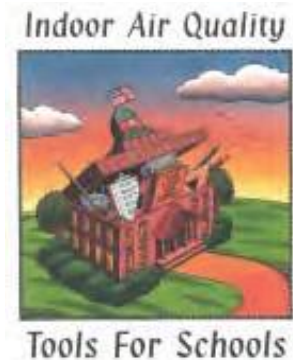


***PROTECT INDOOR AIR QUALITY
PROTECT HEALTH***

- ***19th Annual Tribal EPA Environmental Conference.***
- ***Pala Band of Mission Indians,
Pala CA. October 20, 2011.***
- ***EPA Region IX, Air Division,
Indoor Air Quality Team.***



US EPA Region IX



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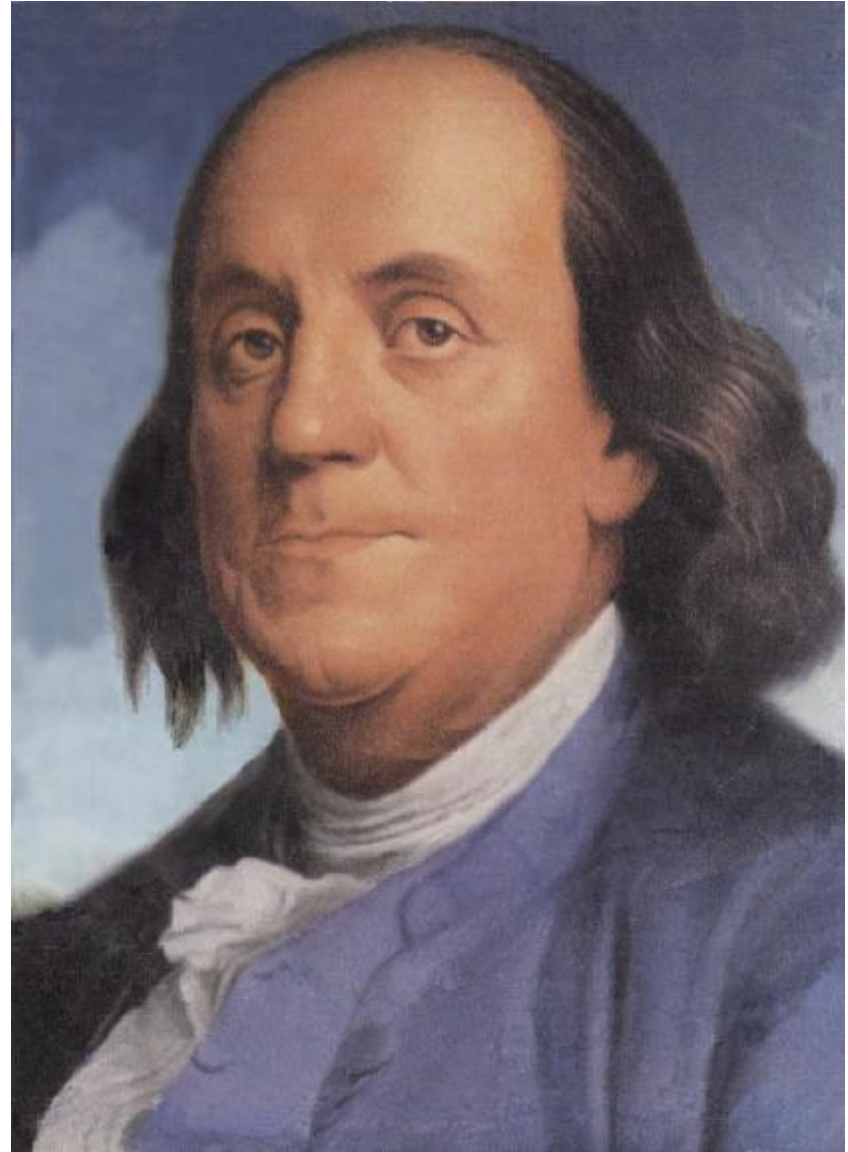
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www.epa.gov/iaq

Ben Franklin:
protecting indoor air
quality....

**“I am persuaded
that no common
air from without is
so unwholesome
as air within a
closed room that
has been often
breathed and not
changed.”**



Protecting Indoor Air Quality (IAQ)

“...In the construction of buildings, whether for public purposes or as dwellings, care should be taken to provide good ventilation and plenty of sunlight. ... school rooms are often faulty in this ...

Neglect of proper ventilation is responsible for much of the drowsiness and dullness that ... make a teacher's work toilsome and ineffective....”

Health Reformer: 1871

New Hampshire Ventilation Code: 1893

“...It is certain that the additional annual expense per pupil of the best ventilation need not exceed the price of one or two cheap lunches.....

....The effect of perfect ventilation, where it has been tried, is to increase the pupil's power of work about 50 percent ...”

Protecting Indoor Air Quality

Indoor air pollutant levels can be 2 to 5x higher than outdoor levels (even 100x greater than outdoor levels).

HVAC systems: most heating, ventilating & air-conditioning (HVAC) systems do not usually control chemical air pollutant vapors/gases.

Poor IAQ Affects Health...

- Exposure to indoor air contaminants causes multiple serious health effects.
- Life-threatening conditions tied to poor IAQ: Legionnaire's disease, carbon monoxide poisoning, severe asthma attacks.

Poor IAQ Affects Health...

- Adverse health effects tied to poor IAQ: headaches, dizziness, nausea, allergy attacks, respiratory problems.
- Exposure to allergens (dust mites, molds) triggers/aggravates asthma symptoms.
- Asthma: #1 cause of school absenteeism for chronic diseases.

Poor IAQ Affects Health...

- Critical for schools/child-occupied facilities (day care/pre-school/Head Start) to control environmental asthma triggers that cause/worsen asthma attacks.
- Clear link between breathing high radon concentrations & lung cancer.

Poor IAQ Affects Health...

- Exposure to environmental tobacco smoke (“secondhand smoke”):
- Responsible for 3,000 lung cancer deaths each year in US among non-smoking adults.
- Impairs respiratory health of hundreds of thousands of children.

Poor IAQ Affects Health...

- New research - Lawrence Berkeley Lab: external pollutants (ozone/smog) can move into buildings & chemically react with existing indoor pollutants - thus creating even worse pollutants.
- Fact Sheet: Respiratory Health Effects of Passive Smoking -
<http://www.epa.gov/smokefre/pubs/etsfs.htm>

IAQ Problems Include...

- Nitrogen oxides (NO_x)/ mono-nitrogen oxides NO and NO₂ (nitric oxide and nitrogen dioxide).
- Volatile organic compounds VOCs: (formaldehyde, solvents, cleaning agents).

IAQ Problems Include...

- **Environmental tobacco smoke (ETS) / “Secondhand Smoke.”**
- **Biological contaminants (mold, pollen, dust mites, pet dander).**
- **Pesticides.**

IAQ Problems Include...

- Lead Dust (lead-based paint).
- Radon – a carcinogen.
- Carbon monoxide (CO).

| <u>Contaminant</u> | <u>Potential Health Effects</u> |
|---|---|
| Bioaerosols ✓ Molds ✓ Dander ✓ Dust Mites ✓ Cockroach Droppings ✓ Bacteria/Viruses | <ul style="list-style-type: none"> • Upper Respiratory Tract Symptoms • Asthma Triggers • Colds • Allergic Reactions |
| Formaldehyde ✓ Building Materials ✓ Carpets | <u>Low Level Exposure:</u> <ul style="list-style-type: none"> • Eye, Nose, Throat Irritation • Dermatitis <u>Long-Term Exposure</u> <ul style="list-style-type: none"> • Headache, Dizziness • Coughing • Chronic Upper Resp. Infections |
| Other Volatile Organic Compounds ✓ Cleaning Solvents ✓ Wood Preservatives ✓ Phenols | <ul style="list-style-type: none"> • Eyes, Upper Respiratory Tract • Potential Carcinogenic, Reproductive Effects |

| <u>Contaminant</u> | <u>Potential Health Effects</u> |
|---|--|
| Environmental Tobacco Smoke | <ul style="list-style-type: none"> • Multiple Health Effects • Group A Carcinogen |
| Lead ✓ Older Elementary Schools | <ul style="list-style-type: none"> • Delays In Development • Lower IQ Levels • Shortened Attention Spans • Behavioral Problems • > Doses: Kidney, Cns Damage |
| Radon | lung cancer |
| Pesticides ✓ See Pesticide Law ✓ IPM Important | <u>Specific symptoms:</u> <ul style="list-style-type: none"> • Type Of Pesticide • Dose • Sensitivity Of Exposed |
| Dust, Dirt ✓ Everywhere! | <ul style="list-style-type: none"> • Eye, Upper Respiratory Tract Irritation • Asthma Trigger |

| <u>Contaminant</u> | <u>Potential Health Effects</u> |
|--|---|
| Nitrogen Oxides ✓ Bus fumes ✓ Combustion appliances | <ul style="list-style-type: none"> • Eye, throat, respiratory system irritations • Special risks to asthmatics, children < 2 |
| Carbon Monoxide ✓ Bus fumes ✓ Combustion appliances | <ul style="list-style-type: none"> • Fatigue • Headache • Nausea • Flu-like symptoms |
| Particulates ✓ Bus exhaust ✓ Pollen ✓ Construction Debris | <ul style="list-style-type: none"> • Eye, throat, respiratory system irritations • Asthma Triggers |

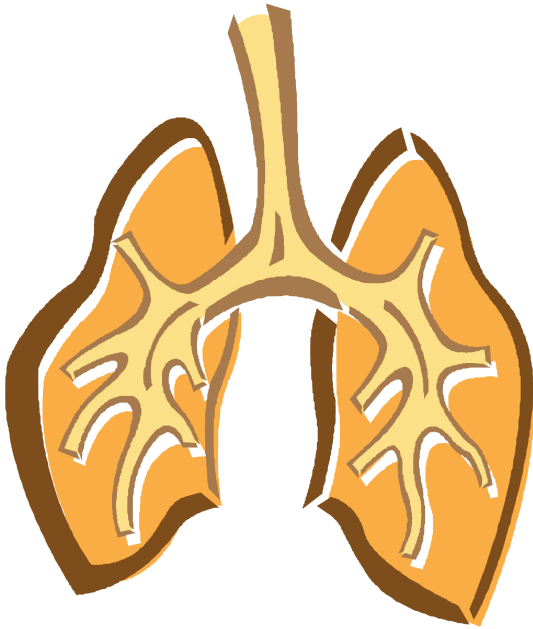
Asthma: Presentation Overview

- What is asthma?
- How does asthma adversely affect tribal residents/communities?
- What triggers asthma?
- What can I do?

Asthma: Facts

- **Asthma can not be cured - but can be controlled.**
- **Most people with asthma should be able to live healthy, active lives with minimal symptoms.**
- **Many actions that families/care providers can take to reduce the burden of asthma.**

Asthma: Facts



Asthma is a condition that:

- **Is chronic.**
- **Produces recurring episodes of breathing problems.**
- **Is potentially life-threatening.**
- **Can occur at any age.**
- **Is not contagious.**
- **Cannot be cured, but can be controlled.**

Asthma in Tribal Communities

- Affects 12% of persons in tribal communities vs. US average of 7%.¹
- Affects 13% of American Indian/Alaska Native children vs. 9% of children in US.²



Asthma in Tribal Communities

- 1 CDC. Surveillance for asthma---United States, 1980--1999. In: **CDC Surveillance Summaries** (March 29). MMWR 2002;51 (No. SS-1). US Centers for Disease Control (Dept of H&HS).
- 2 Asthma Prevalence Among US Children in Underrepresented Minority Populations: American Indian/Alaska Native, Chinese, Filipino, and Asian Indian. Brim, Rudd, Funk, & Callahan. **PEDIATRICS**: 122(1). July 2008, pp. e217-e222.

Symptoms of Asthma

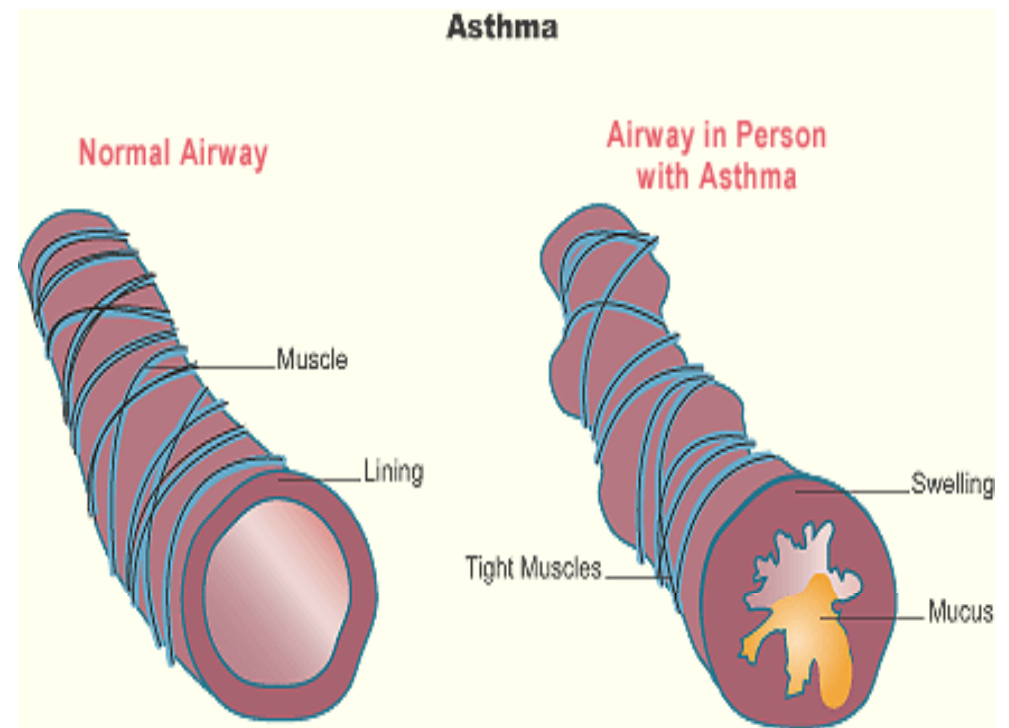


- Shortness of breath
- Wheezing
- Tightness in the chest
- Coughing
- Waking at night with any of the above symptoms+

+key sign of uncontrolled asthma

Asthma Episode

- Lining of airways becomes narrow & irritated due to inflammation.
- Airways produce thick mucus.
- Muscles around airways tighten & make airways narrower.



Asthma: Worsened By

Allergens including....

- Dust mites
- Cockroaches
- Furred/feathered animals
- Pollens
- Molds (indoor/outdoors)
- Nitrogen dioxide



Asthma: Worsened By

Irritants including....

- Tobacco smoke (2nd hand smoke – “passive smoking”),
- Outdoor air pollution,
- Scented products,
- Fumes/odors (diesel bus exhaust).



Asthma: Worsened By

- Exercise (Exercise Induced Asthma).
- Infections in upper airways.
- Changes in weather or temperature.
- Physical expressions (crying /laughing hard; yelling).

Not all factors necessarily affect every one with asthma.

Symptoms of Asthma

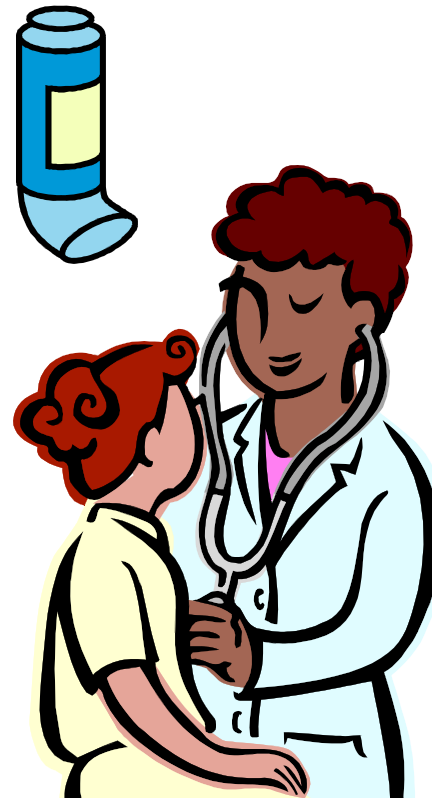


- Shortness of breath
- Wheezing
- Tightness in the chest
- Coughing
- Waking at night with any of the above symptoms+

+key sign of uncontrolled asthma

Controlling Asthma Risks

- Follow individualized, written asthma action plan.
- Reduce or eliminate exposure to factors (indoors and outdoors) that can cause asthma symptoms.
- Complete personal environmental history.
- Encourage and support use of medication as prescribed by medical specialist.



Controlling Asthma Risks

- Reduce asthma triggers at home, schools and child-occupied buildings.
 - Use the EPA Home Environment Checklist.
 - Example Actions:
 - ✓ Reduce exposure to dust mites by regularly washing bedding in hot water and drying completely.
 - ✓ Dry damp or wet items within 24-48 hours to avoid mold growth.
- Encourage use of asthma management plans.
http://www.epa.gov/asthma/pdfs/home_environment_checklist.pdf

Reducing Asthma Risks

- Limit amount of perfumed/scented /fragranced products you use. These can adversely affect persons with asthma.
- Be aware of exposing persons to certain cleaning products including laundry soaps- use less aggravating products if possible.
- Do not to smoke cigarettes around others: especially children & persons with asthma.

Asthma Action Plan

For: _____ Doctor: _____ Date: _____
 Doctor's Phone Number: _____ Hospital/Emergency Department Phone Number: _____

GREEN ZONE

Doing Well

- No cough, wheeze, chest tightness, or shortness of breath during the day or night
- Can do usual activities

And, if a peak flow meter is used,

Peak flow: more than _____
 (80 percent or more of my best peak flow)

My best peak flow is: _____

Take these long-term control medicines each day (include an anti-inflammatory).

| Medicine | How much to take | When to take it |
|-----------------|---|---------------------------------|
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| Before exercise | <input type="checkbox"/> _____ <input type="checkbox"/> 2 or <input type="checkbox"/> 4 puffs _____ | 5 to 60 minutes before exercise |

YELLOW ZONE

Asthma Is Getting Worse

- Cough, wheeze, chest tightness, or shortness of breath, or
- Waking at night due to asthma, or
- Can do some, but not all, usual activities

-Or-

Peak flow: _____ to _____
 (50 to 79 percent of my best peak flow)

First
Second

Add: quick-relief medicine—and keep taking your GREEN ZONE medicine.

- ☐ _____ ☐ 2 or ☐ 4 puffs, every 20 minutes for up to 1 hour
 (short-acting beta₂-agonist) ☐ Nebulizer, once

If your symptoms (and peak flow, if used) return to GREEN ZONE after 1 hour of above treatment:
☐ Continue monitoring to be sure you stay in the green zone.

-Or-

If your symptoms (and peak flow, if used) do not return to GREEN ZONE after 1 hour of above treatment:

- ☐ Take: _____ ☐ 2 or ☐ 4 puffs or ☐ Nebulizer
 (short-acting beta₂-agonist)
- ☐ Add: _____ mg per day For _____ (3–10) days
 (oral steroid)
- ☐ Call the doctor ☐ before/ ☐ within _____ hours after taking the oral steroid.

RED ZONE

Medical Alert!

- Very short of breath, or
- Quick-relief medicines have not helped, or
- Cannot do usual activities, or
- Symptoms are same or get worse after 24 hours in Yellow Zone

-Or-

Peak flow: less than _____
 (50 percent of my best peak flow)

Take this medicine:

- ☐ _____ ☐ 4 or ☐ 6 puffs or ☐ Nebulizer
 (short-acting beta₂-agonist)
- ☐ _____ mg
 (oral steroid)

Then call your doctor NOW. Go to the hospital or call an ambulance if:

- You are still in the red zone after 15 minutes AND
- You have not reached your doctor.

DANGER SIGNS ■ Trouble walking and talking due to shortness of breath

■ Lips or fingernails are blue

■ Take ☐ 4 or ☐ 6 puffs of your quick-relief medicine AND

■ Go to the hospital or call for an ambulance _____ NOW!
 (phone)

See the reverse side for things you can do to avoid your asthma triggers.

Asthma Effects: Chemicals in Perfumes/Scents

- **Perfumes/scents in scented products are complex chemical formulations. Many product constituents adversely affect health/comfort of others.**
- **Explain that you have adverse reaction to “something in the perfume” rather than saying it’s the perfume that affects you.**

Asthma: Information Resources

- EPA's Tribal Indoor Air Quality Webpage – www.epa.gov/iaqtribal

The screenshot shows the EPA's Tribal Indoor Air Quality (IAQ) Tribal Partners Program webpage. The header features the EPA logo and navigation links in multiple languages (Español, 中文, 繁體, 中文, 简体, Tiếng Việt, 한국어). Below the header, there are links for "LEARN THE ISSUES", "SCIENCE & TECHNOLOGY", "LAWS & REGULATIONS", and "ABOUT EPA". The main content area is titled "IAQ Tribal Partners Program" and includes a banner image of three people (two women and one man) with the text "Helping Tribal Families Breathe Easier". Below the banner, there is a "Quick Finder" section with links to various resources, a "Top Questions/Tasks" section with two numbered questions, a "Connect" section with links to tribal champions and events, and a "What is IAQ?" section. The footer includes "NEWS/FEATURES" and "Upcoming Events".

EPA United States Environmental Protection Agency

LEARN THE ISSUES | SCIENCE & TECHNOLOGY | LAWS & REGULATIONS | ABOUT EPA

IAQ Tribal Partners Program

Helping Tribal Families Breathe Easier

Tribal communities may be disproportionately affected by health problems associated with poor indoor air quality.

Learn about Indoor Air Quality

Quick Finder

- A to Z Site Index
- About Us
- Asthma Triggers
- Basic Information
- Carbon Monoxide
- Community Programs
- Directory of Tribal Champions
- Events Calendar
- Frequent Questions
- Innovative Tribal Programs
- Learn about IAQ
- Working with the Media
- Moisture / Mold
- Other Pollutants
- Radon
- Related Links
- Programs in Schools
- Secondhand Smoke
- Wood Smoke
- Indoor Air Quality

Top Questions/Tasks

1. Where can I find tribal IAQ resources and materials?
2. How can I connect with other tribal IAQ leaders?

More Indoor Air Quality Questions

Connect

- Directory of Tribal Champions
- Upcoming Events Calendar
- EPA Tribal Links
- EPA's American Indian Tribal Portal

What is IAQ?

Indoor air quality (IAQ) is a term used

Asthma: Information Resources

- EPA's Asthma Program:
<http://www.epa.gov/asthma>
- EPA's IAQ Tools-for-Schools Program:
<http://www.epa.gov/iaq/schools/>
- NoAttacks.org: <http://www.noattacks.org/>
- Native AIR program:
<http://www.nativeasthma.org>

Asthma: Information Resources

- NAEPP Asthma Basics for Schools PowerPoint Presentation:
http://www.nhlbi.nih.gov/health/prof/lung/asthma/basics_schools/part2.ppt
- AsthmaCommunityNetwork.org:
<http://www.asthmacommunitynetwork.org/>

Asthma: Information Resources...

- **Aberdeen Area Tribal Chairmen's Health
Board Asthma Prevention Campaign:
<http://www.sacredbreath.org/asthma/>**

Radon: Facts...

Radon: cancer-causing, radioactive gas.

**Radon: #2 leading cause of lung cancer
(cigarette smoking is #1 cause).**

Radon can be found all over US.

**Test homes/schools/child-occupied
buildings for radon levels.**

Radon: Facts...

**Radon problems in schools & homes
can be fixed – often at relatively low
cost.**

**New homes can be built with radon-
resistant features.**

Radon: Information Resources...

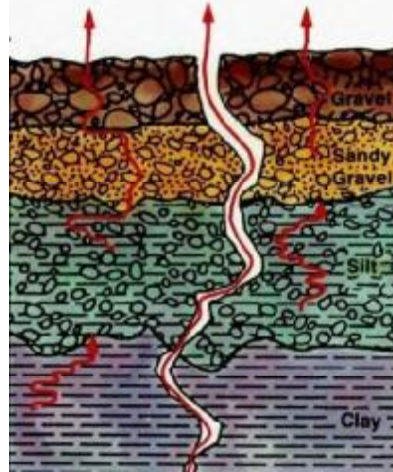
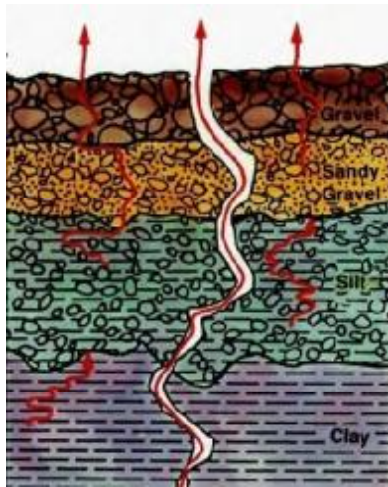
- “Citizen's Guide to Radon:” Protecting Families from Radon Hazards.
- <http://www.epa.gov/radon/pubs/citguide.html>
- More information: www.epa.gov/radon

Radon: Facts

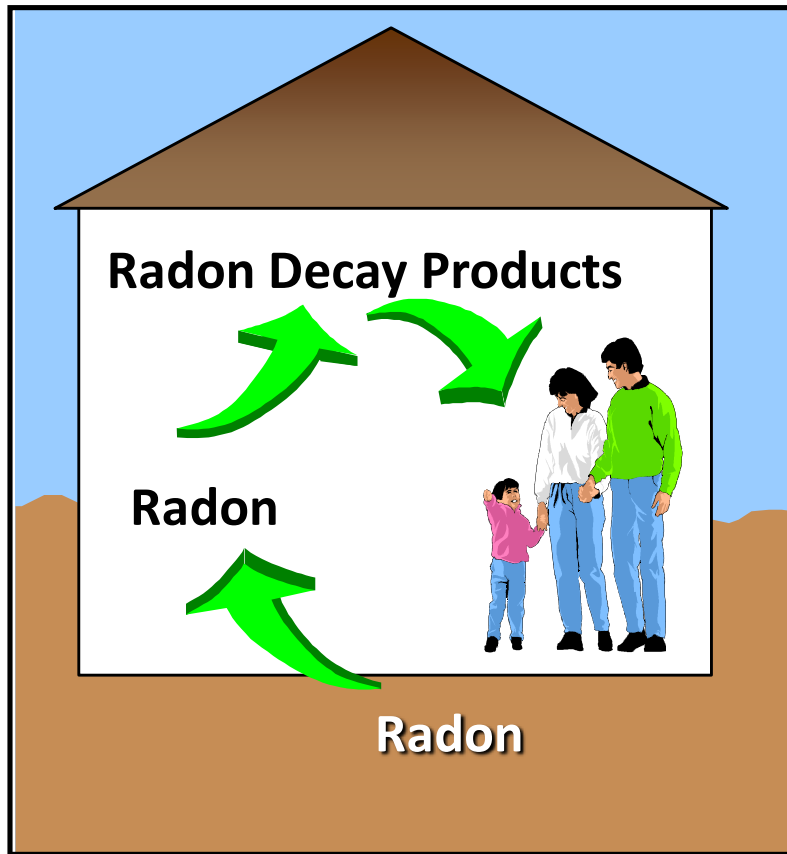


- #2 leading cause of lung cancer (#1: cigarette smoking).
- Doesn't matter where you live.
- Testing inexpensive.
- Not too difficult to fix.
- Test homes & schools for radon.

Any building can have radon problems: schools, homes, offices.



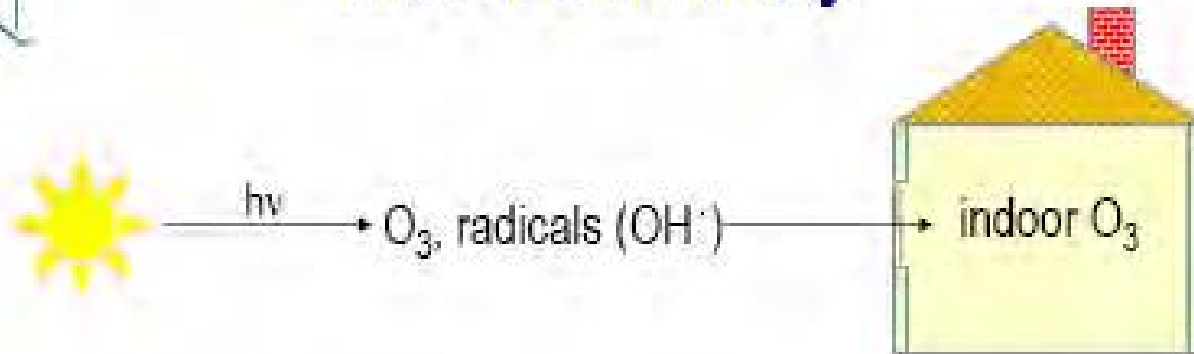
Radon & Human Health...



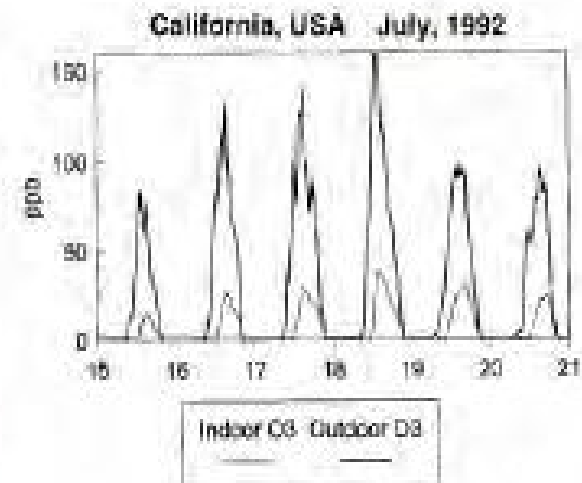
- Radon decays into radioactive particles known as radon decay products.
- These particles are easily inhaled & deposited in lungs where they can damage sensitive lung tissue.



Indoor chemistry



- O_3 + surfaces \rightarrow less O_3
 - Sabersky, Sinema & Shair, ES&T, 1973
- O_3 + carpet \rightarrow aldehydes, less O_3
 - Weschler, Hodgson & Wooley, ES&T, 1992
 - Morrison & Nazaroff, ES&T, 2000, 2002
- O_3 + terpenes \rightarrow $OH\cdot$, particles, formaldehyde
 - Weschler & Shields, ES&T, 1996, 1997
 - Weschler & Shields, Atmos. Environ., 1997, 1999



Weschler et al.
Indoor Air, 2000

Courtesy of Brett C. Singer & Hugo Destailats; Indoor Environment Dept., Lawrence Berkeley National Laboratory

EPA's IAQ Tools for Schools Program...

- **Comprehensive resource: help schools maintain healthy environment in school buildings.**
- **Identify/correct /prevent IAQ problems in school buildings.**

EPA's Tools for Schools Program...

- **Poor IAQ impacts student health.**
- **Poor IAQ affects student concentration, attendance & performance.**

Information Resources: Tools for Schools...

EPA's Tools for Schools Program:

<http://www.epa.gov/iaq/schools/>

Managing IAQ at Schools:

[http://www.epa.gov/iaq/schools/symptoms](http://www.epa.gov/iaq/schools/symptoms.html)
[.html](http://www.epa.gov/iaq/schools/symptoms.html)

Information Resources: Tools for Schools...

- Schools can manage environmental asthma triggers: [Managing Asthma in Schools](#) .
- Common health symptoms from exposure to indoor air pollutants: [Common Symptoms](#).

More Than Monitoring IAQ....

1. Add fewer pollutants

- Learn where & how pollutants are added.
- Occupant activities & maintenance activities.

2. Remove pollutants quickly

- Learn where & how pollutants are removed.
- Learn where & how fresh air is added.
- Learn about operation of HVAC controls.

Two sides to IAQ “coin”

District

- **Building structure.**
- **Ventilation.**
- **Landscaping / pest control.**



School Occupants

- **Art & science materials.**
- **Household cleaners.**
- **Personal care products.**
- **Activities, awareness, etc.**



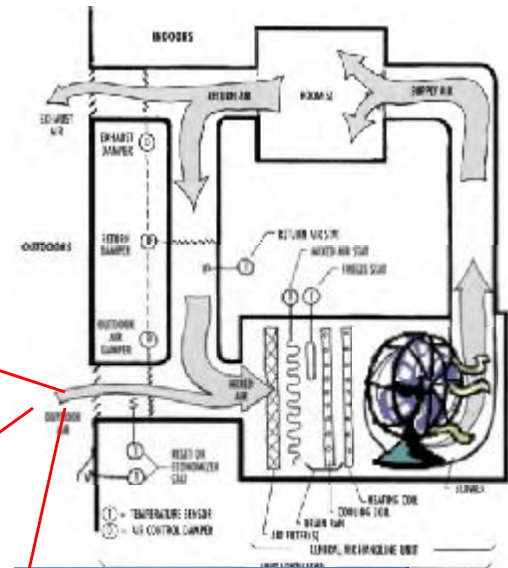
←→
Communication

Tools for Schools: Useful Tips

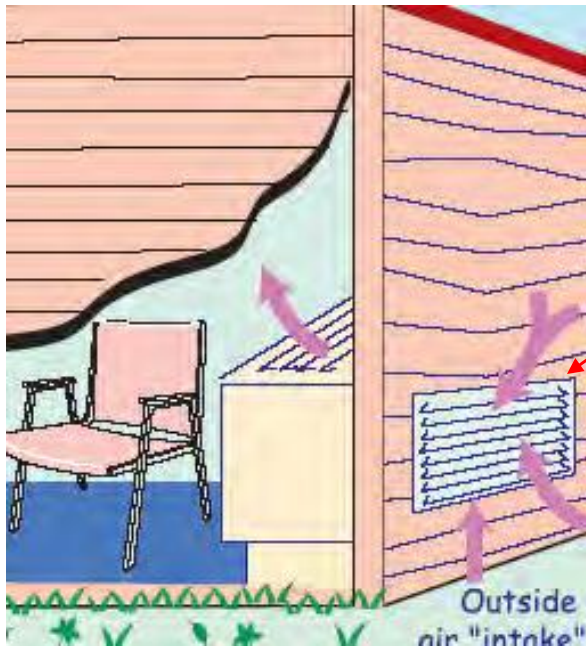
- **IAQ Team/Coordinator at every school.**
- **Checklists: for teachers & facility maintenance, including HVAC system. Compare notes.**
- **Setting priorities: Inspect school & set priorities. Fix simple things first; more difficult problems, set priorities.**
- **Share IAQ information with other tribes, parents & your partners in health protection.**



School occupants need to learn how the ventilation system works.



Outside air gets pulled in here.





Make sure there are no sources of pollution near outside air intakes such as buses or cars with their engines on, flowering plants or pesticides.

Bad for Indoor Air Quality: Bus Stop at Ventilation Intake



Well, I'm
allergic to you
too!

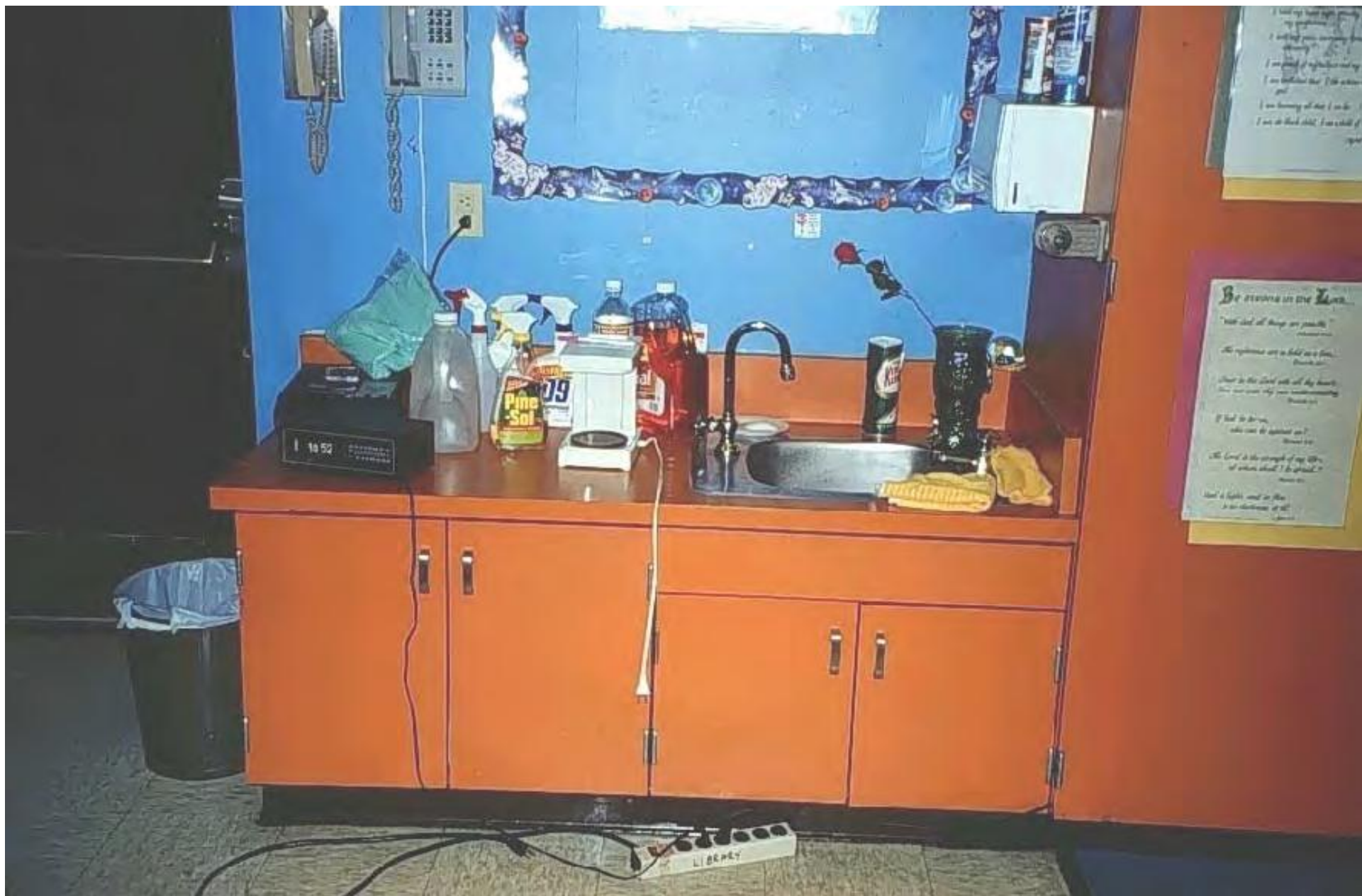
How about
cleaning my
cage?!





*This will be a
challenge!*







If you water it - they* will come!

* Mold remediators

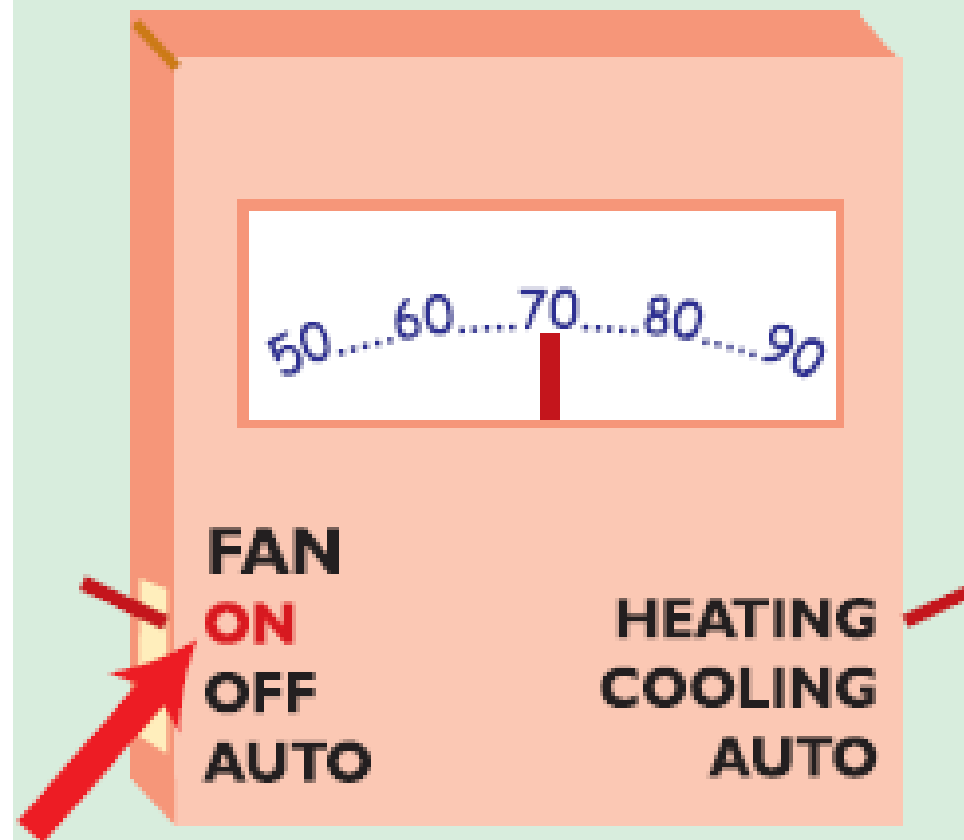
**A waste of energy, money
& staff time.**

**No wonder the air
wasn't moving!**

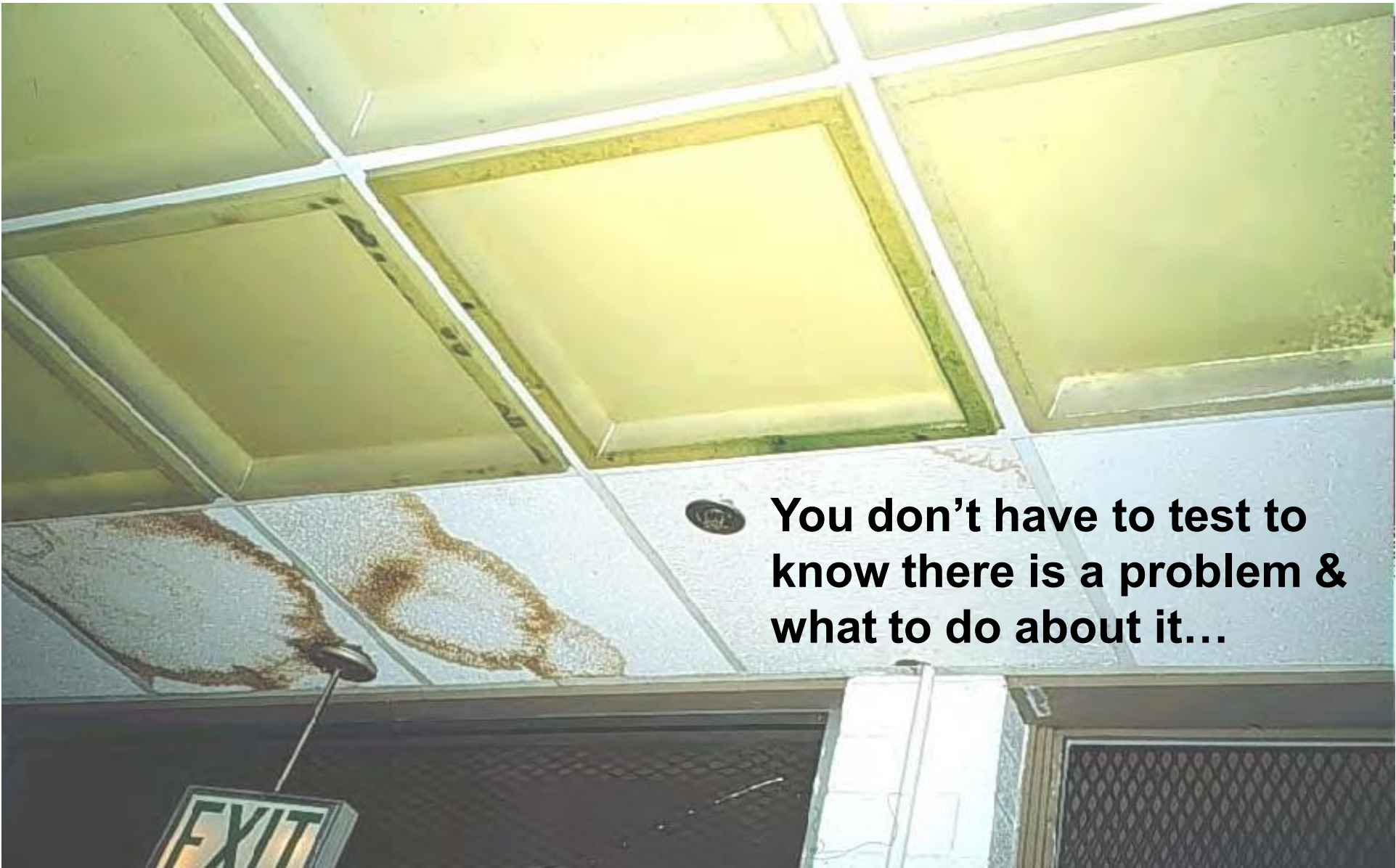
**Somebody missed
this filter!**



Keep the fan "**ON**" when people are there.

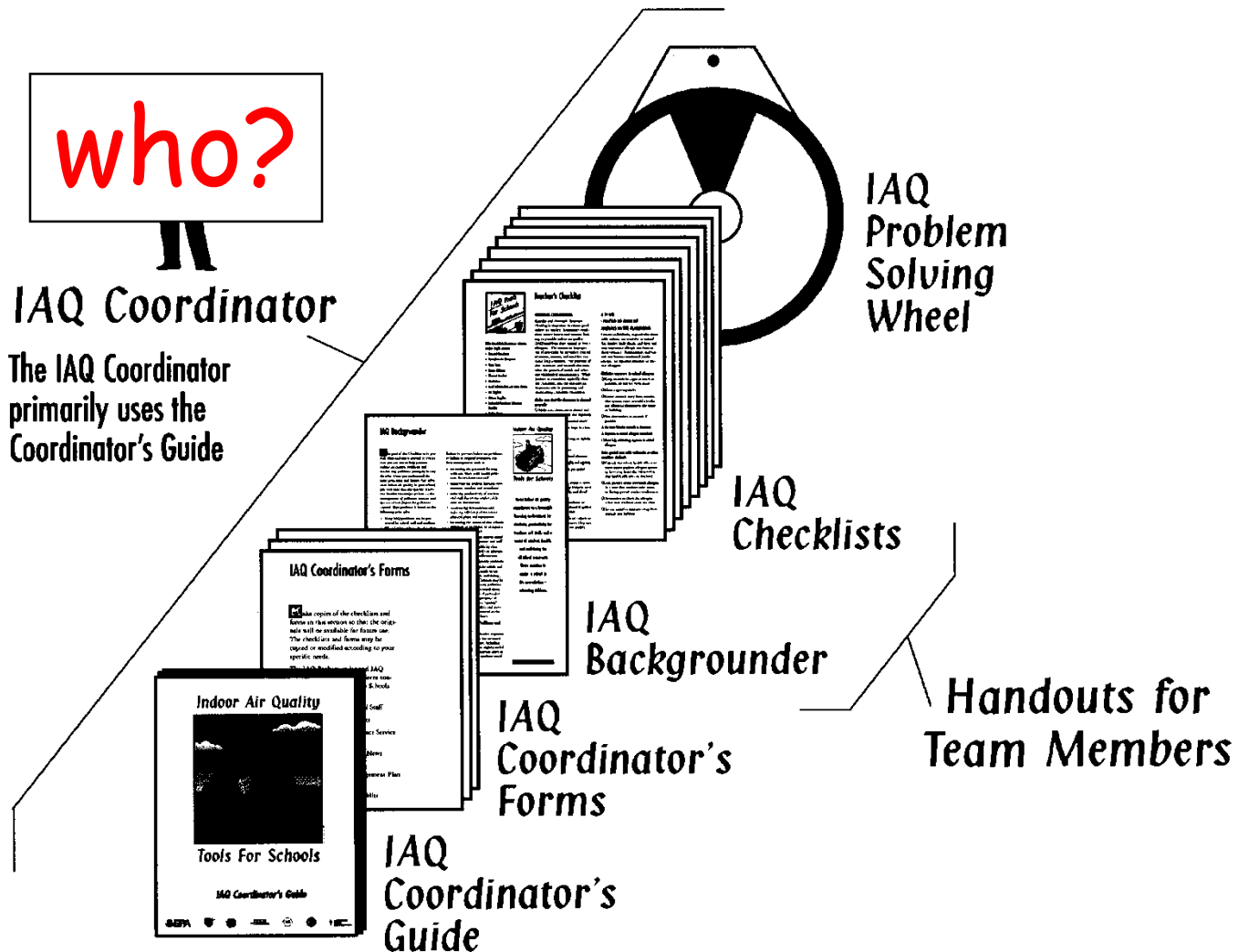


With the fan switch in the "**ON**" position, fresh air will be brought in continuously. The air conditioner or heater will cycle on and off to adjust temperature.

A photograph of a ceiling with several square acoustic tiles. Some tiles are missing or damaged, revealing a brown, stained surface underneath. A small, round, dark object is visible on the ceiling. In the bottom left corner, there is a rectangular exit sign with the word "EXIT" in white letters on a dark background. The overall lighting is dim, and the colors are somewhat muted.

You don't have to test to know there is a problem & what to do about it...

IAQ Tools for Schools Action Kit





Students



Nurses



Planning / Contracting



School staff

Protecting IAQ: Team Efforts



Parents



**School
Board**



Facilities / Maintenance



Teachers