

HAZARD - Spontaneous Combustion leading to fire, explosion, toxic or irrespirable atmosphere					
TRIGGER AND RESPONSE <i>(Refer to clarifying information at end of document)</i>		Normal	Level 1	Level 2	Level 3
LOCATION	Longwall Return	CO Make < 42l/min AND Graham's Ratio < 0.3 AND CO/CO2 < 0.2 <i>(*Refer to clarifying information at end of document)</i>	CO Make >42l/min <53 l/ min OR 0.3 ≤ Graham's Ratio < 0.5 OR CO/CO2 > 0.2	CO Make >54l/min <93 l/ min AND 0.5 ≤ Graham's Ratio <1  OR Sweating, smell, heat or haze (confirmed by ERZ Controller)	CO Make ≥ 93l/min AND Graham's Ratio ≥ 1 OR Smoke (coming from goaf)
	Active Goaf Seal	CO < 130ppm AND No Ethylene AND No Hydrogen	130ppm ≤ CO < 200ppm	200ppm ≤ CO < 800ppm OR 1ppm < Ethylene < 3ppm OR Sweating, smell, heat or haze (confirmed by ERZ Controller)	CO ≥ 800ppm OR Ethylene ≥ 3ppm AND CO ≥ 200ppm
	Goaf Well	Refer to TARP-1430-Goaf and UIS Gas Drainage Management			
RESPONSE	Bag Sampling with GC Analysis	1. Shiftly goaf stream bag at diurnal low (4am/4pm). 2. Tailgate general body bag taken every 24 hours on diurnal low 2pm to 5pm	1. As per normal, and 2. Confirmation bag sample; 3. Shiftly bag sample from the affected goaf seal at diurnal lows (not required if tube bundle is monitoring seal). 4. Bag sample from the surface floxal plant 5. Level 1 status maintained until 3 consecutive results taken at consecutive diurnal lows indicate lower status.	1. 4 hourly bag sample from the affected goaf seal (12 hourly bag sample if tube bundle connected to seal).4 hourly bag sample from the tailgate general body ventilation station (12 hourly bag sample if tube bundle installed). 2. Level status maintained until 3 consecutive results taken at consecutive diurnal lows indicate lower status.	1. As per Underground Mine Manager or Spontaneous Combustion Management Team.
	Bag Sample and GC Confirmation	-	1. Affected goaf seal to have bag sample at next diurnal change.	1. Affected goaf seal confirmation bag sample taken as soon as practicable but within 1 hour.	1. Immediate bag sample to be taken from affected seal 1. To be treated as confirmed until further samples indicate differently
	Tube Bundle Alarm Confirmation	-	2. Verify the result is consistent with the current trend	2. As per Level 1: and 3. Place affected tube on hold to obtain confirmation reading.	2. As per Level 2.
	All Personnel	1. Carry out work in line with Standard procedures and work instructions.	1. Report any unusual conditions/physical signs of coal heating to ERZ Controller.	1. Report any unusual conditions/physical signs of coal heating to ERZ Controller.	2. Withdraw from the mine as directed by ERZ Controllers.
	ERZ Controller	1. Monitor seals and ensure Tailgate and Goaf stream bag samples are taken every 24 hours.	1. Conduct 12 hourly sampling at the affected seal site with bag sampling or arrange for installation of tube bundle monitoring to location. 2. Communicate with CRO. 3. Arrange for detailed inspection of affected area using appropriate equipment to establish air flow patterns, pressure differentials, extent of warm zones, state of oxidation, hot spots and leakage path 4. Ensure that leakage through seals is minimised or eliminated. 5. Notify CRO of findings.	1. As per level 1, 2. Conduct 4 hourly bag sample from the affected goaf seal (12 hourly bag sample if tube bundle connected to seal). 3. Conduct 4 hourly bag sample from the tailgate general body ventilation station (12 hourly bag sample if tube bundle installed). 4. Account for personnel and organise transportation in preparation for withdrawal. 5. Carry out instructions as directed by the Spontaneous Combustion Management Team.	1. Where possible account for all personnel and withdraw from the mine. 2. Carry out instructions from Underground Mine Manager or Spontaneous Combustion Management Team.

Version No	Date	Initiated By / Position	Checked By	Approved By / Position
3	10/04/2019	Elisabeth Marnane – Ventilation and Gas Superintendent	Kate Bachmann: SHE Manager, Wouter Niehaus: Underground Mind Manager & Trent Griffiths: SSE/General Manager (Delegate)	Wouter Niehaus. Underground Mine Manager Trent Griffiths: SSE / General Manager (Delegate)
File Ref			GRO-6953-TARP-Active Goaf Spontaneous Combustion	Page 1 of 3

			<ol style="list-style-type: none"> <li>Record actions taken on statutory report.</li> <li>Take action to ensure that leakage migratory paths or minimised or eliminate.</li> </ol>		
<b>RESPONSE</b>	<b>Control Room Operator</b>	<ol style="list-style-type: none"> <li>Continue routine monitoring of gas monitoring systems.</li> <li>Acknowledge and validate gas alarms as required.</li> <li>Determine TARP level and communicate to mine officials.</li> <li>Maintain routine supervisory function</li> </ol>	<ol style="list-style-type: none"> <li>Acknowledge &amp; record event in Alarm Log.</li> <li>Re-check analysis results.</li> <li>Notify ERZ Controller and Undermanager and Longwall Mining Coordinator</li> <li>Monitor alarm and provide updates on status.</li> <li>Follow gas alarm protocols.</li> <li>Analyse any samples within 1 hour.</li> <li>Request bag sample from floxal sample point on surface for Undermanager to organise</li> <li>Confrim operation of Floxal</li> </ol>	<ol style="list-style-type: none"> <li>As per level 1.</li> <li>Place affected tube bundle monitoring point on hold.</li> <li>Notify Underground Mine Manager, Ventilation Officer, Ventilation &amp; Gas Drainage Superintendent and Longwall Superintendent</li> <li>Follow gas alarm protocols.</li> <li>Provide updates on status</li> <li>Regularly update Spontaneous Combustion Management Team</li> </ol>	<ol style="list-style-type: none"> <li>Notify ERZ Controller of immediate bag sample requirements</li> <li>Initiate orderly withdrawal of personnel other than persons carrying out remedial work as directed by the Underground Mine Manager</li> <li>Initiate Mine Emergency Procedures</li> </ol>
	<b>Undermanager</b>	<ol style="list-style-type: none"> <li>Acknowledge and validate gas alarms as required.</li> </ol>	<ol style="list-style-type: none"> <li>Notify coal mine workers of TARP level condition at start of shift meeting</li> <li>Organise resources for required bag samples to be collected and inspection of affected area or seal</li> <li>Notify ERZ Controllers of alarm status</li> <li>Confirm operation of Floxal</li> <li>Organise resource to take bag sample from floxal surface sample point</li> <li>Arrange for inspection of the inertisation pipework for affected seal site and organise any remedial work to facilitate potential injection of inert gas</li> <li>Arrange for detailed inspection of affected area using appropriate equipment to establish air flow patterns, pressure differentials, extent of warm zones, state of oxidation, hot spots and leakage path</li> <li>Ensure that leakage through seals is minimised or eliminated.</li> </ol>	<ol style="list-style-type: none"> <li>As per Level 1; and</li> <li>Provide resources to implement actions as required by Spontaneous Combustion Management Team.</li> </ol>	<ol style="list-style-type: none"> <li>Initiate withdrawal of all personnel other than persons carrying out remedial work as directed by the Underground Mine Manager.</li> <li>Form Spontaneous Combustion Management Team.</li> </ol>
	<b>Ventilation Officer</b>	<ol style="list-style-type: none"> <li>Routine Review of: <ul style="list-style-type: none"> <li>Gas monitoring system</li> <li>Ventilation system</li> <li>Control room alarm log</li> <li>Gas concentrations</li> <li>Gas trends</li> <li>Barometer Trends</li> <li>Indicator ratio trends</li> </ul> </li> </ol>	<ol style="list-style-type: none"> <li>As per Normal; and</li> <li>Assess data and trends from points in alarm</li> <li>Review tube bundle monitoring set ups for analysing area of concern.</li> <li>Review status of gas wells and drainage systems</li> <li>Review status of inertisation</li> <li>Review the inspection report from the ERZ Controller and consider any further detailed inspection requirements</li> </ol>	<ol style="list-style-type: none"> <li>As per level 1.</li> <li>Consider making a change to the goaf drainage or inertisation systems.</li> <li>Consider external assistance for trending and analysis.</li> <li>Participate in the Spontaneous Combustion Management Team.</li> <li>Investigate available options if the situation deteriorates for inertisation capacity</li> <li>Determine status of Simtars Mobile GC Lab.</li> </ol>	<ol style="list-style-type: none"> <li>Assist with Mine Emergency Procedures as required.</li> </ol>
<b>RESPONSE</b>	<b>Underground Mine Manager</b>	<ol style="list-style-type: none"> <li>–Routine review of control room alarm log</li> </ol>	<ol style="list-style-type: none"> <li>Ensure the TARP and associated procedures are complied with.</li> </ol>	<ol style="list-style-type: none"> <li>As per level 1.</li> <li>Form Spontaneous Combustion Management Team/Incident Management Team.</li> <li>Review trends &amp; develop Action Plan.</li> <li>Notify SSE</li> <li>Ensure Action Plan is implemented.</li> <li>Review preparation for Level 3.</li> </ol>	<ol style="list-style-type: none"> <li>Commence Mine Emergency Procedures.</li> </ol>

Version No	Date	Initiated By / Position	Checked By	Approved By / Position
3	10/04/2019	Elisabeth Marnane – Ventilation and Gas Superintendent	Kate Bachmann: SHE Manager, Wouter Niehaus: Underground Mind Manager & Trent Griffiths: SSE/General Manager (Delegate)	Wouter Niehaus. Underground Mine Manager Trent Griffiths: SSE / General Manager (Delegate)
File Ref			GRO-6953-TARP-Active Goaf Spontaneous Combustion	Page 2 of 3

	<b>Site Senior Executive</b>			<ol style="list-style-type: none"> <li>1. As per level 1.</li> <li>2. Review Action Plan.</li> <li>3. Ensure appropriate external resources are utilised.</li> <li>4. Communicate to general workforce</li> <li>5. Full report on Level 1 actions.</li> <li>6. Participate in Spontaneous Combustion Management Team</li> <li>7. Ensure appropriate external resources are utilised where appropriate</li> <li>8. Notify corporate officials.</li> </ol>	<ol style="list-style-type: none"> <li>1. Full report on level 2 actions</li> <li>2. Ensure appropriate external resources are utilised as required.</li> </ol>
--	------------------------------	--	--	--	---

**\*\*\* Clarifying Information:**

1. All samples are to be verified as soon as is reasonably possible.
2. Methods of sample verification include and are not limited to the following;
  - i) Collecting additional bag samples and re-analysing
  - ii) Manual sampling is to be done where possible when the barometer is low to ensure a true representation sample of the goaf atmosphere (It is expected that a manual resample can be obtained within 3 hours of notification)
  - iii) Bag samples to be analysed with gas chromatograph if required to confirm higher hydrocarbons
  - iv) Utilisation of a second Gas Chromatograph to re-run bag samples, including use of a third party to verify results
3. Triggers are based on raw measurements and not air free analysis
4. Trigger levels have not been adjusted to account for any influence of pro-active inertisation.
5. CO/CO<sub>2</sub> ratio is purposefully only used as a trigger for low level triggers
6. Grahams ratio is purposefully only used for longwall return.
7. The TARP triggers have been established for closed conditions and may need to be reconsidered where a Tomlison Boiler or other inertisation methods area used.
8. A quorum for the 'Spontaneous Combustion Management team' includes Ventilation Officer, Underground Mine Manager, Longwall Superintendent.

Acknowledgement			
Position	Name	Signature	Date
Underground Mine Manager			
Manager (department)			
SHE Manager			
EEM or MEM (if applicable)			
Authorisation			
Position	Name	Signature	Date
Site Senior Executive (SSE)			

Version No	Date	Initiated By / Position	Checked By	Approved By / Position
3	10/04/2019	Elisabeth Marnane – Ventilation and Gas Superintendent	Kate Bachmann: SHE Manager, Wouter Niehaus: Underground Mind Manager & Trent Griffiths: SSE/General Manager (Delegate)	Wouter Niehaus. Underground Mine Manager Trent Griffiths: SSE / General Manager (Delegate)
File Ref			GRO-6953-TARP-Active Goaf Spontaneous Combustion	Page 3 of 3