

Leading Edge IAQ Tools for Schools Assessment Strategies

Tracy Enger
U.S. EPA
April 24, 2007





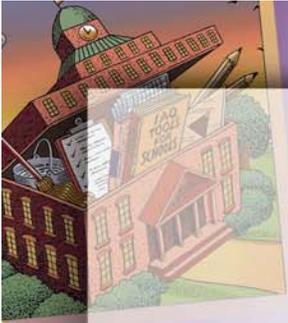
Agenda

- Welcome and Speaker Introductions
- Review of Framework for Effective School IAQ Programs – Assessment Section
- School IAQ Walkthroughs
- Blue Valley Schools IAQ Assessment Program, Overland Park, Kansas
- The School Board of Broward County IAQ Assessment Program, Broward, Florida
- Questions



Framework for Effective School IAQ Programs





Polling Question

Have you participated in an IAQ assessment of a school?

Yes

No



School IAQ Walk-Throughs

==== Walk-the-Talk ====

Putting IAQ Info into Action

Rich Prill & Dave Blake



Rich Prill

Building Science & IAQ Specialist

Washington State University
Spokane, WA

- 25 years IAQ experience
- Region 10 School IAQ Program technical resource
- Building Operator Certification IAQ instructor



Dave Blake

Indoor Air Specialist

Northwest Clean Air Agency
Mt Vernon, WA

- 15 years IAQ experience
- Most schools in NWCAA territory implemented TfS
- Responds to homes, offices, public buildings



IAQ Walk-Throughs are *Essential*



Communications:

public relations & awareness
education & training opportunity

Assess:

Gain insights into conditions & “challenges”

Organize:

Document issues & create a *Plan*

Act:

Prioritize responses
Develop a customized IAQ Program

Evaluate:

IAQ Program must *evolve*

Routine Health Check-Up Analogy

- ✓ Prevention makes the most sense
(find problems before they find you)
- ✓ Checks the usual (not the exotic)
- ✓ Opportunity for communication
- ✓ Documentation establishes baseline information to *shape IAQ Program* content and priorities



Get BUY-IN from the Administration Sell... gently



(but don't burn any bridges if you can't)

Helpful Walk-Throughs:

Non-threatening

Non-regulatory

**Practical learning
opportunity**

Build relationships & skills



Walk-throughs send a positive message to staff... and parents



Visit during occupied hours

Insights into *actual* building operation

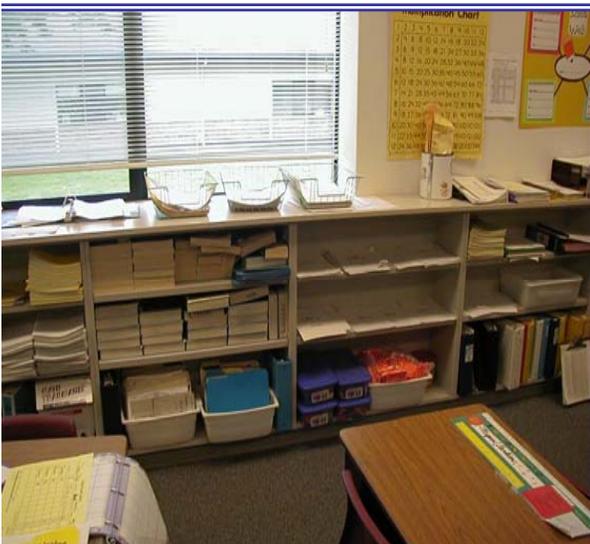


advanced notice of visit

Not a science project ... **look for “good practice”**



Top to
Bottom

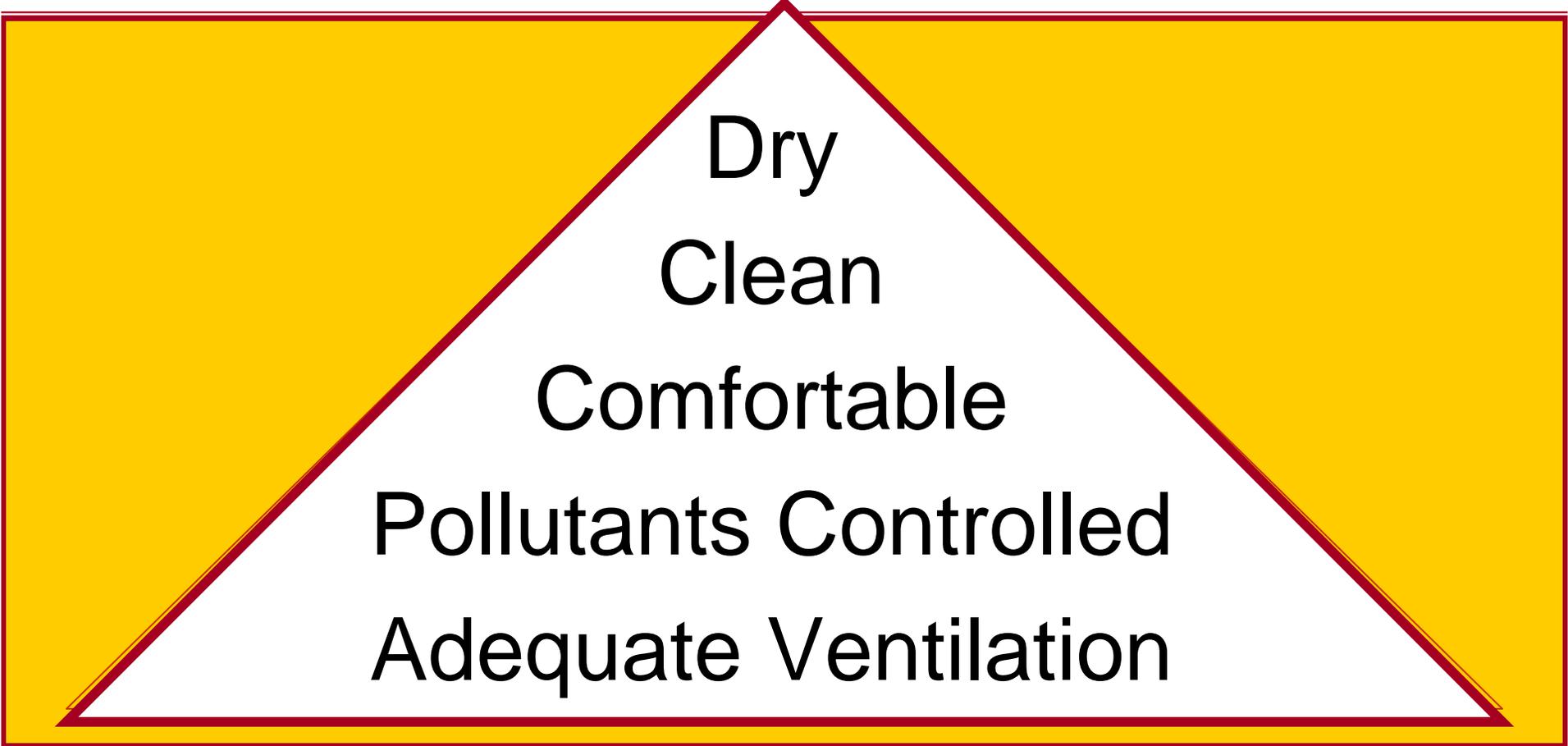


Inside
Outside



Essential "Good Practices" *Observations & Measurements*

Compare to common sense benchmarks:



Dry
Clean
Comfortable
Pollutants Controlled
Adequate Ventilation

Measurements must yield *useful* answers

Dry

Clean

Comfortable

Pollutants

Ventilation

Moisture

Temperature

Air Direction

CO₂

Radon

Lead

Particles

Carbon Monoxide



IAQ Pro-Tip

what gets measured

gets fixed

or controlled



IAQ Pro-Tip

measure only

what you can

reasonably interpret

Point out “potential” problems,
but don't over-react
or be alarmist

Remember:....

School IAQ is *always* a work in progress !





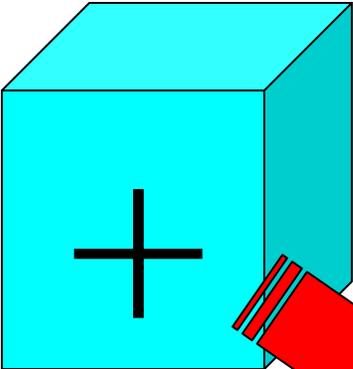
IAQ Pro-Tip

air should move

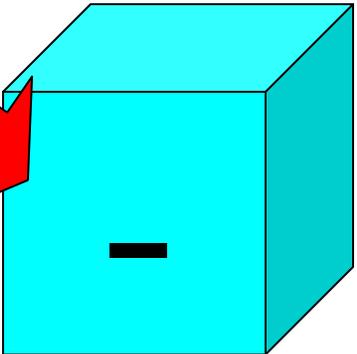
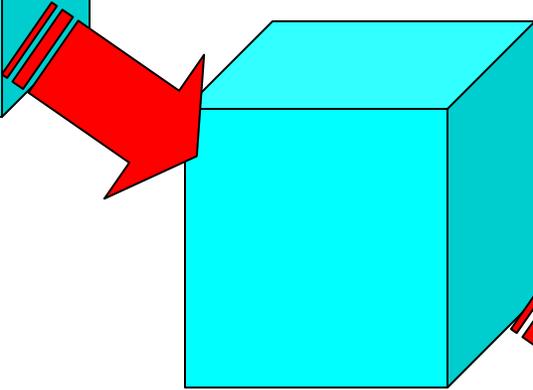
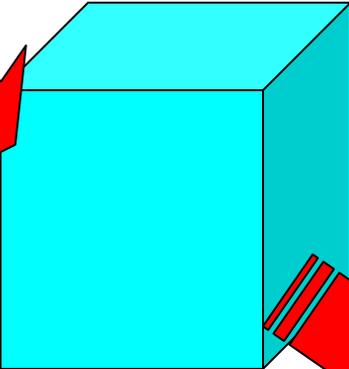
from "clean"

to "dirty"

Cleanest Zone



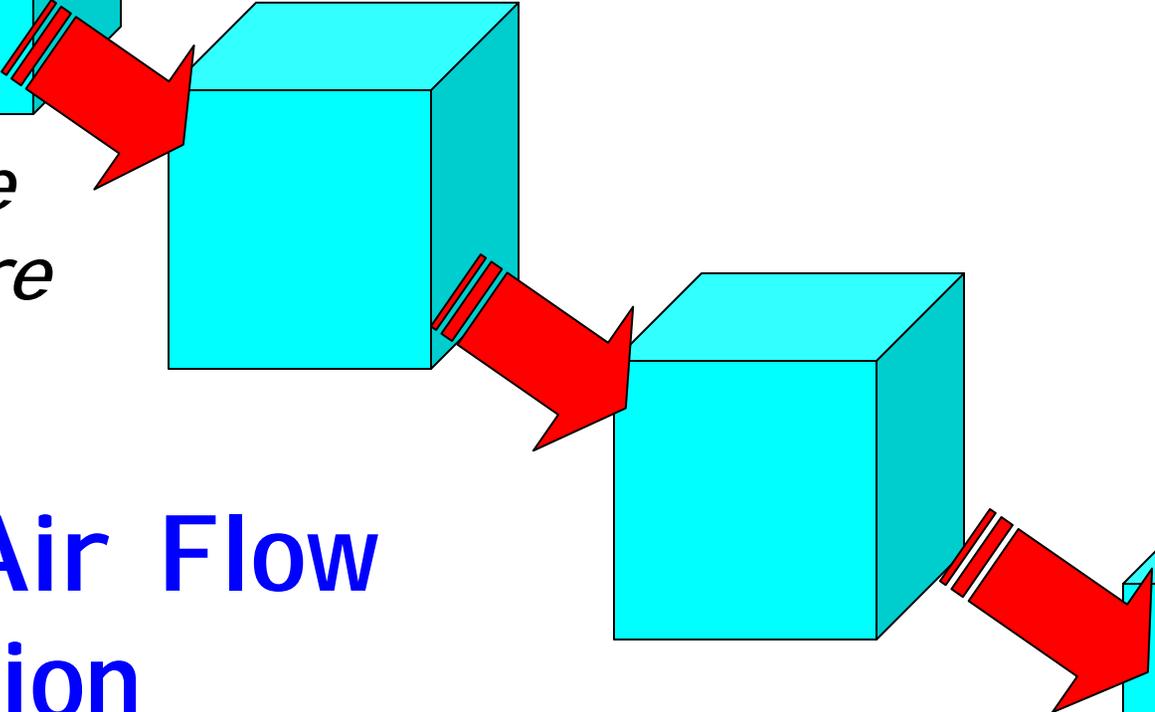
Positive pressure



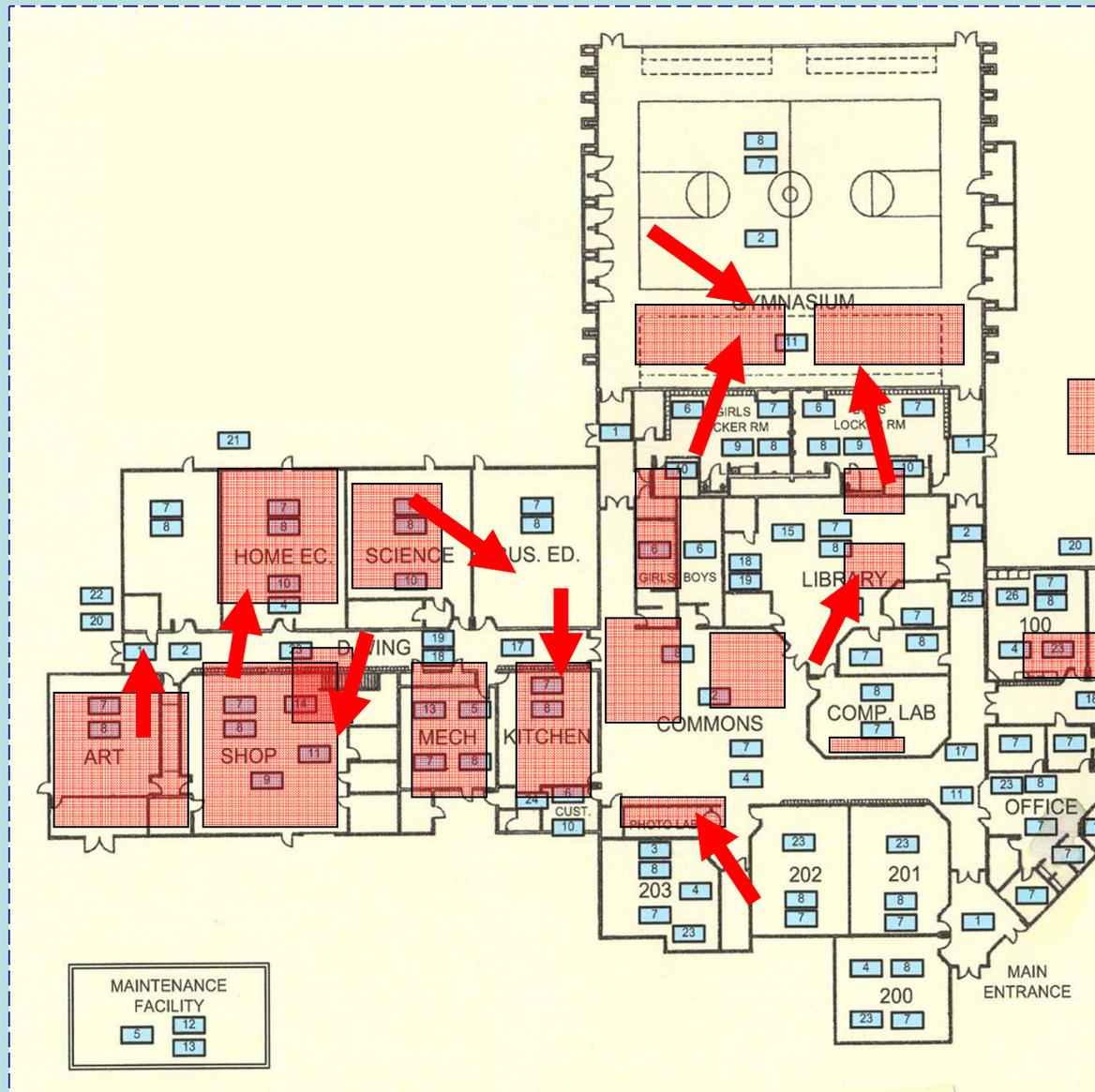
Negative pressure

Best Air Flow Direction

Dirtiest Zone



Pollutant Control: Source Inventory



Chemistry
Physics
Biology
Art
Home Science
Custodial
Rest Rooms
Workroom
Locker Rooms
Kitchen
Boiler Room

Adequate Ventilation

Specified in

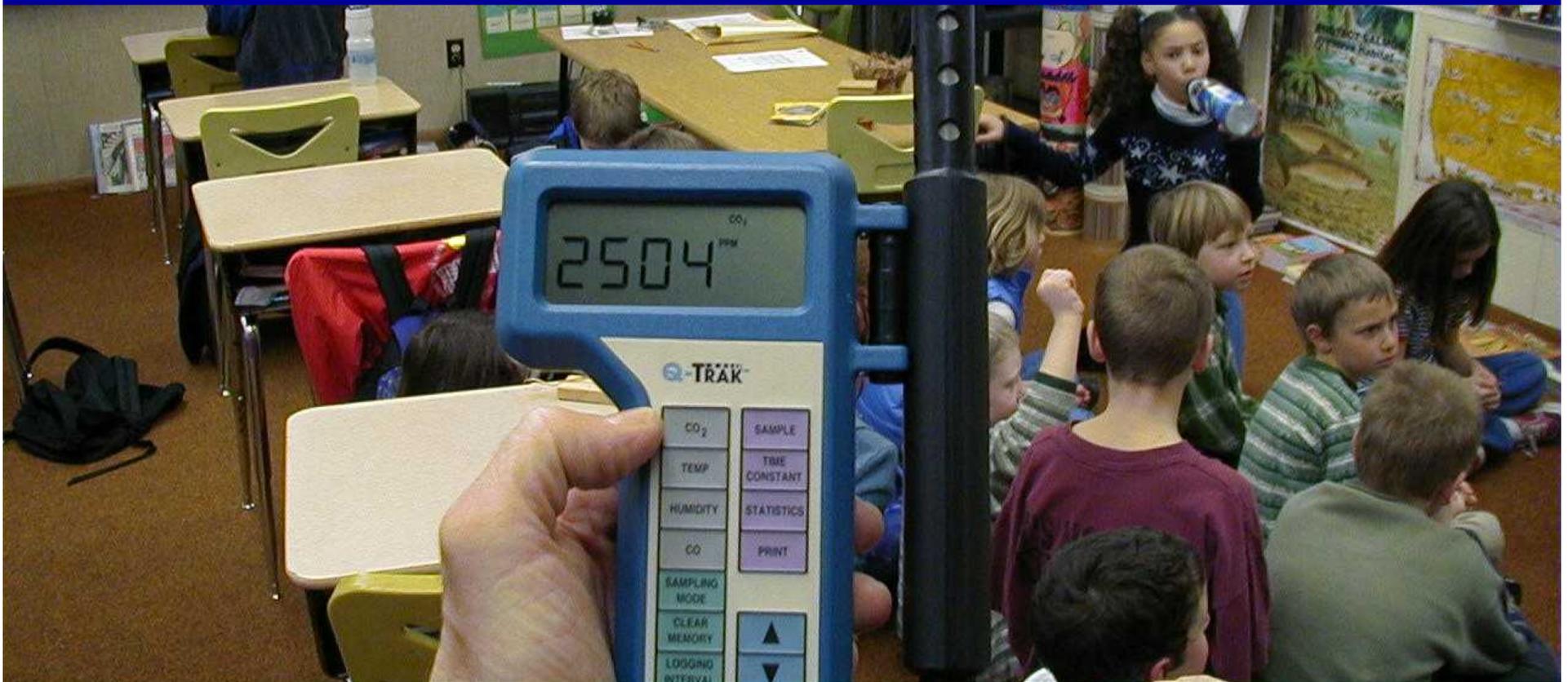
Cubic Feet Per Minute (CFM)

Fresh air

Per Person



- Carbon Dioxide -
CO₂ used to *estimate*
the ventilation rate



CO₂ instrument = handy "fresh air meter"



IAQ Pro-Tip

as CO₂ builds up

so does

everything else

"everything else" is too difficult to measure

Carbon Dioxide vs. Ventilation

CO₂ (ppm)

Outside Air (*Ventilation rate*)

2,400

5 cfm/p

Unacceptable

1,400

10 cfm/p

Poor

1,000

15 cfm/p

Classrooms

800

20 cfm/p

Offices

600

25 cfm/p

~ 380

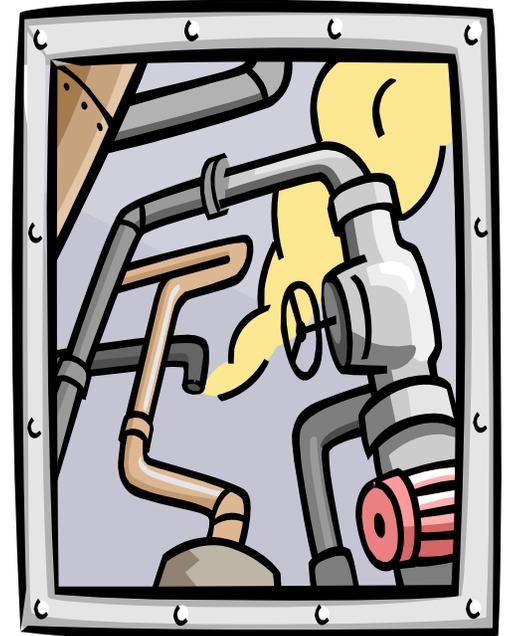


Outdoors

While CO₂ is building up in classrooms . . .



- ✓ Outside
- ✓ Tunnels
- ✓ Attic
- ✓ Custodial
- ✓ Storage
- ✓ Lockers
- ✓ Mechanical





usually about
380 ppm

Check CO₂ Outside for reference



- *Nearby Sources*
- *Drainage*
- *Dirt Control*
- *Plants*



**Mark on floor plan
to ensure thorough
check from the inside**





Air Intakes

Up on the Roof



Check out attic spaces



Bat Guano over a 3rd Grade Classroom

Crawlspaces, Tunnels, Etc.

Contaminated air enters occupied areas through unplanned pathways

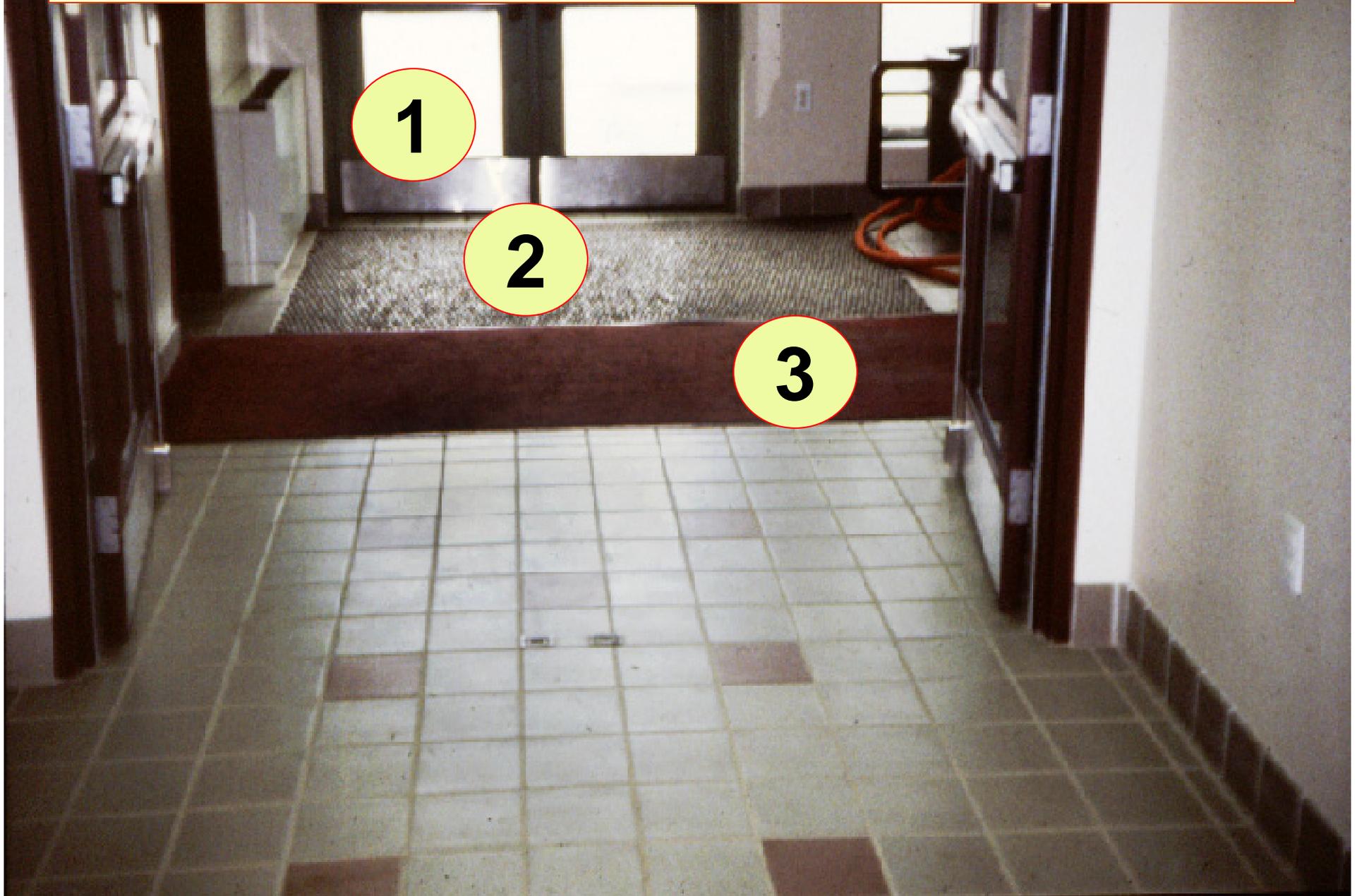
Check air flow direction at access covers or other penetrations and note on map





Tunnel is air duct for school

3 stage dirt control at entry



Walk-off mats are an 'added attraction' to fundamental cleaning



Offices
Work rooms
Staff room



un-vented laminator

un-vented large copier

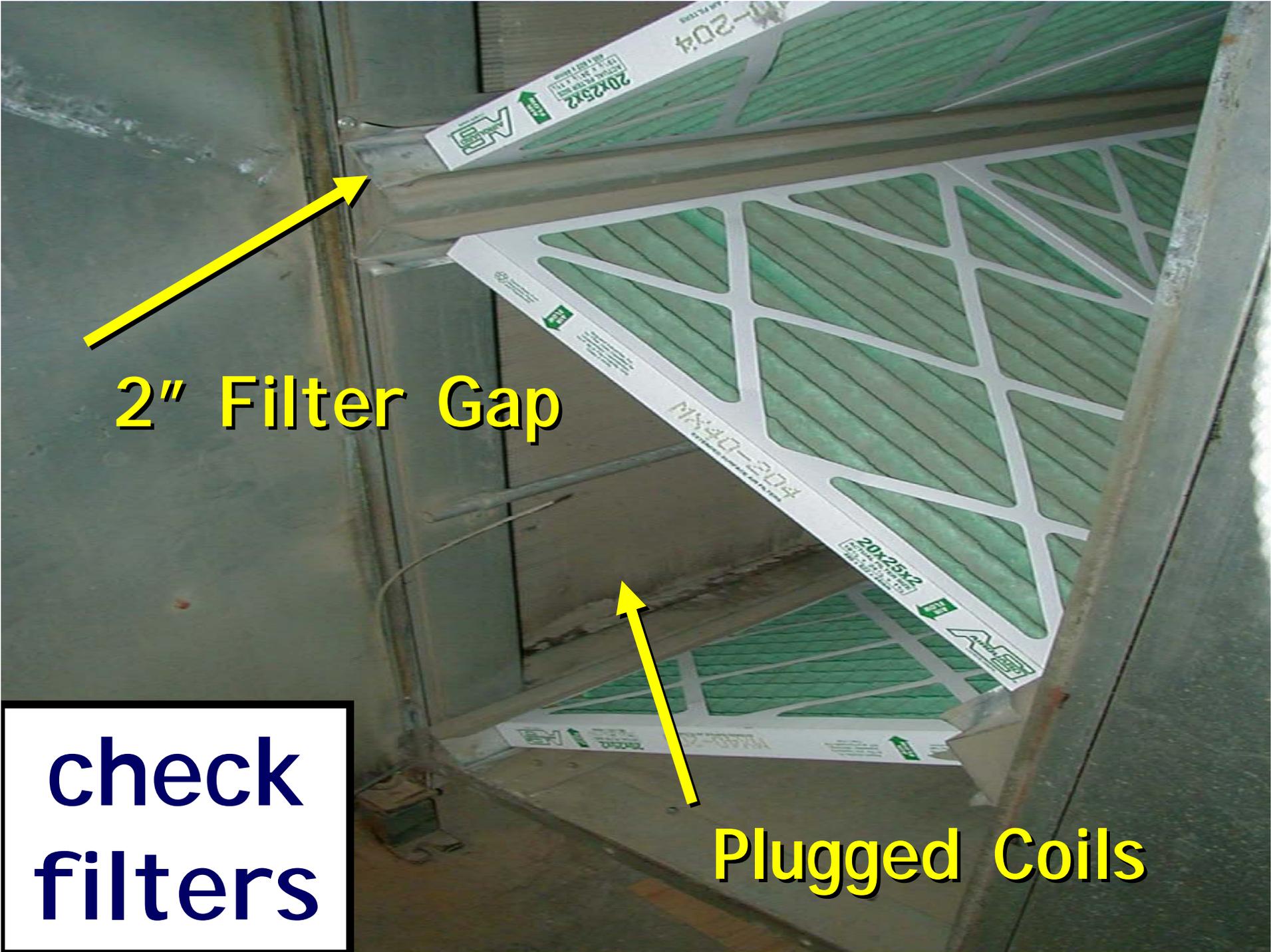




**Storage
Custodial
Mechanical Areas**



**check air flows in
“combustion zones”**



2" Filter Gap

Plugged Coils

**check
filters**

moisture and mold food

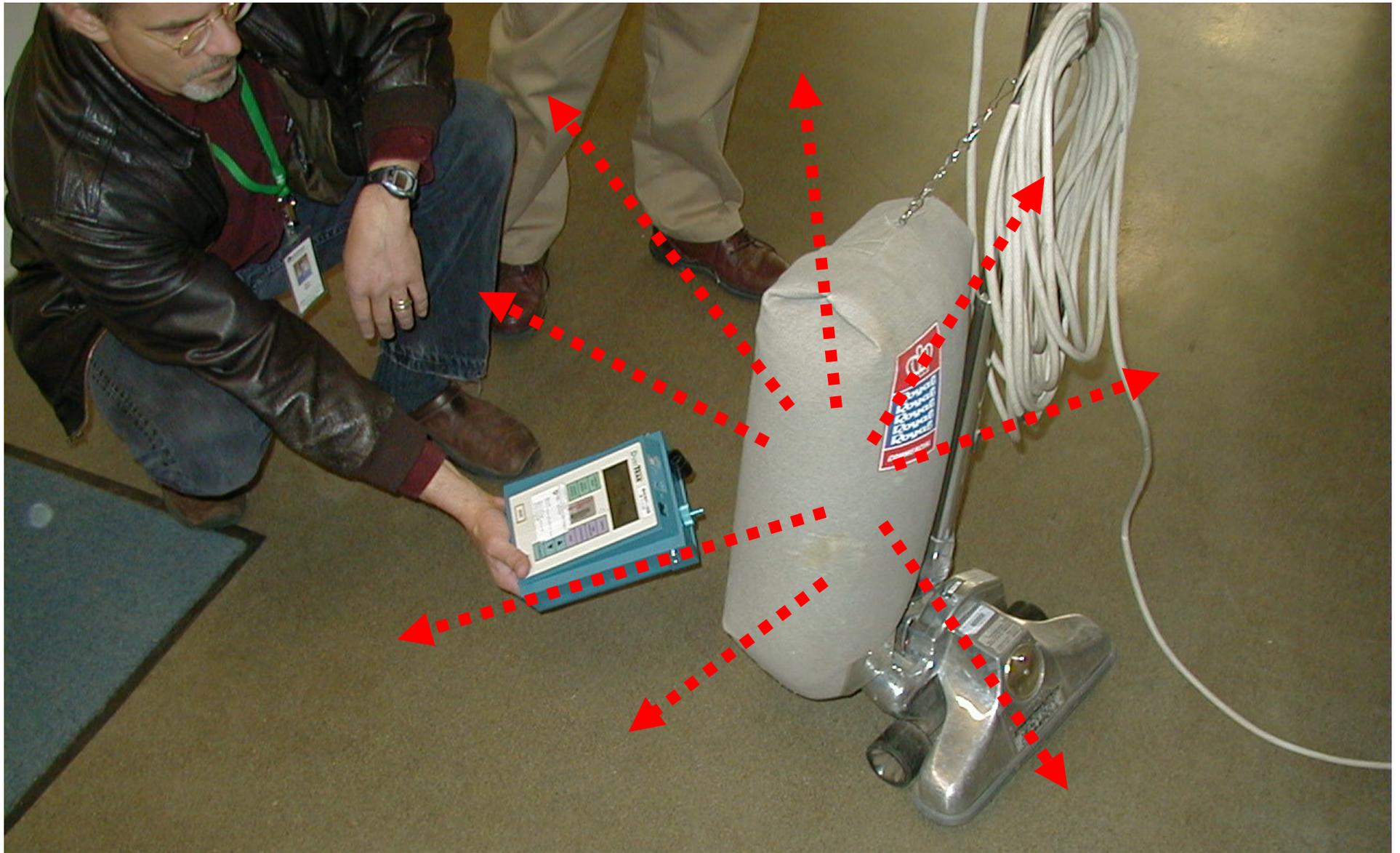




Look for flammables, harsh chemicals, solvents, etc.

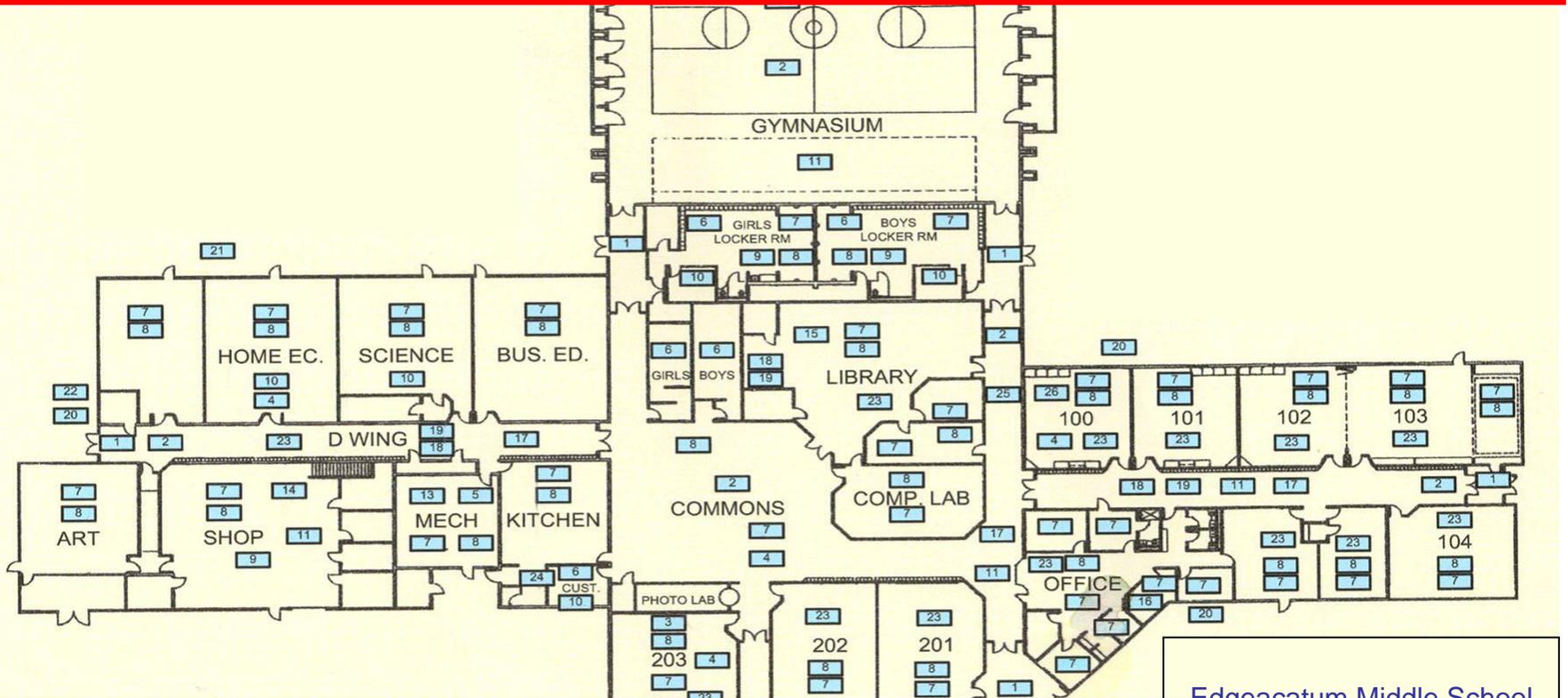


**Note cleaning techniques
and equipment**



use only **HEPA** rated vacuums:
settling of smallest particles takes days

Tour of School Classrooms



Edgemoor Middle School
ve

CO₂ built up by now...

Custodian's Nightmare





Clean Enough ?

Asthma Trigger Reservoirs



non-district furniture, rugs, blankets, pillows

Asthma Triggers ?



**Strong pollutants overwhelm
typical ventilation rates**



carpets can contain huge amounts of allergens and asthma triggers

"second-hand suds"



detergent residue = exposure



**masking with chemicals:
Why ??**

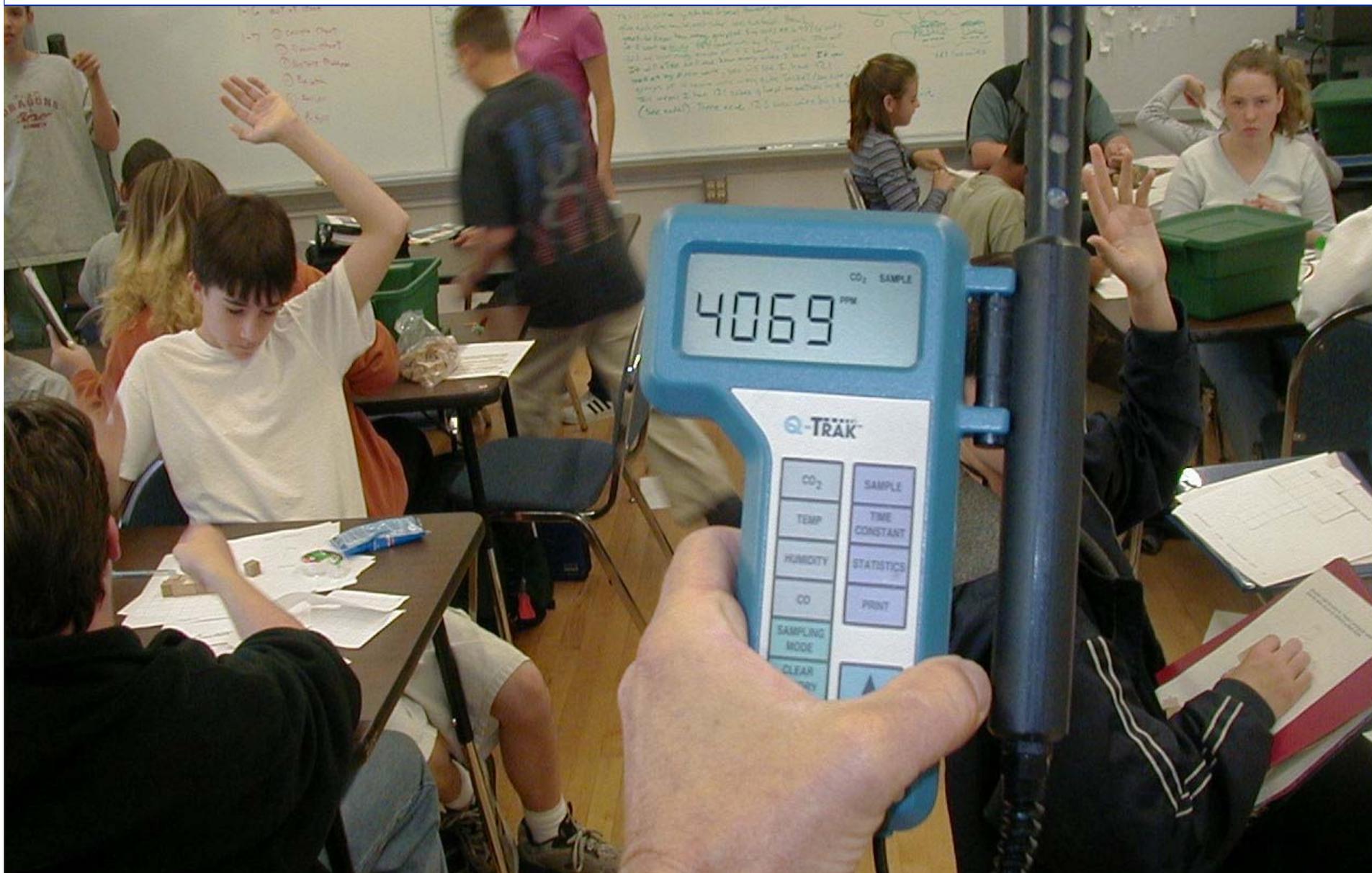
Pollutants ? Hazards ?





Look Above Suspended Ceilings

Measure room CO₂



Measure CO₂ at supply air



'Critical' Air Flow zones

Labs

GYM

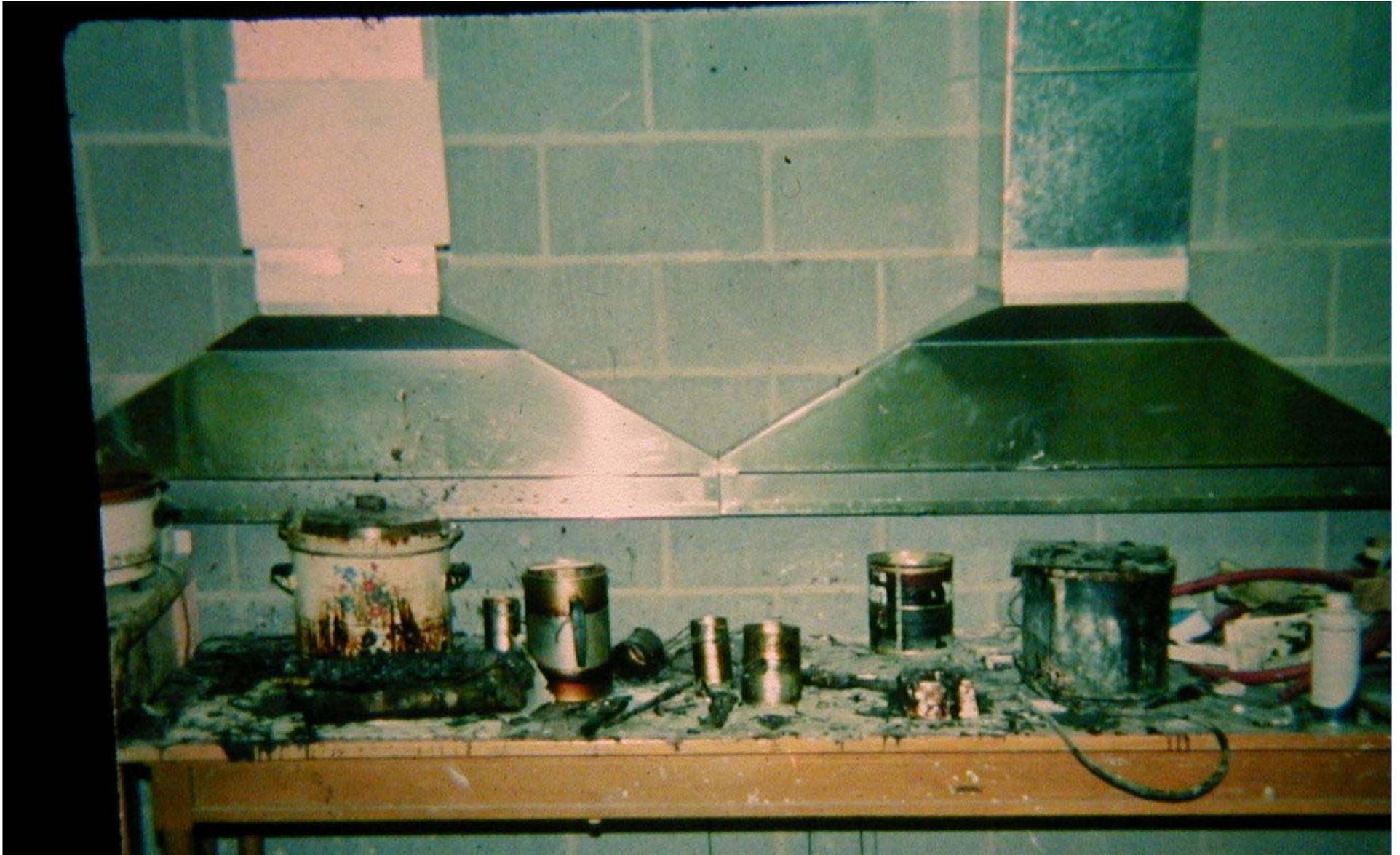
Shops

Home
Science

ART



Exhaust 24/7
(no earthquake protection)



**Capture and exhaust
= less exposure**



Reinforce good practices !

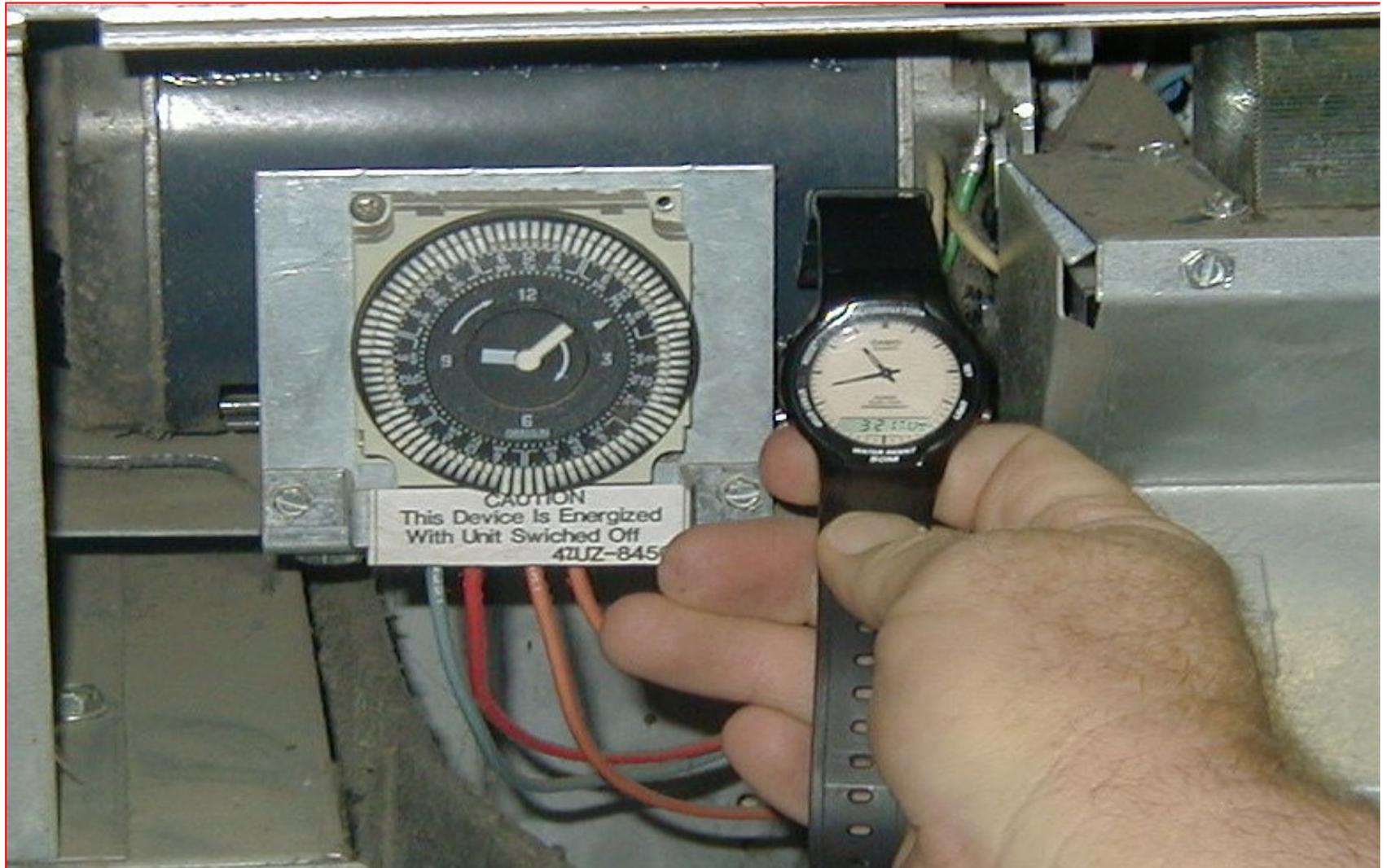
Immediate Results

Orphaned Filter in Ceiling



Fix it on the spot

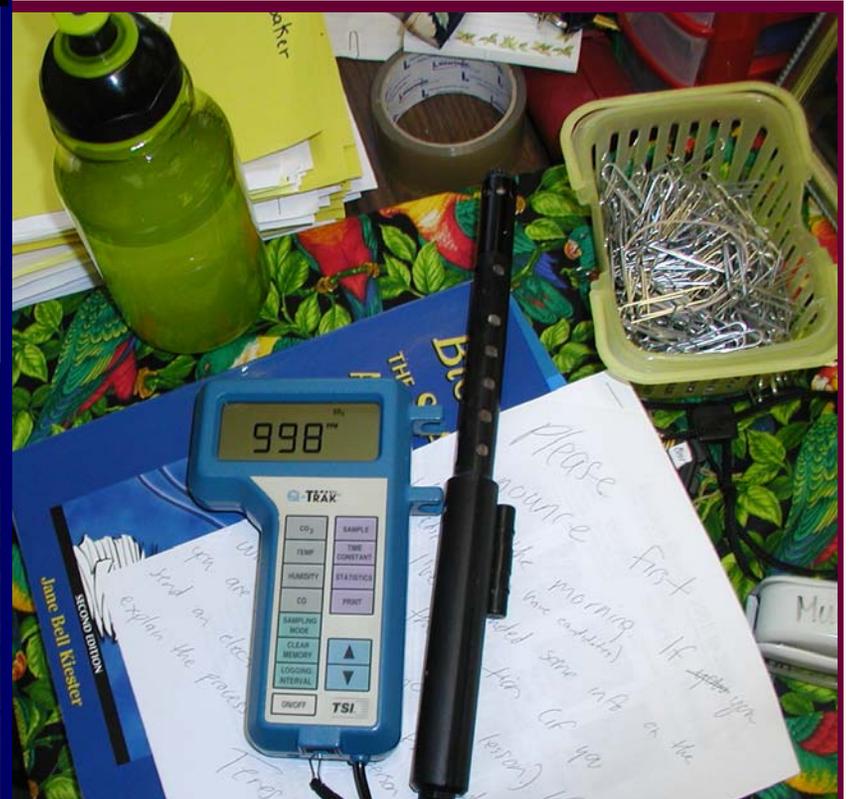
Time clock out of synch



CO₂ = 3,400 ppm



**Outside Air
Intake Cleaned**

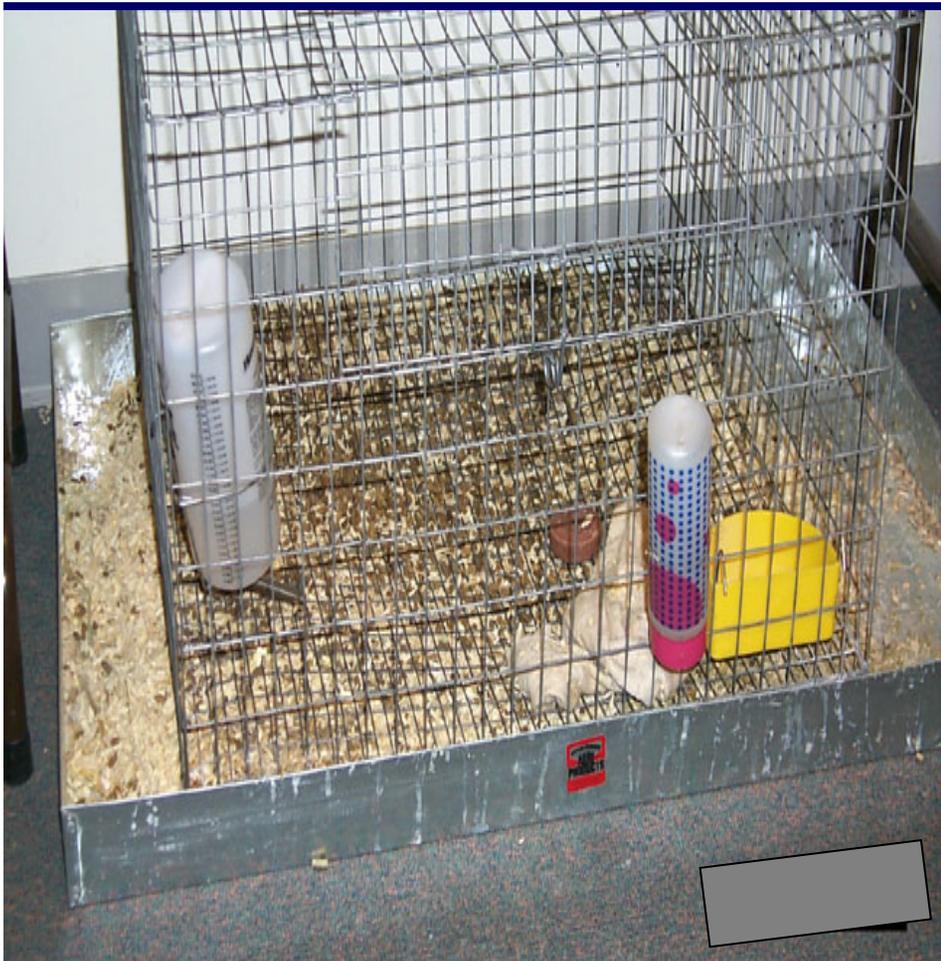


CO₂ = 998 ppm

“cultural change” takes time

Adopt a policy: “*visiting*” animals only

(no permanent residents)



'Post' Walk-Through Debrief



Meet with Principal, coordinator, facility manager, and other stakeholders

Summarize findings -

Discuss the good as well as not-so-good

Emphasize immediate risks

Immediate Feedback

post the measurement
results

CO₂

Temperatures

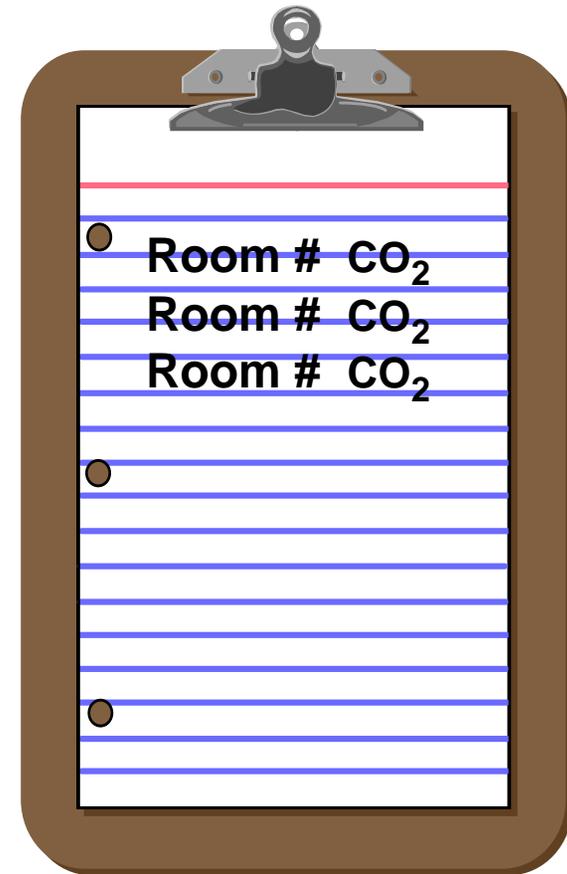
Relative humidity

HVAC on/off

Carbon Monoxide

Particles

Radon



Your Custom IAQ Program
will likely be:

Easier

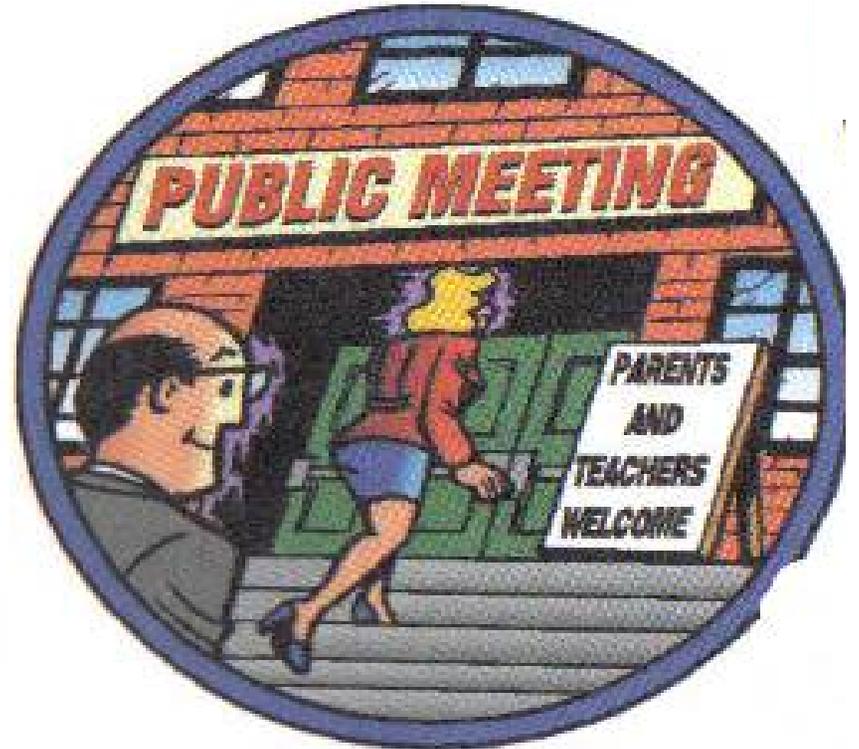
More Effective

Less Expensive

More Personally Rewarding



Publicize your IAQ efforts



Use Resources !!!

- EPA's Healthy SEAT Program

www.epa.gov/schools

- '3-Step' Region 10 IAQ Program

www.energy.wsu.edu/projects/building/iaq.cfm

- Fact Sheets: CO₂, Mold, Cleaning

www.epa.gov/iaq

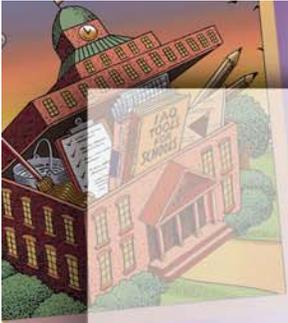
- The Virtual School Walkthrough:
Identifying & Solving Common IAQ
Problems DVD - Developed by Rich Prill
and Dave Blake

dave@nwcleanair.org

- EPA's Indoor Air Quality Tools for
Schools Website

www.epa.gov/iaq/schools



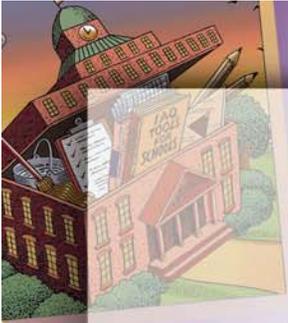


Polling Question

Who participates in your IAQ assessments?

- a.) School Staff**
- b.) Consultants**
- c.) District Staff**
- d.) IAQ Team**





Blue Valley Schools, KS IAQ Assessment Program

David M. Hill

Executive Director of
Facilities & Operations

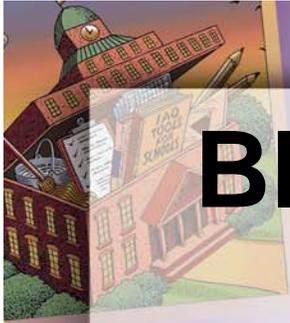




Blue Valley's District Information

- Number of schools: 35 facilities
- Number of students: 20,000
- Number of staff: 2,630
- Total sq. ft. of building space: 3,500,000
- Age range of buildings: 0-87 years
- Setting of district: Suburban
- Launched IAQ management program in 2000





Blue Valley's IAQ Assessment Program

- *Develop an "IAQ Profile" for your building(s)*
- *Collect Data*
- *Building Walkthrough*
- *Communication*



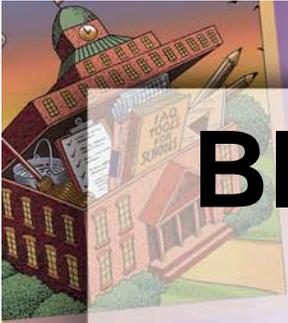


Blue Valley's IAQ Assessment Program con't.

Develop an "IAQ Profile" for your building(s)

- Know what you have; inventory
- Try to use objective, measurable data, but don't ignore subjective data





Blue Valley's IAQ Assessment Program con't.

Collect Data

- Use technology
- Interview occupants
- Look for trends with occupants and/or building operations



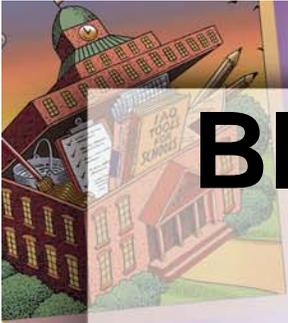


Blue Valley's IAQ Assessment Program con't.

Building Walkthrough

- Know what to look for, be informed
- Use EPA's Tools for Schools checklists or develop your own
- Schedule it
- Invite others
- Teach others; empower reporting



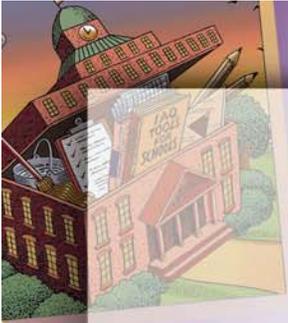


Blue Valley's IAQ Assessment Program con't.

Communication

- Let people know why you're there
- Be open and honest
- Same team, there to help
- Listen
- Follow up – let people know what you found, and what you're going to do about it





Contact Information

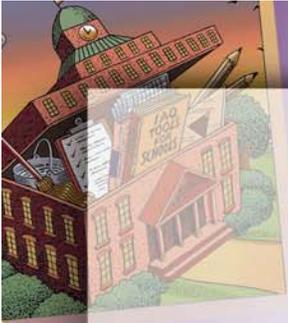
Blue Valley Schools

David M. Hill

Executive Director of Facilities & Operations

dhill@bluevalleyk12.org





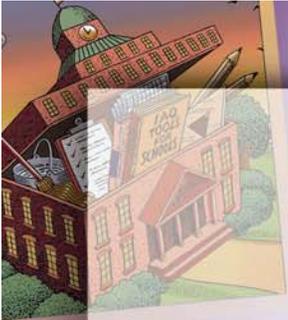
Polling Question

Is electronic technology used in your IAQ assessments?

Yes

No





The School Board of Broward County, FL

Aston Henry, Department of Risk
Management

Theresa Coleman, Department of Risk
Management

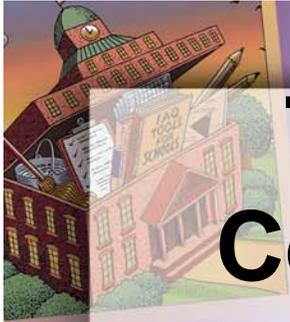




Broward's District Information

- Number of schools: 253 facilities
- Number of students: 262,616
- Number of staff: 38,833
- Total sq. ft. of building space: 28,000,000
- Age range of buildings: 6 months – 79 yrs
- Setting of district: Urban
- Launched IAQ management Program in 2002



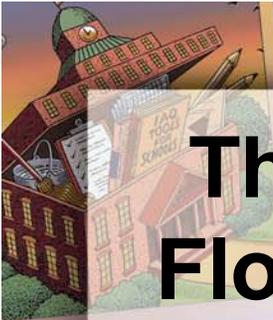


The School Board of Broward County, Florida IAQ Assessment Program

The District has two response mechanisms to assess Indoor Air Quality concerns:

- **Routine/Annual** – Assessment through Tools for Schools Indoor Air Quality Program and annual survey
- **On Demand**– Assessment to investigate complaints received through the District's Indoor Air Quality Response Protocol





The School Board of Broward County, Florida IAQ Assessment Program con't.

Routine/Annual:

Indoor Air Quality Tools for Schools Program

- Online web-based survey using a generic checklist for occupants to identify areas of concern
- Access to the survey from work or home
- Anonymity
- School participation in phases
 - Survey (Fall)
 - Completion (Winter)
 - Results compiled and reports generated
 - Validation walkthroughs (Spring)
 - Corrective action (Summer)
 - Validation of corrective action
- Communicating results with school





The School Board of Broward County, Florida IAQ Assessment Program con't.

On Demand:

Indoor Air Quality Tools for Schools Assessment

- Immediate concerns are reported via our online web-based Request for IAQ Assessment Form, via email or by phone
- Anyone can report a concern
- IAQ Response Protocol
- Validation assessment
 - Outdoor and indoor parameters
 - Interior and exterior walls, flooring, ceiling and environmental surfaces
 - Ventilation equipment
- Reporting
- Corrective action
- Communicating results with school





The School Board of Broward County, Florida IAQ Assessment Program con't.

Walkthrough and Assessment – Technology

- Pocket PC (PDA) – Web-based
- Concerns downloaded to the Pocket PC
- Environmental parameters
- Concerns for each room identified
- Drop down lists (findings)
- Automatically generate recommended corrective action, responsible party and priority
- Data Uploaded to District server
- Reporting





Contact Information

The School Board of Broward County, FL

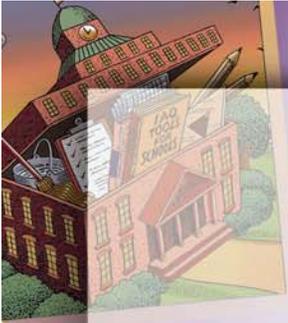
Theresa Coleman, Department of Risk Management

Theresa.coleman@browardschools.com

Aston Henry, Department of Risk Management

Aston.henry@browardschools.com





Polling Question

How do you rate the quality of your current IAQ Assessment Program?

1 = low - 4 = high

1

2

3

4





www.iaqsymposium.com/excellence.html



INDOOR AIR QUALITY TOOLS FOR SCHOOLS

Envisioning Excellence: ***Lessons from Effective*** ***School Indoor Air*** ***Quality (IAQ) Programs***

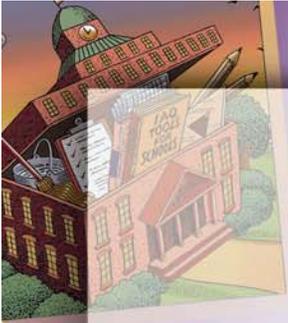
Five Profiles in Excellence



A Framework for IAQ Program Success:

- ▶ Organize for Success
- ▶ Assess Your Environments Continuously
- ▶ Plan Your Short and Long-Term Activities
- ▶ Act to Address Structural, Institutional, and Behavioral Issues
- ▶ Evaluate Your Results for Continuous Improvement
- ▶ Communicate with Everyone, All the Time

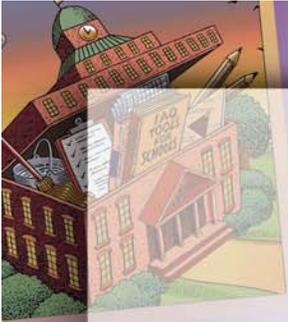




Questions?

What about this information would you like to hear more about?

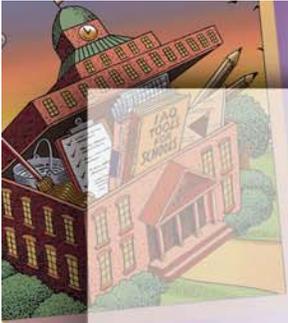




Announcements

- Transcript from call will be electronically sent out and available on IAQ TfS website
 - www.epa.gov/iaq
- Release of Updated Award Applications
 - May, 2007
 - www.epa.gov/iaq/schools/awards
- Next Web Conference Call
 - June or July, 2007





Thank you for your time!

