

Section 13

Air Purifying Respirators

Purpose

To understand the limits and uses of air purifying respirators in different zones at a chemical emergency.

To become familiar with the steps to inspect and fit test an air purifying respirator (APR) if you have to wear one in the warm zone.



Section 13

**What you will find
in this section...**



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Section 13

**What you will find
in this section...**



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Task 1

- **Read the scenario.**
- **Answer the questions on the next page.**

The people on foam line #3 at Magic Foam, Inc. are having a bad day. Here is the situation:

One of the isocyanate (TDI) feed lines just broke. The pump connected to that line went crazy, too. It ran through several cycles in a row. TDI sprayed all over the booth. The flow has stopped now.

George, the supervisor, has asked two operators - Lucy and Phil - and a maintenance mechanic - Juan - to go into foam line #3 with him, turn the pump off, and clean up the mess. He gives them full-face air purifying respirators with black cartridges for organic solvents. There are rubber gloves and boots in the supply cabinet, too.

Lucy and Phil have been trained as operations-level responders, but Juan has not.

Your group is the Health and Safety Committee, and you just found out about the spill. Use at least two of the fact sheets in this section to develop your response to the supervisor, George, who has told Lucy, Phil, and Juan to work on the spill with him.

Task 1

continued

- **Use at least 2 fact sheets to answer the questions.**
- **Respond to the supervisor's orders**

1. Are these air purifying respirators the right kind of equipment to protect these workers? Why or why not?
2. Whether or not this is the right kind of equipment, should George, Juan, Lucy, and Phil be doing this kind of work at all? Why or why not?
3. As an operations responder, which jobs could you use an APR to do during an emergency?
4. Do you think Magic Foam is following OSHA's requirements for a respirator program? If yes, why? If no, what are they missing?

Fact Sheet #1

Two Kinds of Respirators

1. Air Purifying Respirators (APR)

Air purifying respirators have filters or cartridges that will screen out some toxic chemicals from the air. These are the most commonly used, and **MISUSED**, respirators found in manufacturing plants. Each cartridge only works against one or a few toxic chemicals. **Air purifying respirators do not remove all chemicals from the air, just a portion.**

All APRs let some contaminants through the cartridge. You breathe them in.

There are three different types of air purifying respirators:

◆ **Half-face negative pressure mask** —

When you breathe in, you reduce the air pressure inside the mask. Dirty air will try to fill up the space by passing over the cartridges **and** through any gaps or breaks in the seal between the mask and your face. This is why these masks are “negative pressure.”



Half-face Air Purifying
Respirator



Full-Face Respirator

◆ **Full-face negative pressure mask** —

Works the same way as the half-face, but also protects eyes and a larger portion of face. It is also easier to get a good seal with a full-face mask.

Fact Sheet #1, continued

- ◆ **Powered air purifying** — A motor pulls in air from the area where you work, passes it over the cartridges, and pushes the air to the mask.

The Powered Air Purifying Respirator (PAPR) gives you more protection and is more comfortable than the negative pressure types. The forced air helps to keep air flowing out, cutting down leakage into the mask.

2. Supplied Air Respirators

A supplied air respirator connects you to a clean source of air from some other location. The source of air could be a compressor or a cylinder full of clean, compressed air.

There are three types of supplied air respirators.

- ◆ **Self Contained Breathing Apparatus (SCBA)** — This is what fire fighters wear. You wear a “bottle” of air on your back that supplies air to your facepiece through a regulator. It keeps air flowing so that dirty air does not leak in.



Self-Contained
Breathing Apparatus
(SCBA)

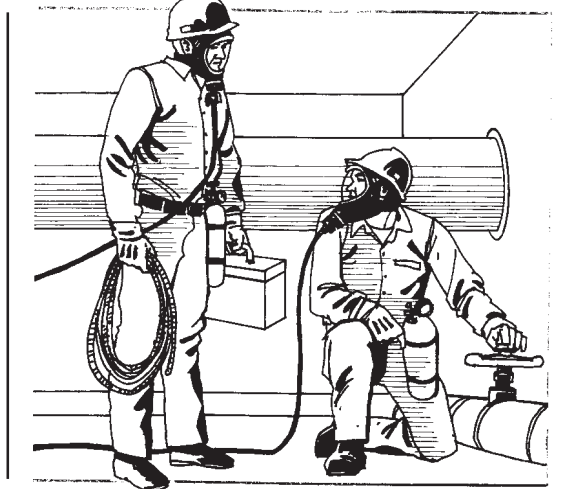
- ◆ **Escape Pack** — This is like a small SCBA. Escape packs are only used for entry into areas that are safe, but might develop dangerous conditions while you are present. For instance, if your air monitor alarm sounded while working

Fact Sheet #1, continued

in a confined space, you would put on your escape pack and leave the area immediately.

◆ **Airline-Supplied**

Respirator — A hose connects you to a source of air that is some distance away. This is NOT the kind of respirator to wear while responding to an emergency incident.



**Airline Respirators
with escape packs**

Fact Sheet #2

All Emergencies are IDLH

IDLH stands for **Immediately Dangerous to Life or Health**. In other words, breathing this air will kill you, hurt you seriously, or impair you so that you cannot escape. Some conditions that create an IDLH atmosphere are:

- ◆ high levels of toxic chemicals
- ◆ high levels of oxygen which causes a fire hazard
- ◆ low levels of oxygen (normal amount of oxygen is about 21%)
- ◆ presence of vapors or gases that can burn or explode (near or above the LEL or lower explosive limit)

Your facility's emergency response plan should treat all emergencies as IDLH until air monitoring shows that the air is below this level.

Many chemicals have specific concentrations that are their IDLH level. You can find some IDLH levels in the NIOSH Pocket Guide to Chemical Hazards. Here are a few examples:

Some IDLH levels


Toluene	500 ppm
Hydrogen sulfide	300 ppm
Chlorine	30 ppm
Hydrogen fluoride	30 ppm
Bromine	3 ppm
TDI	2.5 ppm

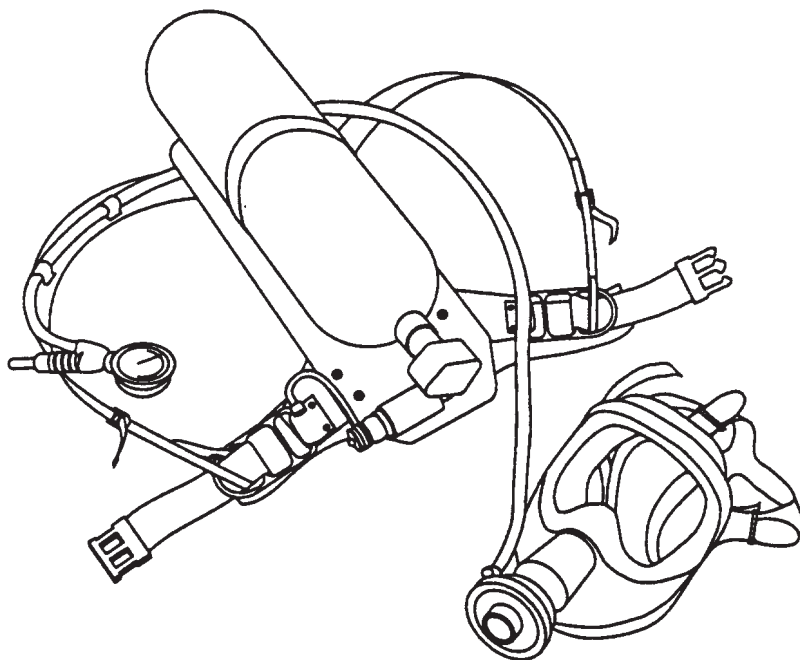
A chemical with a low IDLH is a very dangerous chemical. It doesn't take much of that chemical to create a deadly atmosphere. This is why emergency responders usually need self-contained breathing apparatus (SCBA) in the hot zone.

Fact Sheet #2, continued

Which Respirator Works in IDLH Conditions?

A person working in IDLH conditions has to use the most reliable respirators that provide the best protection. This means a self-contained breathing apparatus (SCBA) or a positive pressure airline respirator. An extra escape pack is also needed if the worker is using an airline respirator as a back-up if something stops the flow of air from the source.

 **You cannot use an air-purifying respirator in a situation that could produce an IDLH atmosphere. They could leak or fail too easily to risk using them in deadly conditions.**




Source: NIOSH Pocket Guide to Chemical Hazards, 1994.

Fact Sheet #3

Air Purifying Respirators Don't Go Into the Hot Zone

Air-purifying respirators are almost useless in emergency situations. Here are some of the major problems with APRs in emergencies:

1. You can't use APRs when you don't know what chemicals are involved in the emergency.
2. Don't use APRs if the chemical spilled is very toxic. Even very small doses of highly toxic substances can harm you. APRs only keep out some of the contaminant. You still breathe in some. **For instance, don't use an APR to protect you from a cancer-causing chemical.**
-  3. Don't use APRs if there are **high levels of chemicals** in the air. This is an IDLH situation — Immediately Dangerous to Life or Health.
4. Don't use APRs unless **air monitoring is done**. You must know what chemicals are present and how much is there.
5. APRs **cannot be used in low oxygen** (air with less than 19.5% oxygen). APRs don't supply any extra oxygen.
6. APRs cannot be used for **certain chemicals** that have poor warning properties. (See Fact Sheet #6)
7. You have to be **fit-tested** for an APR before you can use it in **any** situation. You can't just grab an APR and expect it to work for you.

Fact Sheet #3, continued

8. You have to have the **right type of cartridge** for the chemical spilled. There is no single cartridge that is good for all chemicals.
9. Don't use APRs in fire situations.

Also, see Fact Sheet #3, Section 3 entitled "Respirators: A Last Ditch Control."

**APRs can be used
on the decontamination line,
but not in the hot zone.**

Fact Sheet #4

APR's Provide the Least Protection

Each type of respirator is rated for the amount of protection it gives. This is called the **Protection Factor (PF)**. The protection factor gives you an idea of the amount of chemicals the respirator can keep out of your breathing air.

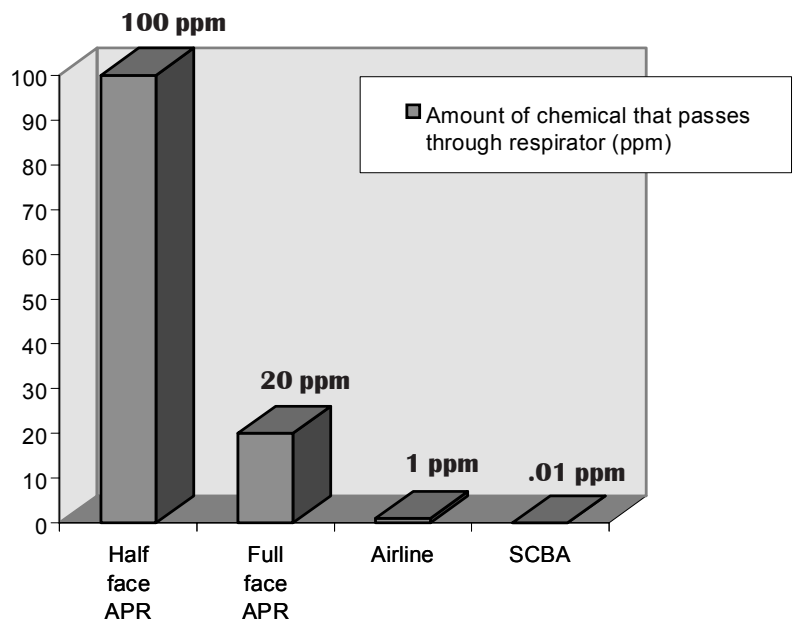
The half-face air purifying respirator has a PF of 10. This means that you can wear a half-face air purifying mask in air that contains **NO MORE** than 10 times the safe exposure limit for the chemicals present.

<u>Type of Respirator</u>	<u>Protection Factor</u>	
Half-Face Air Purifying	10	* Provides the least protection
Full-Face Air Purifying	50	
Powered Air Purifying	100	
Airline Air Purifying	1,000	
SCBA (pressure demand)	10,000	* Provides the most protection

APRs Let Chemicals In

The chart at the right shows how much dust or chemical will leak through different respirators when used in an atmosphere with 1000 ppm of a chemical.

Exposure with APRs is 10,000 times more than with SCBAs.



Source: NIOSH Respirator Decision Logic, 1987, Pub. #87-108.

Fact Sheet #5

Respirators for Decon Only

Your job as an Operations-level Responder is to control a spill or release from a safe distance. This should keep you out of contaminated areas when you are trying to confine a spill.

So, you do NOT need a respirator for spill control activities.

In addition, your job as an Operation's responder might put you on the decontamination line, providing decon mostly for the entry team. **You might have to wear an air-purifying respirator or an SCBA on the decon line, with chemical protective clothing.** Though the decon line starts out in a clean area, you need protective equipment to protect you from chemicals that the entry team might bring out of the hot zone on their clothing or equipment.

Escape Respirators: If Things Get Too Hot to Handle

You might be given an escape respirator during an emergency, if there is a chance that the cold zone might suddenly change to a hot zone. A hot zone is supposed to be large enough to protect those in the cold zone from surprises like wind changes. However, there may be a chance that an unexpected change in wind direction could catch the area where you are doing spill control in a vapor cloud. The Incident Commander should decide on escape respirators in the initial stages of the spill after consulting with the Health and Safety Officer.



Fact Sheet #5, continued

Which Respirator? Depends on Your Job!	
Job	Respirator
<ul style="list-style-type: none"> • Defensive Spill Control • Evacuate and keep others away • Decon Line 	<ul style="list-style-type: none"> • None • Escape respirator possible if wind direction prone to wild changes • None • Air purifying respirator, or • Self Contained Breathing Apparatus (SCBA)

Fact Sheet #6

Warning!

Is My Respirator Working?

You can only wear air purifying respirators for chemicals that have good warning properties.

Every respirator can fail, especially air purifying respirators. The only way you will know if your respirator is failing is if you can smell or feel the chemical as it gets into the mask. You can smell or taste some chemicals when they are still at a concentration that won't hurt you. Other chemicals you cannot detect until they are at dangerous levels — when it's too late!

Good Warning Properties - Chemicals that you can smell, taste, or feel **before** there is a dangerous amount in the air. You should be able to detect the chemical when there is **less than the permissible exposure limit present**.

Check the MSDS for Good Warning Properties

Check the MSDS or the New Jersey Fact Sheet for the chemical you work with. Look for the "odor threshold" - the amount of the chemical that your body can just start to detect. If the odor threshold is much less than the permissible exposure limit (PEL), it probably has good warning properties. But keep on reading this fact sheet before you decide.

Example: TDI Odor Threshold = 0.17 ppm
Permissible exposure limit = 0.02 ppm

The PEL for toluene di-isocyanate (TDI) is far below the amount that you can smell. So you cannot wear an air purifying respirator if you work with TDI. You wouldn't know if your mask failed until too late.

Fact Sheet #6, continued

Here is a list of some chemicals that **DO NOT** have good warning properties.

Do NOT use an air purifying respirator to protect you from these. Use an air-supplied respirator that gives you a higher level of protection. This is not a complete list.

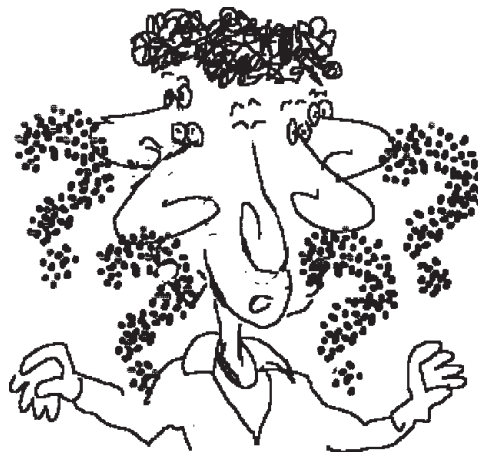
Acrolein	⇒Methylene chloride
Aniline	⇒Nickel carbonyl
Arsine	Nitro compounds:
Bromine	Nitrobenzene
⇒Carbon monoxide	Nitrogen oxides
⇒Diisocyanates (TDI, MDI, HDI, etc.)	Nitroglycerin
Dimethylaniline	Nitromethane
Dimethyl sulfate	Ozone
Hydrogen cyanide	Phosgene
Hydrogen fluoride	Phosphine
Hydrogen selenide	Phosphorous trichloride
Hydrogen sulfide (sewer gas)	Stibine
⇒Methanol	Sulfur chloride
Methyl bromide	Vinyl chloride

⇒☆Chemicals commonly found in UAW facilities.

Source: MSA

Fact Sheet #7**Don't Use an APR if...****Does Your Nose Get Used to the Chemical?**

Some chemicals affect your nose so that you cannot smell them after a while. Hydrogen sulfide, for example, wears out your sense of smell quickly so that you cannot smell it at high levels. Your nose adapts to methylene chloride, a common solvent, if you are exposed to it several times. Make sure you check the MSDS or New Jersey fact sheet for any information on how your body may adapt to a chemical. Don't use an air purifying respirator for chemicals that affect your sense of smell.

**Does the Chemical You Work With Cause Cancer?**

Air purifying respirators only remove some of a chemical from the air that you breathe, not all. No one can really say what is a “safe” level of a chemical that can cause cancer (carcinogen). In fact, the rule of thumb is that NO level of a cancer-causing chemical is safe for your body.

**Don't use an air purifying respirator
to protect against cancer-causing agents.***

* **Source:** National Institute of Occupational Safety and Health (NIOSH) — *Guidelines for Exposure to Chemical Hazards*

Fact Sheet #8

How Long Do Cartridges Last?

An air purifying respirator will only work from a few minutes up to a few hours. The cartridges do the “work” of catching toxic chemicals from the dirty air before you breathe them. But, they get used up quickly. If the amount of chemical in the air is high, the cartridges could be used up in a few minutes. **Changing cartridges on a regular basis is very important — at least every 8 - 10 hours of use.**

How often you need to change the cartridges depends on 4 things:

1. The concentration of the toxic chemical you are trying to keep out — as the concentration goes up, you have to change the cartridges more often.
2. How often you use the respirator.
3. Where the respirator and cartridges are stored. The cartridges can get used up even when you are not wearing the respirator. Cartridges will continue to pick up chemicals from the air unless they are stored in a clean area in sealed plastic containers.
4. For some cartridges, the age of the cartridge also counts. Those containing "activated carbon" lose their activity over time.

To figure how long cartridges will last:

Before you start to wear a respirator, your employer must test the air you will be working in. The air test should tell what chemicals are there and in what amounts. Using this information a “qualified” person, like an industrial hygienist, should then figure out how long your cartridge will last. Of course, you should be told how often to change your cartridges before you start using them.

Fact Sheet #8, continued

Warning Signs

You can tell when a filter (pink/purple cartridge) needs changing. A filter gets hard to breathe through when it is filled up with dust or fibers.

When other cartridges fail, you start to smell, taste, or feel the chemical coming through the mask. This is called “break through.” Break through occurs when the cartridge is saturated with a chemical. You should know the chemical warning signs before you use the respirator so that you will notice break through quickly.

Don’t wait for break through to tell you when to change cartridges. Break through is an emergency situation because you are being exposed.

Here are some recommendations:

- NIOSH recommends that cartridges be replaced daily (8-hour day), if not more frequently.
- Don’t use cartridges which have had their outer wrapping removed.
- Don’t use a cartridge that someone else has already used.
- Don’t wait until your cartridges become saturated to change them. Your workplace should have a change-out schedule for cartridges, based on manufacturer’s service info.

Fact Sheet #9

What OSHA Says

OSHA's standard on Respiratory Protection (1910.134) says that your employer must establish a respirator program. If you may be over exposed to a chemical and your employer gives you a respirator, OSHA requires your employer to provide these six items:

- 1. Training:** Training should include how to use, inspect, and maintain the respirator. It should also cover the limits of the respirator, how to tell when it is not working, and when to change the cartridges.
- 2. Develop a Written Respirator Program:** This is a planning document. It should say who will be in charge of the respirator program, how they will select the right respirators, and how the rest of the items in this list are going to be carried out. You have a right to get a copy of this written program.
- 3. Medical evaluation:** Wearing a respirator makes your heart and lungs do a lot more work. You should have a medical evaluation to make sure that your body can stand this extra stress, and that you don't have any conditions that would be made worse by working with chemicals and wearing a respirator. Your employer must offer you this evaluation.
- 4. Fit testing:** Your respirator has to fit your face. If not, then the respirator will not protect you. To make sure your mask fits you, your employer must provide a quantitative or qualitative fit test on an annual basis. (See the fact sheet "*One Size does Not Fit All*" for more information.)

Fact Sheet #9, continued

- 5. Select the right respirator:** Your employer must provide you with a respirator that protects against the hazards that are present. The person in charge of the respirator program must show how he/she selected the respirator. This includes monitoring the air and making sure that the respirator is approved by NIOSH (National Institute of Occupational Safety and Health) or MSHA (Mine Safety and Health Administration).

- 6. Good maintenance and inspection program:** Unless your respirator is cleaned, inspected, stored in a clean place, and maintained on a regular basis, it won't work. These things should happen **after every use or at least once a month.**

Source: OSHA's standard on Respiratory Protection, 29 CFR 1910.134.

Task 2

Every Time You Wear a Respirator, Inspect It.

Select an air purifying respirator. With your partner(s), inspect your respirator to make sure all of its working parts are there. Answer these questions as you proceed through the inspection. Use Fact Sheets #10 and #11 to help you.

Respirator Brand _____ Size _____

Half or Full face (circle one)

1. Facepiece	Yes	No
---------------------	------------	-----------

Check the rubber facepiece, especially the part that will rest against your face.

Does the facepiece have any cracks or look worn out?	---	---
--	-----	-----

Is it clean?	---	---
--------------	-----	-----

2. Visor (full-face respirator only)		
---	--	--

Check the plastic viewing visor.

Is it loose in the facepiece?	---	---
-------------------------------	-----	-----

If there is a nut and bolt that hold the visor in place, are they tight?	---	---
--	-----	-----

Is it scratched too much to see through?	---	---
--	-----	-----

Task 2
continued

Every Time You Wear a Respirator, Inspect It.

3. Headstraps

Yes

No

Loosen the head straps fully.
Then pull on them gently.

Are the straps and clasps in good shape?

4. Valves

Are the two **inhalation** valves in place?
Adjust them so that they cover the opening completely.

What is the function of the inhalation valves?

Is the **exhalation** valve in place?
Adjust it (if you can touch it) to make sure that it covers the opening.

What does the exhalation valve do?

Task 2
continued

Every Time You Wear a Respirator, Inspect It.

5. Nosecup (full-face mask only)

Yes

No

Does your respirator have a nose cup inside? ___

Are the valves in place? ___

What does the nosecup do?

6. Cartridges

Yes

No

Unscrew the cartridges from the facepiece.

What color cartridges do you have?

What chemical(s) are these for?

Are there any dents or damage to the cartridges? ___

Some respirators have a gasket that sits between the cartridge and where it screws into the respirator. Does your respirator have gaskets? ___

Task 2
continued

**Every Time You Wear a
Respirator, Inspect It.**

	Yes	No
If yes, are both of them present?	---	---
What do these gaskets do?		
Screw the cartridges back onto the mask.		
Does your respirator pass inspection?	---	---

*If no, get another respirator and inspect it
before you try fit-testing.*

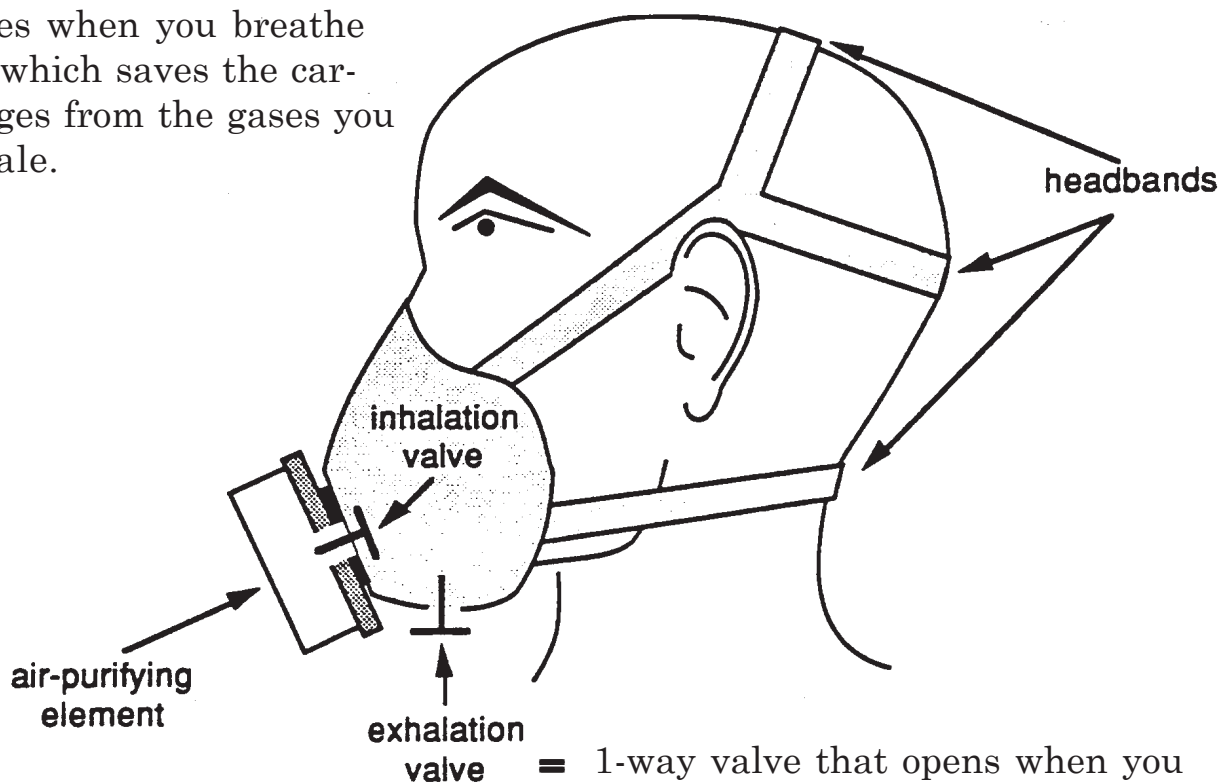
Fact Sheet #10

Parts of an Air Purifying Respirator

This picture shows the parts of a half-face air purifying respirator. You should check to make sure that all of these parts are present and in good working order before you put your respirator on. Inspect these parts every time you wear a respirator.

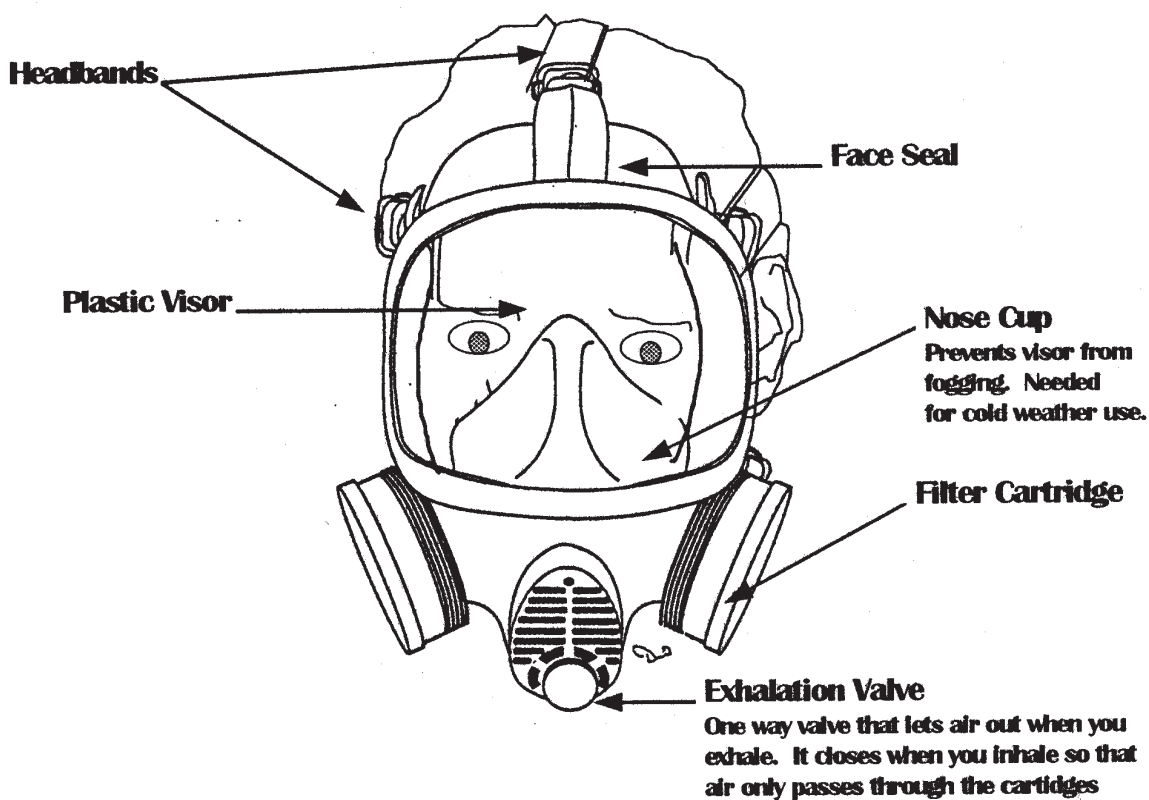
Inhalation valve =

1-way valve that opens when you inhale. It closes when you breathe out which saves the cartridges from the gases you exhale.

**Half-Face APR**

Fact Sheet #10, continued

Full-face APR



Fact Sheet #11

Check the Cartridge Color

Air purifying respirators come with many different types of cartridges. Each cartridge removes some chemicals from the air, but not all. You have to know which chemicals are in the air to be able to pick the right cartridge(s). To make it easier, each type of cartridge is given a different color. Each cartridge also has lettering on its side that lists the chemicals it works against and what brand of respirator it fits.

Color of Cartridge	Toxic Chemicals
Black	Organic vapors, such as acetone, methanol, mek, etc.
White	Chlorine, hydrogen chloride, sulfur dioxide, chlorine dioxide, and hydrogen sulfide (escape only). These are acid gases.
Yellow	Organic vapors and acid gases including chlorine, hydrogen chloride, sulfur dioxide or hydrogen fluoride.
Green	Ammonia, methylamine
Pink or Purple	High efficiency particulate filter (HEPA). Good for more toxic dusts, fumes, mists, radioactive materials such as radon daughters and asbestos-containing dusts.
Brown	Varies -- see manufacturer's product information or side of cartridge. Usually for formaldehyde, but might include other chemicals.
Orange	Varies -- see manufacturer's product information or side of cartridge. Some manufacturers make an orange cartridge for less toxic dusts, fumes, mists. Others make an orange cartridge for protection against mercury and chlorine.
Gray	Varies -- see manufacturer's information.

Source: American National Standards Institute (ANSI) K13.1-1973, Identification of Air-Purifying Respirator Canisters and Cartridges.

Task 3

APR Fit Check and Fit Test

With your partner, fit check your respirator. Answer the questions or check each step as you go.



Read the fact sheet called “**One Size Does Not Fit All**” before proceeding.

Put on the Respirator

Yes No

Loosen all straps. ___ ___

Put chin in facepiece, then pull straps over head and fasten. ___ ___

Tighten the straps evenly and in pairs. Start from the bottom and move up your head. ___ ___

Shake your head up and down and from side to side. ___ ___

Is the respirator sitting straight on your face? If pulled to one side, readjust straps. ___ ___

Task 3
continued

**APR Fit Check
and Fit Test**

	Yes	No
Does the respirator feel comfortable enough to wear for an hour or more?	---	---
If not comfortable, try a different size or brand.	---	---

Fit Check

	Yes	No
Cover the 2 cartridges with the palms of your hands or 2 plastic bags.	---	---
Inhale lightly and count to 10. Does the facepiece stay collapsed a little bit?	---	---
Cover the exhalation valve with the palm of your hand. Blow out lightly. Do you feel or hear air leaking?	---	---
Does the respirator fit you?	---	---
If no, try a different brand or size.		

Task 3
continued

**APR Fit Check
and Fit Test**

Do the next activity with all the members of your table. Only two or three people need to go through the fit test procedures as the others help or observe.

Chemical Fit Test — As soon as you smell or feel the test chemical - STOP! - your respirator leaks.

	Yes	No
Do you have the right cartridges for the test substance? (pink/purple for smoke, black for banana oil, combination - black and pink - for either.)	---	---
Have you had the mask on for 10 minutes (or more) to let it warm up and mold to your face?	---	---
Step into test bag and have your partner spray the test substance inside. Or have your partner spray test substance near facepiece during entire procedure.	---	---
Breathe normally for about 1 minute.	---	---
Breathe deeply for about 1 minute.	---	---
Turn head slowly from side to side. Breathe in on either side. Do this for about 1 minute.	---	---

Task 3
continued

**APR Fit Check
and Fit Test**

	Yes	No
Move head up and down slowly. Breathe in when head is fully up or down (about one minute).	---	---
Talk aloud for about 1 minute. Try to move your mouth in a wide range of motion.	---	---
Do you smell or feel the smoke or banana oil?	---	---
Step out of the test bag.	---	---
Is the respirator still comfortable to wear for another hour?	---	---

Everyone should do the following activity.

	Yes	No
<u>Cleaning and Storage</u>		
Take the respirator off.	---	---
Loosen the straps.	---	---
Remove the cartridges.	---	---

Task 3
continued

**APR Fit Check
and Fit Test**

	Yes	No
Clean the facepiece with an alcohol wipe or in a bucket with soap and water.	---	---
Are the valves still in place? Replace any missing valves.	---	---
Dry the respirator and place it in a clean plastic bag for storage.	---	---
Put a slip of paper with your name in the bag so you can use it again.	---	---

Fact Sheet #12

One Size Does *Not* Fit All

When a respirator “fits,” the facepiece sits snugly against your face. If there is a good seal between your face and the respirator, you will only breathe air that goes past the cartridges. When the cartridges work, they take out some of the contaminants from the air so that you do not breathe them in. **But, dirty air will flow directly into your facepiece through any gaps or “breaks” in the seal.**

It is extremely important to make sure that your respirator fits you by going through some standard fit check and fit test procedures. **In fact, the OSHA Respirator standard (1910.134) requires that your employer provide fit testing and training for you before you use a respirator for work.**

Check the Seal Every Time You Wear a Respirator

Every time you put on a respirator, you should check the seal. There are two quick and easy procedures that will help you check the fit.

1) Positive Pressure Check (Blowing Out)

Cover up the exhalation valve (around the chin) with the palm of your hand. Blow out gently. The facepiece should bulge out slightly, but don't blow so hard that it lifts off your face! Listen for air leaks from the valves or around the facepiece.

If you hear air leaking, tighten the straps and check again.



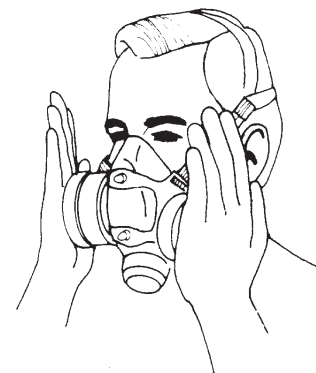
Fact Sheet #12, continued

2) Negative Pressure Check (Sucking In)

Cover the cartridges with the palms of your hands. Or, unscrew the cartridges and cover the inhalation holes (over each cheek) with your palms.

Inhale. The mask should suck into your face slightly. If there is a leak, air will flow in and the mask will ease up from your face before you release your hands.

If you have a leak, move the mask around a little to make sure it is sitting straight on your face and tighten the straps.



If it doesn't fit, don't wear it!

MOST IMPORTANT - Annual Fit Tests

Routine fit checks help you make sure that your respirator is adjusted properly when you put it on. The more accurate way to make sure that you have a respirator that fits well even when you are hot and sweaty is to go through **FIT TESTING**.

Qualitative Fit Test

The Fit Testing procedure is breathing air that has a test substance in it while you wear a respirator. If you can smell or react to the test substance, you do **not** have a good fit. The test substances that are most commonly used are banana oil (because it smells like bananas) and a smoky irritant.

Fact Sheet #12, continued

Quantitative Fit Test

A quantitative fit test uses a machine to measure how much test substance is outside your facepiece and how much has passed to the inside. The device figures out your protection factor for that respirator. Of course, these test conditions are ideal, unlike your working conditions. The amount of protection you will actually get from a respirator will go down as you work. You get hot and sweaty, and your respirator gets knocked about while working which makes it more likely to break the seal.

Once you have been fit tested, why do it again?

Here are some things that can change the fit of your respirator:

- ◆ gaining or losing weight
- ◆ getting denture work
- ◆ losing teeth
- ◆ an injury to your face that changes its shape
- ◆ a beard

Your employer must provide you with a fit test on the kind of respirator you will use and before you use it. The fit-test should be repeated every year to make sure your respirator still fits you.

Sources: *OSHA Respirator Standard, 29 CFR 1910.134*
NIOSH Guide to Industrial Respiratory Protection, National Institute for Occupational Safety and Health, 9/87, Publication # 87-116

Summary

Air Purifying Respirators

- ★ Air purifying respirators (APR) don't go in the hot zone in an emergency. SCBA's are needed in the hot zone because they are more protective. Operations-level responders will wear an APR or an SCBA on the decon line where the contamination is lower than in the hot zone. You don't wear a respirator for defensive spill control.
- ★ Your employer must develop a respirator program to meet OSHA's respiratory standard (1910.134). Before wearing an air purifying respirator you have to be trained, have a medical evaluation, and be tested to make sure that your respirator fits your face.
- ★ You can only wear an air purifying respirator (APR) when you know:
 - what the chemical and its warning properties are;
 - you can smell, taste, or feel the chemical at a safe level (it has "good" warning properties);
 - you have the right cartridges;
 - your respirator fits.
- ★ Your employer must do air monitoring to find out if the amount of oxygen in the air is safe (between 19.5% and 23.5%) and the amount of contamination in the air is low enough for an APR.
- ★ Cartridges are only effective for a limited time. Change them frequently. Make sure you have an extra supply on the decon line.

Summary

(Continued)

Air Purifying Respirators

- ★ You must be refitted every year by repeating the fit test. The fit test some of you went through in this class is not enough. A fit test must be performed by a qualified person.
- * Respirators and cartridges should be stored in clean, sealed bags or containers, away from the work (dirty) area. They should be inspected before each use and cleaned after every use.
- * Don't use an APR to protect yourself against cancer-causing chemicals in *any situation*.