



Washington State Department of
Labor & Industries

Respiratory Protection- supplied air respirators

Training on the use of respirators in
the workplace – module 3



Developed by the Division of Occupational Safety & Health (DOSH)
for employee training
June, 2009

Supplied Air Respirators – Module 3

Airline Respirators & SCBAs



Training Notes

This module is introductory training for employees who wear supplied air respirators.

The two main types of supplied air respirators are covered in this module. Abrasive blasting hoods or re-breather type respirators are not covered.

This module only covers basic facts of supplied air respirators and is not complete training by itself.

Employees must also be given hands-on training with the respiratory equipment they will use.

Why Is This Training Required?

Training is required by WISHA for anyone who wears a respirator.

We also are providing this training so you will know how to protect your health.

If you don't know how to use a respirator properly, you can get a false sense of protection.



Respirator Program Administrator

Our respirator administrator is [name]

This person is responsible for overseeing our respirator program.

This person has training on respirators.

What are supplied air respirators?

Two Types



Airline respirator – air from a compressor



SCBA (self-contained breathing apparatus) – air from a tank

Typical Examples of Use



Sandblasting



Firefighting



Chemical leak or spill response



Confined space work

Where we use supplied air respirators

We use supplied air respirators in the following locations, jobs or situations:

Supplied-air respirators are required for protection in cases of:

- ✓ Oxygen deficiency
- ✓ High levels of toxic chemicals in the air – above “IDLH” levels
- ✓ Other conditions of high levels of highly toxic chemicals in the air
- ✓ Firefighting



What is Oxygen Deficiency?

An oxygen deficiency can be life-threatening

Normal air contains 21% oxygen. A space with oxygen content below 19.5% is "oxygen deficient".

Lack of oxygen can cause immediate collapse and death.

Oxygen deficiency can occur in confined or enclosed spaces or areas of large chemical leaks.



Effects of Oxygen Deficiency

<u>% Oxygen</u>	<u>Symptoms</u>
19.5% - 16%	Fatigue, mild impaired coordination
16% - 12%	Increased breathing rate and pulse; impaired coordination, perception or judgment
12% - 10%	Further increased breathing rate, blue lips, mental confusion
10% - 8%	Fainting, nausea, vomiting, mental confusion within minutes, collapse
8% - 6%	Collapse, death within 8 minutes
6% - 0%	Coma within 40 seconds, death

What is “IDLH”?

Immediately Dangerous to Life or Health

“IDLH” means immediately dangerous to life or health

Many chemicals have a listed IDLH level [link to NIOSH IDLH Table](#)

Oxygen deficiency is also IDLH

IDLH conditions can occur in confined spaces, large chemical spills or leaks and fires

IDLH



Entering an IDLH Atmosphere

Several safeguards must be used to enter an area with IDLH conditions:

- ✓ Must have at least one or two standby persons at entrance.
- ✓ Standby employees must be trained to conduct emergency rescue.
- ✓ Appropriate retrieval equipment may be needed.



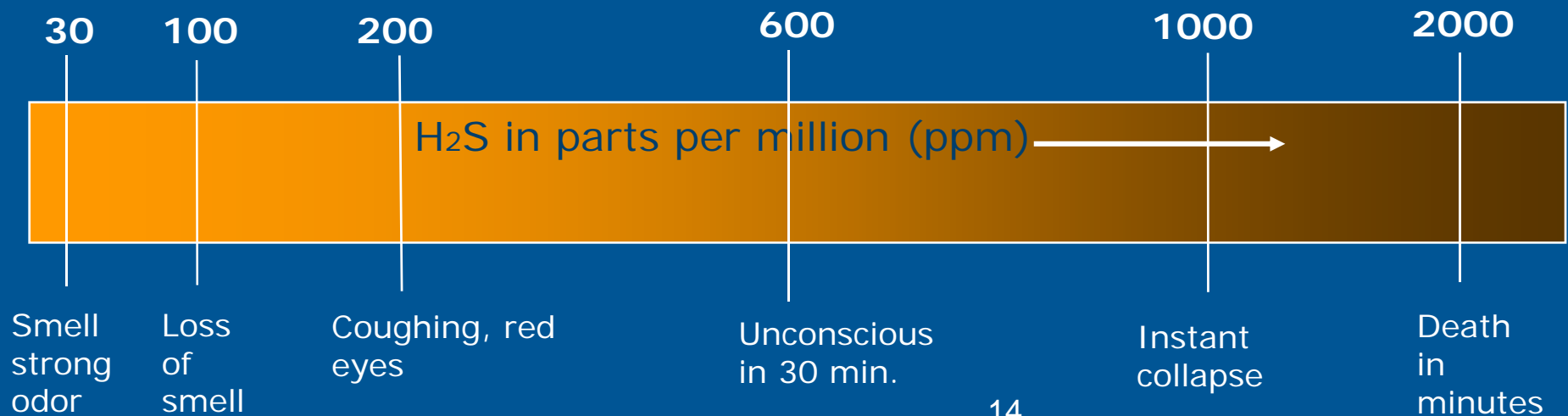
Example of IDLH - Hydrogen Sulfide (H₂S)

Hydrogen sulfide gas is commonly found in sewers.

It can be instantly fatal at higher levels in a confined space. IDLH level is 100 ppm.

Disturbing sewage sludge can release more hydrogen sulfide gas.

Supplied air respirators are normally needed to enter sewers.



Escaping an IDLH Atmosphere

In IDLH conditions, a worker may need to escape or immediately leave the area.

An SCBA allows escape at any time.

Airline respirators need a small escape bottle of air attached at the waist.



Airline respirator with
emergency escape
cylinder

Escape-only Respirators

Escape-only respirators can be used in situations where chemical releases might occur, but the air is normally uncontaminated.



Respirator Air Pressure

Pressure Demand vs. Demand

Air pressure inside the respirator facepiece is controlled by the respirator regulator.

“Pressure-demand” means air flows into the facepiece as needed, but the facepiece is always positively-pressured.

“Demand” means air flows into the facepiece only when you inhale.

Only pressure-demand can be used in IDLH conditions.



Air Flow in Supplied Air Respirators

Continuous flow airline respirators

“Continuous flow” means air is constantly blowing into the respirator facepiece.

Continuous flow is found in loose-fitting airline respirators.

This type is often more comfortable and hoods can be worn over a beard.

This type cannot be used in IDLH conditions.



Loose-fitting hood



Loose-fitting facepiece

Supplied Air Respirator Selection

Conditions

Type of Respirator

IDLH conditions or oxygen deficiency	SCBA or airline with escape bottle	
Dust/chemical levels up to 1000 times PEL	Airline with tight-fitting full facepiece or full hood	
Dust/chemical levels up to 50 times PEL	Airline with tight-fitting half facepiece	
Dust/chemical levels up to 25 times PEL	Airline with loose facepiece	

PEL = permissible exposure limit

Airline Respirator Advantages & Limitations

Advantages –

- ✓ continuous air supply,
- ✓ lightweight,
- ✓ less maintenance,
- ✓ don't need to buy tank air

Limitations-

- ✓ tied to a 300 ft. hose,
- ✓ depends on output of compressor,
- ✓ need an attached escape bottle in IDLH conditions



SCBA Advantages & Limitations

Advantages

- ✓ highest form of protection,
- ✓ can be used anywhere,
- ✓ allows unrestricted mobility

Limitations

- ✓ heavy & bulky,
- ✓ limited air supply(30 - 60 min.),
- ✓ extensive training required,
- ✓ high maintenance



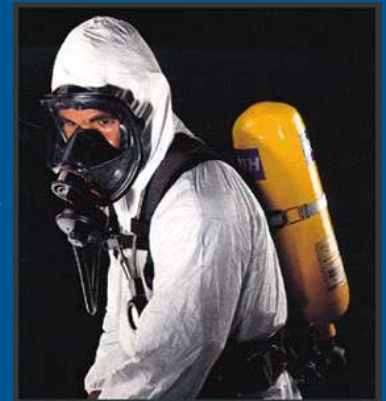
Using SCBAs – Special Notes

SCBAs are sophisticated respirator equipment used for possible or actual life-threatening situations.

SCBAs should not be used without extensive hands-on training and frequent re-training.

Most SCBA manufacturers or distributors provide this training.

If you have large chemical spill or leak, it may be safer to call professional emergency responders.



Air Quality For SCBAs

Air for breathing must be “Grade D” air

Grade D air for tanks is usually purchased from a specialized supplier.



Grade D air must meet strict requirements. [link to WISHA requirements](#)



Supplier must certify that tank air meets Grade D requirements.

Air Quality for Airline Respirators

Air compressors must deliver clean air

Locate pump intake in an area of clean, fresh air.

Filter air as needed.

Watch out for nearby running engines.

Be sure air intakes are located away from exhaust pipe of an engine compressor.



Small electric air pump



Small engine compressor

Compressors for Airline Respirators

Three types of breathing air compressors



Electric low pressure compressor



Gasoline high pressure air compressor



Electric high-pressure air compressor

Construction & Plant Air Compressors

Use these compressors with caution

Be careful – these do not provide clean air without a filter system!!

Oil-lubricated compressors are especially hazardous. Must test for carbon monoxide or have high temperature alarm.

Engine exhaust can also contaminate breathing air.



Compressor Air Filters

What air filters are needed on compressors?

Moisture trap

Dust filter

Hydrocarbons(oil, solvents)
absorbent

Carbon monoxide alarm or high-
temp. alarm for oil-lubricated
compressors



compressor filters



carbon monoxide alarm

Compressors We Use

[Discuss compressors you use here]

Storage and Maintenance

Airline Respirators

Store facepiece and regulator in clean, dry place. [location]

Coil up hose and store in protected area to prevent damage.

Clean as needed before storage – especially the inside of the facepiece.

Inspect facepiece and hose for damage and replace as needed.



Supplied air respirator repairs

Keep spare parts available.

Tag damaged respirators to prevent use.

Repair of SCBA valves, regulators or alarms can only be done by manufacturer's trained person.