Thompson: Strata Refuge Station Orientation

1. Tailings Operations Procedure

1.1 Thompson Strata Refuge Station Orientation

1.2 EMERGENCY REFUGE CHAMBERS (ERC)

EMERGENCY REFUGE CHAMBERS (ERC)

- **The Strata ERCX is designed to provide safety and breathable air in the event that the quality of the air in the working section has become compromised and escape is not an option.**
  - They are intended for use in emergency situations ONLY!
  - Do not remove any material from inside the chamber
  - Proper care, training and maintenance is essential
  - Do not tamper with during daily operations
  - Follow all instructions **carefully**

1.3 MAIN CHAMBER SYSTEMS

MAIN CHAMBER SYSTEMS

- Airlock entrance (if applicable) with private lavatory
- Mine air filtration system – Primary source of breathable air
- Compressed Oxygen, CO2 and CO Removal – Secondary source of breathable air
- Back-up power supply, air conditioning and LED lighting.
- Food and water to last full duration
- Seating and supply storage

1.4 AIRLOCK ENTRY (if applicable)

AIRLOCK ENTRY (if applicable)

- Entry area of the refuge chamber, sectioned off by a secondary steel door or privacy curtains. This prevents smoke, heat and contaminated air from entering the main chamber when the entry door is open.
- This airlock entry also includes the switch panel for lights and siren, a chemical toilet, first aid kit and optional CO gas detector.

1.5 PRIMARY BREATHABLE AIR

PRIMARY BREATHABLE AIR

MINE AIR & FILTRATION SYSTEM – Primary source of breathable air

- The filtration system cleans the mine air, removing oils, water and other compounds
- The air is released into the main chamber via a silencer to reduce noise level
- This system will provide breathable air as long as mine compressed air is available

1.6 PRIMARY BREATHABLE AIR

PRIMARY BREATHABLE AIR

CARBON MONOXIDE DIVERSION (if applicable)

- The Strata Carbon Monoxide (CO) Diversion System is a fully automatic system that monitors the quality of the air entering a mine refuge alternative
- The system automatically re-routes the air to the outside if CO is detected at dangerous levels

1.7 PRIMARY BREATHABLE AIR

PRIMARY BREATHABLE AIR

STRATA ACTIVEAIR™ SYSTEM

- Carbon dioxide removal via active scrubber
- Compressed oxygen cylinders supplied with special valve to control the amount of oxygen based on the number of occupants
- Carbon monoxide removal

1.8 CARBON DIOXIDE REMOVAL

BACKUP BREATHABLE AIR

- Soda lime chemicals are provided in sealed, easy to use cartridges that remove human produced CO2
- Electrically powered fans circulate the air in the chamber through the cartridges
- Operating instructions and change-out charts are located inside the chamber

CARBON DIOXIDE REMOVAL

1.9 BACKUP BREATHABLE AIR

BACKUP BREATHABLE AIR

CARBON MONOXIDE REMOVAL

- Stand-alone battery powered catalytic converter to remove CO from the environment
- It is magnetically mounted on the wall of the chamber near the CO2 scrubber
- Simple On/Off switch located on unit

1.10 ATMOSPHERIC MONITORING (if applicable)

ATMOSPHERIC MONITORING (if applicable)

- ActiveAir Scrubbers are equipped with two Sentro1 gas detection units
- The sensors are built into the scrubber body where they automatically and continually monitor air quality inside the chamber
- Handheld monitors will require a manual reading of the atmosphere
- If gas levels rise or fall to dangerous levels, alarms will alert occupants and necessary adjustments can be made

Strata ActiveAir ™ Scrubber with atmospheric monitoring

1.11 ATMOSPHERIC MONITORING (if applicable)

ATMOSPHERIC MONITORING (if applicable)

PRIMARY POWER SUPPLY

- Chambers are attached to mine power via a transformer
- Powers the lighting, air conditioning and CO2 scrubbing systems
- Electrical panel inside chamber indicates mine power availability

1.12 SECONDARY POWER SUPPLY

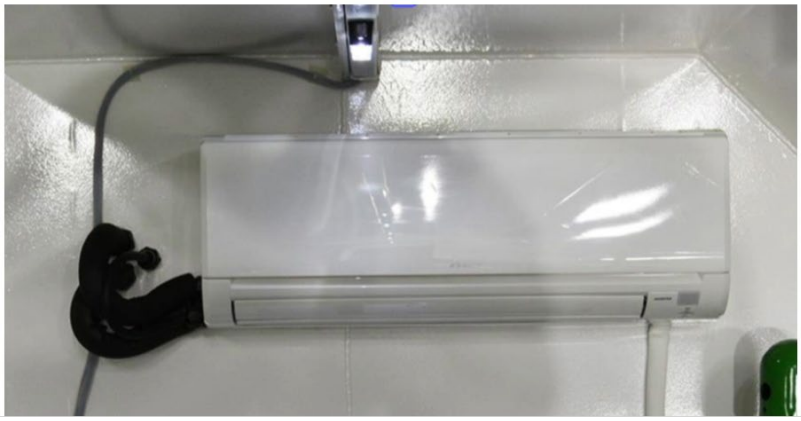
SECONDARY POWER SUPPLY

- If mine power is lost or unavailable, chambers are equipped with battery back-up to power electrical systems
- Electrical panel inside chamber indicates when chamber is running on back-up power
- Back-up power is designated for a period of time ranging from 12 to 96 hours depending on customer specifications

1.13 AIR CONDITIONING (if applicable)

AIR CONDITIONING (if applicable)

- Heat and moisture produced by human occupants and the CO2 scrubbing process can create an uncomfortable environment for occupants. Chambers are equipped with an industrial grade, AC powered Air Conditioning System with dehumidifying controls



1.14 LIGHTING

LIGHTING

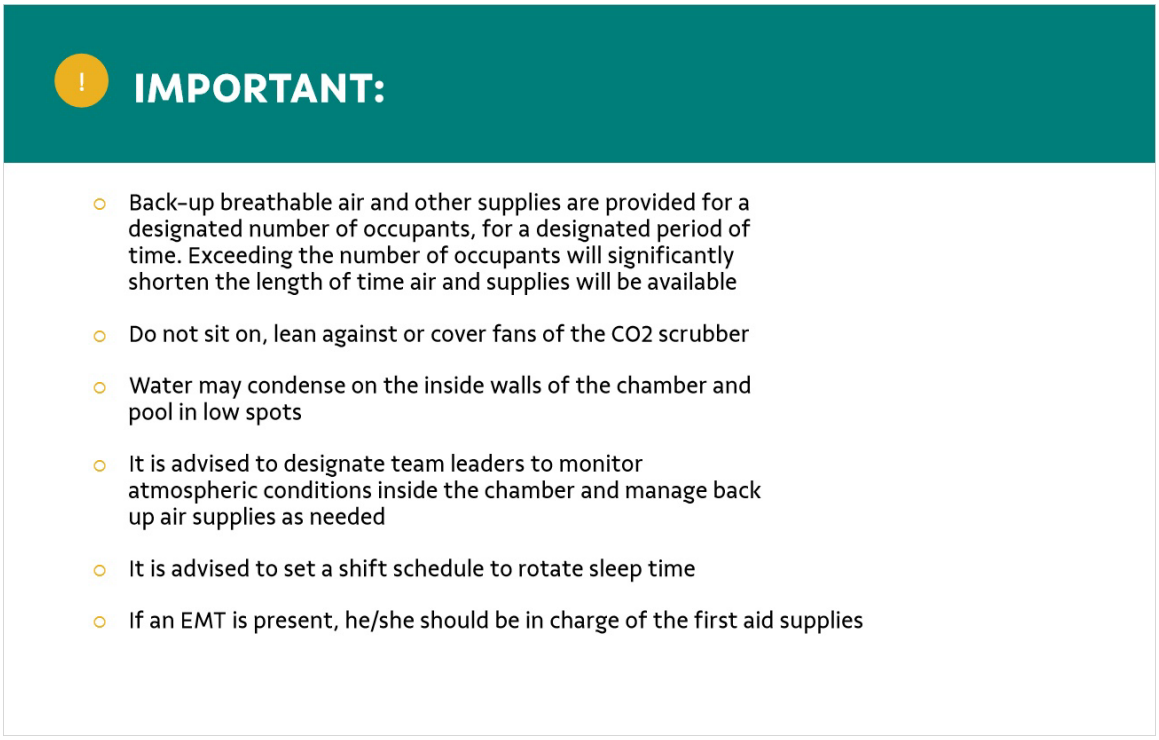
- Chambers interior are equipped with low power consuming LED lights
- One blue LED light is mounted on exterior wall above entrance door to indicate the chamber has been activated
- One red flashing LED light is mounted on exterior wall above entrance door to assist in locating the chamber

1.15 CHAMBER SUPPLIES

CHAMBER SUPPLIES

- Emergency, long-life food and water is provided for designated period of time
- First Aid Kit
- Chemical toilet in Airlock compartment with privacy curtain
- Radios compatible with mine system can be installed
- Food, water and soda lime cartridges are stored under the seats

1.16 IMPORTANT



1.17 OPERATIONAL MANUAL

Operational Manual

1.18 HANDLING & LIFTING

HANDLING & LIFTING

- Chambers are equipped with lifting lugs, forklift slots and optional towing packages
- All (4) lifting lugs should be used to distribute the weight
- The center of gravity will be behind the midpoint, toward the battery end
- The lugs on each corner, near the base of the unit can be used for pulling/dragging the unit

CHAMBER TRANSPORT

- Ensure all gas cylinders are turned off
- Ensure all cylinders and batteries are strapped in place securely
- Place any loose equipment (gas monitors, toilet, first aid kits, etc.) beneath the seats
- Securely close both internal and outer doors

1.19 HANDLING & LIFTING

HANDLING & LIFTING

LOCATION & POSITIONING

- Chamber placement is pre-determined and plotted on a mine map
- Position the chamber and attach electrical and compressed air sources as applicable
- The battery end of the chamber must have a minimum clearance of 3 feet (1m) on both sides, as well as 6 feet (2m) at the end. This will allow for efficient air circulation around the air con units as well as easy access for maintenance
- Ensure the escape hatch is unobstructed
- Remove the towing hitch (if equipped)

! **IMPORTANT:** (Very important as the main access door may not open if tow hitch is attached)

1.20 CHAMBER OPERATION

CHAMBER OPERATION

INITIAL ENTRANCE

- Upon entry into the air lock, turn on overhead lights and push to turn on the chamber power, activate the emergency siren and external flashing light
- Flashing light and siren should remain on until all miners have located the chamber
- Continue to wear your SCSR and turn off cap lamps

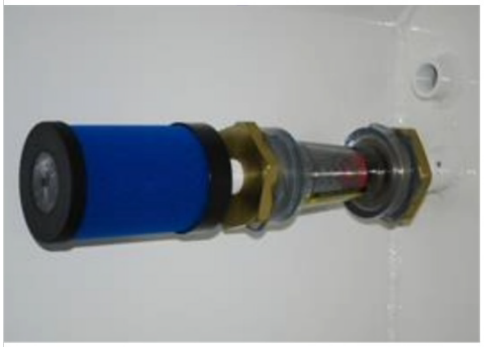
1.21 CHAMBER OPERATION – AIRLOCK USE IF APPLICABLE

CHAMBER OPERATION – AIRLOCK USE IF APPLICABLE

- Fill the Airlock compartment with as many people as possible and shut the main entrance door
- Activate mine air by turning valve in line with blue hose
- Open interior secondary door or push through the plastic Airlock curtain to enter the main chamber
- Close the interior door or curtain before reopening main entrance to admit additional occupants
- Measure air quality
  - *If safe for breathing remove SCSR units and breath normally and calmly*
  - *If unsafe for breathing continue to wear SCSR units while mine air flushes through the chamber*
  - *Recheck air quality until safe for breathing*

1.22 BREATHABLE AIR

BREATHABLE AIR



- Mine air flows through the filter system into the main chamber via a silencer
- A loud hissing sound can be heard as long as air is flowing
- If the hissing sound ceases, mine air has stopped flowing and the back-up air system must be activated
- If the Strata CO diversion system is installed and CO concentration in the mine air exceeds 50 ppm, the system emits alarms and re-routes the air outside
- The CO diversion system will continue to monitor the mine air. If CO concentrations drop to a safe level, the mine air will be re-directed back into the chamber

1.23 BACKUP BREATHABLE AIR SYSTEM

BACKUP BREATHABLE AIR SYSTEM

- If mine air stops or has to be shut off, do not panic. The air in the chamber is sufficient for a period of time while back-up air is activated
- Instructions for operating the ActiveAir ™ system are clearly printed on or above the scrubber

1.24 STRATA ACTIVEAIR ™ OPERATION

STRATA ACTIVEAIR ™ OPERATION

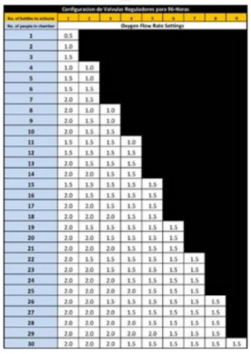
1. Watch for sharp angles of large waste rocks on roads that could puncture tires or damage vehicles.
2. Set oxygen flow rate on each bottle according to the number of occupants in the chamber. Refer to the Oxygen Valve Settings Chart
3. Open the valves on the oxygen cylinders slowly by turning counterclockwise
4. Locate soda lime under seats and unwrap two (2) soda lime cartridges and place on top of the scrubber
5. Turn scrubber on with ON/OFF switch- this will automatically turn on the soda lime change-out timer
6. Set the timer according to the number of occupants by turning the dial. If additional people arrive at the chamber, simply adjust the timer to reflect the new number of people in the chamber. The timer will alarm when soda lime needs to be changed.

1.25 STRATA ACTIVEAIR ™ OPERATION

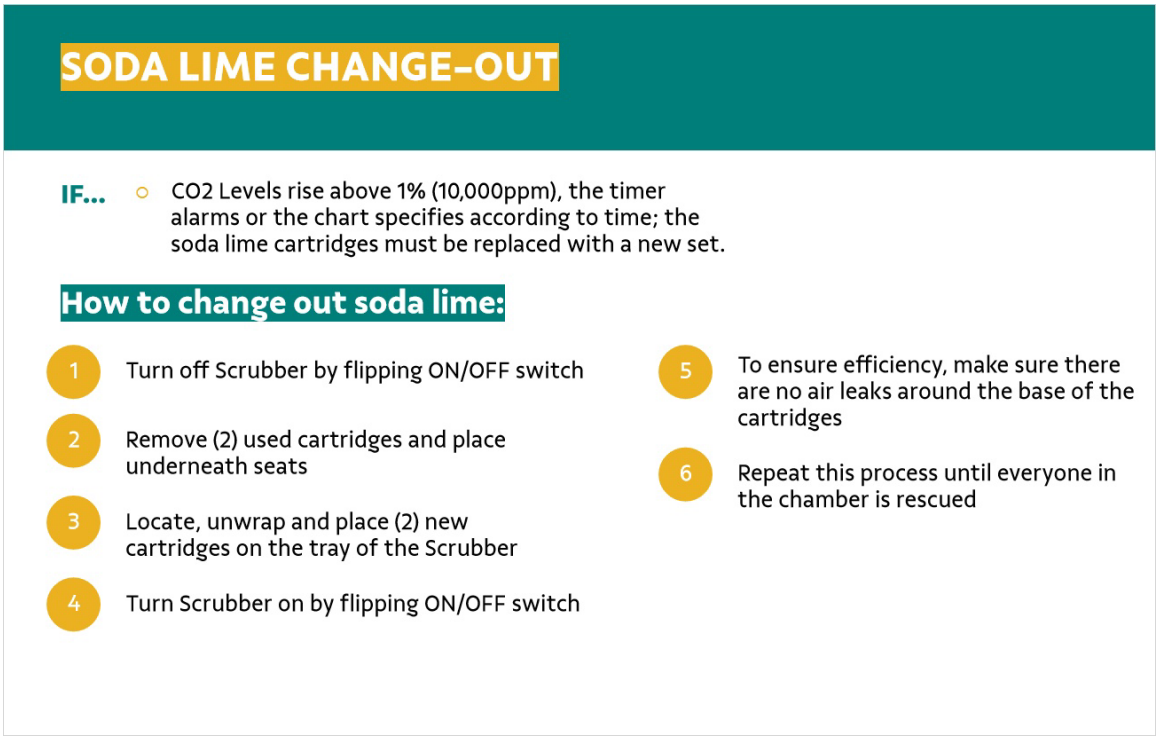
STRATA ACTIVEAIR ™ OPERATION

PLEASE NOTE:

- Oxygen levels must remain between 19.5% and 22%. Monitor air quality and adjust oxygen levels on cylinder flow meters as needed.
- If equipped, the scrubber sensors will alarm when either CO2 or O2 levels are not in the acceptable range
- Once people are settled and the level of activity decreases, the oxygen flow rate will need to be reduced to avoid an oxygen enriched environment
- Levels below 18.5% cause oxygen deficiency.
- Levels over 23% can create a dangerous fire hazard

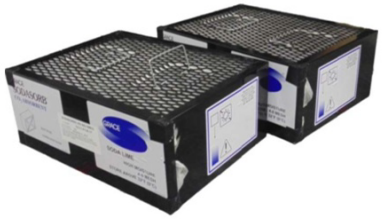


1.26 SODA LIME CHANGE-OUT



1.27 TROUBLESHOOTING – CO2 SCRUBBER

TROUBLESHOOTING – CO2 SCRUBBER



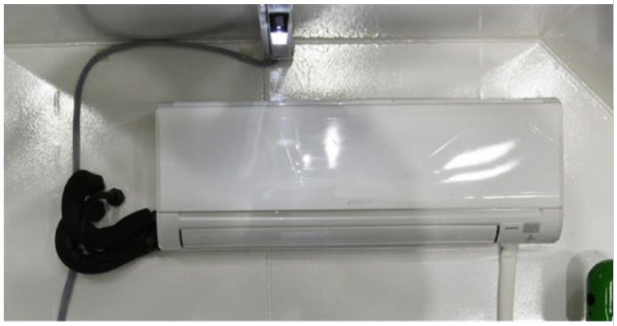
- In the unlikely event that the scrubber stops working, soda lime can be spread on the floor to absorb CO2
- Circulate chemicals frequently to maximize absorbency
- To remove the soda lime from the cartridges use the provided screwdriver to unscrew the metal frame from the soda lime

1.28 ACTIVATING AIR CONDITIONING

ACTIVATING AIR CONDITIONING

- For operation press the emergency operation switch on the unit.
- Press same switch to cycle through settings
  - *Cool*
  - *Heat*
  - *Off*

Default Settings
Temp: 75°F (24°C)
Fan Speed: Medium
Horizontal Vane: Auto



IMPORTANT: **Moisture removed from the air will be collected in the AC units and piped out of the chamber through clear plastic tubes. Make sure these are not blocked**

1.29 CARBON MONOXIDE REMOVAL

CARBON MONOXIDE REMOVAL

- If equipped, the CO Converter is mounted on the wall above the CO2 scrubber
- Once you have activated the CO2 Scrubber and AC unit, turn the CO Converter on by flipping the ON/ OFF switch. A green light will illuminate indicating the unit is operating
- The unit will run continuously while the chamber is occupied

1.30 EMERGENCY ESCAPE HATCH

EMERGENCY ESCAPE HATCH

- If the main chamber door gets blocked or damaged, an emergency escape hatch can be used to exit the chamber
- Turn handle to release latch and pull the escape hatch towards you

1.31 WHEN INSTRUCTED TO SAFELY EXIT THE CHAMBER

WHEN INSTRUCTED TO SAFELY EXIT THE CHAMBER

1. Turn Air Conditioning unit off
2. Turn Strata ActiveAir System off
3. Close oxygen cylinder valves
4. Turn mine air lever to OFF position

1.32 Tailings Management Area Roads

PLEASE NOTE:

- Strata Worldwide is a global leader in the design and construction of mine refuge chambers
- The basic information provided herein is issued to assist and instruct people on the operation of the Mine Refuge Chambers.
- This information is supplied in good faith and subject to our general terms and conditions.
- Our products are built with the highest-level quality and reliability. We ensure ease of use and minimal maintenance.
- We utilized high quality materials and fittings in both mechanical and electrical components and these will provide many years of service.
- All customer input is considered important and included as continued improvement