

Coal Industry GAGing in 2014

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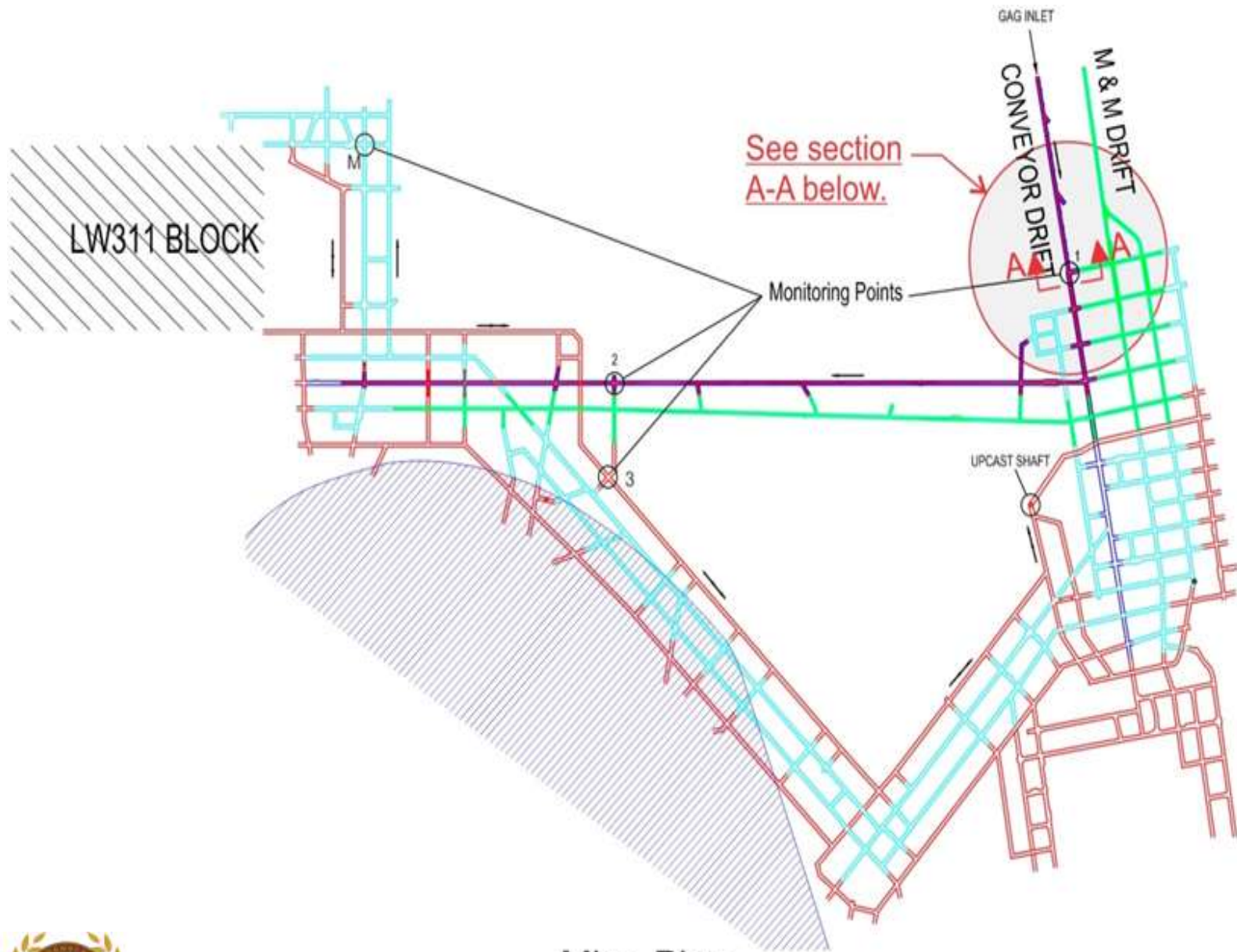
Gorniczy Agregat Gasniczy (GAG)



GAG operation

- GAG output 20-25 m³/s (effective 7m³/s)
- Gas temperature 80°C
- Water 600 L/minute
- Fuel type Jet A1
- N₂ + Vapour 79.5 – 84.5%
- CO₂ 13 -16%
- O₂ 2-4%
- CO + H₂ 0.5%

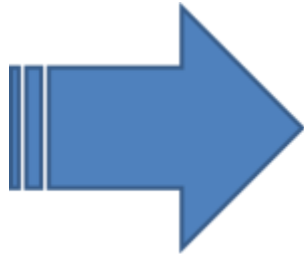




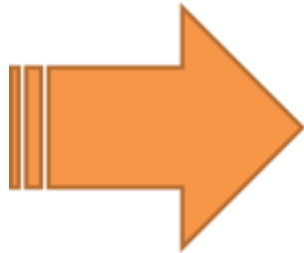
Mine Plan



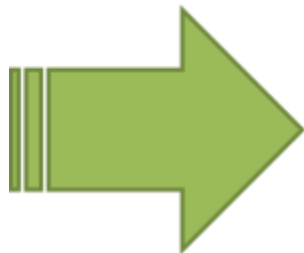
Project Aims



GAG product composition, flow and movement throughout the mine



Life sustaining environmental conditions



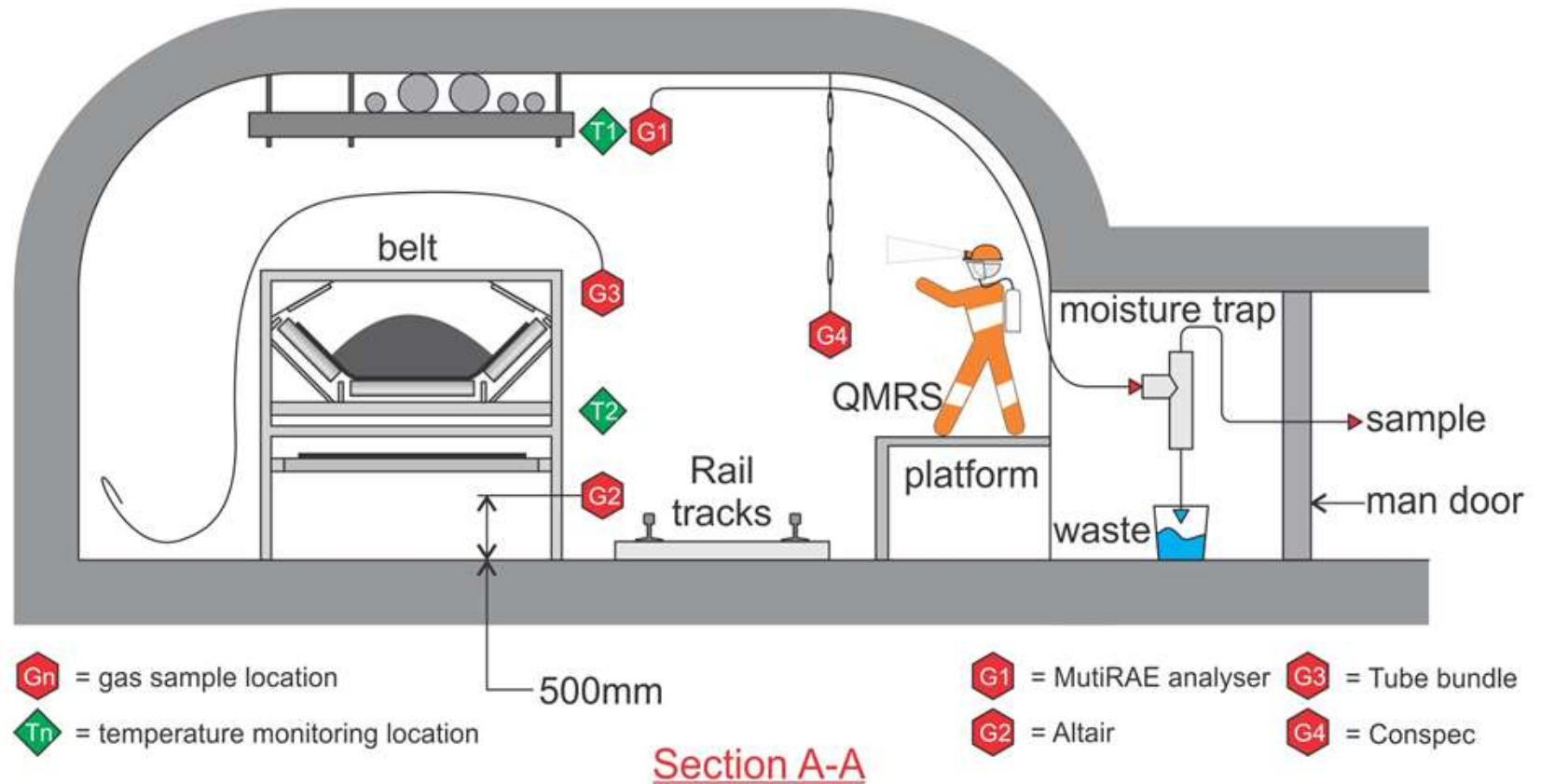
Mine infrastructure and equipment



Project Background & Aims

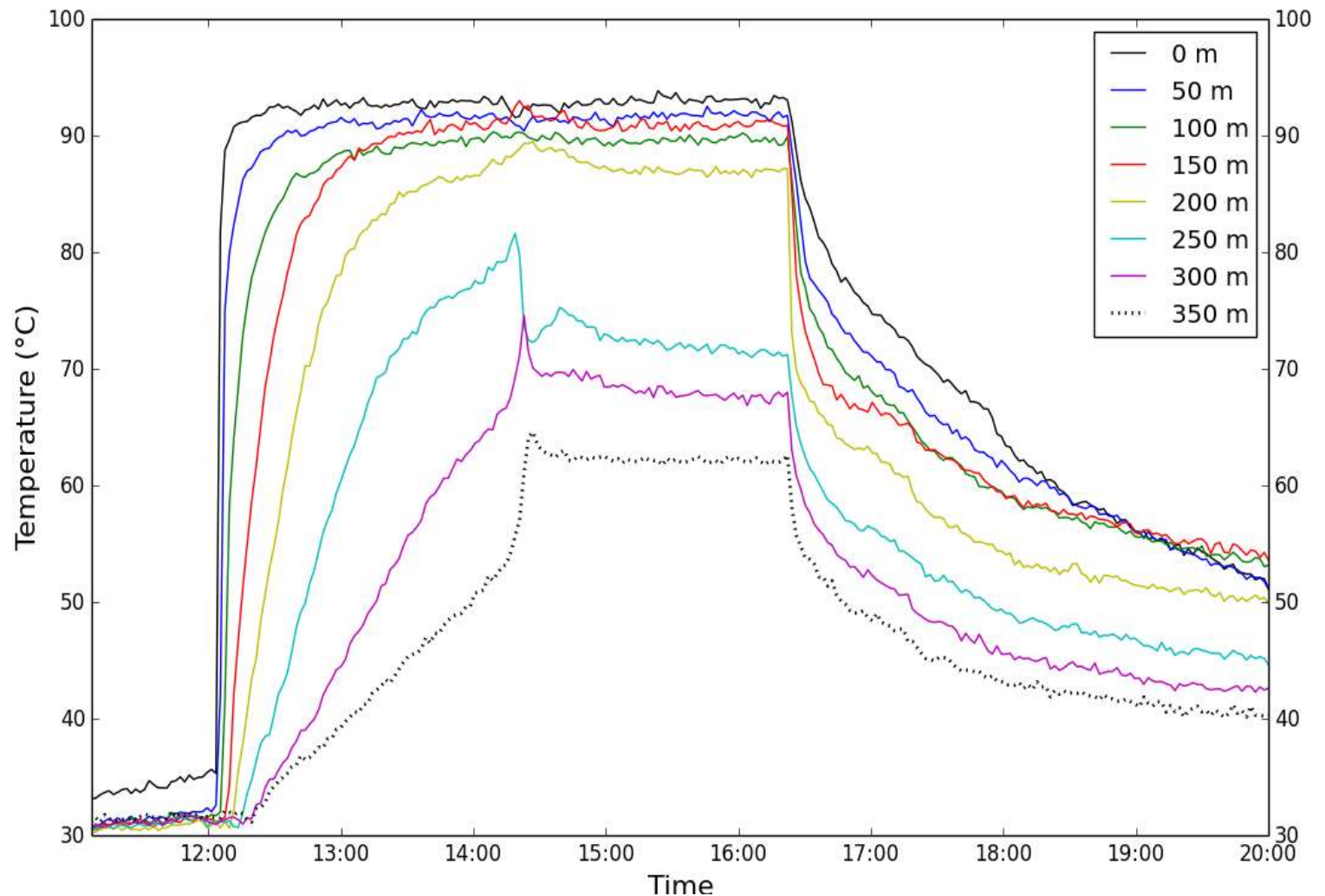
- Composition of GAG products
- Distribution and flow of GAG gases
- Temperature profiles around the mine
- Humidity
- Visibility
- Performance of existing monitoring infrastructure
- GAG product migration into cut-throughs & blind ends
- Time required to 'GAG' the mine
- Impact of short-term GAG gas exposure on the mine infrastructure
- Geotechnical implications of short-term GAG gas exposure on mine workings

Monitoring set-up





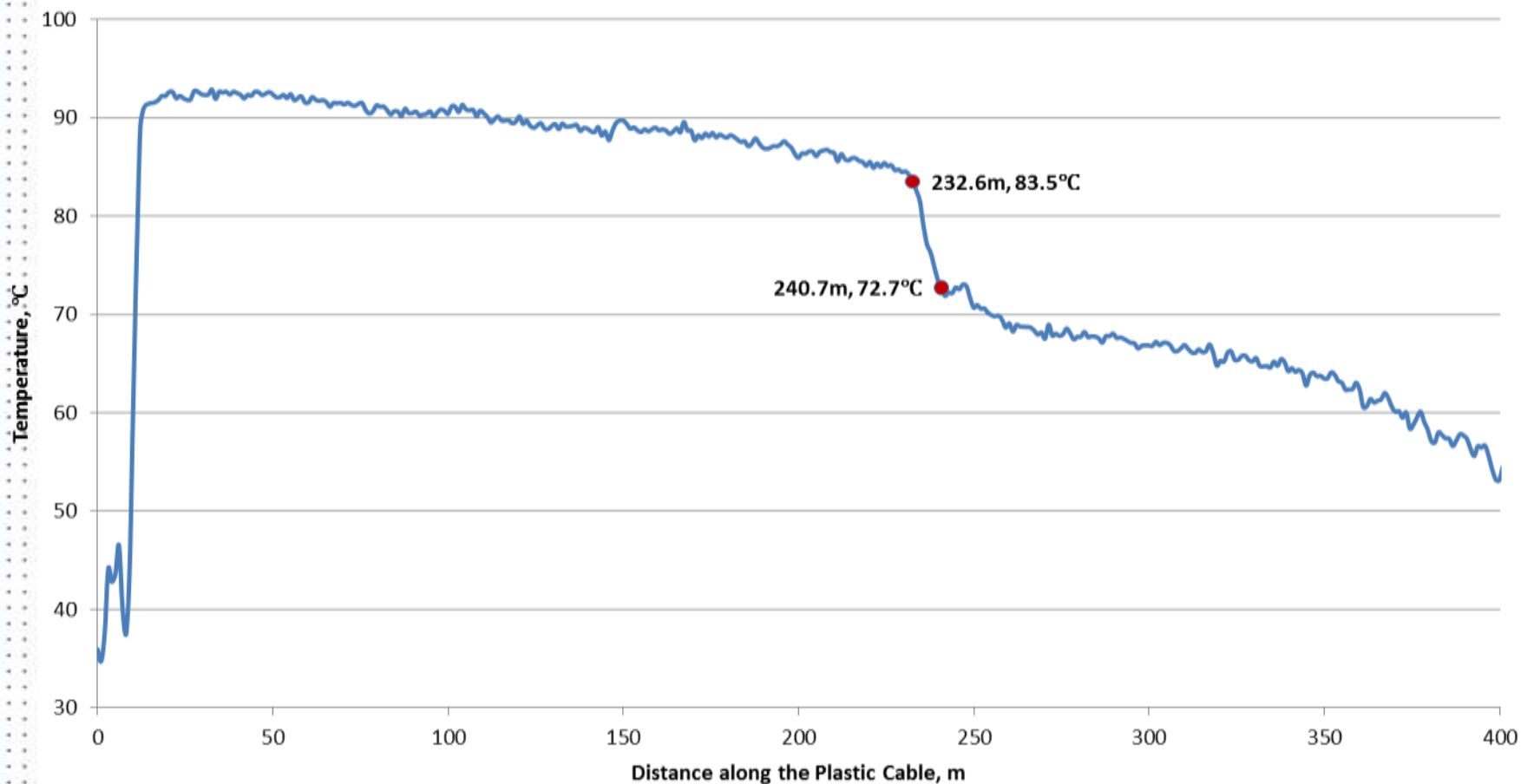
Temperature Distribution

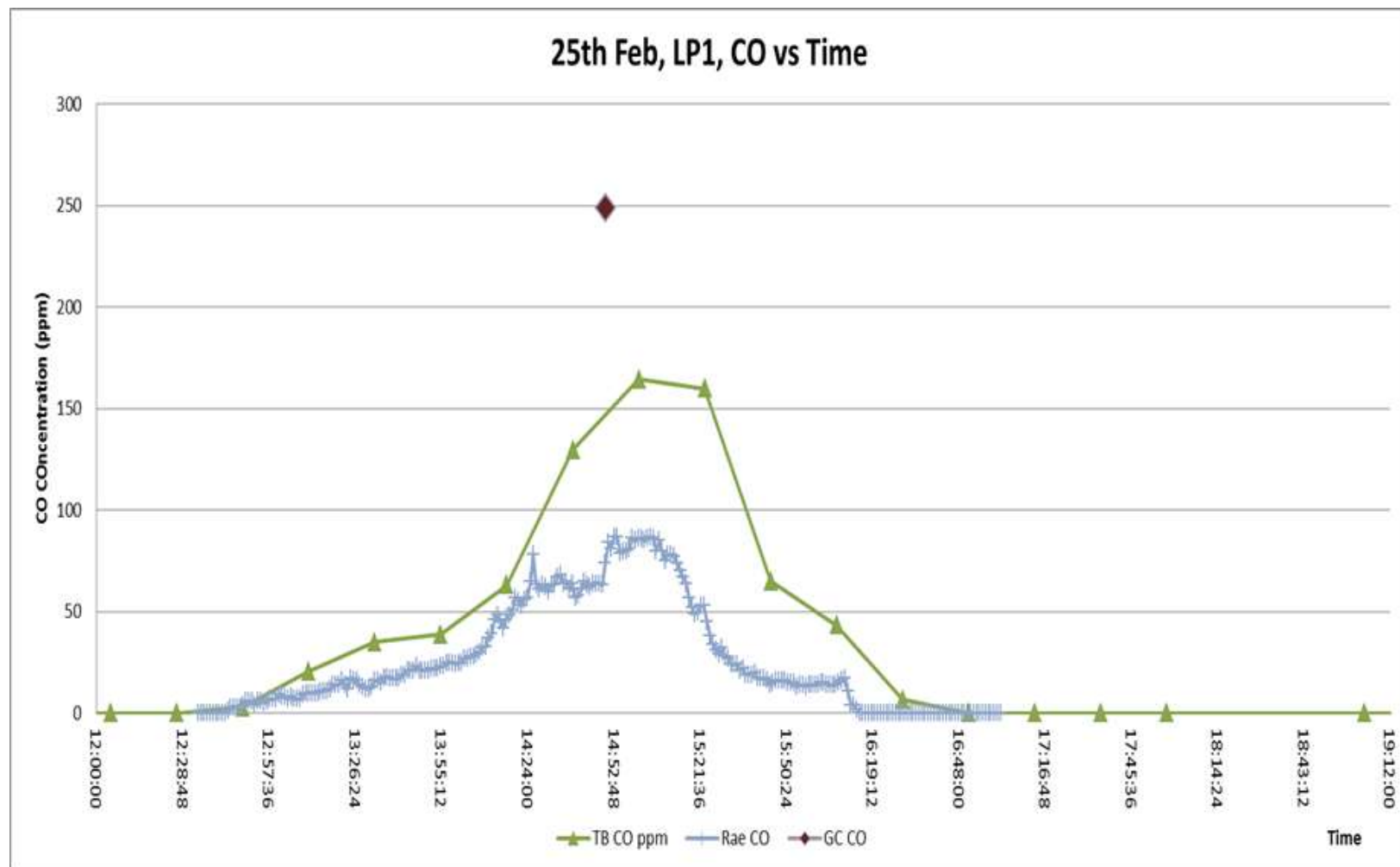


Temperatures at 560m from the portal reached 64 °C
LP1 ambient was 23 °C and increased by only by 1.5°C

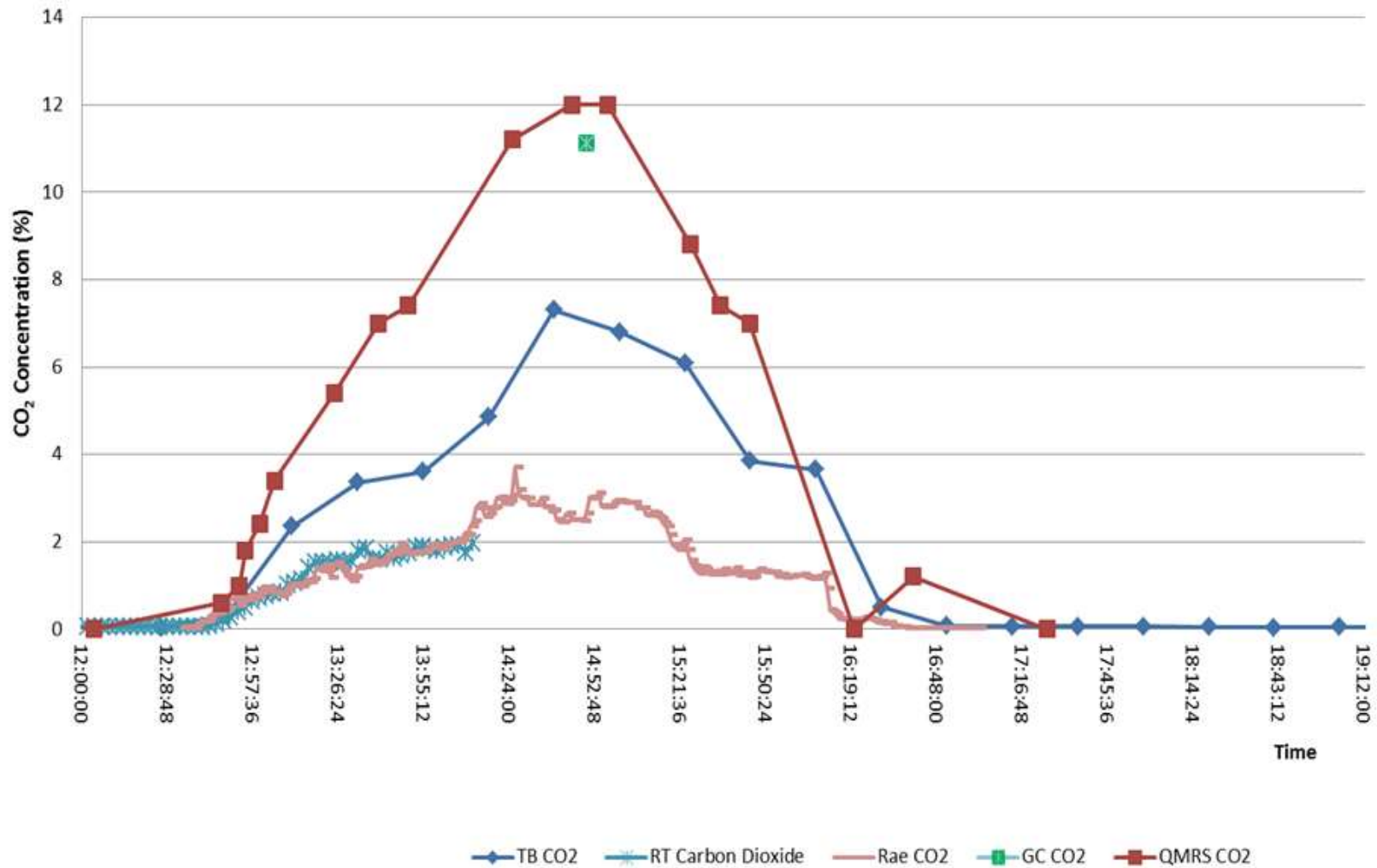


Day 1 14:26:59 Thermal Event

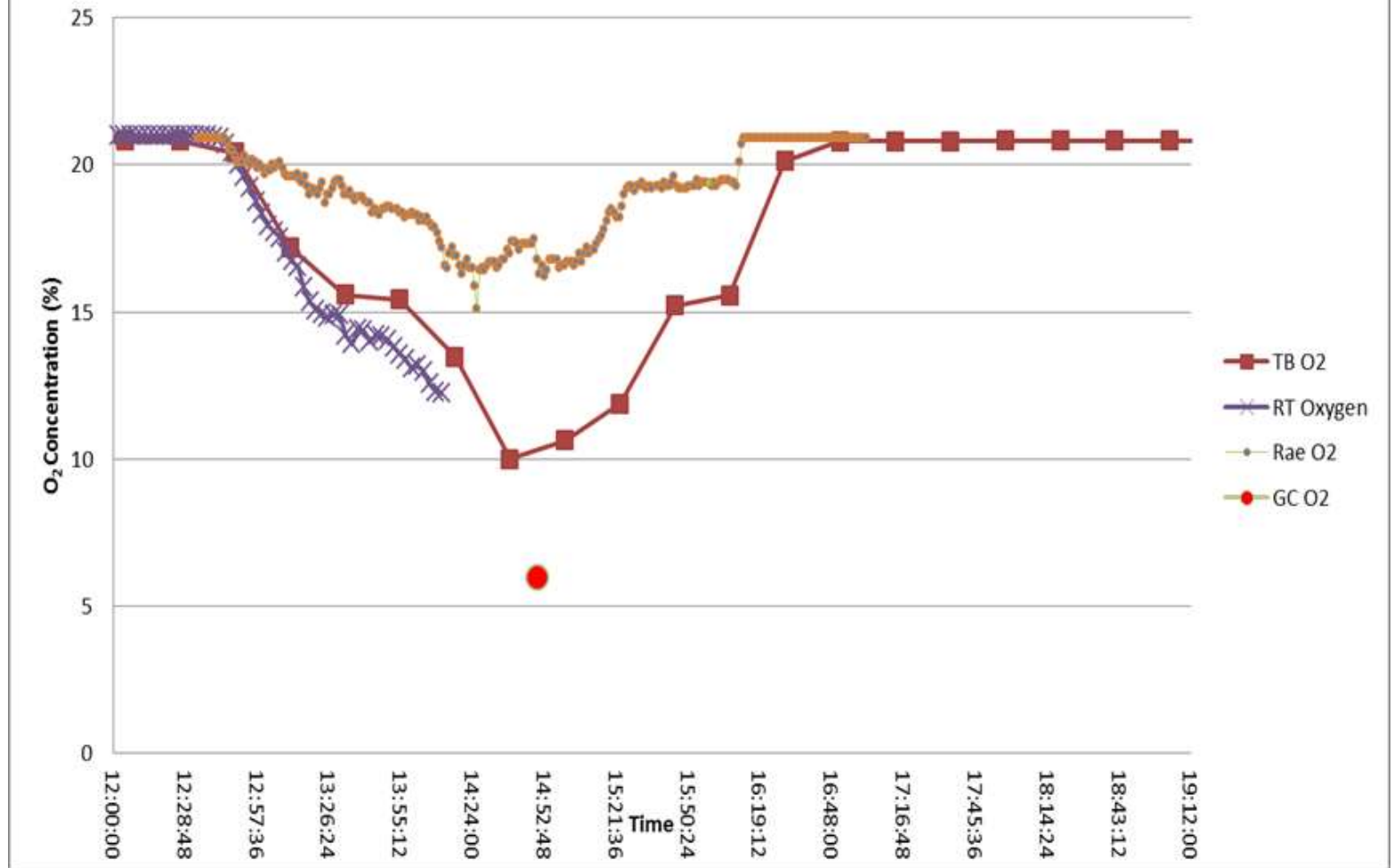




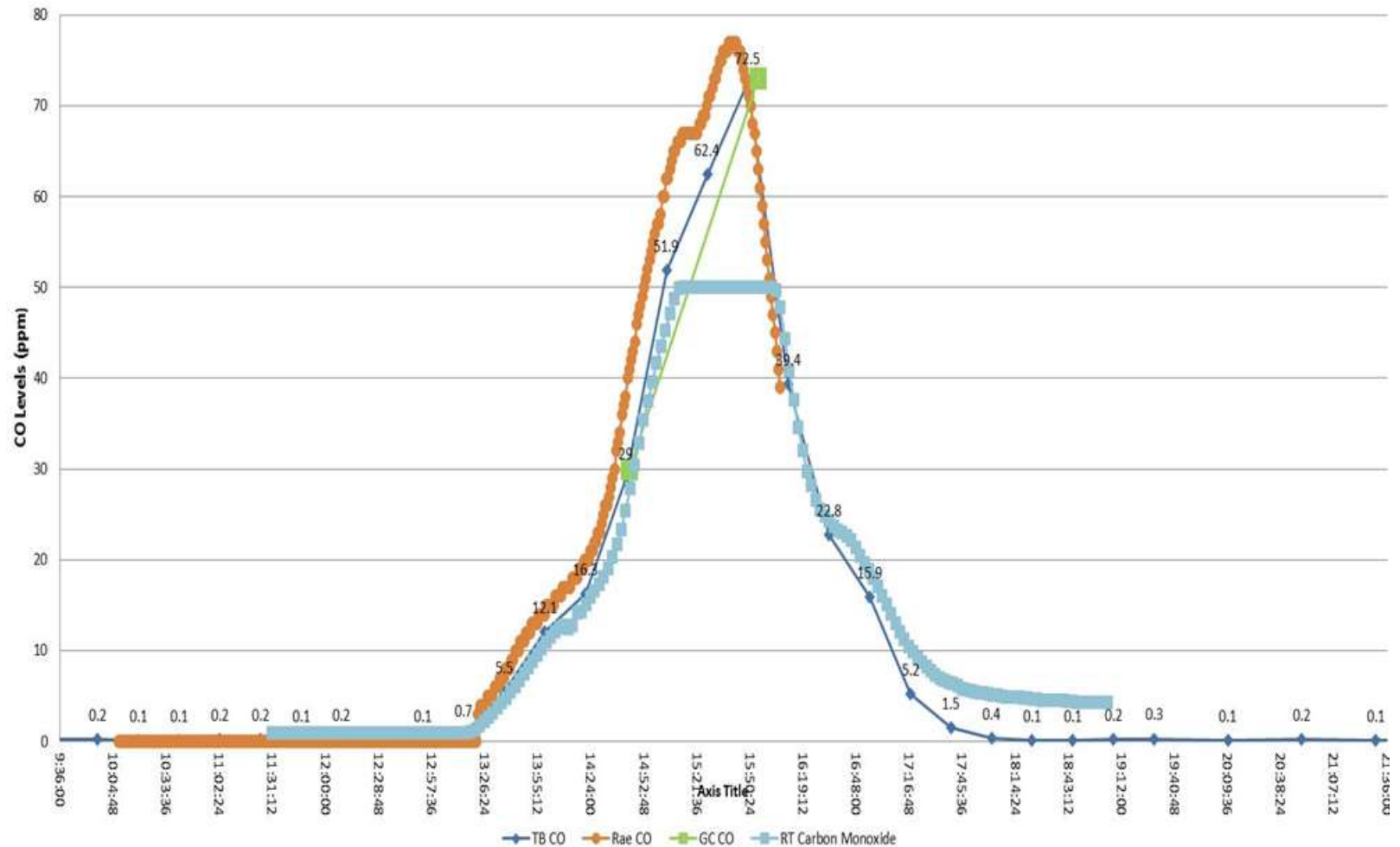
25th February, LP1, CO₂ vs Time



25th Feb14, LP1, O₂ vs Time



25 February 2014, LP2, CO Levels, Time

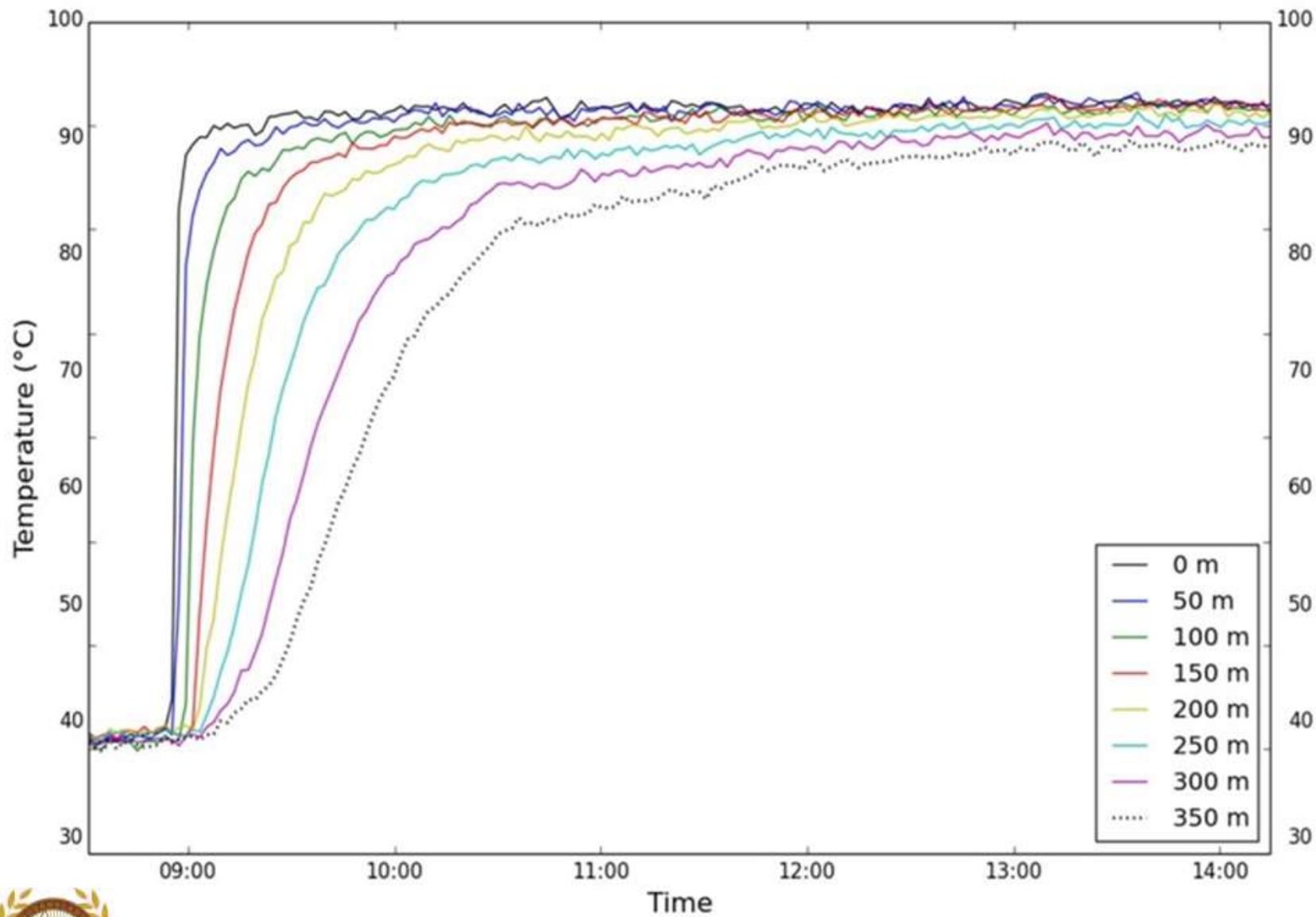


Day 1 Observations

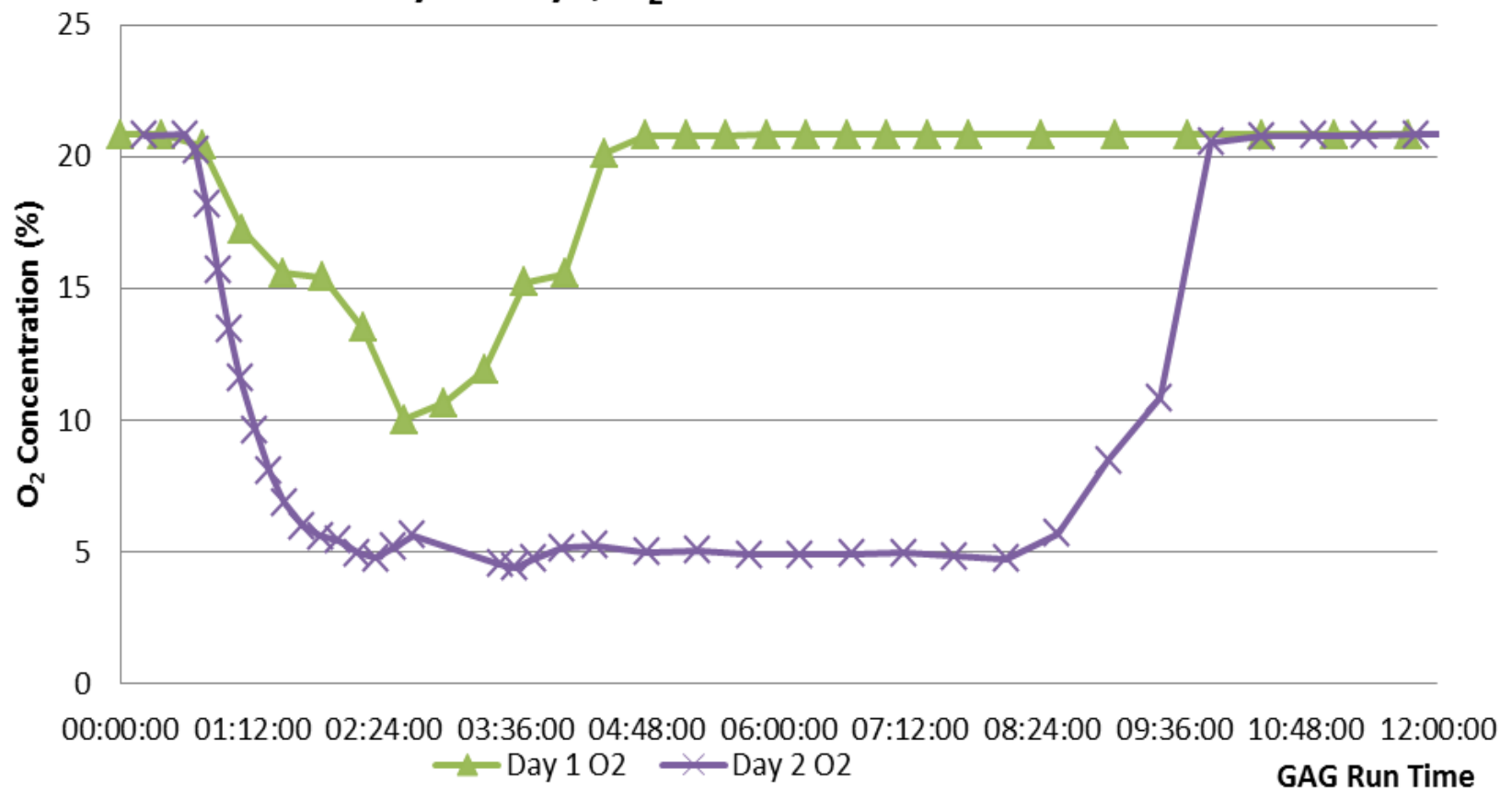
- It is clear from observations on the oxygen levels at LP1 that the GAG system was operating well, since the oxygen level was quickly stabilised below 6%.
 - LP1 (1km) had an inert atmosphere under 3 hours.
- Substantial leakage around the conveyor portal drift door adversely impacted the process the mine inertisation.
- Day 1 was curtailed due to the break in the compressed air line.
- The LP1 CO levels were higher than expected
- Visibility remained good 1 km from the GAG inlet.
- After the conveyor drift had cooled the surface roller door was opened and inspection showed deterioration of exposed rock/coal areas and buckling of the steel rail track in places.



Temperature Distribution



Day1 x Day2, O₂ Concentration x Run Time





Conclusions

- Underground coal mine sites should review their surface sealing arrangements close to GAG docking points
- QMRS should regularly audit underground coal mine site sealing arrangements.
- Mine sites should review their emergency procedures with regard to compressed air underground post explosion/fire due to the possible dilution of the GAG product when introduced.
- Underground coal mine sites should review their Emergency Response Plan for Inertisation and determine any additional measures would be required for tracking GAG gas
- Investigation into the use of boreholes for targeted delivery of GAG product should be considered.
- Investigations have been proposed to gather data on temperature, gas concentrations and pressures over a prolonged inertisation.





Thank you for your attention

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