick found to have the tungsten insert damaged or missing shall be replaced.

4.6.4 Pick Holders

Where it is identified that a pick holder is damaged to the point where a pick cannot be inserted or retained, the following is to apply:

- Cutting is to cease until a JSA is completed to allow the shearer to be moved (produce) to an appropriate location to allow the issue to be rectified this may include the requirement to cut a stable
- Consideration must be made to maintain water pressure at the shearer sprays
- Consideration must be made on how to effectively cool the damaged pick holder

4.6.5 Inspection & Maintenance

- During the normal cutting and bolting operations the Miner Driver should regularly complete a visual inspection of the cutter head by spinning the heads. The miner driver will look for pick condition and the operation and effectiveness of the sprays.
- If any obvious deficiency is observed then the face is to be secured and the issue with the cutter head is to be resolved (such as change picks or clean sprays);
- The following TARP will applies when cutting stone to ensure pick wear is routinely monitored and controlled.

Condition	Green	Yellow	Orange	Red
Cutter head operational triggers	During last inspection: • 5 of less picks changed out • 3 or less sprays where changed or blocked • 0 – 1 pick sleeves were changed • No pick blocks changed or missing	During last inspection: • 6 - 10 picks changed out • 4 - 6 sprays where changed or blocked • 2 pick sleeves were changed • 1 pick blocks changed or unable to replace sleeve	During last inspection: • 11 - 15 picks changed out • 7-9 sprays where changed or blocked • 3 pick sleeves were changed • 2 pick blocks or more than 3 single pick blocks are missing or removed.	During last inspection: • More than 15 picks changed out • More than 9 sprays where changed or blocked • More than 3 pick sleeves were changed • More than 2 pick blocks or more than 3 single pick blocks are missing or removed.
Metres advance to next FI inspection	35m maximum in stone	20m maximum in stone	12m maximum in stone	8m maximum in stone

Table 1: TARP - Frictional Ignition TARP for stone drivage

5 Other potential Frictional ignition Sources

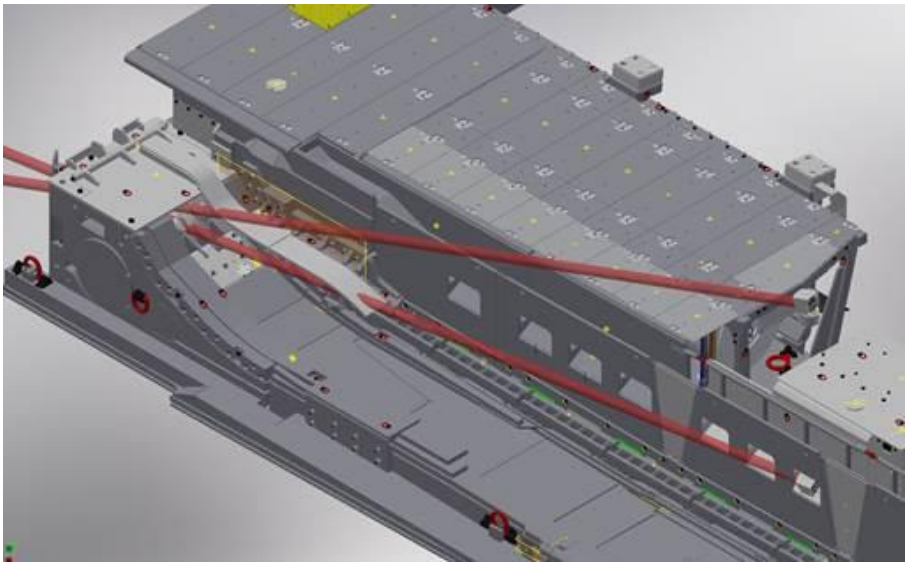
5.1 Metal On Metal

Metal rubbing on metal or metal striking metal has the potential to create heated surfaces or a hot shards of metal with sufficient temperature to ignite methane gas.

Steel rib bolts have the potential to be drawn into the bottom race of the AFC or BSL and create friction as the Bolt is caught an dragged along by the AFC flights. To mitigate this risk of the steel rib bolts they shall be manged in accordance with GRO-7827-SWI-Management of steel rib bolts in the LW block.

The shearer cutter drum has the potential to contact metal components of the longwall face as well as installed strata support in the gate ends of the face.
Horizon control is critical to prevent the pans rolling back causing the cutter drum rubbing on or contacting the tips of the canopies.

The AFC chain and flights rubbing on the Tailgate rerouters or pressure angles can be another potential ignition source. The Grosvenor Longwall in fitted with water sprays in the bottom race (Mexican Sprays) and sprocket flushing sprays to provide lubrication and cooling.



5.2 Incident Investigation & Reporting

Audit and reporting:

During mining under frictional ignition conditions, the miner driver or shearer operator for the shift is to fill out the frictional ignition check sheet and submit to ERZC who will return it to relevant coordinator (longwall or development) to audit for compliance.

Incident investigation / Reporting.

A *FI* event is classified as a high potential incident (HPI) under section 198 of the Coal Mining Safety and Health Act 1999 (Act);

5.3 Where a *FI* event occurs in development:

- Cease cutting operations, keep ventilation devices running and lower the cutter head to the floor;
- Extinguish and cool the affected area by keeping the sprays running on the Miner and using fire extinguishers and/or fire hoses;
- The place is not to be interfered with unless action is required to make the place safe;
- The incident site area is then to be withdrawn from, the ERZ Controller is to cordoned off the area and report the incident;
- Commence investigation of incident.
- Follow incident reporting TARP and escalation procedure

5.4 Where a *FI* event occurs in the longwall:

- The shearer drums are to be placed at mid seam.
- The shearer and shearer sprays are to be left running to assist control and containment by cooling the area.

- The fire extinguishers available on the longwall shields and shearer are to be used, they must be discharged from the intake side of the cutter drum if flames are still evident. Do not discharge the fire extinguishers against the ventilation current. This allows the extinguisher to be dispersed using the ventilating air to carry the extinguishing agent to blanket the face area.
- Beware of the possibility of the ventilation carrying extinguishing agent back towards the operator.
- As soon as practical, the pan line hoses or shield wash down hoses should be used to douse and cool the affected area to minimise the possibility of re-ignition.
- Once the frictional ignition has been extinguished and the area has been adequately cooled by the application of water, immediately contact the ERZ Controller who shall check the site for general safety, welfare of mine workers and equipment, then immediately contact the CRO.
- The ERZ Controller is to then electrically isolate the affected face equipment and restrict access to the Longwall face area.
- The ERZ Controller is to arrange a fire watch for a period of no less than 2 hours
- Commence investigation of incident.
- Follow incident reporting TARP and escalation procedure

6 Competencies and Authorisations

The following appointments, authorisations or competencies are required to implement this HMP:

Designation	Training / Competencies / Authorisations required
	• NA

7 Roles and Responsibilities

7.1 Statutory Position Holders

7.1.1 SSE

The SSE shall:

- Ensure that the required actions specified within this SOP are effectively implemented and applied across the Grosvenor Coal Mine.
- Ensure that adequate resources are provided to maintain compliance with the requirements of this procedure.
- Ensure that training, supervision and monitoring are provided to those bound by this procedure.

7.1.2 Underground Mine Manager (UMM)

Shall ensure that:

- This procedure remains relevant to addressing the hazard of frictional ignition.

7.1.3 Electrical Engineering Manager (EEM)

Shall ensure that:

- Compliance to legislation around automatic methane detection is maintained through the implementation and quality assurance of maintenance strategies on this system.

7.1.4 Mechanical Engineering Manager (MEM)

Shall ensure that:

- A maintenance strategy is in place to ensure the cutter head/drum is maintained to the site standards through implementation of compliance checks.

7.2 Management

Shall ensure that:

- Tools, procedures and resources are available to practically carry out the requirements under this procedure.
- Develop the systems within the workforce to ensure compliance to this procedure.
- Access to procedures is available.
- Ensure that audits are conducted at appropriate intervals to measure the effectiveness of the system requirements and the training provided.
- Ensure that the procedures under this system are monitored to ensure they are effective.

7.3 Supervisors

Shall ensue that:

- Ensure compliance to section 56 of the Coal Mining Safety and Health Act
- Monitor their work environment for changes in heat conditions.
- Ensure that workers receive training and instruction to enable them to comply with this procedure.
- Ensure that heat stress management strategies are applied within their area of responsibility.
- Grosvenor Supervisor appointment details the supervisors duties all of which relate to the duties required for this procedure.

7.4 Coal Mine Workers

Shall ensure that:

- They comply with the requirements of this procedure.
- Understand mechanism of frictional ignition and the reasons behind the controls put in place.
- At all times the obligations are met under section 39 of the Coal Mining Safety and Health Act.

8 Records

The following records shall be maintained in accordance with this HMP:

- Training in this HMP.
- Incident investigations pertaining to HMP – Development Frictional Ignition
- Statutory reports referencing TARP triggers in this HMP

9 Internal References

9.1 Grosvenor Coal Mine SHMS

- GRO-14-PHMP Gas Monitoring [Management]
- GRO-15-PHMP Ventilation
- GRO-3533-RA-Development Frictional Ignition
- GRO-62-SOP Changing gas alarm levels
- GRO-69-SOP Action taken if methane is detected
- GRO – 71 - SOP General back up for the Gas Monitoring System
- GRO-7775-TARP-Longwall Respirable Dust
- GRO-7779-TARP- Frictional Ignition TARP for Stone Drivage
- GRO-8515-TARP-Frictional Ignition

9.2 Other Internal References

- Anglo American Fatal Risk Standards.
- Anglo American Golden Rules.

9.3 Forms/Registers/Checklists/Other

- GRO-3420-CHK-Stone drivage – Frictional Ignition Check Sheet

10 External References

10.1 Legislation

- Coal Mining Safety and Health Act 1999.
- Coal Mining Safety and Health Regulation 2001.
- Report Aa151202isp: Frictional Ignition Testing or The “Incendive Sparking Potential” Of Drill Core Samples (GSC0049A_Fp001) At 360.78 - 361.05 M For Grosvenor Project
- Report Aa151204isp: Frictional Ignition Testing on Three Drill Core Samples (GSC0052A_FP001, GSC0052A_FP002 and GSC0052A_FP003) From Grosvenor

11 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**.

12 Record of Consultation

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

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

13 Document Control

Issue No.	Issue Date	Description	Approver
1	08/08/2014	Initial Document	Karl Barnsdale Tim Conway Julian Barnsdale Scott Barker Peter Manning
2	28/10/2015		Scott Barker Karl Barnsdale Paul Irwin Wayne Bull Justin Joubert
3	19/07/2016	Reviewed as part of the LW Start-up.	Justin Joubert Mark Bobeldyk Michael Webber Wayne Bull
4	15/10/2016	Updated for new Fricitional Ignition TARP	Justin Joubert John Fitzpatrick Tim Reeves Richard Livingston-Blevins

14 Appendix A: LW Operational Dust & Frictional Ignition Checklist

LONGWALL OPERATIONAL DUST & FRICTIONAL IGNITION CONTROL CHECK LIST

S M T W T F S Shift Day/Night	Date ___/___/___ LW Panel		ERZ Controller _____
Crew A B C D	Prescribed PPE verified as being worn by all persons while producing and Equipment is being operated from agreed operating positions Yes / No Non compliance recorded on stat report.		
BSL & Scrubber Systems			
Check condition and operation of		**Comments /Actions Taken**	**Action required**
Discharge sprays	√ X		
BSL Dust Flaps & Covers	√ X		
Hood sprays	√ X		
BSL Race Sprays	√ X		
Scrubbers cleaned : & : am/pm	√ X		
Identify Leakage paths from BSL & Crusher	√ X		
Dust observed to be issuing from			
Maingate	√ X		
Check condition and operation of			
Interlace discharge sprays	√ X		
BSL/Maingate covers in place	√ X		
MG Run of Face Sprays	√ X		
Maingate Curtain	√ X		
MG drive Hosed down	√ X		
Clean down MG gate end shields	√ X		
Mexican Sprays ROF	√ X		
Spray bar active while on return side of #40 support	√ X		
Shields cleaned	√ X	From to	
Shearer	√ X		
Slothing Plates hosed off	√ X		
Slothing Plate Sprays Operational	√ X		
MG Shearer Clearer operational	√ X		
MG cowl sprays Operational	√ X		
TG cowl Sprays Operational	√ X		
MG picks - # Replaced	√ X		
MG Sprays - # Replaced	√ X		
TG picks - # Replaced	√ X		
TG Sprays - # Replaced	√ X		
Bretbry Race Cleaning sprays	√ X		
Shields			
Front canopy sprays Operational	Faults on		
Chock Leg Sprays Operational	Faults on		
Interchock Curtain Sprays Operational	Faults on		
Dust Surfactants			
Surfactant Pod litres remaining	√ X		
Surfactant Pump SWBP	√ X		
Surfactant Pump Process Water	√ X		
Automated Dust Suppression systems not working or in by pass			

Opportunities for Improvement