**SUBMISSION: NO PREDRAINAGE OF FLOOR SEAMS SUBMISSION 1**

**FINDINGS**

1. **7th November 2019. GROSVENOR UNDERGROUND MINE MANAGER (WOUTER NIEHAUS), SITE SENIOR EXECUTIVE (ROB NOWELL at time of Report),** **TECHNICAL SERVICES MANAGER (LOGAN MOHR), ANGLO HEAD OF OPERATIONS (GLENN BRITTON) WERE AWARE THAT**

**That seams up to 40m below the seam floor should be considered for potential to emit gas into the LW working area/goaf. In the zone for this LFI, this would include the GML and the Harrow Creek Lower Measures**

**Reference** **GROSVENOR LFI IN.00211941 CH4 Exceedance LW103 Incident Date: 7 November 2019**

**<https://coalminesinquiry.qld.gov.au/wp-content/uploads/2021/04/16.-LFI-investigation-report-for-HPI-07112019.pdf>**

1. **GROSVENOR UNDERGROUND MINE MANAGER (WOUTER NIEHAUS), SITE SENIOR EXECUTIVE (TRENT GRIFFITH), TECHNICAL SERVICES MANAGER (LOGAN MOHR), ANGLO HEAD OF OPERATIONS (GLENN BRITTON)**

**DECIDED THAT IT WAS AN ACCEPTABLE LEVEL OF RISK TO MINE WORKERS SAFETY AND HEALTH TO NOT DRAIN THE FLOOR SEAMS FOR LW104**

**Reference LW 104 Second Workings SOP**

**https://coalminesinquiry.qld.gov.au/wp-content/uploads/2021/04/5.-SOP-LW104-Second-Workings.pdf**

1. **RSHQ INSPECTORS CONSCIOUSLY DECIDED**

 **THAT THE DECISION OF GROSVENOR MANAGEMENT AND HEAD OF UNDERGROUND OPERATIONS NOT TO METHANE DRAIN THE LOWER SEAMS**

**ACHIEVED AN ACCEPTABLE LEVEL OF RISK TO WORKERS SAFETY AND HEALTH**

**Evidence**

**NO ACTION TAKEN TO REQUIRE GROSVENOR MANAGEMENT TO TAKE ACTION TO PRE-DRAIN THE FLOOR SEAMS PRIOR TO LONGWALL MINING COMMENCING**

**Grosvenor LFI Reports acknowledge no concerns were raised with the Second Workings SOP.**

***No pre drainage of the GML seam has been conducted for LW104. The GML is expected to release gas due to the reservoir size combined with proximity to the working seam* between Ch4000 and Ch2000 (MG104 20-36c/t)**

**LW 104 Second Workings SOP**

**https://coalminesinquiry.qld.gov.au/wp-content/uploads/2021/04/5.-SOP-LW104-Second-Workings.pdf**

**a) 06/03/2020 11:56**

***Notice of Intent to commence Second Workings in LW104 acknowledged via email from Paul Brown (Inspector of Mines).***

**https://coalminesinquiry.qld.gov.au/wp-content/uploads/2021/04/LFI-investigation-report-for-serious-accident-06052020.pdf**

**b) *The strategy to manage C heading as part of the Tailgate 104 return was supported by ventsim modelling, detailed in the Second Workings SOP and submitted through to the DNRME. There were also discussions with the DNRME in advance of submitting the Second Workings SOP, particularly given the change in regulation, with no concerns raised.***

**GROSVENOR LFI IN.00226742 & IN.00228255**

***c) MINES INSPECTORS have had all Methane HPI’s and LFI’s provided with all the Comments.***

***d) Demonstrated inability to control floor heave methane inrushes in MG 104 and the introduction of PIF (Proactive Interburden Fracturing) for Development Mining***

1. **FLOOR BLOWERS at CHOCKS #22 and #55 TRIP FACE POWER on LW 103 7th November 2019.**
2. **1,504m3 of Methane released over 2 hours before returning to normal background levels. The methane monitor in the TG roadway peaked at 2.73%.**

**Reference GROSVENOR LFI IN.00211941 CH4 Exceedance LW103 Incident Date: 7 November 2019**

***PREVENTATIVE ACTIONS IDENTIFIED***

1. **Trial of GML drainage holes in LW105 block to target IMMEDIATE GAS RESERVOIR in FLOOR HORIZON.**
2. **Conduct a detailed investigation to try and identify the source of the methane**
3. **PREVIOUS FLOOR BLOWER AT #55 CHOCK TRIP FACE POWER on LW 103 face on 11th July 2019**
4. **2463m3 of Methane released over 1 hour.**
5. **4790m3 of Methane released over 7.5 hours (inclusive of first hour)**

**Reference https://coalminesinquiry.qld.gov.au/wp-content/uploads/2021/04/8.-Form-5A-LW103-TG-HPI3-11072019.pdf**

***INCIDENT CAUSES***

***24 Organisational***

1. ***Gas Make (SGE) greater than expected in excess of system capacity.***
2. ***Less than adequate methane recovery/dilution***
3. ***LESS THAN ADEQUATE PRE-DRAINAGE IN LOWER SEAM(S).***

**GROSVENOR LFI IN.00211941 CH4 Exceedance LW103 Incident Date: 7 November 2019**

***DESCRIPTION OF INCIDENT***

***On Thursday the 7th of November during normal production, the shearer on the LW103 face was travelling to the MG (cutting bi-directional) when at roof support #9,*** ***a floor blower became active at roof supports #22 and #55 after mining past the area and advancing the face. The tailgate drive sensors at 03:04 went above 2.0% tripping face power. The methane monitor in the TG roadway peaked at 2.73% at 03:08am.***

***The methane calculated to have released into the mine’s general body atmosphere was approximately 1,504m3 after 2 hours before returning to normal background levels.***

***Geotechnical Assessment***

***Floor fracturing behind/underneath a longwall face has not been studied extensively due to the operational limitations surrounding such research.***

***No specific study has been performed for Grosvenor to date that identifies the extent of potential floor fracturing; as such a literature review has been performed to identify how deep floor fractures can reasonable extend under a longwall retreat scenario***

***This paper, which primarily focuses on longwall operations in China, discusses that many operations there work above confined aquifers, hence determining failure scope within the floor is an important factor.***

***An empirical formula was developed to predict the depth of ‘water-conducting failure zones’ for Chinese operations, however it is proposed that this is applicable as well for Grosvenor to provide indicative values of depth of fracturing that may provide a conduit for gas flow.***

***This empirical formula is as follows:***

***𝐻𝑓 = 0.303𝐿0𝑥.8***

***Where:***

***Hf is the depth of fracturing into the floor that can act as a hydraulic conduit***

***Lx is the width of the longwall panel.***

***Using this relationship for Grosvenor, the approximate depth of fracturing is 29m.***

***It is acknowledged that this relationship is an empirical one derived from longwall operations in China, however the database contains cases with a varying range of cover depths (103m to 560m), hence can be used to provide a baseline value.***

***In addition to this, there are varying models that can be used for the prediction of the degree of gas emissions from overlying and underlying seams in a longwall operation. One such model is the Flugge model, as shown below.***

***AAMC.001.009.0556***

***This model suggests that the deepest below the floor that a seam may emit emissions from is 40m.***

***This is in a similar range to the value derived from the empirical model by Bai & Tu for estimating floor fracturing creating a hydraulic conduit for gas to flow from underlying seams.***

***As such it can be concluded that seams up to 40m below the seam floor should be considered for potential to emit gas into the LW working area/goaf. In the zone for this LFI, this would include the GML and the Harrow Creek Lower Measures (see Appendix: Stratigraphy).***

***It is important to note that geological structures can create localized anomalous conditions that may lead to a zone of fracturing that can act as a conduit for gas emissions, or the fault plane itself can act as a conduit.***

***The figure below shows the LW face at the time of the incident and highlights the major structure in the area.***

***The MG 103 floor heave events were discussed in detail.***

***I highlighted the incident report dated 1/05/17, this incident report identified "Off Scale" alarms on the 4 gas Altair instrument. The report also identified 1.35% methane present within the fan ducting. The incident report does not contain the level of detail required to fully understand all circumstances and actions taken. The fact the Altair is recorded as off scale should escalate the investigation process and determine if CMW's where exposed to danger being, methane greater than 2.5% in general body.***

***The incident dated 2/05/17 does not identify the level of gas that tripped the auxiliary fan which was stated by UMM Ivers to be 2.01% methane, again more detail and further investigation required.***

***There are numerous reports of floor heave through Statutory reports from 3/05/17 and back to 6/03/17 (which was as far back as I checked while on site).***

***There was a report on the 6/03/17 (report number 12984) of an auxiliary fan trip due to surge of methane.***

***Another report on 9/04/17 (report number 14091) of an auxiliary fan trip due to surge of methane after floor heave event.***

***My concerns from these events is there is a lack of follow up investigation into the circumstances. The current phenomenon of floor heave in the gateroads is not fully understood meaning understanding and tracking the mechanism that is initiating the heave and, where is the reservoir of methane that is being released during the floor heave events? The hazard is not currently identified on the Geological Hazard Plans and is not referenced within the Permit to Mine.***

***A Directive was issued to the SSE in relation to the risk presented by the floor heave events.***

***1 Floor Heave and uncontrolled Methane release 26/05/2017 To reduce risk by:***

***1 . Conducting investigations into the floor heave events causing uncontrolled releases of methane contained within MREs dated 3/05/17, 4/05/17. (to be completed by 19/05/17) and:***

***2. Identify SHMS controls to be developed or reviewed specifically for identifying, managing and controlling the risk of uncontrolled methane releases induced by floor heave. Provide the Inspector with a report of actions taken immediately and proposed actions to address the issue. (to be completed by 26/05/17)***

***The surface Statutory Notice Board in the Muster area was not up to date, there was an MRE absent, the V.O's monthly report was more than 3 months old and the Safety Bulletins were not the most recent Bulletins issued. Mr Ivers gave an undertaking this would be addressed.***

***Gas leaking from bolt holes on MG 102 install face has been planned to pressure grout on the faceline, noted in the oncoming Nightshift planning notes.***

***I requested a copy of the two incident reports raised for the floor heave / gas trip events, I-JMM Ivers committed to making these reports available and would check on availability of the Gas Drainage Engineer.***

***Prior to leaving site I met with Gas Drainage Engineer, Mr Salani Mudongo. We discussed the 2 most recent floor heave events that occurred in MG 103 on the A/Shift of 1/5/07 and A/Shift 2/5/17. Mr Mudongo explained the lithology of the seams and Interburden in the vicinity of the 103 floor heave events, the cause of the floor heave and the gas reservoir is to be determined***