



Grosvenor Mine

## Trigger Action Response Plan

Title  
NameGoaf and UIS Gas Drainage Management  
GRO-1430-TARP-Goaf and UIS Gas Drainage Management

**HAZARD - EXCESSIVE GAS LIBERATION FROM GOAF IMPACTING OPERATIONS OR OXYGEN INGRESS LEADING TO SPONTANEOUS COMBUSTION AND LESS THAN ADEQUATE GAS CAPTURE FROM UG IMPACTING ON UG ATMOSPHERE AND OPERATIONS. FLAMMABLE MIXTURES IN GAS DRAINAGE SYSTEM.**

Location	NORMAL	LEVEL 1 TRIGGER	LEVEL 2 TRIGGER	LEVEL 3 TRIGGER
Goaf or UIS Well	<p>O<sub>2</sub> (Oxygen) less than 8% AND CH<sub>4</sub> (Methane) greater than 45%</p> <p>CO (Carbon Monoxide) less than 100ppm</p> <p>Differential pressure across detonation arrestor less than 8kPa</p>	<p>O<sub>2</sub> 8% -11% AND CH<sub>4</sub> 30% - 45%</p> <p>OR CO 100ppm - 200ppm</p> <p>OR Differential pressure 8kPa - 12kPa across detonation arrestor</p>	<p>O<sub>2</sub> &gt; 11% AND CH<sub>4</sub> &lt; 30%</p> <p>OR CO 200 - 800ppm AND H<sub>2</sub> 10ppm - 25ppm</p> <p>OR Differential pressure &gt; 12Kpa across detonation arrestor OR Failing to comply with these TARP monitoring requirements and inspections</p>	<p>CO &gt; 800ppm AND H<sub>2</sub> &gt; 25ppm</p>
Gas Drainage Plant (Vacuum Pump Station and Blower/Flare Skids)	<ol style="list-style-type: none"> <li>Gas Drainage Plant operating at design efficiency.</li> <li>No mechanical or electrical critical alarms present for Plant Operation.</li> </ol>	<ol style="list-style-type: none"> <li>Gas Drainage Plant operating at less than design efficiency.</li> <li>Critical Low level mechanical or electrical alarms present for Plant, but still operational.</li> <li>Water in reticulation lines (audible, visible in trending). Goaf drainage plant tripped or loss of applied suction pressure to well trunk line for less than 30 minutes.</li> </ol>	<ol style="list-style-type: none"> <li>Gas drainage plant tripped or loss of applied suction pressure to well trunk line for greater than 30 minutes, without venturi's on all equivalent goaf or UIS holes with venturi's.</li> </ol>	<ol style="list-style-type: none"> <li>Gas drainage plant down for greater than 30 minutes and unable to supplement with sufficient venturi's.</li> </ol>
Goaf Seals	<ol style="list-style-type: none"> <li>Refer to Active Goaf TARP GRO_6953.</li> </ol>			
Portable Gas Detectors - Flow and Composition (Manual monitoring)	<ol style="list-style-type: none"> <li>Daily manual monitoring with PGD where real time monitoring is in place, once every 24 hours.</li> <li>Goaf holes without real time monitoring twice shiftly.</li> <li>UIS risers every 24 hours.</li> </ol>	<ol style="list-style-type: none"> <li>As per Normal; and;</li> <li>2 times shiftly monitoring 6 hourly manual monitoring with PGD where real time monitoring is not in place – Goaf only.</li> <li>UIS risers once shiftly.</li> <li>Level 1 status maintained until 3 consecutive results taken at consecutive diurnal lows indicate lower status.</li> </ol>	<ol style="list-style-type: none"> <li>As per Level 1; and;</li> <li>3 hourly manual 4 times shiftly monitoring with PGD where real time monitoring is not in place.</li> <li>Level 1 2 status maintained until 3 consecutive results taken at consecutive diurnal lows indicate lower status.</li> </ol>	<ol style="list-style-type: none"> <li>As per Level 2; and;</li> <li>PGD monitoring at periods as requested by Ventilation Officer or Underground Mine Manager.</li> </ol>
Bag Sample Regime and Alarm Confirmation for GC Analysis or IR analysis	<ol style="list-style-type: none"> <li>Weekly bag sample for each operating well (free vent or applied suction), where real time monitoring is in place.</li> </ol>	<ol style="list-style-type: none"> <li>As per Normal; and;</li> <li>Confirmation bag sample must be taken within 4 hours of the alarm raised.</li> </ol>	<ol style="list-style-type: none"> <li>Confirmation bag sample must be taken and analysed within 2 hours of the alarm being raised.</li> <li>4 hourly bag sample from the affected goaf well; and;</li> <li>Three (3) consecutive results taken at consecutive diurnal lows indicate lower status.</li> </ol>	<ol style="list-style-type: none"> <li>Immediate bag sample to be taken from affected goaf well and analysed.</li> <li>To be treated as confirmed until further samples indicate differently.</li> </ol>

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PERSON	NORMAL	LEVEL 1 RESPONSE	LEVEL 2 RESPONSE	LEVEL 3 RESPONSE
All Personnel	1. Carry out work in line with Standard procedures and work instructions.	1. As per Normal; and; 2. Report any unusual conditions/physical signs/system damage from goaf drainage wells to Control Room Operator (CRO).	1. As per Level 1; and; 2. Report any unusual conditions/physical signs/system damage from goaf drainage wells to CRO.	1. As per Level 2; and; 2. Comply with directions of shift Undermanager (UM) and/or Statutory Officials.
Control Room Operator	1. Routinely monitor gas monitoring systems and gas plant operation as part of normal control room duties. 2. Acknowledge and validate gas plant alarms as required. 3. Log all gas alarms in the gas alarm register.	1. As per Normal; and; 2. Notify ERZ Controller for Zone. 3. Acknowledge & record gas plant system events in Alarm CRO Log. 4. Notify Undermanager and Seamgas Technician of any critical gas plant alarms TARP status. 5. Review longwall gas monitoring trends accordingly. 6. Analyse bag samples with GC or IR for TARP confirmation immediately. 7. Monitor and provide updates on gas drainage system status.	1. As per level 1; and; 2. Notify Seamgas Technician. 3. Notify UM, LW ERZ Controller of goaf plant trip or goaf well issues. 4. Notify Seam Gas Superintendent or Delegate of goaf plant trip. 5. Liaise with LW ERZ Controller to provide information based on recent trending of TG Methane Levels (determine shear by shear increase in methane levels). 6. Immediately Notify UM and LW ERZ Controller of gas plant trip or goaf gas well issues.	1. As per level 2; and; 1. Notify UMM and VO.
Seamgas Technician	1. Commission and decommission well surface connections and monitoring as required by operations. 2. Manage surface reticulation system routine maintenance. (e.g. dewatering, flame arrestor). 3. Take active / UIS bag sample(s) for active goaf / UIS / goaf wells as required by Ventilation Officer. 4. Review and maintain goaf well data base for hole performance.	1. As per Normal; and; 2. Notify CRO of TARP trigger. 3. Investigate cause of TARP trigger and put reasonable measures in place to rectify. Notify Shift Undermanager of actions taken and record actions in shift report. 4. Ensure PGD manual monitoring and bag sampling is conducted as per Level 1 responses. 5. Analyse data and provide status updates to CRO and UM. 6. Review available gas data relating to Goaf drainage individual wells and the gas plant. 7. Take appropriate measures to rectify problems reported with the goaf drainage system. 8. Verify LW face position and check if next available goaf well can be activated. 9. Conduct a physical check on goaf infrastructure, hole gas flows and gas composition. 10. Mitigate methane purity out of well / or riser via amending pressure and or flow as required. 11. Investigate methods to further increase Goaf drainage or UIS capacity (e.g. additional venturis to supplement Gas Plant). 12. Complete bag sample to confirm gas composition of well.	1. As per Level 1; and; 2. Isolate affected gas well from underground workings or reduce pressure or flow to remove from level 2 TARP (applies to goaf well and UIS risers). 3. Ensure resources are provided requested to expedite any surface goaf drainage system work. as directed by UM and VO. 4. Develop action plan to optimise goaf drainage system performance and immediately communicate with UM. 5. Report all rectification measures taken to CRO and UM. 6. Notify VO of status and action taken. 7. Complete bag sample to confirm gas composition of well. Document any measures taken in shift report. 8. For "Failing to comply with these TARP monitoring requirements and inspections", isolate affected goaf / UIS well.	1. As per level 2; and; 2. Isolate affected gas well from underground workings. 3. Complete bag sample to confirm gas composition of well. 2. Participate as part of IMT (if required).
ERZ Controller	1. Monitor goaf seals and gas compositions in the longwall tailgate roadway as per normal inspection regime.	1. As per Normal; and; 2. Investigate and verify cause of alarm, including seal integrity, ventilation flows & possible leakage sources underground. 3. Take gas bag sample from seal sites and tailgate return as directed by UM and VO. 4. Communicate findings with CRO. 5. Record actions taken on statutory report. 6. Rectify if possible.	1. As per level 1; and; 2. Inspect any VCDs on the longwall face & tailgate as required by the UM and VO. 3. Investigation of UIS drainage stub for leaks or blockages.	1. As per level 2; and 2. For CO and H2 ONLY: • Facilitate orderly withdrawal of personnel to place of safety as directed by Undermanager. (Longwall crib room, panel intake) • Account for all personnel and organise transportation in preparation for withdrawal. • Carry out instructions from UM and /or Underground Mine Manager.

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<b>Undermanager</b>	<ol style="list-style-type: none"> <li>1. Monitor Gas Plant operation as part of normal shift duties.</li> <li>2. Review and sign gas data log book.</li> </ol>	<ol style="list-style-type: none"> <li>1. As per Normal; and;</li> <li>2. Review all available data and continue to monitor (RT sensors, Tube Bundle, Surface Gas Bags, Underground Gas Bags).</li> <li>3. Monitor Gas Plant operation.</li> <li>4. Ensure resources are provided to expedite any surface goaf drainage system work.</li> <li>5. Ensure gas drainage personnel inspect surface gas drainage system to rectify faults or validate gas concentrations.</li> <li>6. Record TARP status in report.</li> </ol>	<ol style="list-style-type: none"> <li>1. As per level 1; and;</li> <li>2. Review action plan and validate with VO where required.</li> <li>3. Ensure resources are provided to expedite any surface goaf drainage system work.</li> </ol>	<ol style="list-style-type: none"> <li>1. As per level 2 and;</li> <li>2. Participate as part of IMT. (Lead IMT in absence of UMM other than for Oxygen or Methane purity levels trigger).</li> </ol>
<b>Ventilation Officer</b>	<ol style="list-style-type: none"> <li>1. Monitor effectiveness of gas well operation as part of normal duties, and identify which wells are to be operated in conjunction with the Seamgas Technician.</li> <li>2. Review results for weekly bag samples.</li> <li>3. Monitor Underground Mine Atmosphere as per normal</li> <li>4. Review and authorise gas drainage permit authority forms.</li> </ol>	<ol style="list-style-type: none"> <li>1. As per Normal; and;</li> <li>2. Review all available data and continue to monitor (RT sensors, Tube Bundle, Surface Gas Bags, Underground Gas Bags).</li> <li>3. Review TARP status, provide guidance and direction to ERZ controller.</li> </ol>	<ol style="list-style-type: none"> <li>1. As per level 1; and;</li> <li>2. Compile all data and provide a detailed report to UMM. Report all rectification measures taken.</li> <li>3. Consider ventilation network and changes where possible.</li> </ol>	<ol style="list-style-type: none"> <li>1. As per level 2 and;</li> <li>2. Participate in IMT.</li> </ol>
<b>Seam Gas Superintendent or Delegate for Goaf</b>  <b>And/ OR</b>  <b>UG Gas Co-ordinator for UIS</b>	<ol style="list-style-type: none"> <li>1. Provide assistance resources to Seamgas Technician.</li> <li>2. Monitor effectiveness of gas well operation as part of normal duties, and identify which wells are to be operated in conjunction with the Seamgas Technician.</li> <li>3. Review results for weekly bag samples.</li> <li>4. Monitor Underground Mine Atmosphere as per normal.</li> <li>5. Review and authorise gas drainage authority forms.</li> </ol>	<ol style="list-style-type: none"> <li>1. As per Normal; and;</li> <li>2. Review all available data and continue to monitor (RT sensors, Tube Bundle, Surface Gas Bags, Underground Gas Bags).</li> <li>3. Propose recommendations to Seamgas Technician.</li> <li>4. Review TARP status, provide guidance and direction to ERZ controller.</li> </ol>	<ol style="list-style-type: none"> <li>1. As per level 1; and;</li> <li>2. Review trends &amp; develop Action Plan.</li> <li>3. Assist UMM with Action Plan.</li> </ol>	<ol style="list-style-type: none"> <li>1. As per level 2; and;</li> <li>2. Participate in IMT.</li> </ol>
<b>Underground Mine Manager</b>	<ol style="list-style-type: none"> <li>1. Normal duties.</li> <li>2. Review all alarm conditions &amp; validate.</li> <li>3. Ensure the TARP and associated procedures are complied with.</li> </ol>	<ol style="list-style-type: none"> <li>1. As per Normal; and;</li> <li>2. Review all alarm conditions &amp; validate.</li> <li>3. Ensure the TARP and associated procedures are complied with.</li> </ol>	<ol style="list-style-type: none"> <li>1. As per level 1; and;</li> <li>2. Review trends &amp; develop Action Plan.</li> <li>3. Pass Action Plan to Supervisor / coordinator.</li> <li>4. Review trends &amp; develop Action Plan.</li> <li>5. Review preparation for Level 3 and ensure an Action Plan is implemented.</li> </ol>	<ol style="list-style-type: none"> <li>1. As per level 2; and;</li> <li>2. Commence Mine Emergency Procedures.</li> <li>3. Notify SSE and Form IMT.</li> <li>4. Review preparation for Level 3 and ensure an Action Plan is implemented.</li> <li>5. Pass Action Plan to Supervisor / Co-ordinator / Stat Official</li> <li>6. Initiate and lead IMT</li> </ol>
<b>Site Senior Executive</b>	<ol style="list-style-type: none"> <li>1. Normal duties.</li> </ol>	<ol style="list-style-type: none"> <li>1. Normal duties.</li> </ol>	<ol style="list-style-type: none"> <li>1. Normal duties.</li> </ol>	<ol style="list-style-type: none"> <li>1. As per Level 2; and;</li> <li>2. Participate in IMT.</li> <li>3. Provide external notifications as required.</li> </ol>

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Acknowledgement			
Position	Name	Signature	Date
Underground Mine Manager	Wouter Niehaus		20/11/19
Manager (department)	Logan Mohr		18/11/19
SHE Manager	Jeff Perks		22 Nov 2019
EEM or MEM (if applicable)	N/A		
Authorisation			
Position	Name	Signature	Date
Site Senior Executive (SSE)	Trent Griffiths		1/12/19

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