Respiratory Protection

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Actual Change Details	Clean shaven requirement flow chart updated to provide clarity on roles				
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1. GENERAL PRINCIPLES

A guiding principle for respiratory protection is that no worker shall be exposed to an atmosphere that is, or could cause injury or illness, without suitable respiratory protection.

The following general principles apply:

a. The goal is for all work to be conducted in a safe atmosphere. Accordingly, consideration is given to prevent the release of harmful substances into the work environment, where practical, in preference to other control methods.

b. Reasonable steps must be taken to identify all work that requires the use of respiratory protection.

c. Where identified, a risk assessment must be completed, and controls such as suitable respiratory protection, clean shaven, face fit testing and being medically fit implemented.

d. Atmospheric monitoring shall be performed by properly trained personnel, using suitable equipment.

e. Training and instruction in the proper use of respiratory protection shall be given prior to the issue and use of the equipment.

2. OBJECTIVES

This document will provide:

a. Details of the applicable legislation.

b. Roles and responsibilities of workers.

c. The different types, selection and use of respiratory protection.

d. Maintenance, training and fit testing requirements.

3. LEGISLATION

The guide follows the requirements of the following standard:

- AS/NZ1715: Selection, use and maintenance of respiratory protection devices.
- AS/NZ1716: Respiratory protection devices.

4. ROLES AND RESPONSIBILITIES

Health and safety team

a. Provide information and instruction to workers.

b. Review, approve and distribute this document.

c. Respond to any issues and actions that may arise through implementation of this document.

d. Assist with the selection of suitable respiratory protection devices.

e. Perform quantitative face fit testing using a TSI PortaCount.

f. Provide fitness for work assessments to all workers.

Responsible officer/Accountable person

a. Ensure workers are clean shaven if a facial seal is required for respiratory protection.

b. Ensure a risk assessment is completed to identify work requiring respiratory protection.

c. Ensure adequate controls such as being face fit tested and medically fit to wear respiratory protection are implemented to reduce the exposure risk.

d. Ensure appropriate and maintained respiratory protective equipment is used.

Workers/Contractors

a. Workers to be clean shaven if a facial seal is required for respiratory protection.

b. Complete a risk assessment to identify work requiring respiratory protection.

c. Controls such as face fit testing and medically fit to wear respiratory protection are adhered to.

d. To wear, as instructed, all respiratory protective equipment provided.

e. Reporting any uncontrolled atmosphere that is, or could cause injury or illness.

f. Participating in awareness sessions.

5. ATHMOSPHERIC HAZARDS

5.1 PARTICULATES

The generic name for a group of liquid or solid particles usually in the range of 0.001 to 100 microns, suspended in a gaseous medium. Shape of particles could be spheres, cylinders, crystals or irregular.

- **Dust** is solid particles suspended in the air as a result of cutting, crushing or handling of solid materials. Dusts can be further classified depending on their health hazard:
  - Inert or Nuisance Dusts: Generally, only a discomforting nuisance, to be avoided.
  - Toxic Dusts: Dusts which can produce injury when sufficiently concentrated, e.g. silica, sodium cyanide and trace element dusts such as copper sulphate.
- **Fibres** are either naturally occurring i.e. asbestos or cotton, or man-made vitreous fibres i.e. SMF, Kevlar and carbon that's small enough to be inhaled.
- **Fumes** are airborne suspension of solid particles or metallic oxides formed by the volatilisation and condensation of matter, e.g. acid fume, process fumes, or welding fumes.
- **Mists** - airborne droplets that may carry substances in solution or particles in suspension. Mists are usually formed by the condensation of vapour but may be produced by the atomisation of a liquid, e.g. paint spray or acid mist.
- **Nanoparticles** can be naturally occurring in by-products of heating/combustion such as diesel emissions, fume and smoke. They can also be present in the form of engineered nano-sized particles. Size range from 0.001 to 0.1 microns.
- **Smoke** - particles of low-pressure vapour suspended in the air. Smokes settle slowly under gravity and are characterised by their mode of formation which may include combustion, destructive distillation, volatilisation and condensation, and chemical and photochemical reactions.

5.2 GASES AND VAPOURS

Gases and vapours capable of producing injury when they reach a susceptible site in or on the body, in a sufficient concentration, e.g. carbon monoxide, ammonia, hydrogen cyanide, nitrogen oxides, sulphur oxides and solvent vapours.

Note: *When used in this guide manual, the word 'gas' includes vapours.*

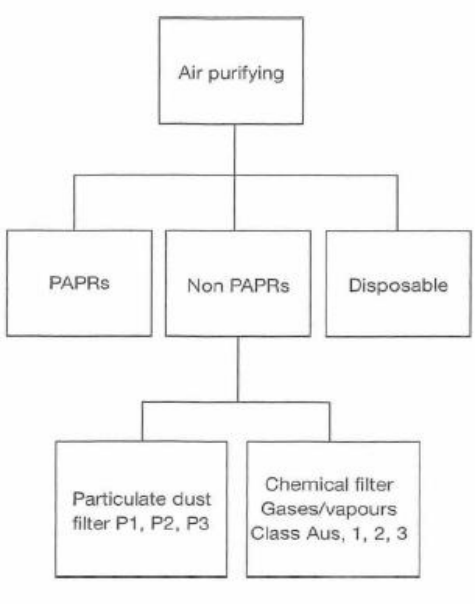
5.3 OXYGEN DEFICIENCY AND ENRICHMENT

An oxygen deficient atmosphere is one in which the oxygen content is below 19.5%. This deficiency can occur in poorly ventilated areas, typically confined spaces and enclosed vessels, where the oxygen has been displaced by another gas, e.g. nitrogen purging or has been consumed by chemical reaction, (combustion).

An oxygen enriched atmosphere is one in which the oxygen content is above 23.5%. This condition can exist in poorly ventilated areas such as confined spaces and enclosed vessels when excess oxygen has been allowed to accumulate i.e. a leaking oxygen bottle.

Note: *A safe level of oxygen is defined as above 19.5% and below 23.5% by volume at atmospheric pressure.*

6. AIR PURIFYING DEVICES



Designed to give respiratory protection where safe levels of oxygen exist and where the type and concentration of atmospheric hazard are known. Air purifying devices provide personal respiratory protection by purifying the air supplied to the wearer. The air is drawn through a filter medium that removes the harmful substances. The filter medium used depends on the composition and physical state of the contaminant.

6.1 POWERED AIR PURIFYING RESPIRATOR (PAPR)

A powered air-purifying respirator (PAPR) uses a blower to pass contaminated air through a filter, which removes the contaminant and supplies purified air to a facepiece (full or half) or hood under slight positive pressure.

Minimum protection factor 10 for P1, 50 for P2, 100 for P3 and 10 with a maximum gas/vapour concentration in air of 1000 ppm.

Note: *Example on-site includes Sundstrom SR500, CleanSpace2 PAPR, Speedglas 3M Welding PAPR .*

6.2 NON-POWERED AIR PURIFYING RESPIRATOR

Half or full-facepiece respirator fitted with either of the following filters:

6.2.1 Particulate dust filter type/classes

- P1 – Protects against mechanically generated particulates.
- P2 – Protects against mechanically and thermally generated particulates.
- P3 – Protects against all particulates, including highly toxic materials.

Half facepiece respirator

P1 and P2 usually consist of a half facepiece respirator with a valve system and replaceable cartridge filter. Minimum protection factor up to 10.

Note: *Example on-site includes a half-face Sundstrom mask with a P2 or P3 filter. P3 filter in combination with a half-face mask is classified as a P2 respirator, see below.*

Full face piece respirators

P3 particulate respirators need a full-facepiece to ensure that the effectiveness of the facial seal is comparable with that of a P3 filter and to protects the eyes from exposure.

Minimum protection factor for a full face mask is 10 for P1 filter, 50 for P2 filter and 100 for P3 filter.

Note: *Example on-site includes a full face MSA mask with a P3 filter.*

6.2.2 Gas/vapour filter classes/type

- Class 1 - Low- to medium-absorption capacity filters.
- Class 2 - Medium-absorption capacity filters.
- Class 3 - High-absorption capacity filters.
- Type A - Organic gases and vapours
- Type B - Acid gases and vapours as specified, excluding carbon monoxide
- Type E - Sulphur dioxide and other inorganic gases and vapor as specified
- Type K - Ammonia and organic ammonia derivatives
- CO – Carbon monoxide specific protection (single use only)
- NO – Oxides of nitrogen specific protection (single use only)
- Hg – Mercury specific protection

Note: *Example on-site includes either a half or full-facepiece with ABEK1 filter.*

Half facepiece respirator
Minimum protection factor up to 10 with a maximum gas/vapour concentration in air of 1000 ppm.

Full face piece respirators
Minimum protection factor

Up to 50 for class 1 – max 1000ppm gas,

Up to 100 for class 2 – max 5000 ppm,

Up to 100 for class 3 – max 10 000ppm.

6.2.3 Combined particulate and gas/vapour filter (Combination)

- Half face or full face respirator in which the filter incorporates an absorbent for gases and vapours, and an element for the removal of particulates. An external pre-filter may also be used to remove coarse particulates.
- Escape respirators are designed for minimum exposure in low to medium gas concentrations and are used for escape purposes only.

Minimum protection factor up to 10 for half facepiece respirator. For full facepiece respirators, the minimum protection factor is given by the MPF assigned to the relevant filter class, e.g. with A1 gas filters (MPF up to 50) and P3 particulate filters (MPF up to 100).

Note: *Example on-site includes full facepiece with ABEK1 NO CO Hg P3 filter.*

6.3 DISPOSABLE

Disposable type that has the filter incorporated within the facepiece. Could be either valved or non-valved. Some contain a carbon layer to filter out nuisance odours.

Note: *Example of this on-site included a disposable 3M 9320A+, 3M 9322A+ or Draeger 1720.*

7. SUPPLIED-AIR DEVICES

Supplied-air devices must always be used when the type or extent of the atmospheric hazard is unknown and/or oxygen-deficient/enriched atmospheres. Refer to the manufacturer for all minimum protection factors.

7.1 CYLINDER AIR

7.1.1 Supplied-air breathing apparatus (SABA)

Full facepiece positive pressure used mainly in maintenance situations where there is a possibility of toxic gas/fume and/or oxygen deficiency in the work area. Air is supplied to the user on demand through a positive pressure demand valve fitted to the facepiece.

Air shall be supplied from G-sized medical air cylinder with a nominal working capacity of 2.5 hours when full (7 m^3 at 15 500 kPa). Supplied-air trolleys, consisting of two G-sized medical air cylinders, two positive pressure full facepiece respiratory masks, regulators and two 30 metre airlines, are maintained in the manufacturing businesses.

7.1.2 Self-contained breathing apparatus (SCBA)

SCBA units permit the wearer to move relatively unrestricted in atmospheres that are contaminated or oxygen-deficient. The wearer relies on clean, respirable air supplied to the face piece from a compressed air cylinder.

These units have cylinders with differing fill capacities. Duration depends on the fill capacity, level of activity and fitness of the wearer. The facepiece incorporates an automatic (first inhalation) positive pressure demand valve.

7.1.3 Emergency Life Support Apparatus (ELSA)

This unit has a 200-bar/2-litre cylinder, giving up to 10 minutes of respirable air. ELSA units are intended for escape purposes only.

7.2 COMPRESSED AIR

7.2.1 Sundstrom compressed air filter system (Kleenheat only)

Full and half face masks with positive pressure used mainly in maintenance situations where workers are inside confined spaces and are potentially exposed to low oxygen/fumes/mercury vapour rich environments. Air is supplied from the workshop air compressor system to the user through the Sundstrom SR99-1 filter and can be adjusted via the control valve on the Sundstrom SR307.

Air must be supplied to the SR99-1 filter from a suitable air compressor system which includes a dryer, relief valve, and initial filter. The supplied air pressure to the filter must be 6-10 Bar with a maximum flow rate of 900 l/min. The minimum flow rate for the control valve attachment is 120 l/min per person.

The work instruction describing how to set up, use and maintain the Sundstrom compressed air filter system for confined space work located in Docova here

Sundstrom manuals located in Docova here.

8. SELECTION

There are two important factors to consider:

- The level of protection given by the respirator is suitable for the level of airborne contaminant.
- The filter in the respirator is suitable for the type of airborne contaminants in the workplace.

Selection between respirator and filter type will be influenced by the following factors:

8.1 CONTAMINANT

- The nature (particulate, gas or combination), toxicity, physical form and concentration of each contaminant.
- Whether failure of the device can result in a situation which is immediately dangerous to life or health (IDLH).
- The need to wear other PPE, i.e. eye or skin protection to protect against irritants.
- The possibility of the contaminated atmosphere being flammable/explosive.

8.2 TASK

- Frequency and length of use.
- Degree of activity and mobility.
- Location of the task.
- Working environment conditions i.e. hot or cold temperatures.

8.3 OPERATOR

- Basic physiological considerations i.e. pre-existing medical conditions, physical and mental fitness
- Facial fit.
- User acceptance.

8.4 EQUIPMENT LIMITATIONS

- Vision and communication required for the task.
- Limitations of rate of air supplied to match the expected demands of the user.
- Limitations of loose-fitting head coverings in case of failure.

- Limitations of close-fitting facepieces.
- Limitations of supplied-air equipment in IDLH atmospheres that require training.

Note: *The atmosphere in which air purifying devices are used shall have an oxygen content of between 19.5% and 23.5% by volume.*

For entry in confined spaces, additional requirements, as detailed in Confined Spaces procedure, must be complied with.

Respirators used at work should comply with Australian standard AS/NZS 1716. This number is usually displayed on the respirator or its packaging.

9. USE

The wearer must be aware of the correct method of fitting the device and ensure that it is worn in accordance with the manufacturer's instructions. With a filter respirator, the user shall check the expiry date of the filter(s) and note the times and date of previous usage, if applicable.

10. REPLACEMENT OF FILTERS

10.1 PARTICULATE FILTERS

Replace particulate filter when:

- It becomes difficult to breathe comfortably. Guideline is 4-6 weeks (160-240 hours).
- The filter become dirty or physical damage occurs.

10.2 GAS/VAPOUR FILTER

The service life (i.e. how long it will last) of any gas/vapour filter is affected by many factors:

- The concentration of the contaminant present.
- Breathing rate, humidity, ventilation, temperature.
- Exposure of carbon to the atmosphere.

Replace gas/vapour filter when:

- When the expiry date stamped on the sealed packet has elapsed.
- Once opened, maximum use time is 1 week (even if not used). The carbon will absorb contaminants from the general environment.
- Co filter is single use only. 20 minutes maximum duration in CO environment.
- Mercury filter should be replaced every 50 hours.
- When contaminant can be detected by smell or taste.
- Risk assessment indicate its required to replace.

11. USE IN OXYGEN DEFICIENT ATMOSPHERES IN CONFINED SPACES

If there is an unsafe oxygen range or contaminants are immediately dangerous to life or health (IDLH):

- Supplied Air Breathing Apparatus (SABA), with full face-piece, and Emergency Breathing Apparatus (EBA) back-up shall be used by trained personnel for respiratory protection by entering personnel.
- Whilst work is in progress, two trained standby workers, with equal protection available (independent SABA with EBA backup or SCBA), shall be in attendance at the entry point to the confined space. Only one can ever enter the space at a time.
- The rescue and retrieval plan shall be prepared and agreed upon before entry. The retrieval equipment shall be trialled.
- A lifeline and /or harness shall be used, where practical, to facilitate rescue from outside the confined space with a retrieval system.

Note: *A second, trained watch worker shall be in attendance at the supplied air source (air cart/cylinder(s)/compressor) if the first watch worker cannot perform this function whilst watching the worker(s) working within the confined space.*

- Two standby workers, with independent SABA or SCBA shall be in attendance (only one can ever enter).

12. MAINTENANCE REQUIREMENTS

12.1 CLEANING AND DISINFECTION

Non-disposable RPE shall be cleaned after each use. The cleaning and disinfection should be according to the manufacturer's instructions or, where these are not available, refer to Appendix C in AS 1715. Disassembly and reassembly of RPE shall be carried out in accordance with the manufacturer's instruction. Every effort should be made to obtain such instructions.

Supplied-air devices (SCBA and ELSA) shall be maintained, cleaned, inspected and controlled by the emergency service department.

12.2 INSPECTION

All respiratory protective equipment shall be inspected before and after each use and during cleaning. In addition, SCBA and equipment designated for emergency use should be inspected regularly in accordance with the manufacturer's specifications to ensure equipment is always ready for use.

12.3 REPAIR AND REPLACEMENT OF COMPONENTS

Respirators showing signs of physical damage, broken straps, broken nose clips, defective valves, cracks, tears, holes or hardening will not be repaired and new RPE will be obtained.

Filters showing signs of increased resistance, missing or worn gaskets, cracks or dents will be disposed and new filters will be obtained.

Servicing of supplied air devices is only to be performed by workers competent in respiratory equipment maintenance servicing.

Refer to table 9.1 in AS1715 for a checklist for defects relating to respirators, especially PAPR and Supplied Air devices.

12.4 PROPER STORAGE

Users should consult manufacturers' instructions, particularly about storage recommendations. The following should be observed for storage and protection:

- Respirators should be readily available to encourage use.
- Cleaned respirators should be clearly identified and separated from used/contaminated respirators.
- Respirators provided for emergency and rescue work should maintained in a condition ready for immediate operational use and secured to prevent unauthorized use or tampering.
- Respirators should be kept clean and dry and away from dust, corrosive atmospheres, oil and exposure to direct sunlight to avoid deterioration.
- Facepieces should be stored so that they are not subject to distortion.
- Supplied-air devices (SCBA and ELSA) shall be retained in designated locations for maintenance or emergency use, as appropriate.

13. TRAINING

The following learning modules located on Elevate (Search all learning) should be completed by all workers who are required to wear respiratory protection:

- Operate Powered Air Purifying respirators (PAPR).
- Operate Respiratory protection equipment.

13.1 TRAINING RECORDS

Details of all SCBA respiratory training shall be sent to the Training Department, who shall maintain the records. Training and instruction records for air purifying devices are to be maintained in the work area.

Training shall cover the following:

- How to recognise when there is a need to wear the device.
- The importance of conscientiously wearing the device.
- The essential parts of the device and the principles of operation.
- The applications and limitations of the device.
- Symptoms by which a deteriorated performance or improper functioning of the device may be recognised.
- The approximate duration of air supply when using cylinders.
- The importance of supplied-air quality standards being maintained.
- The procedure to be adopted if an emergency condition arises while the device is being worn.
- The importance of not removing the facepiece, until the wearer is certain that this can be done without danger.
- The importance of taking care of the device, including prompt and regular cleaning, service and storage.

13.2 FIT TESTING

For information regarding fit testing, please contact the safety department as this could be arranged.

14. FACIAL SEAL

Good facial fit, if required by the manufacturer, is a prime factor in obtaining appropriate and proper protection from respiratory protective devices whether of half or full facepiece design. Protection obtained will be influenced by such variables as whether the worker:

- Wears prescription glasses.
- Has facial hair (including stubble growth) that interferes with the facial seal.
- Adjusts the facepiece and straps correctly.

If a worker is required to wear full facepiece protection and needs to wear prescription spectacles to complete the task, fitted prescription lenses and special adaptor are available for full facepieces.

Note: *Full facepiece respirators shall not be worn with side arm (normal) spectacles, as an effective seal cannot be obtained*

Safe working standards require that half or full facepiece respiratory devices, which depend on an effective seal between the face and the facepiece, shall not be worn over a beard or a hairstyle which interferes with the proper sealing of the facepiece.

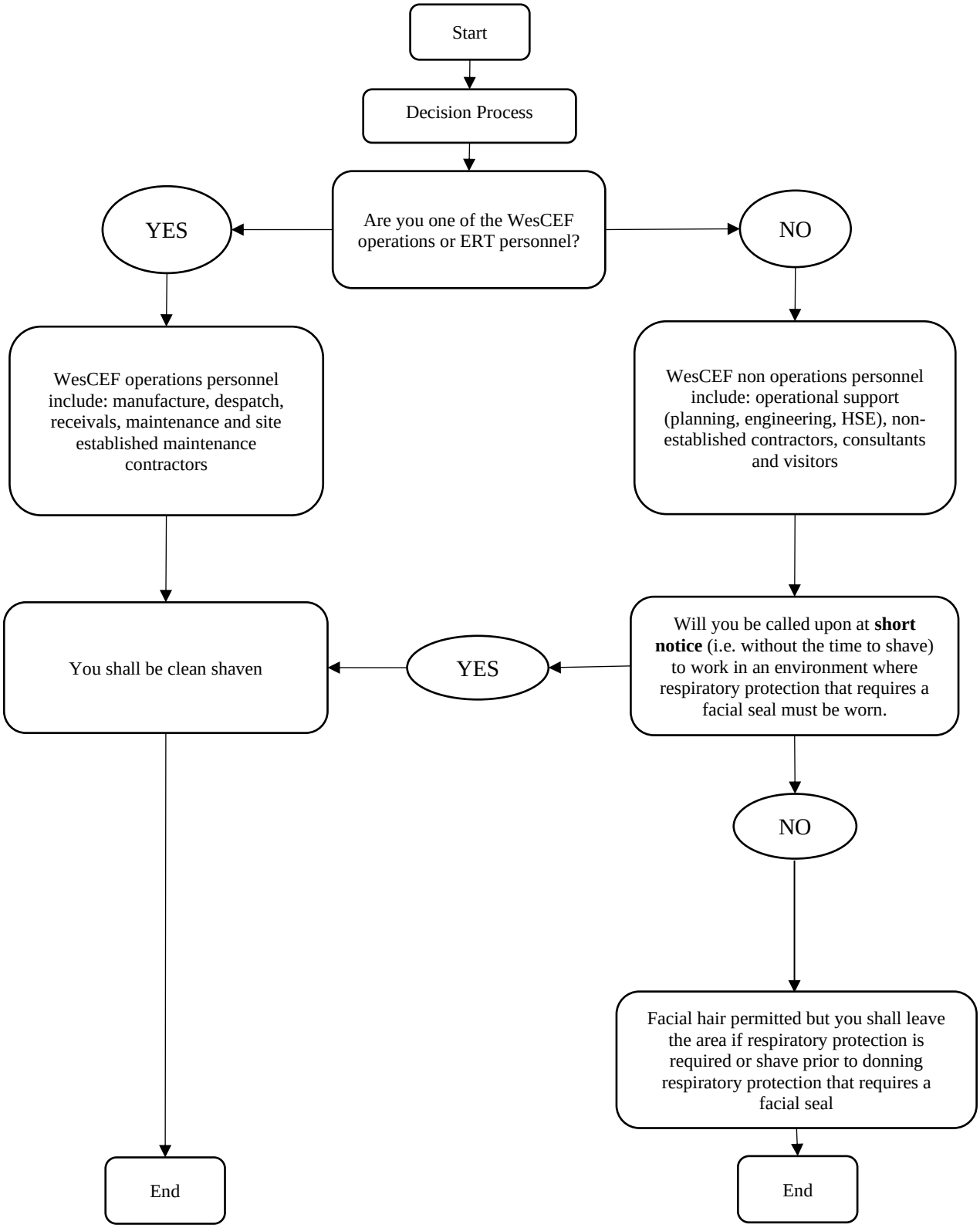
Positive pressure face pieces diminish the effect of poor facial fit. Any leakage from the facial seal increases air consumption and decreases service time. This is an important factor to consider when wearing Self-contained Breathing Apparatus (SCBA), as the reduction in safe service time when worn over facial hair is uncertain and may vary widely between individuals. This is only applicable to devices where manufacturer stipulates a facial seal is required.

Note: *A positive pressure device shall not be relied upon to compensate for a potentially poor facial seal if a facial seal is required from the manufacturer.*

A negative pressure fit test shall be carried out before each respirator is used. Chemical ampoules or specialised fit test equipment may be used to determine the proficiency of mask fitment during training.

14.1 RESPIRATORY PROTECTION REQUIRING A FACIAL SEAL DECISION PROCESS

The decision process shown in Figure 1 below shall be followed when attending a WesCEF operational workplace for respiratory protection that **requires a facial seal**



14.2 FACIAL SEAL OF RESPIRATORS

As facial hair (beards, stubble growth, long sideburns and moustaches) trapped between the sealing surface of a respirator facepiece (e.g. dust mask, half facepiece or full facepiece respirator) and the wearer's skin will prevent a good seal, the general rules on a facial seal of respirators extracted from AS/NZ Standard 1715 shall be followed.

General	Beard growth and other facial features prevent an adequate seal between the wearer's face and the fitting surfaces of the facepiece or mouthpiece. Facial hair may also interfere with the inhalation and exhalation valve operations.
Beards	Bearded workers cannot expect to achieve adequate respiratory protection when wearing a full face respirator or a half facepiece respirator. Accordingly, no one who requires respiratory protection shall attempt to wear either a full face respirator or a half-face respirator over a beard.
Moustaches and goatees	Facial hair must not impede the seal of the respirator. Moustaches must not extend past the line of the lip, goatees must not extend below the base of the chin.
Sideburns	Sideburn facial hair must not impede the seal of the respirator.
Stubble growth and long hair	Stubble growth, depending on its length and stiffness, interferes to some degree with proper sealing of a facepiece and it is necessary that male wearers of respirators shave daily.
Mouthpiece and nose clip	A mouthpiece and nose clip may not provide adequate Protection to a bearded worker. When the worker at risk has a 'bushy' facial hairstyle, hair trapped between the lips and the mouthpiece may prevent a satisfactory seal being obtained. Because of the varying amount of cartilage in an individual's nose, there is the added difficulty of obtaining a satisfactory seal of the nasal passages with a nose clip. This problem is worsened by the presence of perspiration which may cause difficulty in maintaining the nose clip in position.

15. GUIDELINES FOR WORKPLACE USAGE

The table below describes the protection required only for minimum level of respiratory protection that shall be worn for circumstances that may occur in the workplace.

For any other hazardous material or condition present, appropriate PPE must also be worn.

Atmospheric contamination levels are classed as follows:

- **High** - levels in excess of 5 times the exposure standard, or at the Ceiling Limit, where serious disability could occur after short exposure.
- **Medium** - levels of 2 to 5 times the exposure standard, where disability could occur with continued exposure but would not cause immediate collapse.
- **Low** - levels at or slightly above the exposure standard, but not at peak levels where continued exposure is possible but not desirable.

Note: *If work is to be performed within a confined space, the required level of protection is that stated in Confined Spaces' procedure.*

CONDITION	PROTECTION REQUIRED
Evacuation/escape from a **toxic gas** e.g. ammonia, hydrogen cyanide, carbon monoxide.	ELSA escape unit Draeger PARAT escape respirator Full-face respirator with ABEK NO-CO-Hg/ST filter.
Potential **high-level gas release** e.g. Work on cyanide lines and equipment, work in ammonia tank bund area, and some confined space work.	Supplied-air Breathing Apparatus (SABA) Self-Contained Breathing Apparatus (SCBA) Refer Confined Spaces procedure.
Potential **medium level gas release** e.g. removing a valve or spool piece from a hazardous/toxic material pipeline, some confined space work.	Supplied-air with positive pressure facepiece or supplied-air hood. Refer Confined Spaces procedure.
Potential **low-level gas release** e.g. sample taking, instrument adjustment.	Full-face respirator with ABEK-CO-NO-Hg/ST filter or supplied-air hood.
Inert or nuisance dust particles . Working where particulates are present or generated up to 10 times the exposure standard. Toxic dusts (e.g. asbestos, trace elements, lead-based coatings, Vanadium) below exposure standard.	P2 disposable respirator. Half-face respirator with an P2 or P3 filter has also been approved for use.

CONDITION	PROTECTION REQUIRED
Abrasive blasting.	Supplied air with blasting hood fitted with an inner bib.
Spray painting.	Supplied air with suitable facepiece. Half-face or full face respirator with an ABEK1P3
Fume/smoke/vapour below exposure standard.	P2 carbon-layered disposable respirator. Half-face respirator with an appropriate filter has also been approved for used.
Welding: where toxic fumes/gas are generated and/or ventilation is inadequate.	Supplied: air-mask with welding attachment or equivalent supplied-air protection.

Hazardous Atmospheres			
	Low	**Medium**	**High**
Ammonia (NH_3)	0 - 25ppm	25 - 125 ppm	>125ppm
Hydrogen cyanide (HCN)	0 – 4.7ppm	4.7 - 30ppm	>30ppm
Nitrogen oxides (NO_X)	0 – 3ppm	3 - 15 ppm	>15ppm
Carbon dioxide (CO_2)	0 - 5000ppm	5000 - 15000ppm	>15000ppm
Hydrogen fluoride (HF)	0 – 3ppm	3 - 9ppm	>9ppm
Hydrogen sulphide (H_2S)	0 - 10ppm	10 - 50ppm	>50ppm
Carbon monoxide (CO)	0 - 30ppm	30 - 90ppm	>90ppm
Response to Hazardous Atmospheres in the Plant			
Immediate Action	Personnel must leave area, to fresh air and notify permit office/operations	Personnel must leave area, to fresh air and notify permit office/operations	Personnel must leave area, to fresh air and notify permit office/operations
Follow up action	• Operations to inspect area and conduct gas testing to identify source of exposure with Air purifying respirator.	• Operations to investigate source of gas with Supplied Air RPE. • Area to be barricaded off and access restricted	• Area to be barricaded off and access restricted • Attempt to isolate source of exposure e.g. closing valve, process isolation

	• Attempt to isolate source of exposure e.g. closing valve, process isolation • Rectification work order to be raised where immediate controls are not possible Notification level: • Process Engineer	• Attempt to isolate source of exposure e.g. closing valve, process isolation • Where risk of exposure cannot be removed, TBRA to be conducted to manage risk and controls. Notification level: • Process Engineer • Operations Superintendent • Health & Safety Advisor	• Where risk of exposure cannot be removed, TBRA to be conducted to manage risk and controls. • If required Shutdown to be planned to execute repairs. Notification level: • Production Manager • Process Engineering Superintendent • Operations Superintendent • Health & Safety Advisor
Reporting Requirement	Hazard report raised in Cintellate	Incident Report raised in Cintellate	Incident Report raised in Cintellate

Minimum Required Respiratory Protective Equipment (RPE) for Gases

	No RPE	**Air purifying RPE with appropriate gas filter**	**Supplied Air RPE**
Conditions	**Personnel must leave area, to fresh air if 50% of upper level is exceeded on gas detector and source investigated.**	**Personnel must leave area, to fresh air if upper level is reached.**	**Maximum level - be set via risk assessment based upon specific conditions i.e. ease of escape - fresh air, redundancy of supplied air system.**
Ammonia (NH_3)	0 - 25ppm	25 - 125 ppm	>125ppm
Hydrogen cyanide (HCN)	0 – 4.7ppm	4.7 - 30ppm	>30ppm
Nitrogen oxides (NO_X)	0 – 3ppm	3 - 15 ppm	>15ppm
Carbon dioxide (CO_2)	0 - 5000ppm	5000 - 15000ppm	>15000ppm
Hydrogen fluoride (HF)	0 – 3ppm	3 - 9ppm	>9ppm
Hydrogen sulphide (H_2S)	0 - 10ppm	10 - 50ppm	>50ppm

Carbon monoxide (CO)	0 - 30ppm	30 - 90ppm **Note:** **Full face negative pressure air purifying respirator fitted with CO filter only (Draeger 1140 6738801 or MSA 10115315) Single use only. 20 minutes maximum duration in CO environment.**	>90ppm

16. REFERENCES

AS/NZS 1715 Selection, Use and Maintenance of Respiratory Protection Devices.

AS/NZS 1716 Respiratory Protection Devices.

AS 2704 Portable Cylinders for Resuscitators and Self-contained Breathing Apparatus (non-underwater) - Safety Guide.

CSBP Confined Spaces (CSBP-GM-11-031-52).

CSBP Gas Testing (CSBP-GM-11-031-33).

Kleenheat Confined Spaces procedure – Manual (KHP-GM-OHS-070-02)

Kleenheat Gas Testing and Monitoring Guide Manual (KHO-PD-OHS-070-03)