



LEARNING FROM INCIDENTS

INVESTIGATION REPORT

GRASSTREE MINE

Metallurgical Coal

Incident Number: IN.00216236

Classification: High Potential Incident

Incident Title: >2.5% CH₄ LW808 TG Flushing

Incident Date: 11/01/2020

Report Date: 11/01/2020

Learning from Incidents Investigation Report

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1 EXECUTIVE SUMMARY

During normal longwall production in LW808 on 11/01/2020 a goaf fall event occurred at the tailgate drive area, causing methane at the tailgate drive to exceed 2.5%.

The investigation found the following:

- An incident occurred on 11/01/2020 where a concentration of >2.5% methane was measured at the LW808 TG drive methane monitors tripping power.
- Goaf drainage was functioning normally during the event.
- The longwall face was approaching at Tailgate drilling stub.
- Geotechnical conditions at the time of the incident were normal, however poor tailgate conditions had been experienced in earlier retreat.
- An additional face advance was undertaken (compared to normal cutting sequence) with a goal of catching the lip of the drillers stub for roof control.
- A goaf fall behind the tailgate drive flushed goaf atmosphere over the methane sensors.
- While the cause of the goaf fall being significant enough to force sufficient goaf atmosphere over the drive to trip power cannot be conclusively determined, it is possible that the additional advance of the face may have contributed to the amount of goaf caving at the time of the incident.
- While operating standards specify the typical cutting sequence of the longwall, the judgement and experience of ERZ Controller is critical to ensuring safe and effective control of dynamic mining conditions, and therefore awareness of the potential for goaf 'hang up' when completing multiple advances is preferable to providing restricted cutting sequences when approaching stubs.

2 INVESTIGATION TEAM MEMBERS

Peter Noton – LW ERZ Controller

Braedon Smith – Ventilation Officer

James Moreby – Ventilation Officer

3 KEY WITNESSES

List of Key Witnesses	
Name	Designation
Peter Noton	LW ERZ Controller

4 METHODOLOGY AND TOOLS USED

An investigation has been conducted in accordance with the Anglo-American investigation methodology known as the Learning from Incidents model, supported by various investigative and analytical tools.

The analysis tools used for this investigation are:

Analysis Tool	Attached as Appendix if applicable - Yes/No
Time Series Events Chart	Yes – mandatory tool
Control Analysis	No
Behaviour Analysis	No
Change Analysis	Yes
Why Analysis	Yes

5 EXECUTIVE SUMMARY OF INCIDENT

Summary of Incident						
Incident Number	00216236			Department	Longwall	
Area / location	LW808			Contracting Company (if applicable)		
Summary of findings from Incident Investigation						
Incident Category e.g. Safety, Health, Env, Legal, Reputation, Community.	Agent EG – Fall of Ground	Actual ISR Rating	Potential ISR Rating	Date of Incident	Time of Incident	Number of hours worked
Legal and Regulatory	Non-compliance	Minor	Moderate	11/01/2020	00:28	4
Task being performed at time of incident	Longwall production				Planned or Unplanned task?	
					Planned	
Summary of Incident	<p>During longwall production on LW808 face a goaf fall behind the tailgate chocks flushed at atmosphere of methane >2.5% over the TG drive sensors tripping power to the face.</p> <p>Gas monitoring data indicates that the goafing event occurred at approximately 12:29 AM, with methane reaching 2.5% at approximately 12:29AM, peaking at 3.6% at 12:32AM then returning below 2.5% at approximately 12:33AM (total duration >2.5% CH₄ – Approximately 4 minutes).</p>					
Immediate actions taken	<p>Wait for ventilation to dilute and clear gas around the TG drive</p> <p>Re-establish brattice wing in drill stub at 14CT (intersecting the longwall face).</p>					

6 DESCRIPTION OF INCIDENT

On night shift 10/1/2020 LW808 was on production approaching the drillers stub in 14C/T in 808TG. This stub had been geotechnically assessed and additional standing support installed to ensure integrity during the longwall approaching the cut-through. Goaf drainage was functioning as normal during the shift.

During the shift the Longwall ERZ Controller Peter Noton observed no abnormal geotechnical conditions in the tailgate area in the hours prior to the incident occurring.

When cutting into the tailgate, on approach to intersecting the drill stub, an additional advance (push) of the face was undertaken (3x pushes, compared to 2x pushes in typical operation). This additional advance was undertaken in order to try and catch the lip of the drill stub in the tailgate with the face supports to ensure the integrity of the tailgate area (as in the prior 200m of retreat tailgate conditions had been heavy at times). During each face advance, methane spikes were recorded at the tailgate drive sensors (at escalating concentrations).

During the third push, at 00:29hrs 11/1/20 the roof immediately behind the tailgate goafed forcing a concentrated volume of goaf atmosphere to be pushed over the tailgate drive methane sensors resulting in methane reaching 2.5%, peaking at 3.6% at 00:32hrs then returning below 2.5% at approximately 00:33hrs (total duration >2.5% CH₄ – Approximately 4minutes). This event tripped face power.

At approximately 00:35hrs the elevated methane at the tailgate had been cleared by the panel ventilation, and the ERZ Controller inspected the area. A brattice wing was re-established in the tailgate stub prior to production recommencing, although this is not considered to have contributed significantly to the event.

Following this the ERZ Controller notified the MSO of the incident.

7 CRITICAL CONTROL FAILURE

What / which critical controls failed? (List CT number)	Nil
Why did the critical control fail?	N/A
How did the critical control fail?	N/A
What additional or revised critical controls and/or monitoring activities need to be established/change to mitigate risk of recurrences, or to improve risk control?	N/A

8 FINDINGS / CONCLUSIONS

This incident occurred due to an a goafing event forcing goaf atmosphere over the tailgate drive.

While it is not possible to determine the exact cause for the goaf behavior key factors contributing to the incident were:

- Proximity of the face to the 14CT TG Stub
- An additional face advance being undertaken to catch the lip of the stub
- Potential for a larger goaf void to have formed immediately behind the tailgate chocks due to the additional face advance in quick succession to the typical advance sequence. This may have resulted in a small hang up, which subsequently forced a large volume of goaf atmosphere over the drives.
- While no abnormal geotechnical conditions were observed during the shift, previous heavy conditions in the tailgate had been experienced and may have contributed to the desire to close up the tailgate due to the presence of the stub.

While the additional advance of the face may have contributed to the incident, provision of a 'standard' cutting/advance sequence for the intersection of a tailgate stub is difficult as strata conditions on approach to a stub may change rapidly. This requires the experience and judgement of the ERZ Controller on shift to make determinations as to how to best control the face.

Given the frequency of the event to date, it is not considered appropriate that unnecessary restrictions in the form of a specified cutting sequence for stub intersections is prescribed to the ERZ Controllers. However, if the frequency of this type of incident increases this position may be reconsidered.

As such it is recommended that awareness of the potential for goaf 'hang up' when completing multiple advances in quick succession is communicated to all ERZ Cs.

9 PREVENTATIVE ACTIONS / RECOMMENDATIONS

The following key actions were identified to prevent recurrence and have been assigned as detailed below in Enablon.

Task Description	Hierarchy of Control	Task Assignee	Due Date	Task ID
Communicate LFI findings to LW ERZ Cs and highlight caution and assessment of goaf state to be made by ERZ Cs prior to undertaking extra pushes with TG drive.	Administrative	D Cavanagh	30/04/2020	TS.01306675

10 TEST FOR EFFECTIVENESS

Post Implementation Action Plan

Test of effectiveness is to be done to ensure that the above actions to prevent recurrence have worked as intended. (Nominally scheduled 3,6 or 12 months after completion of preventative action plan)

Enablon Task No.	Action Description	Responsible Person	Due Date	Completed Date
TS.01306678	Review TG CH4 concentrations during retreat through TG stubs outbye 14CT (including review of cutting sequence) and provide feedback to LW department as to impact of cutting sequence on Gas emission.	Braedon Smith	30/04/2020	

11 INVESTIGATION REPORT SIGN –OFF

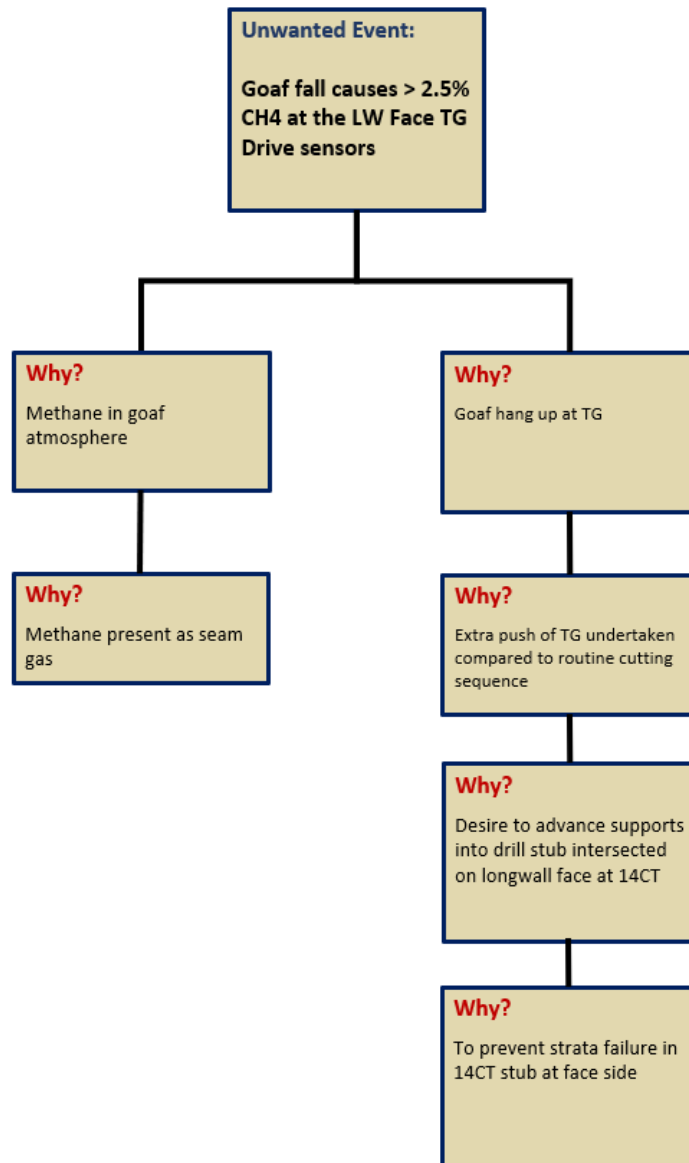
The Incident Investigation Team submits this report as a true reflection of the information gathered. To maximize the preventive potential of the investigation report, the findings, conclusions and learning's of the report should be distributed as appropriate.

<i>Department Manager</i>		
Name	Signature	Date
Tim McNally	Confidential	12.05.2020
<i>SHE Manager</i>		
Name	Signature	Date
Stephanie Oppermann	Confidential	12.05.2020
<i>General Manager</i>		
Name	Signature	Date
Damien Wynn	Confidential	12.05.2020
<i>Head of Operations</i>		
Name	Signature	Date
<i>Additional EXCO member signoff – if applicable</i>		
Name	Signature	Date

12 EVIDENCE & ANALYSIS TOOL APPENDICES

Timeline:		
10/01/20 20:30		NS Crew Shift Commences
10/01/20 23:58		LW808 Shearer cut back toward MG and completed 1st push (TG CH4 Spiked to 1.16%)
11/01/20 00:13		LW808 Shearer cut back toward MG and completed 2nd push (TG CH4 Spiked to 1.53%)
11/01/20 00:20		LW 808 Shearer cutting into TG
11/01/20 00:28		LW808 Shearer cut back to end of snake and completed 3rd push
11/01/20 00:29		Methane concentration at TG Drive Sensors reach 2.5%
11/01/20 00:32		Methane concentration at TG Drive Sensors peak at 3.6%
11/01/20 00:33	After the Incident	Methane concentration at TG Drive Sensors return below 2.5% (Total duration >2.5% CH4 – Approximately 4minutes)
11/01/20 00:35		Elevated methane from goaf fall cleared
11/01/20 00:45		TG brattice wing previously established for drill stub at 14CT Reset
11/01/20 00:45		LW ERZC notified CRO/MSO

Anglo LFI Tool – Timeline

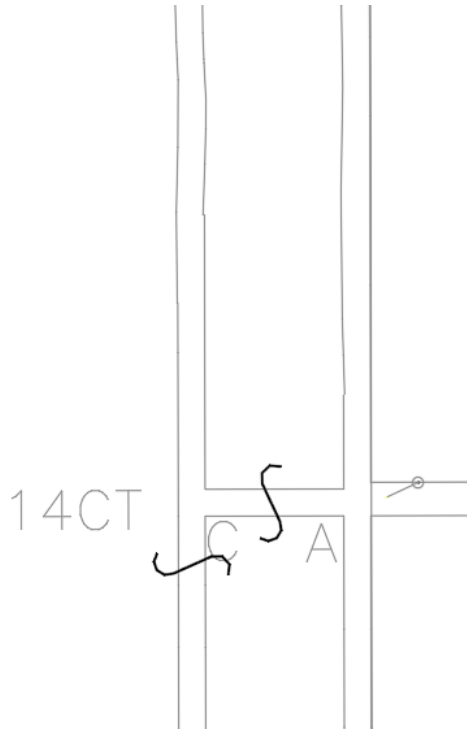


Anglo LFI Tool – Why analysis for incident

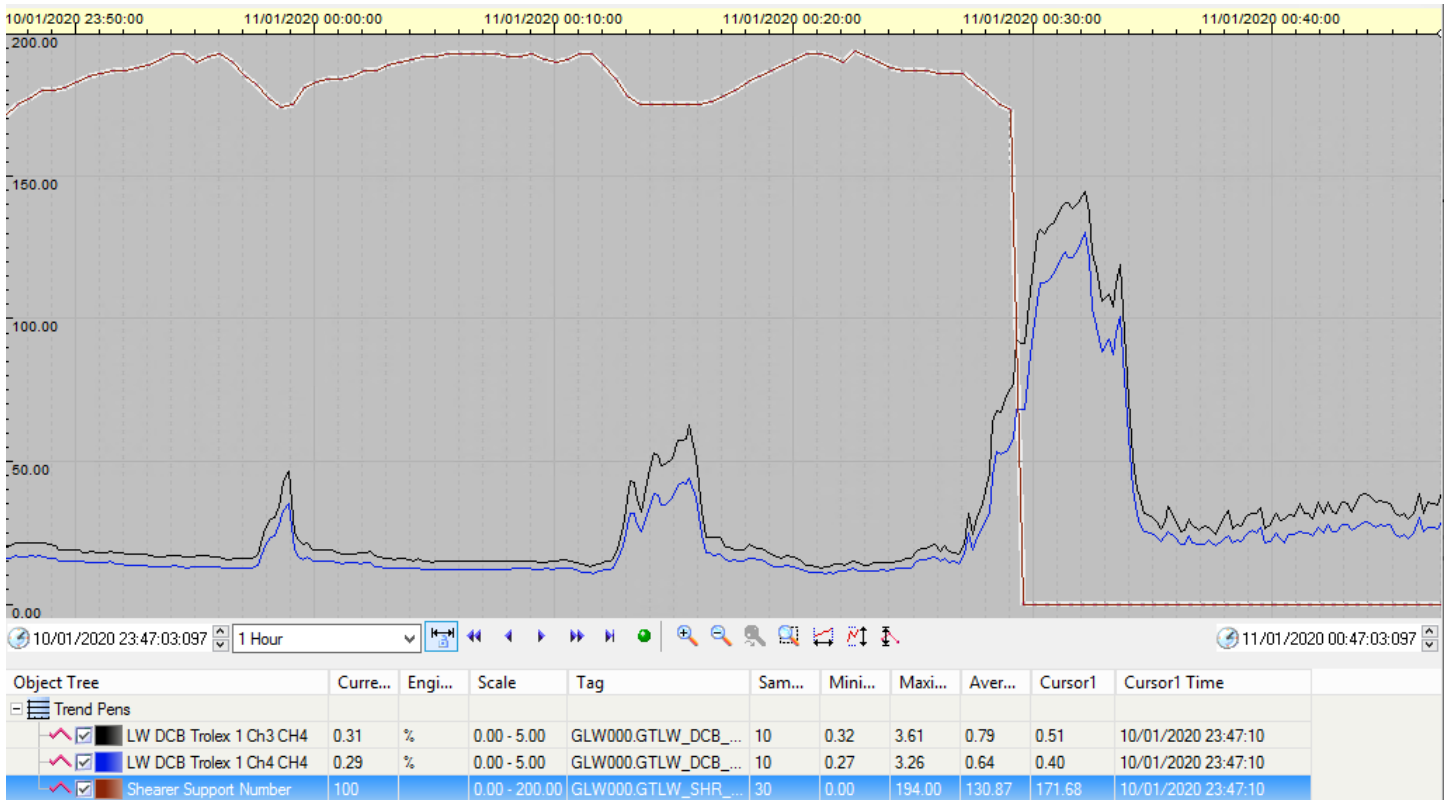
Anglo Learning From Incidents - Change Analysis

Normal Practice	Situation or practice at the time of the incident	Gap (Difference)	Impact of Difference
Push twice when in normal cutting sequence	Pushed 3x times in TG cutting sequence	1x extra advance of TG	Potentially caused large area of goaf to cave than would typically occur during cutting sequence

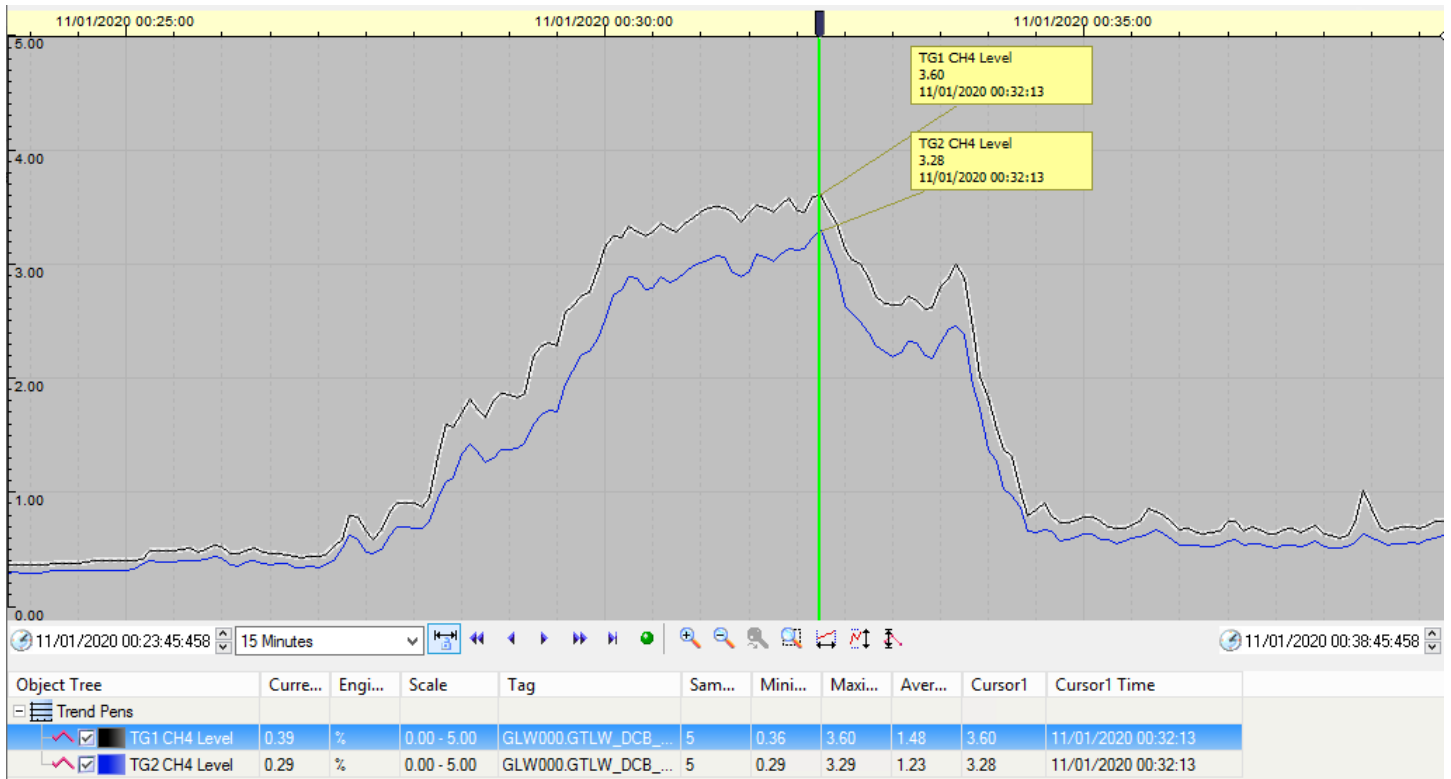
Anglo LFI Tool – Change Analysis for incident



Location of 808TG Stub at 14CT (intersected by the face at time of incident).



TG Drive Methane Sensor data with Shearer position showing methane spikes with each push of face at the TG



TG Drive Methane Sensor data during >2.5% event showing peak of 3.6% at 00:32:13

13 RECORD OF AMENDMENTS

Issue 6	:	Full review to align the investigation report to the Learning from Incidents process being rolled out at Met Coal in 2018.	08 June 2018, Chris Gately, Lynda Butler
Issue 5	:	<ul style="list-style-type: none"> • Sign off table updated to include "Additional EXCO" member signoff. • Section 7 – New – Critical Control Failure (for HPI's only) • References to Met Coal removed. 	15 September 2015, Allan Gordon
Issue 4	:	Reviewed Sign off table updated to include sign off from Head of Operations	22 April 2014, Allan Gordon
Issue 3	:	Reviewed for currency – reformatted	8 January 2014, Bruce Gavin
Issue 2	:	Reviewed to align with Enablon Incident Database	6 March 2013, Graeme Redding
Issue 1	:	New Template	15 December 2011, Bruce Gavin