



Grosvenor Mine

Trigger Action Response Plan

Title
NameActive Goaf Spontaneous Combustion
GRO-6953-TARP-Active Goaf Spontaneous Combustion

TARP - Active Goaf Spontaneous Combustion

ZONE:	NORMAL	LEVEL 1 TRIGGER	LEVEL 2 TRIGGER	LEVEL 3 TRIGGER
Longwall Return	<ul style="list-style-type: none"> CO Make less than 42l/min AND Graham's Ratio less than 0.3 AND CO/CO2 less than 0.2 <p><i>(*Refer to clarifying information at end of document)</i></p>	<ul style="list-style-type: none"> CO Make equal or greater than 42l/min and less than 53 l/ min OR Graham's Ratio equal or greater than 0.3 and less than 0.5 OR CO/CO2 equal or greater than 0.2 	<ul style="list-style-type: none"> CO Make equal or greater than 53 l/min and less than 93 l/min OR Graham's Ratio equal or greater than 0.5 and less than 1 OR Ethylene equal or greater than 1ppm and less than 3ppm and CO Make equal or greater than 42 l/min and less than 53 l/min OR Sweating, smell, heat or haze (confirmed by ERZ Controller) 	<ul style="list-style-type: none"> CO Make equal or greater than 93 l/min and Graham's Ratio equal or greater than 1 OR Ethylene equal or greater than 3ppm and CO Make equal or greater than 53 l/min OR Smoke (coming from goaf)
Active Goaf Seal	<ul style="list-style-type: none"> CO less than 130ppm AND No Ethylene AND Graham's Ratio less than 0.3 	<ul style="list-style-type: none"> CO equal or greater than 130ppm and less than 200ppm OR Ethylene detected and less than 1ppm OR Graham's Ratio equal or greater than 0.3 and less than 0.5 	<ul style="list-style-type: none"> CO equal or greater than 200ppm and less than 800ppm OR Ethylene equal or greater than 1ppm and less than 3ppm OR Graham's Ratio equal or greater than 0.5 and less than 1 OR Sweating, smell, heat or haze (confirmed by ERZ Controller) 	<ul style="list-style-type: none"> CO equal or greater than 800ppm OR Ethylene equal or greater than 3ppm and CO equal or greater than 200ppm OR Graham's Ratio equal or greater than 1 and CO equal or greater than 200ppm
Goaf Well	Refer to TARP-1430-Goaf and UIS Gas Drainage Management			
PERSON	NORMAL	LEVEL 1 RESPONSE	LEVEL 2 RESPONSE	LEVEL 3 RESPONSE
Bag Sampling with GC Analysis	<ol style="list-style-type: none"> Shiftly goaf stream bag at diurnal low (4am/4pm). Tailgate general body bag taken every 24 hours on diurnal low 2pm to 5pm 	<ol style="list-style-type: none"> As per normal, and Confirmation bag sample; Shiftly bag sample from the affected goaf seal at diurnal lows (not required if tube bundle is monitoring seal). Bag sample from the surface floxal plant Level 1 status maintained until 3 consecutive results taken at consecutive diurnal lows indicate lower status. 	<ol style="list-style-type: none"> 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). Level status maintained until 3 consecutive results taken at consecutive diurnal lows indicate lower status. 	<ol style="list-style-type: none"> As per Underground Mine Manager or Spontaneous Combustion Management Team.

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4	01/05/2020	Hayden Hearn - Ventilation Gas Superintendent	Logan Mohr – Tech Services Manager	Wouter Niehaus - Underground Mine Manager
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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 2. To be treated as confirmed until further samples indicate differently
Tube Bundle Alarm Confirmation		1. Verify the result is consistent with the current trend	1. As per Level 1: and 2. Place affected tube on hold to obtain confirmation reading.	1. As per Level 2.
All Coal Mine Workers	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.	1. 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. 6. Record actions taken on statutory report. 7. Take action to ensure that leakage migratory paths or minimised or eliminate.	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.
Control Room Operator	1. Continue routine monitoring of gas monitoring systems. 2. Acknowledge and validate gas alarms as required. 3. Determine TARP level and communicate to mine officials. 4. Maintain routine supervisory function	1. Acknowledge & record event in Alarm Log. 2. Re-check analysis results. 3. Notify ERZ Controller and Undermanager and Longwall Mining Coordinator 4. Monitor alarm and provide updates on status. 5. Follow gas alarm protocols. 6. Analyse any samples within 1 hour. 7. Request bag sample from floxal sample point on surface for Undermanager to organise 8. Confirm operation of Floxal	1. As per level 1. 2. Place affected tube bundle monitoring point on hold. 3. Notify Underground Mine Manager, Ventilation Officer, Ventilation & Gas Drainage Superintendent and Longwall Superintendent 4. Follow gas alarm protocols. 5. Provide updates on status 6. Regularly update Spontaneous Combustion Management Team	1. Notify ERZ Controller of immediate bag sample requirements 2. Initiate orderly withdrawal of personnel other than persons carrying out remedial work as directed by the Underground Mine Manager 3. Initiate Mine Emergency Procedures
Undermanager	1. Acknowledge and validate gas alarms as required.	1. Notify coal mine workers of TARP level condition at start of shift meeting 2. Organise resources for required bag samples to be collected and inspection of affected area or seal 3. Notify ERZ Controllers of alarm status 4. Confirm operation of Floxal 5. Organise resource to take bag sample from floxal surface sample point 6. Arrange for inspection of the inertisation pipework for affected seal site and organise any remedial work to facilitate potential injection of inert gas 7. Arrange for detailed inspection of affected area using appropriate equipment to establish air flow patterns, pressure differentials, extent of warm	1. As per Level 1; and 2. Provide resources to implement actions as required by Spontaneous Combustion Management Team.	1. Initiate withdrawal of all personnel other than persons carrying out remedial work as directed by the Underground Mine Manager. 2. Form Spontaneous Combustion Management Team.

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		zones, state of oxidation, hot spots and leakage path 8. Ensure that leakage through seals is minimised or eliminated.		
Ventilation Officer	1. Routine Review of: <ul style="list-style-type: none"> Gas monitoring system Ventilation system Control room alarm log Gas concentrations Gas trends Barometer Trends Indicator ratio trends 	1. As per Normal; and 2. Assess data and trends from points in alarm 3. Review tube bundle monitoring set ups for analysing area of concern. 4. Review status of gas wells and drainage systems 5. Review status of inertisation 6. Review the inspection report from the ERZ Controller and consider any further detailed inspection requirements	1. As per level 1. 2. Consider making a change to the goaf drainage or inertisation systems. 3. Consider external assistance for trending and analysis. 4. Participate in the Spontaneous Combustion Management Team. 5. Investigate available options if the situation deteriorates for inertisation capacity 6. Determine status of Simtars Mobile GC Lab.	1. Assist with Mine Emergency Procedures as required.
Underground Mine Manager	1. Routine review of control room alarm log	1. Ensure the TARP and associated procedures are complied with.	1. As per level 1. 2. Form Spontaneous Combustion Management Team/Incident Management Team. 3. Review trends & develop Action Plan. 4. Notify SSE 5. Ensure Action Plan is implemented. 6. Review preparation for Level 3.	1. Commence Mine Emergency Procedures.
Site Senior Executive			1. As per level 1. 2. Review Action Plan. 3. Ensure appropriate external resources are utilised. 4. Communicate to general workforce 5. Full report on Level 1 actions. 6. Participate in Spontaneous Combustion Management Team 7. Ensure appropriate external resources are utilised where appropriate 8. Notify corporate officials.	1. Full report on level 2 actions 2. Ensure appropriate external resources are utilised as required.

*** 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/CO₂ 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.
9. A confirmed alarm consists of:
 - a. Analysis of three (3) alarms from three consecutive cycles of the tube bundle gas monitoring system when placed on hold augmented by results for two (2) simultaneous underground confirmation bag samples taken by an ERZ Controller.
 - b. Physical indicators must be confirmed by an ERZ controller.

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Acknowledgement			
Position	Name	Signature	Date
Underground Mine Manager	Wouter Niehaus		7/01/2020
Manager (department)	Logan Mohr		7/1/2020
SHE Manager	Kate Bachmann		07.01.2020
EEM or MEM (if applicable)			
Authorisation			
Position	Name	Signature	Date
Site Senior Executive (SSE)	TRISTAN WILFELDS		7/1/20

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