



Underground Refuge Chambers





Company Overview

- MineARC Systems is involved in providing solutions to underground safety requirements specialising in the mining and tunnelling industry
- They are the world's leading developer and manufacturer of underground Refuge Chambers and have pioneered the carbon monoxide scrubbing system for underground use.





Major Customers

- Anglo
- Barrick
- CSA Mines
- Dominion Mining
- Donegal Resources
- FMI – Freeport Mining (Indonesia)
- Goldfields Australia
- Irish Salt Mines
- Lionore Australia
- Mincor
- MPI Mines
- Newcrest Mining
- Newmont Mining
- Nishimatsu – Dublin Port Tunnel Project
- Placer Dome
- Sir Samuel Mines
- Solid Energy (New Zealand)
- Tasmania BST
- Western Metals
- WMC Resources



MineARC Around the World



- Located around the world in Ireland, Sweden, Turkey, Canada, South America, Papua New Guinea, Indonesia and all of Australia.
- New Zealand at Huntly Coal Mine.



Coal Mining Refuge Chambers

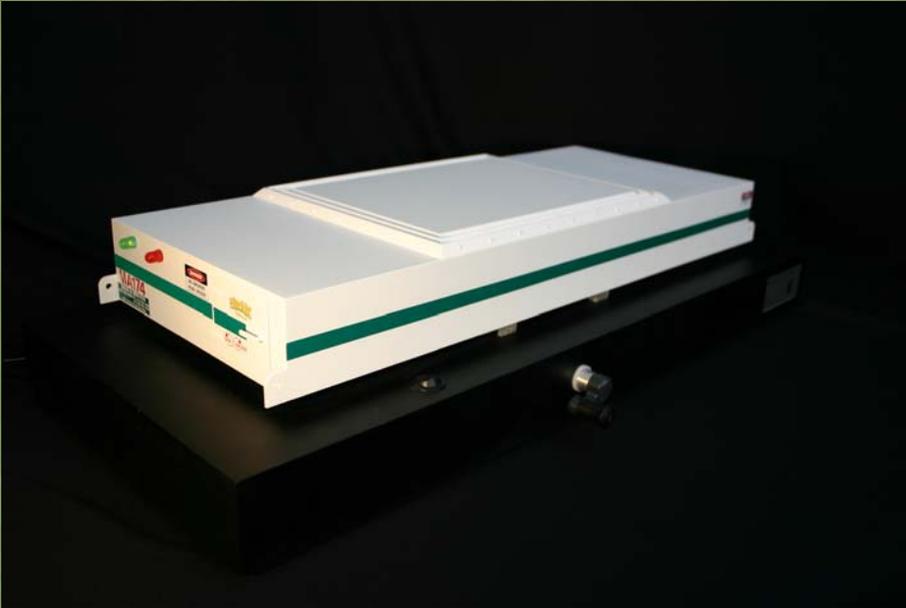
- Two units designed.
- Currently in manufacture within Australia.
- Approval to be sought in Australia and MSHA concurrently.
- Delivery to the US within 4-6 months (dependent on MSHA approval process).
- Manufacture within the US (state government joint venture?).

CRM64





CRM24



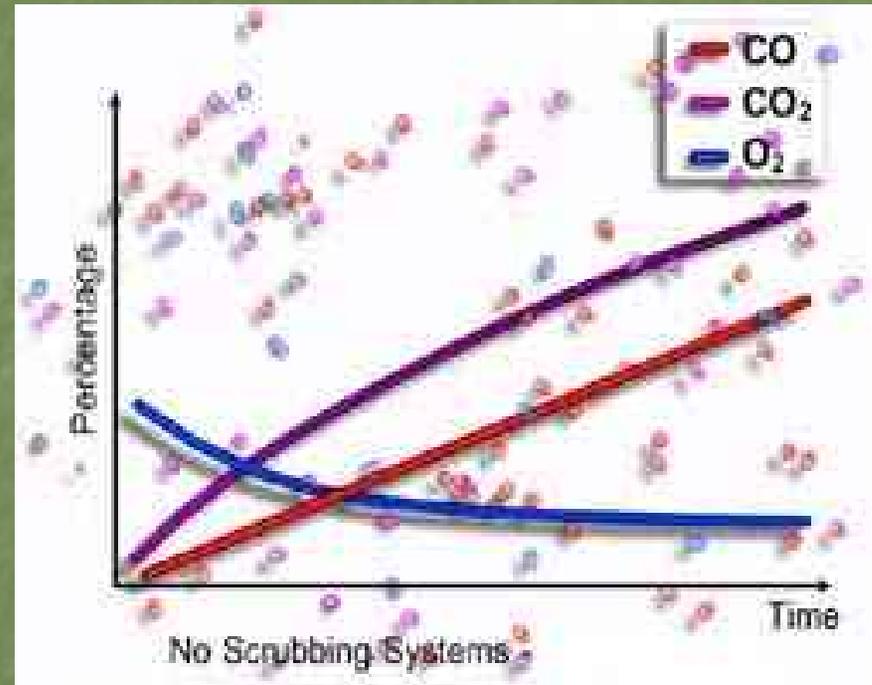


Scrubbing System

- The CO₂ and CO Scrubbing system is in a self-contained unit designed to clean air in confined spaces where human life needs to be supported over a period of time, such as in Mine Refuge Chambers.
- The purpose is to remove the Carbon Dioxide (CO₂) and Carbon Monoxide (CO) from the air in the Chamber, reducing the risk of Carbon Dioxide and Monoxide poisoning, which can result in loss of life.

Why CO Scrubbing?

- Endogenously produced CO from occupants.
- Cigarette smokers exhale around 20 ppm
- In 10hrs CO will reach 0.2% which is lethal (15 man chamber)
- Patented by MineARC systems.



Air Systems

The chamber is fitted with two separate breathing air supply system:

- Medical Oxygen Cylinders regulated for the number of occupants.
- Oxygen Candle





Electrical System

- Intrinsically safe and designed to run on mine power in stand by mode.
- Once the mine power fails a UPS battery back up system will automatically run the unit for durations of 36-96 hours.
- Air conditioning system as occupants will produce heat and scrubbing is an exothermic reaction (high temperature air conditioning).

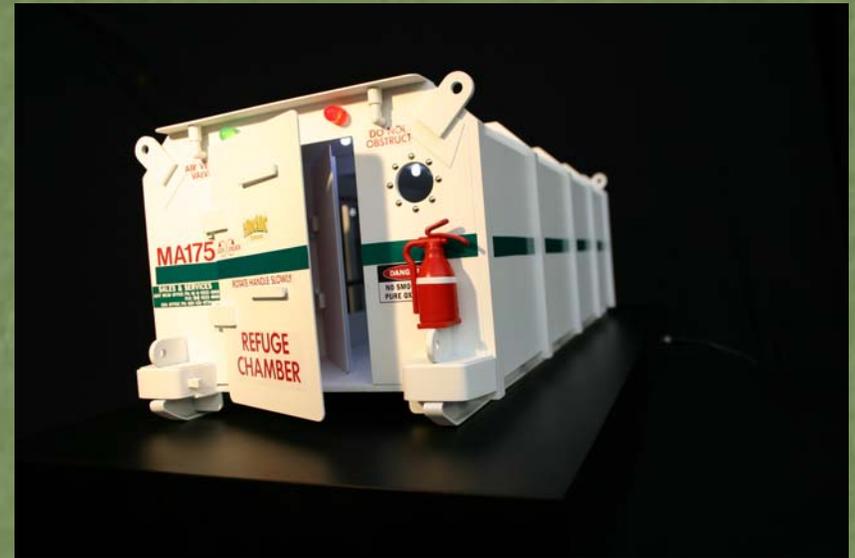
Airlock System



- Ensures occupants can enter the chamber without contaminating persons in the chamber.
- Pneumatic system with binary locking system.

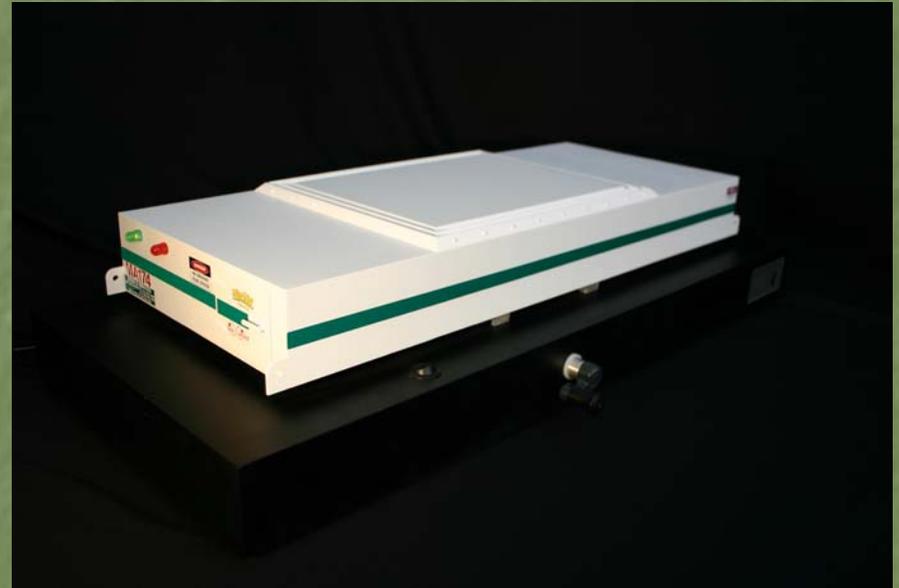
CRM64

- 64" overall height
- Constructed of ¼" steel plate and 4" PFC reinforcement.
- Fitted with a skid base and towing and lifting points (steel wheels optional).
- Internal and external real time gas monitoring CO CO₂ & O₂.
- Temperature monitoring



CRM24

- Hydraulic telescopic roof 24"-72"
- Constructed of ¼" steel plate.
- Fully automated closed circuit scrubbing system.
- Fitted with steel wheels for towing.
- Internal and external real time gas monitoring CO CO₂ & O₂.





Fire Rated Units



Fire Rate Refuge for 20
person @ 2000° F for
120 minutes



Fire Rated Units



- 4" Rockwell Fire Rated Panels
- Steel Fixings Every 4"
- Steel External Skeleton Structure
- Coating ¼" Intumescent Paint Expanding 2" @ 2000°F



Future Developments

- Video Camera images internal and external.
- Alarms for power disruption and operation to a central control module on the surface in real time and will be able to be overridden by the surface control unit (mines rescue).
- Voice communication through serial link with the Refuge Chamber control system.



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