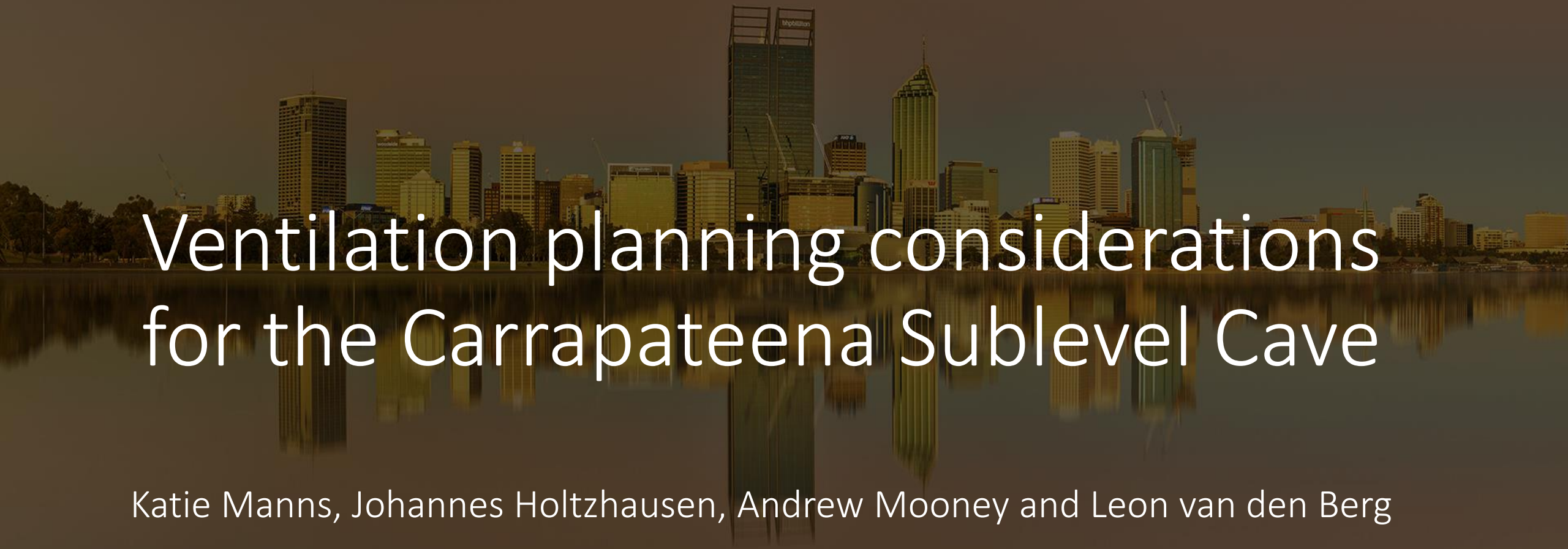
MINE VENT 2019



Ventilation planning considerations for the Carrapateena Sublevel Cave

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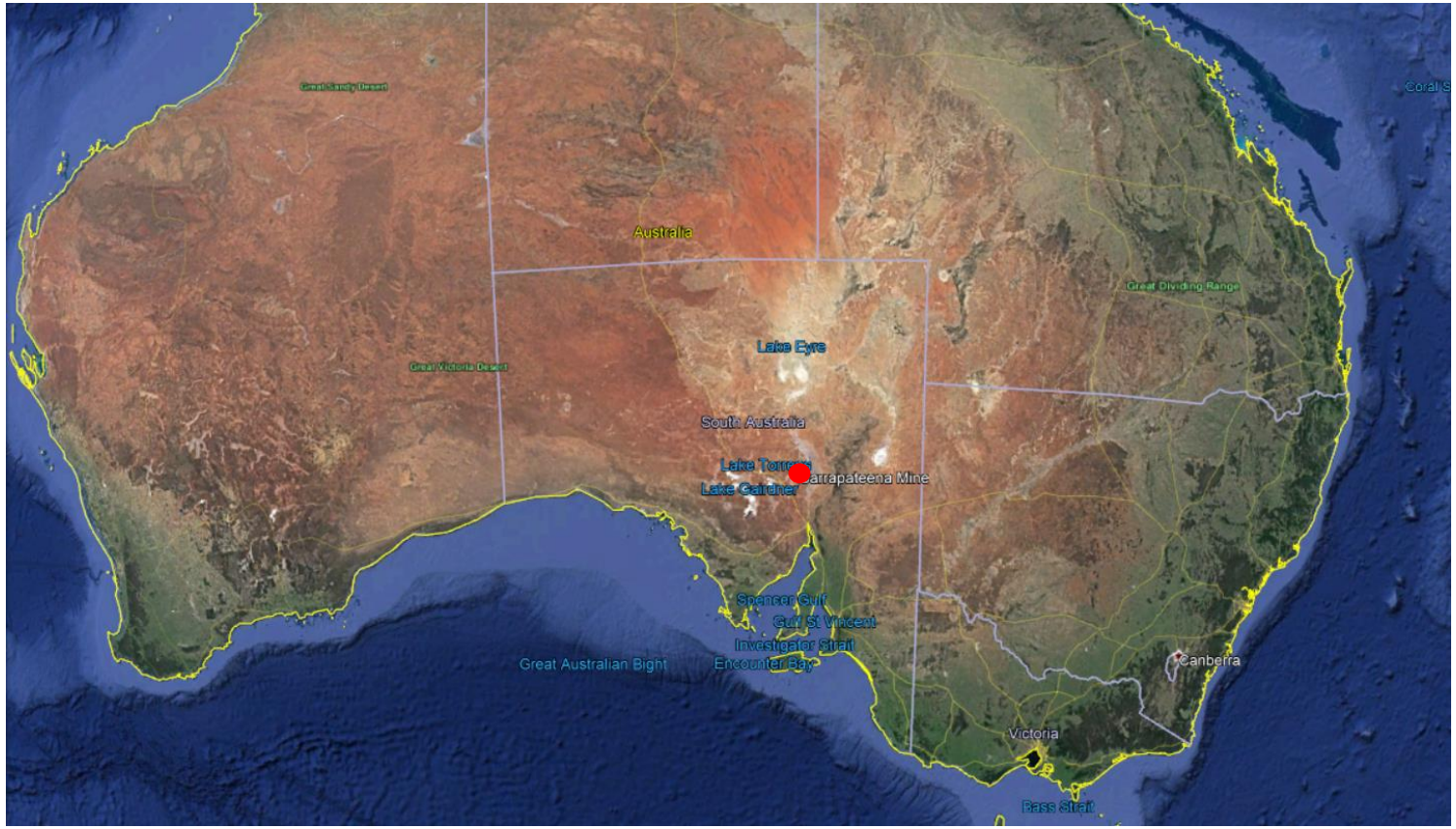
Introduction

OZ Minerals is a South Australian based modern mining company with a focus on copper.

Their Carrapateena project, located 160km north of Porth Augusta is one of Australia's largest undeveloped copper deposits

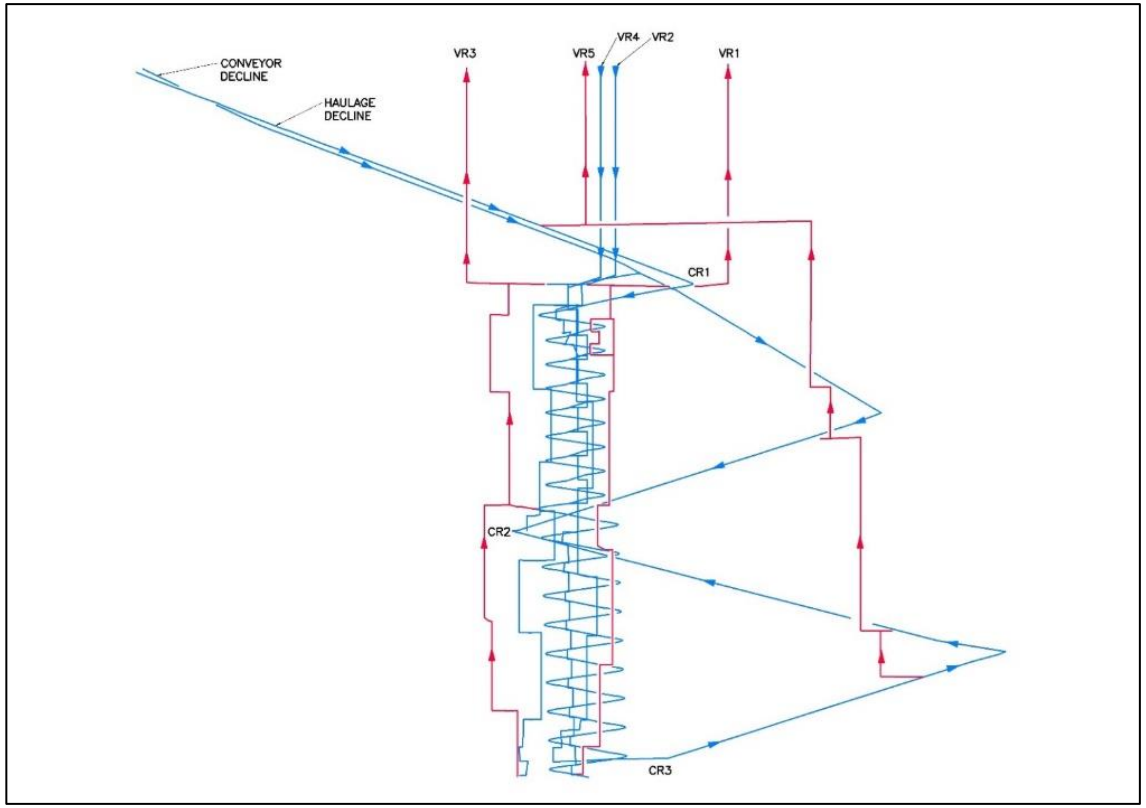


Background

- 4.25Mtpa Sub-level Caving Operation
- Estimated mine life of 20 years
- Potential to transition for initial SLC to a future 12Mtpa Block Cave
- 1.4km deep with Refrigeration required from ~700m depth
- Max VRT of 66ºC
- Copper-gold orebody with uranium grade, low-levels radon emanation
- Heat and Radon main drivers
- Ventilation on Demand “mine-of-the-future”

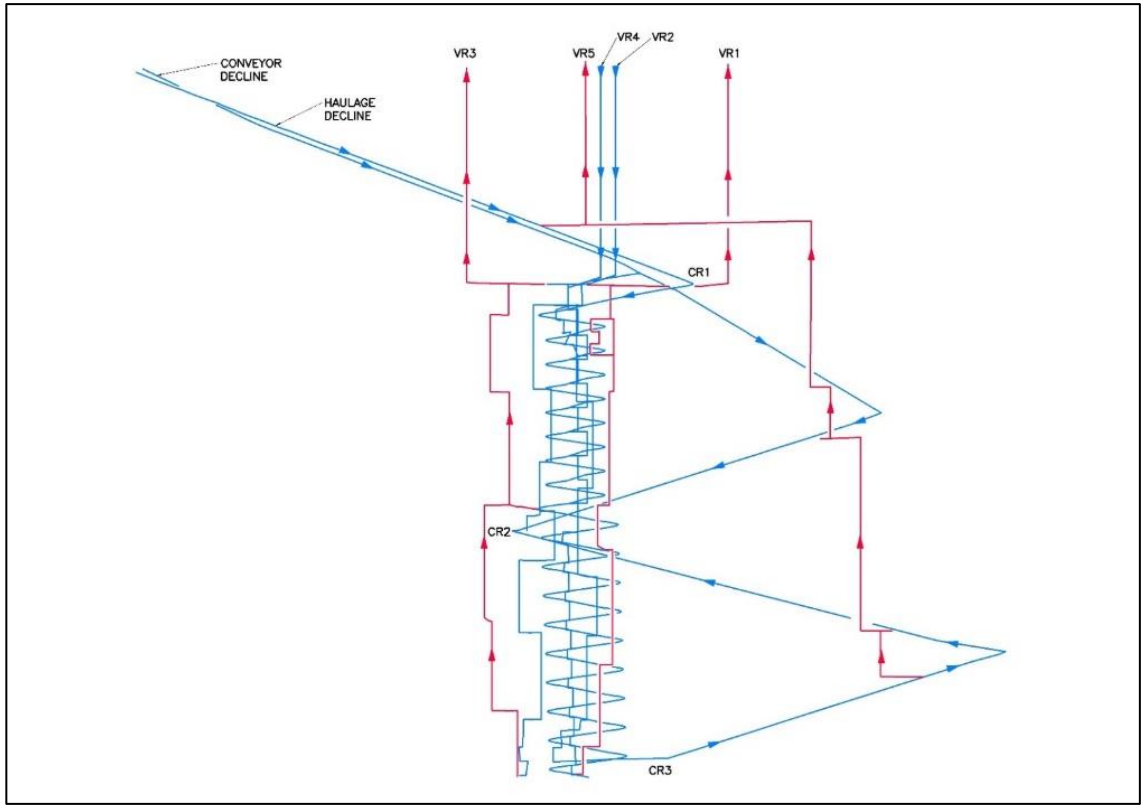
Planned Intake Infrastructure

- Conveyor Decline
- Access Decline
- Two Φ5.0m Production FAR
- One stepped 5.5mx5.5m decline FAR
- 16MW$_R$ Refrigeration
- Two 8MW Bulk air coolers



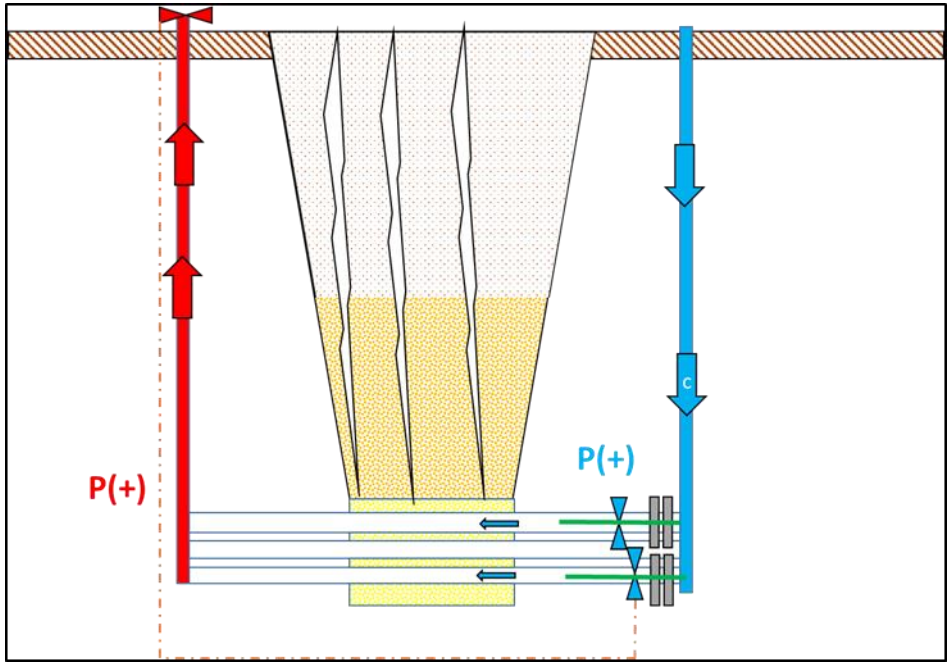
Planned Exhaust Infrastructure

- Two Φ5.5m Production RAR
- One Φ4.1m Infrastructure RAR
- Primary airflow capacity - 1180m^3/s



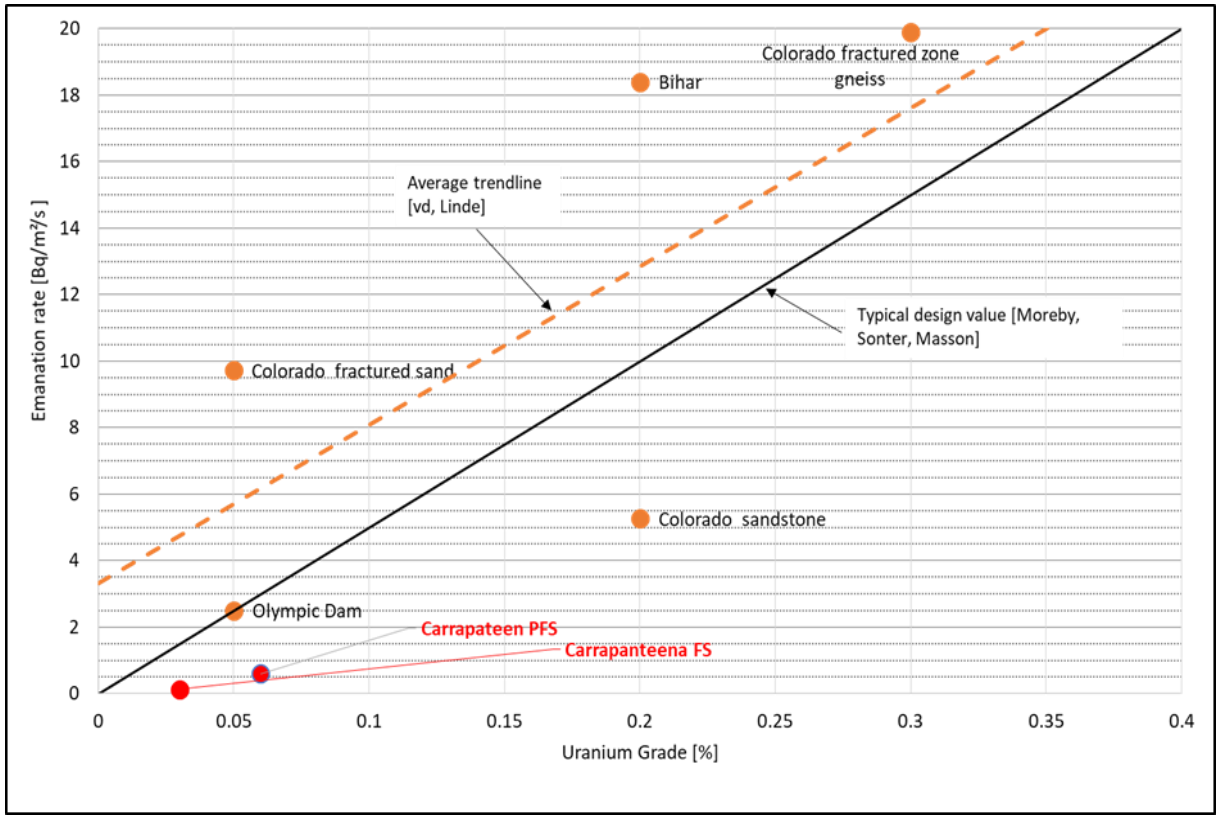
Primary Ventilation Strategy

- Push-Pull Strategy
- Conventional surface primary exhaust fans
- Secondary fans installed in tight circuit in FAR
- Positively pressurised levels



Considerations

- Ore body contains low levels of uranium grade
- Radon management for production levels only
- Low levels of radon emanation expected
- Pro-active conservative ventilation design



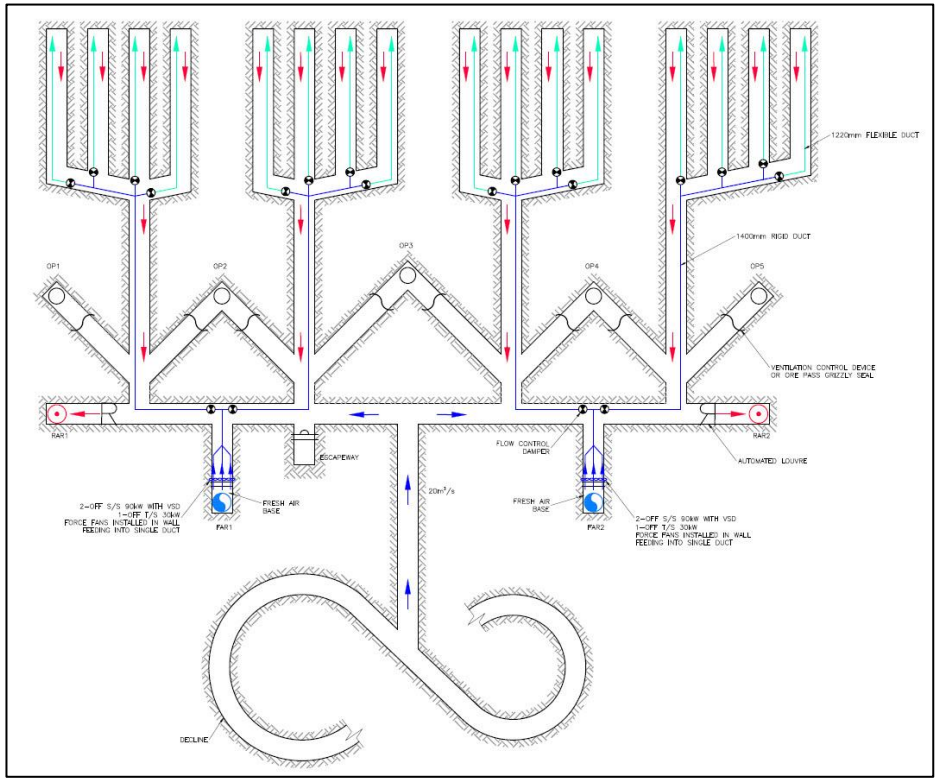
Radon Management Principles

To manage Radon in underground mines;

- Manage dust as Radon Daughters adhere to dust particles
- Ensure one pass ventilation and minimize series ventilation and re-use
- Ensure adequate air velocity to prevent dust settling in working areas
- Ensure areas such as crushers and ore passes have adequate dust suppression.

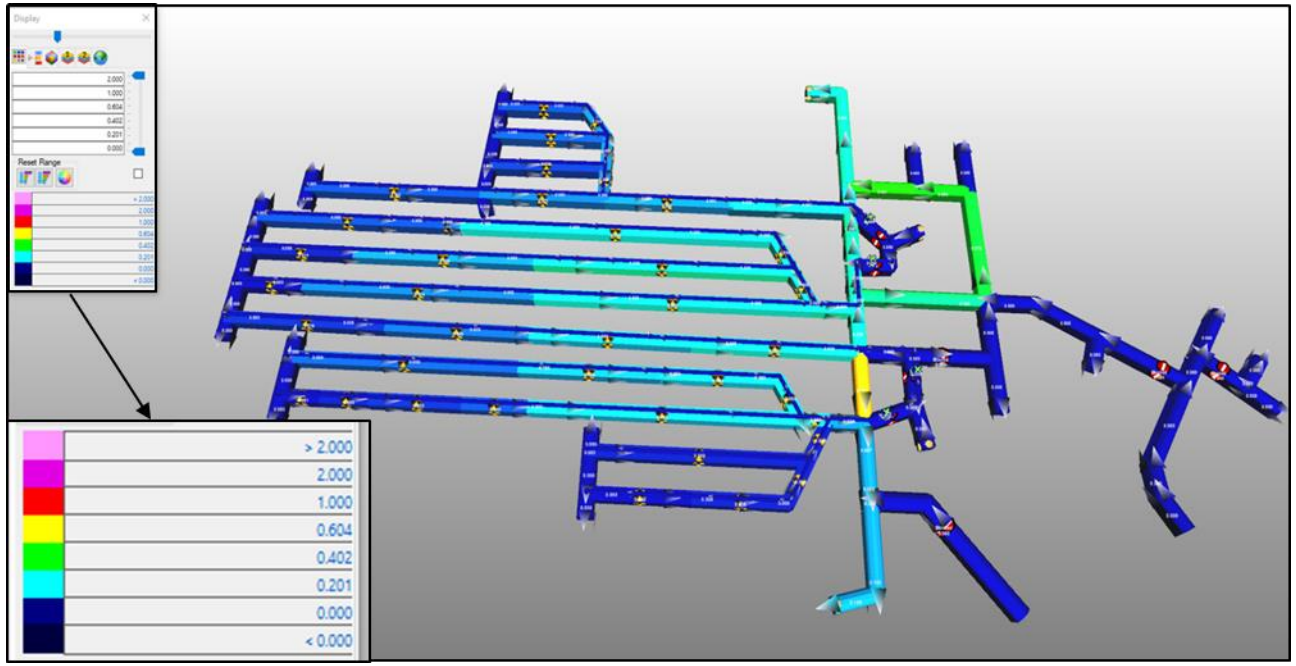
Features of the mine – Initial SLC

- 25m vertical sub-level spacing
- Ore is tipped on-level into ore passes
- Two lift SLC with three underground crushers
- Four levels in production
- Two levels in development
- Average of four “chickens feet” per level



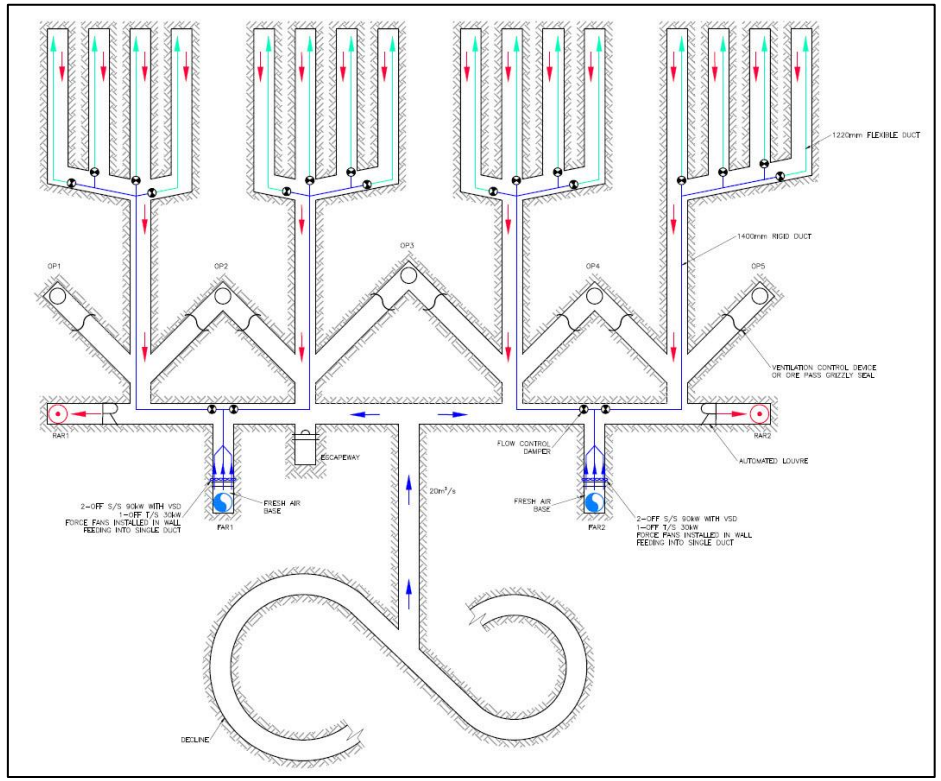
Production Level Ventilation

- Maintain RnDP below 2µJ/m^3
- 2m^3/s continuous flow required
- Impractical to maintain
- Flushing cycle strategy
- VoD system reliant



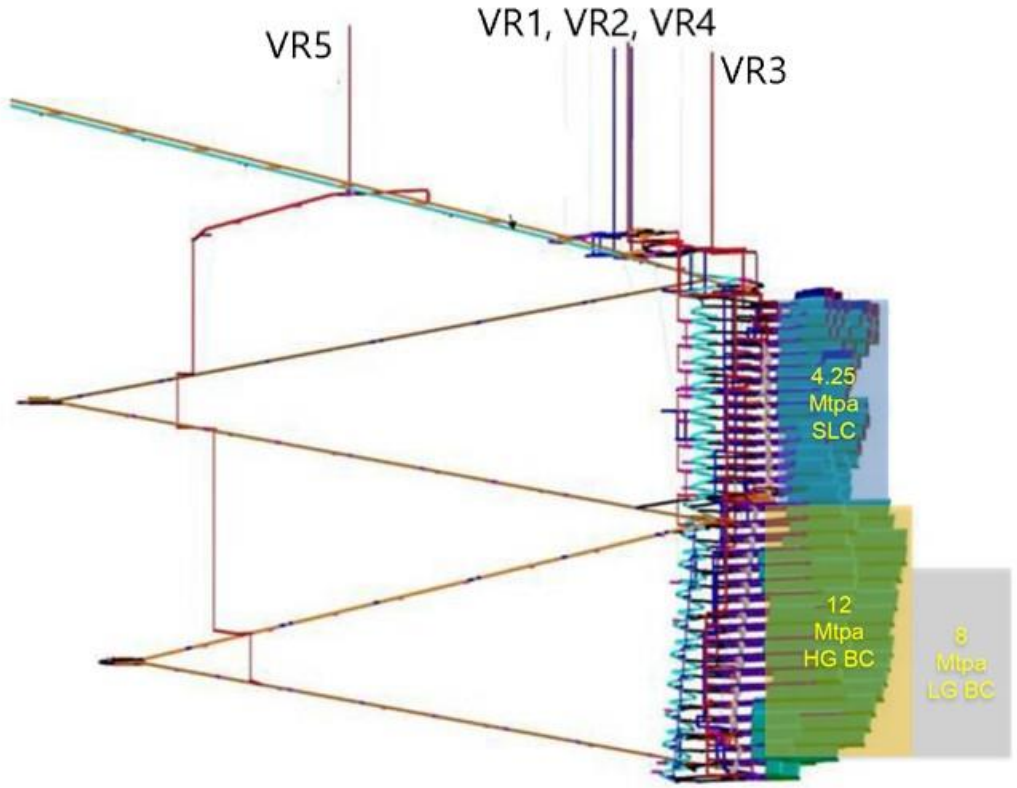
Ventilation on Demand Strategy

- Variable / dual speed fans
- In-duct flow control valves
- Automated exhaust louvres
- Air quality monitoring
- Equipment tracking
- Pressure differential sensors



Features of the mine – Future block cave

- Increase production to 12Mtpa
- Apex, Undercut and Extraction levels
- El Teniente extraction level layout
- Dedicated exhaust ventilation level
- Peak airflow during development and construction ~1000m^3/s



Transitioning from an SLC to a BC

Minimize flow through the cave

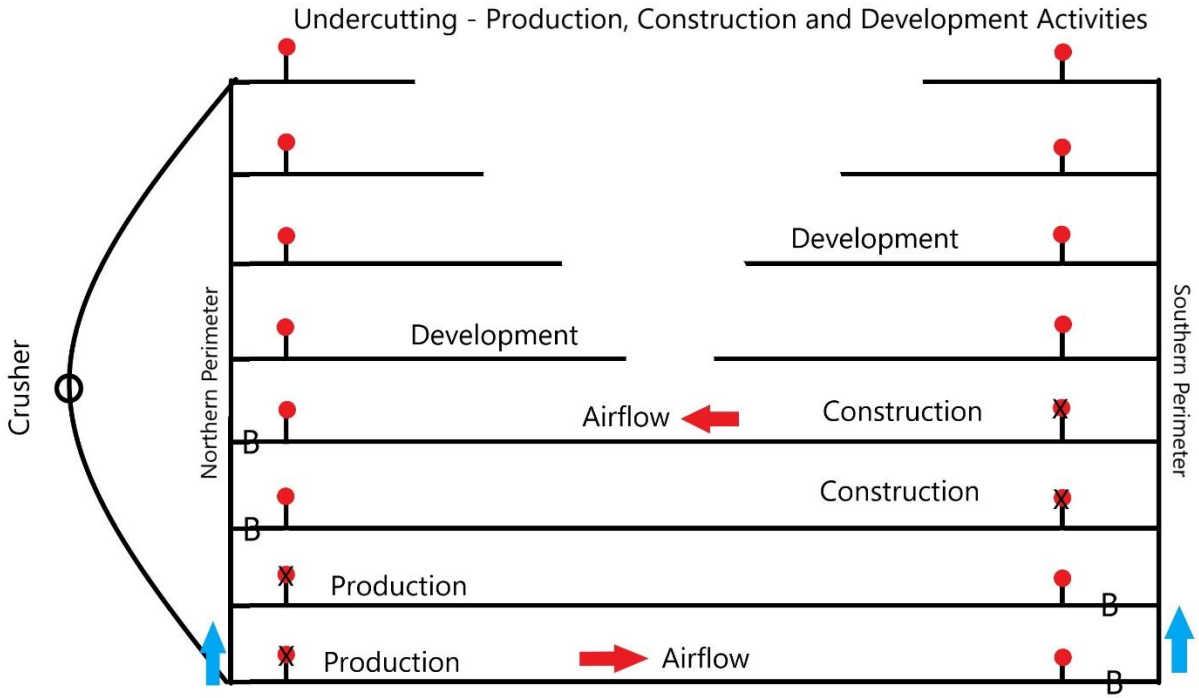
- Manage connections to the ventilation system
- Barricade connections to the cave where possible

Manage pressure gradient

- Manage pressure gradient across the cave to discharge radon to non-working areas (not the Undercut and Extraction levels)

Block Cave Development

- Multiple short raises
- No daisy chain or series ventilation
- Ability to flip exhaust direction
- Provision for additional 8MW$_R$ during development



Conclusion

- Initial 4.3Mtpa SLC transitioning into a 12Mtpa Block Cave
- Push-pull ventilation strategy
- Positively pressurise levels to manage leakage from cave
- High VRT's and Radon Management Key Ventilation Drivers
- Radon management during cave development requires a flexible system
- VoD systems to design a "mine-of-the-future"

Any Questions??