



# BCD Resources (Operations) NL Tasmania Mine

## Site Underground Safety Induction



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## WELCOME

Employees undertaking this induction should have first completed:

- The “TIMI General Safety Induction”, **and**,
- The BCD Resources Surface (Mine and Mill) Induction, **and**
- The “TIMI” Underground Induction”.

The contents of this Underground induction are specific to the underground environment and build on the contents of the Surface Induction.

The underground environment is a totally new experience for the new employee with its own special and unique challenges.

It is essential that all employees working underground at BCD Resources learn, follow and understand the contents of this manual to protect themselves and the welfare of others from possible hazards in our mining environment. It is your Duty of Care to do so.

*General Manager*

## OVERVIEW

Underground access is by winder down the Hart shaft from the surface (dimensions are 5.0 metres by 3.0 metres) to the 375 metre level.

The decline commences South of the 375 plat and has a gradient of 1 in 8. Fresh air to the underground workings is via a fresh air shaft which is located adjacent to the Chinese restaurant in the main street.

## TAG BOARD PROCEDURE

**ALL** persons going underground **MUST** tag in at the Surface Tag Board and place their tag on the **Red** Surface Tag Board and remove it when returning to the surface

The **Red** tag board is divided into **D/S and N/S**. Tags will be placed onto appropriate section (no numbered place on surface tag board).

Upon completion of the winder driver's shift he will check the tag board and close his **D/S or N/S** section by turning the Perspex shield up or down, then report to shift supervisor any tags left on that section.

The supervisor shall communicate with those still tagged on and ensure their safety.

The Surface Tag Board is at the Hart Shaft. If the FAR shaft is used the Surface Tag Board at the Hart Shaft is still used.

In addition to the Surface tag board BCD Resources has a two tag boards at the 375 meter level and the 700 metre level, and you must also tag on at each tag board when proceeding beyond this point and remove each tag when you return to above that specific board. At times further tag boards may be used. You will be advised of this when completing the tag board procedure MIN\_SWP-0080.

The underground board/s is used in the same way as the surface tag board.

**YOU MUST BE AT OR ABOVE THE DESIGNATED FIRING POINT LEVEL TAG BOARD AT FIRING TIMES.**

As part of your induction pack you will be provided with a card advising both the day and night shift firing times.

**SHORT TERM CONTRACTORS / VISITORS**

As part of entry Underground YOU ARE REQUIRED to fill in the '**Sign-In**' book before entry and upon exit of the mine EACH day.

This is located at the gate office - **NO EXCEPTIONS.**

As a site entry requirement all personnel are required to conduct a self test for alcohol upon entry to site each day and sign the declaration that they have a reading of 0.00. They must also comply with any request for a drug test or belongings check from staff.

All contractors must contact the Shift Supervisor when entering the mine.

**Note:** The StepBack process can and should be used when entering a workplace underground.

**EXPLOSIVES**

**Tasmania Mine complies with state Security Sensitive Dangerous Substance Legislation 2009. Therefore no person is allowed to come within 8 meters of explosives unless they are a certified Responsible Worker by Workplace Standards or are under the direct supervision of a responsible worker.**

**No person shall place detonators into explosives unless they are a ticketed Shotfirer or are under the direct supervision of one.**

Explosives are used daily in our mine as part of the mining process. We also store explosives throughout the mine.

- Smoking is not permitted around explosives or in company vehicles or buildings.
- Do not use radios other than mine issue units. Keep all non-vehicle mounted radios at least 15 metres clear of explosives and magazines.
- Mobile phones must be turned off on our site other than in site offices. Cameras are not to be used near explosives.
- You must tag on at the surface tag board whenever entering the mine. If you proceed below any tag board you must tag on. The reverse applies if passing above the tag boards.

- No other person is to touch your tag. Do not move any other person's tag. It indicates you may be in danger.
- We fire at set times. You must be at or above the designated firing point level tag board at firing times.
- Do not leave the crib room unless approved by the Shift Supervisor. Explosive gases are harmful to your health.

**Note:** As part of your induction pack you will be given a separate card showing our current firing times.

**YOU MUST BE AT OR ABOVE THE DESIGNATED FIRING POINT LEVEL TAG BOARD AT FIRING TIMES - NO EXCEPTIONS!**

### **PERSOANL EQUIPMENT & CLOTHING (PPE)**

The BCD Resources mine is considered humid. However, long sleeves are required as a condition of employment. Tearing sleeves off shirts and overalls is a disciplinary offence.

DO NOT rip off sleeves. The freshly fired rock is sharp and breaks with angular fractures = cuts!

### **VENTILATION**

At BCD Resources keep the vent bag **15 metres** to the face.

The primary ventilation airflow is drawn into the mine through the Fresh Air Rise (FAR) Shaft (approximately 70%) and Hart Shaft (approximately 30%) by a fan mounted in the North Drive on the 375 level.

Exhaust to the surface is through the Return Air Rise (RAR) exhaust shaft behind the Council offices and Backfill Plant. The fan must never be turned off unless authorised by the Underground Manager.

When the fan is operating there is approximately 125 cubic metres of air / sec air movement being drawn through the mine via the FAR and Hart shafts.

Underground workings require continuous ventilation to prevent hazardous build-up of dust, fumes, heat and carbon dioxide gas (CO<sub>2</sub>).

Where ventilation duct is used it must be installed to within 15 metres of the face in the heading.

The Ventilation officer conducts monthly checks and instructs supervisors on how many machines are allowed in a level or stope area.

Do not run other machines above the vent system allowable level, otherwise a build-up of fumes can occur.

Do not enter into old or unventilated areas. Do not leave diesel engines idling for long periods as this adds to the fume and heat load.

## **MINE EVACUATION – VENTILATION FAILURE**

In the event of a power failure which causes failure of the mine ventilation system, heavy underground diesel equipment is to be parked up and all personnel report to crib room and await further instructions. Report to your Shift Supervisor.

**In the event of re-entry following an auxiliary fan being turned off for a period of time refer to “Ventilation Re-entry Procedure” MIN\_SWP\_0081**

## **DUST**

Every effort must be made to reduce Silica Quartz and Respirable dust and maintain the quality of air. The best way to stop dust is to water down.

## **UNDERGROUND GASES**

The BCD Resources Beaconsfield Gold Mine has suffered from the presence of “Bad Air” or Carbon Dioxide (CO<sub>2</sub>) in the Underground workings since mining began in the 1870s.

This Carbon Dioxide gas is generated by the reaction between slightly acidic water and the surrounding limestone and alkaline rock and flows into the mine from fresh excavations and the old workings.

Therefore high readings of carbon dioxide may be expected whenever old workings are first opened up or when a low pressure weather system is over Beaconsfield. (This decreases natural ventilation and allows carbon dioxide to flow out of the country rock).

Carbon Dioxide is an odourless, colourless gas and is heavier than air. Its presence should be suspected in any sump, shaft bottom or dead end (or decline face) where there may be little air movement, and whenever there is a dank or musty smell. High concentrations of Carbon Dioxide will cause a faster breathing rate, faster pulse rate and dizziness.

The only sure way of knowing if Carbon Dioxide is present or not is by use of a gas monitor which has a Carbon Dioxide detector. However it must always be suspected whenever there is a musty or dank smell in the air, or in areas where there is very little or no air movement.

Numerous studies have shown that a person will suffer no ill effects while working in an atmosphere of up to 5000 parts per million of Carbon Dioxide i.e. 0.5%. This figure of 0.5% has been taken by the Mines Department as the limit in which persons may work for 8 hours per day, every day of your working life.

The main danger associated with Carbon Dioxide is that it displaces and replaces the Oxygen in the air so that there is less Oxygen to breathe. At concentration of 10% or more, Carbon Dioxide can cause unconsciousness.

It is important to remember that CO<sub>2</sub> gas is heavier than air, and will therefore accumulate in low areas, such as sumps, pits, shaft bottom and decline face.

If a person is injured and falls into a low area with potential for the presence of gas, this means that an unconscious person is in a greater danger of dying. Where such an incident occurs the person must be removed from the accident scene with the aid of a Self Contained Self Rescuer (e.g. Oxybok).

**The gas gives no warning of its presence at these concentrations and a worker may enter a confined space and be overcome before they become aware of the danger. For this reason gas monitors are kept in the crib room to be used to check gas levels and concentrations.**

When using gas monitor if any of these monitors flash red, or the red light stays fully ON and an audible alarm sounds, there is a hazardous gas level or low oxygen level. Retreat and report this immediately to your Shift Supervisor.

### **Carbon Dioxide Level Indicating Lights**

There are barometric pressure light indicators onsite to aid in identifying when weather conditions are influencing CO<sub>2</sub> gas levels onsite. These are situated above the surface tag board, at the 375 Plat area and in the 375 crib room.

These indicate:

- RED Light – A low barometric pressure system is over the area, CO<sub>2</sub> levels may be increased and should be checked.
- AMBER Light – The barometric pressure is changing and CO<sub>2</sub> levels may change.
- GREEN Light – A high barometric pressure system is over the area and CO<sub>2</sub> levels should be lower.

Low barometric pressure affects the mine conditions as the reduction in air pressure allows CO<sub>2</sub> to flow freely from the rock and old workings. On the same principal high pressure will slow the flow from these areas.

### **Work Practice**

To reduce the hazards of Carbon Dioxide and other gases the following work practices must be adhered to:

- A Self Contained Self Rescuer (e.g. Oxybox) must be worn at all times.
- Ventilation must be kept well up to the working face.
- The air in any low area or unventilated area must be suspected of a high Carbon Dioxide (CO<sub>2</sub>) level and should be avoided until a gas test has been conducted.
- NO ENTRY into unventilated old workings.

## SHAFT USE & WORK

Access to the underground workings is via the Hart shaft by means of a Conveyance that is called a “skip” or “cage” and is made up of three sections that consist of: -

### 1. Skip

which is the lower section that is used for hauling rock

### 2. Cage

which is the middle section that is used to transport personnel and equipment.

### 3. Maintenance Platform

which is used for working off when doing shaft maintenance and repair. This is PLACED onto the top of the cage when required.

Movement of this conveyance is controlled by the Winder driver on receipt of bell signals that are given by the occupant by pushing the “RED or BLACK” mushroom button.

For the Hart Shaft this is located on Electric Signal Boxes that are located on the surface and all plats underground. For the FAR shaft the signal bell controller is inside the conveyance.

**NOTE: If the cage is NOT in sight and you need the cage, ring the Winder Driver on Phone “147” and discuss.**

**Never ring bells for cage to be lowered or raised to you unless first contacting winder driver. There may be people working in the shaft and your signal may be interpreted as those of the people working in the shaft.**

## Emergency

Ring 555 (or **222**) and give details

DO NOT ring the 12 accident signal followed by a level signal as workers may be on/ in the cage working and you could cause the cage to move with them in a hazardous situation

**No person shall operate the shaft signals until he or she has been trained, tested and authorized to do so and is in direct sight of the conveyance.**

Signals can also be given to the Winder Driver by pulling on the blue "knocker line" hanging in the shaft. However **this line is restricted to shaft inspections, maintenance or power failure.**

The signals used are displayed at each point of entry to the shaft.

SMOKING is strictly PROHIBITED while working in or travelling in the shaft.

## Man Hoisting

- Personnel shall only travel in the cage section of the conveyance unless specifically permitted for shaft work.
- All doors must be closed during travel.
- Conveyance hatch must be closed during travel when personnel are in the cage.
- Conveyance hatch must be closed during travel except as provided for long items.
- The cage floor must be clear of items such as slings, timber blocks, loose tools, debris, etc. for all man travel.
- Persons are not permitted to travel with equipment or material in the cage except;
  - Hand tools in containers
  - Crib boxes, personal bags etc.
  - A small number of long items sitting on the floor and contained within the roof hatch opening such that they cannot fall over and then only if securely lashed top and bottom to the ladder.
  - Tools for shaft work but with speeds limited to **2 m** per second.

**NOTE:** No part of the body to protrude outside the cage at any time whilst travelling.

## Shaft Work

All persons working in the shaft must be proficient in the use of the shaft code of signals. Workers must notify the winder driver prior to work commencing and establish radio communications. An explanation of the works to be carried out should also be given.

A hot work permit is required as per the “Hot Work Procedures” prior to any hot work in or near the shaft or Skyshaft.

No smoking, welding, oxyacetylene cutting, grinding or burning is permitted in or within 3 metres of the shaft without appropriate permits and procedures being followed.

All conditions as set out in the Hot Work Permit **MUST** be followed. The Hart shaft at BCD Resources is timber lined and the timbers must be kept wet. Failure to do so could lead to a catastrophic shaft fire.

All persons working on the top maintenance section of the cage must wear a safety lanyard and full body harness to prevent falls into the shaft.

## Code of Signals

A code of signals is displayed at the Surface Brace and at every level underground. The signals that are used at this shaft are as follows:

**Note:** You must be trained and authorised to use the shaft bells at the BCD mine.

<u>Number of Bells</u>	<u>Meaning</u>
1	Stop
<b>1 long (5secs)</b>	<b>Wrong signal; wait 5 secs then ring correct call</b>
2	Lower
3	Raise
4	Men on
5	Slung load under cage (usually 1 metre / sec)
6	Conveyance free, Can be used (ensure gates are closed as you get off)
8	Cage has materials in cage that is being transported
12	Accident
1    Pause	1    150 Level
1    Pause	2    180 Level
1    Pause	3    Vacant
1    Pause	4    300 Level
1    Pause	5    340 Level
2    Pause	2    Skip to Loading Position 375 L (Winder drivers only)
3    Pause	3    Skip is full, take to surface for tipping. (Winder drivers only)

All signals are to be returned by the winder driver to confirm that the correct signal was received. The driver then waits **5** seconds before obeying the signal.

**NOTE: If the cage is NOT in sight and you need the cage, ring the Winder Driver on Phone "147" and discuss.**

Having arrived at your destination or upon receipt of equipment and/or materials required, the conveyance **MUST** be freed by signalling **6** bells to the Winder driver.

**EMERGENCY: RING 555(or 222) and give details. DO NOT ring the 12 accident signal followed by a level signal (workers may be on/in the cage working and you could cause the cage to move with them in a hazardous situation.**

## Shaft Safety

### *The key points concerning safety are as follows:*

- Always give the correct signal.
- Prior to giving the signal think about where you are going.
- Listen for the return signal from the Winder driver; if the wrong signal is returned press **1** long bell then give the correct signal.
- When travelling in the Cage make sure that all body parts are inside the cage.
- If the Cage stops in the shaft for any reason whatsoever do not climb out.
- When entering or leaving the cage always close the door after you.
- Do not enter the cage until it has come to a complete stop and the winder driver sounds the one bell, stop signal.
- If leaving a plat underground, the plat gate **MUST** be closed.
- Secure all loads such that they cannot move during travel.
- Only those who have been tested and approved in shaft signalling are to operate the signals.
- You are not to travel in the conveyance alone if you are not authorized.
- Always remember to Tag In and Out as required.

**NOTE:** - When working in the shaft below the 375 sill, the winder driver must be notified before any activity commences.

## UNDERGROUND FACILITIES

Crib rooms have been installed underground at various levels. These have been equipped with the following:

- First Aid Kits and Stretchers
- Microwave Oven
- Refrigerator
- Tables and Chairs
- Electric Jug
- Lights
- Telephone
- Drinking Water (ensure it is potable water before drinking)
- Garbage Bins
- Shower facility at 700 level
- Washing facilities are outside the door.

All cribs and food items must be kept in the crib room and all scraps put in the garbage bin!

## Toilets

Toilets have been installed at various locations underground please ask their current locations.

Keep them clean and hygienic for all personnel.

It is a disciplinary offence to soil in a mine other than in a proper toilet.

## Telephones

Internal site telephones are located throughout the mine.

If phone lists fade or go missing advise your Shift Supervisor.

**DO NOT ABUSE THE PHONE**

**It may save your life!**

## Radios

The shaft and underground workings are equipped with a “leaky coaxial cable feeder” communication system which allows radio contact from the surface to most locations underground.

Only approved radios are allowed underground, as their power output is restricted to prevent initiation of electrical detonators.

**KEEP ALL NON VEHICLE MOUNTED RADIOS CLEAR OF ALL EXPLOSIVES AND MAGAZINES - AT LEAST 15 METRES.**

## First Aid Kits

First aid kits are **located on the surface and underground** at various locations including:

- Admin (main office) receptionist
- Winder House
- Main Workshop
- Crib Rooms
- Main First Aid Room
- Light Vehicles
- Refuge Chambers

**Always report all injuries no matter how minor** to the Shift Supervisor or First Aid Personnel prior to going off shift.

If you have used gear from the kits, inform the OH&S Department so it can be replaced.

## **Stretcher**

There are stretchers located at various locations throughout the mine and in Refuge Chambers.

## **Drinking Water**

Water from the general mine service lines is not suitable for drinking. Fresh drinking water is available at the underground crib rooms.

## **Safe Working Places**

Before starting work:

- StepBack 2 metres and 2 minutes- it is **Mandatory** to carry a stepback card on your person whenever you are underground.
- Ask yourself the 6 questions on the StepBack card

No person is to go past the last row of ground support. Shotcrete alone is not classed as ground support.

BCD operates a reference called TARPS (Trigger, Action, Response, Plan). It provides actions to follow in circumstances such as a seismic event and concerns over ground safety. These can be found in all vehicles and all cribsrooms underground.

## **REPORT ALL ROCK FALL & ROCK NOISE INCIDENTS**

## **BARRING & SCALING DOWN**

Whilst you need to assess the ground do not bar or scale down until you have received further training in the safe work procedure and have been assessed as competent. In the meantime if you identify ground that needs barring move away from the area, barricade, and speak with a person who is competent to do this task and have them bar down.

## **UNDERGROUND MOBILE EQUIPMENT**

Underground mobile equipment is a core risk for underground operations. Fatalities and high potential incidents have occurred throughout the industry involving underground mobile equipment. The causes and contributing factors to these incidents have been:

- Interactions between vehicles/pedestrians e.g. passing or, working close by
- Speeding
- Non-adherence to operating procedures
- Rolling and tipping over of vehicles
- Unplanned inadvertent movements of vehicles down inclines and slopes
- Operator error due to fatigue and substance abuse
- Poor visibility

Each piece of underground mobile equipment has a specific procedure for the safe operation, maintenance, pre-starts and competency to operate assessments.

### **Note to Contractors intending to supply own mobile equipment underground**

Under condition of your contract any underground mobile equipment must comply with minimum safety specifications that are set out in the "Traffic Management Plan" OHS-BMP-7120.

#### **Procedural Requirements**

Underground vehicles must only be operated by persons who have been trained licensed and found competent to operate that particular piece of equipment.

- Seat belts shall be used in all vehicles where fitted by all occupants.
- A formal risk-based selection and acceptance process shall be in place for all new (to site) and modified underground mobile equipment prior to commencement of work underground.
- Prestart checks for all underground vehicles will be conducted as per relevant procedures prior to operation of vehicles.
- Procedures shall be in place to ensure mobile equipment only operates on sufficiently stable surfaces and on gradients that are within the limits of safe operation.
- Dust control for roads, for haulage and tramming operations shall be in place.
- A maintenance and inspection program must be in place for all underground mobile equipment.

All lifting and elevating attachments should be lowered or secured in the parked position when not in use as per relevant procedure.

#### **Flashing Lights**

All vehicles underground will be fitted with orange flashing lights.

#### **Explosives Vehicles**

Explosives vehicles will be fitted with a blue flashing light in addition to the orange light.

#### **Speed Limits**

- Maximum speed limit for all underground vehicles is 25kph
- Vehicles travelling are to keep a minimum of 30m distance between other moving vehicles
- Road signage in place must be obeyed

## **Communications**

- All underground mobile equipment is to be fitted with two way radio communication prior to operation. Operator and pedestrians are to act and use radios in accordance with Radio Procedure MIN\_SWP\_0035 and specific instructions in equipment or pedestrian procedures.
- Horn signals are used for starting, moving forward and reversing:
- Sound horn once - to start engine
- Sound horn twice - to move forward
- Sound horn three times - to reverse (if the reversing beeper is not working)

## **Loading & Unloading of Vehicles**

Procedures are in place for all vehicles underground. Reference should be made to individual procedures as requirements are different for each load.

## **LASERS**

Lasers are used for guidance in long straight development and on some drill rigs. Most low powered lasers emit light in the form of a narrow light beam of low divergence (spread) many times brighter than the sun.

Lasers, if of sufficiently high power, may inflict damage to the eye or skin. This damage can result from direct viewing or from reflections from flat, mirror-like surfaces.

The lasers used in development by BCD Resources Mine are classified as Class 3A lasers.

Class 3A lasers may present a potential for eye injury due to:

- direct viewing when using optical instruments
- reflection from mirror-like surface when using optical instruments; or
- deliberate suppression of reflex action, including blink reflex, by a person. (holding eyelid open)
- Class 3A lasers do not represent an eye hazard from a diffuse (i.e. Flat, non-mirror-like surface) reflection, nor a skin or fire hazard from unintentional exposure.
- No person should to look directly into the laser beam.
- The laser beam must be switched off when not in use.

If an injury due to a laser is suspected the Shift Supervisor, First Aid Personnel must prepare a report of the circumstances.

## EMERGENCY, ACCIDENT OR CHEMICAL ALERT RESPONSE

Any person recognising an emergency, accident or chemical alert must immediately adhere to the following procedure:

- Take necessary precautions to protect yourself and your workmates from danger (put on self rescuers if necessary). If in any doubt as to the nature of the hazard, warn others and evacuate immediately.
- If possible make the area safe and eliminate any dangers to yourself, others and the casualty. Initiate DRABCD if safe to do so, or evacuate casualty to safety if safe to do so.
- If area is unsafe, secure the incident area to prevent entry to the area.
- Notify the winder driver by PHONING 555 or 222 (if using the radio call “**emergency, emergency, emergency**”) and be prepared to answer all questions clearly and concisely. Do not hang up until instructed. Do not panic; accurate information is essential.
- Remain by the telephone for verification — only call again if safe to do so.
- If safe, return to casualty.
- Use all available personnel to assist with duties.
- If area is unsafe, initiate evacuation procedure.
- IF UNDERGROUND – The Crib rooms at 375 Level and 700 Level are the main Safety Assembly Areas. However, in the event of fire, smoke or gas ingress the 700 crib room is NOT a refuge. The 375 Level has a Refuge Station. There are additional Refuges that are moved around, depending on where work is being done underground. You will be advised of the locations of these refuges and when they are moved.

**Note:** All persons entering underground MUST wear a Self Contained Self Rescuer (e.g. Oxybok).

Take note of the "**Emergency Oxyboks**" mounted in **designated Electrical stations**; these units have 30 to 45 minutes duration.

The Winder Driver activates the personnel warning system, (e.g. **stench gas** located at the Fresh Air Rise shaft and Hart Shaft) which is released into ventilation downcasts, along with radio warnings to personnel).

You will be issued with a card during your site induction which shows the location of all refuge chambers and oxybox caches.

**Call 555 (or 222) for any emergency**

**If you smell **stench gas** immediately stop work** and travel to your nearest refuge.  
If you are unsure of the danger put on your self-rescuer.

### **Activating the Refuge Chamber**

**Note:** The scrubber units and oxygen supply only need to be activated if the mine air supply fails.

Scrubber units in Refuge Chambers work on the principal of sucking in the room's air through chemical granules to absorb carbon dioxide and add pure medical grade oxygen. It sustains a normal atmosphere for many hours or days if necessary.

On receiving the evacuation signal personnel are to:

- Put-on OxyBok Unit (If necessary)  
Plug Oxybox on entering chamber to preserve it for later use if needed
- Proceed directly to nearest refuge chamber

**ONCE IN REFUGE CHAMBER FOLLOW THE INSTRUCTIONS ON THE WALLS  
OR SCRUBBER UNITS FOR OPERATION.  
THEN LIST ALL PERSONNEL IN THE CHAMBER BY FULL NAME AND WAIT TO  
BE CONTACTED FROM THE SURFACE BY PHONE OR RADIO.  
ATTEND TO ANY FIRST AID WITH THE REFUGE CHAMBER FIRST AID KIT.  
AWAIT INSTRUCTIONS**

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