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DOCUMENTS FOR WORK ABOVE 5.500 MASL.

CERRO CHAJNANTOR, SAN PEDRO DE ATACAMA

GENERAL MANAGER: Jim Blair

SIGNATURE_____

INSTRUCTIVE CCAT-002

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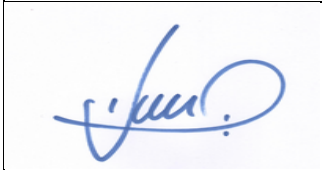
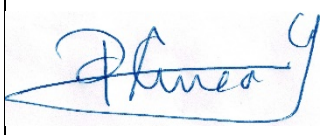
 Signature	 Signature	 Signature

1. Objective

To supply oxygen at a rate of 1 to 3 lts/min permanently to workers when exposed to extreme altitude above 5,500 masl as a mitigation method for hypoxia, physiological recovery, and prevention of altitude sickness. In this way, one of the requirements demanded in the Technical Guide on Occupational Exposure to Chronic Intermittent Hypobaria due to High Altitude, published by the Ministry of Health for work above 5,500 masl, is fulfilled.

2. Scope

This instruction must be known and complied with by all the personnel that directly or indirectly participate in the CCAT Project who carry out work at or above 5,500 masl.

3. Responsibilities

CCAT Management is responsible for requiring its workers and those of collaborating companies, contractors and subcontractors working on CCAT sites at or above 5,500 masl have a permanent individual oxygen supply and use it during the working day at that altitude.

4. Definitions

Extreme altitude: Geographical altitude equal to or greater than 5,500 masl.

Individual oxygen: Device that provides pure oxygen from cylinders, portable concentrators or backpacks, with flows between 1 and 5 lts/min, either through continuous flow or through demand valves. The oxygen reaches the subject by mask or nasal cannula.

Backpack or Transport Bag: The cylinder or portable concentrator must be inside a backpack or transport bag, with fasteners that allow the use of the upper extremities for work during the day.

Flowmeter: A device attached to the outlet of the oxygen cylinder or concentrator that controls the amount of liter per minute (flow) that leaves the oxygen supply source.

Oximeter, saturation meter: A device that measures the concentration of oxygen transported in the blood. It comprises sensors that are applied to a finger or ear, and by means of painless infrared light, measures how much blood is saturated with oxygen. The sensors send a signal to a microprocessor that delivers values to a screen, with two numbers, one large number indicating oxygen saturation in percentage (% O2) and another smaller number, indicating the pulse or heart rate. The reference oximetry values at 5,500 masl and in a seated position should be greater than 85%. By using an oxygen supply at 1-3 lts/min all workers must achieve figures equal to or greater than 85%. The reference value for pulse or heart rate is between 50 to 100 beats per minute.

5. Procedure

For workers over 5,500 masl, CCAT will provide its own personnel with an individual oxygen system. In turn, each contractor and subcontractor is responsible for providing individual oxygen to its own workers.

For this purpose, CCAT recognizes an authorized supplier of cylinders or oxygen tanks in Calama, which performs the filling of empty cylinders/tanks. Each company, as well as CCAT, will carry out the supply with this authorized supplier. Similarly, each company, or CCAT, will provide sterile cannulas or masks for individual use.
Empty cylinders will be deposited on specific transport and holding pallets to be sent to an authorized oxygen tank and cylinder filler supplier.

At the beginning of the shift, each worker will receive an oxygen cylinder in a backpack, as well as a mask or cannulas, with a setting of the flowmeter at 2 liters/minute. By means of an oximeter, an authorized person will verify that the oximetry (O2 saturation) of the worker is equal to or higher than 85% before going to work at high or extreme altitude.

CCAT will keep a daily record of the oxygen delivery to its workers. Similarly, each contracting company shall keep its own register.

As part of the Risk Prevention Program, CCAT and each contractor will include and conduct on-site inspections to verify that workers are using oxygen during working hours at or over 5,500 masl.

5.1 Control and supply of oxygen

In compliance with item 2 of item 17 in the Technical Guide on occupational exposure to chronic intermittent hypobaria due to high altitude, the following plan has been designed for the control and supply of individual oxygen by each CCAT worker. The same requirement will be mandatory for contractors and subcontractors to take the measures necessary to protect the health of all their personnel.

- Oxygen supply:
  Under normal conditions, a person will use between 1 and 2 tanks of compressed oxygen per day depending on the regulation per minute (1 lt/m, 1.5 lt/m or 2 lt/min). Therefore, in the site a sufficient stock of at least four (4) cylinders of individual oxygen per worker will be maintained ensuring there is adequate supply of oxygen available based on the projected work schedule and associated shifts. At the same time, two 6 m3 oxygen cylinders (mother tanks) will be maintained in the summit site recovery room, for which a record of use, maintenance, and replacement will be kept.

- Replacement:

  The oxygen cylinders will be continuously replaced every two days considering the transport, filling and replacement times by the company qualified to fill the cylinders. At the same time also considering to always maintain a constant flow of 1-2 cylinders per day of the personnel following the attached form in Annex 1. This is to ensure a sufficient stock of O2 is always available. This will be adjusted with experience.

- Oxygen Quantity Reference:

  The following table is a reference of quantities before the use of oxygen in the workplace.

Item	Total Quantity	Minimum Quantity	Recharge Period	Use per person
Backpacks	14	14	Upon use	1
Mother tanks	4	2	2 cylinders/month	Filling
Cylinders of 6 m3	3	2	When below 1,000 psi	Emergency Stabilization
Individual cylinder	40	20	Every 2-3 days	1-2 per day/person

- Control of availability of mother tanks and oxygen cylinders at the work site:

  A minimum stock control record will be maintained in the workplace and checked at least 2 times per week in order to assure the availability of an appropriate level of supply for all the workers present at the high elevation work site, and to ensure timely replacement in cases of critical stock. The control and verification form is Annex N°4.

6. References

Technical Guide on Occupational Exposure to High Altitude Chronic Intermittent Hypobaria, Sanitary authorization for works over 5.500 masl., page 20.

https://www.minsal.cl/sites/default/files/guia_hipobaria_altitud.pdf

7. Annexes

Annex 1: Individual oxygen delivery record and accessories.

Annex 2: Oximetry monitoring

Annex 3: O2 Mother Tank Supply Charge Control

Annex 4: Stock control of oxygen cylinders and tanks on site.

Annex 1: Individual oxygen delivery record and accessories.

REGISTRO ENTREGA DE OXIGENO Y ACCESORIOS

N°	Nombre y Apellido	Fecha	Hora Entrega	Mochila SI/NO	Posee Válvula SI/NO	Posee Cánula SI/NO	Empresa	Firma	Hora devolución	Firma
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										

N°	Complete Name	Date	Delivery Time	Backpack Yes/No	Has valve Yes/No	Has cannula Yes/No	Company	Signature	Return Time	Signature
1										
2										
3										

Annex 2: Oximetry monitoring

CONTROL DE OXIMETRIA - HIPOBARIA

				Medición Oximetria 8:00 am (~comienzo trabajo)		Medición Oximetria 10:00 am (~primer descanso)		Medición Oximetria 12:00 pm (~almuerzo)		Medición Oximetria 03:00 pm (~segundo descanso)		Medición Oximetria 05:00 pm (~fin trabajo)	
N°	Nombre y Apellido	RUN	Cargo	Saturación O2	Pulsación	Saturación O2	Pulsación	Saturación O2	Pulsación	Saturación O2	Pulsación	Saturación O2	Pulsación
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													

Annex 3: O2 mother tank supply load control

O2 Mother Tank load supply control will be performed by the company performing this action, where each cylinder will have a code. The company will deliver this information to CCAT Management where a copy of the register will be kept.

Annex 4: Stock control of cylinders and oxygen tanks in the work site.

Item	Quantity	Quantity at Site	People at Work	Enough Yes/No	Last Date	Next Date	Notes
O2 Mother Tank							
Backpack cylinder							
6 m3 cylinder							
Individual cylinder							
Valve							
Nose pin							
Canula							
	Reviews:					Receives:	
	Position:					Position:	
	Signature:					Signature:	