CT School Indoor Environment Resource Team

Refresher Training

Welcome!

Indoor Air Quality Tools for Schools

6/10

Agenda:

1. Welcome, Introductions and “Catch-up”
2. Why School IAQ Is Important
3. Indoor Air Quality Health Issues
4. Quick Review of TfS Implementation
5. Importance of Communication Plan
6. Walkthrough
   - IAQ Sources
   - Conducting the Walkthrough
7. Making TfS Successful

“Catch-up”

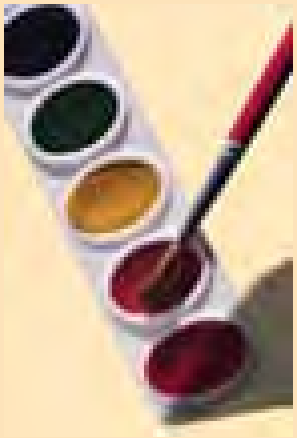
- How Many Are New Building Team Members? How Many Are “Old”?
- How Many of the Schools Have Active Teams?
- Progress So Far?

Consequences of Poor IAQ

- Health Problems
- Reduced Learning and Productivity
- Higher Costs to Fix Problems than to Prevent
- Poor Public Relations
- Liability Issues

Unique Aspects of Schools

- **Budgets are Tight**
- **Space is Densely Populated**
- **Buildings May be Old and Suffer from Deferred Maintenance**
- **Special Sources of Pollution and Odors**
- **Space Utilization**
- **Additions and Temporary Space**



What is Indoor Air Quality?

in·door (in′dôr′) ***adj.*** **air** (er,ar) ***n.*** **quality** (kwô′i′tē) ***n.***

1. the temperature, humidity, ventilation, and chemical or biological contaminants of the air inside a building.

School Indoor Air Contaminants (1)

Contaminant	Potential Health Effects
Bioaerosols ✓ Molds ✓ Dander ✓ Dust Mites ✓ Cockroach Droppings ✓ Bacteria/Viruses	• Upper Respiratory Tract Symptoms • Asthma Triggers • Colds • Allergic Reactions
Formaldehyde ✓ Building Materials ✓ Carpets [?]	Low Level Exposure: • Eye, Nose, Throat Irritation • Dermatitis Long-Term Exposure • Headache, Dizziness • Coughing • Chronic Upper Resp. Infections
Other Volatile Organic Compounds ✓ Cleaning Solvents ✓ Wood Preservatives ✓ Phenols	• Eyes, Upper Respiratory Tract • Potential Carcinogenic, Reproductive Effects

School Indoor Air Contaminants (2)

Contaminant	Potential Health Effects
Nitrogen Oxides ✓ Bus fumes ✓ Combustion appliances	• Eye, throat, respiratory system irritations • Special risks to asthmatics, children < 2
Carbon Monoxide ✓ Bus fumes ✓ Combustion appliances	• Fatigue • Headache • Nausea • Flu-like symptoms
Particulates ✓ Bus exhaust ✓ Pollen ✓ Construction Debris	• Eye, throat, respiratory system irritations • Asthma Triggers

School Indoor Air Contaminants (3)

Contaminant	Potential Health Effects
Environmental Tobacco Smoke	• Multiple Health Effects • Group A Carcinogen
Lead ✓ Older Elementary Schools	• Delays In Development • Lower IQ Levels • Shortened Attention Spans • Behavioral Problems • > Doses: Kidney, Cns Damage
Radon	lung cancer
Pesticides ✓ See Pesticide Law ✓ IPM Important	Specific symptoms: • Type Of Pesticide • Dose • Sensitivity Of Exposed
Dust, Dirt ✓ Everywhere!	• Eye, Upper Respiratory Tract Irritation • Asthma Trigger

Asbestos

- All Schools Built Before the 1970's Probably Contain Asbestos
- Schools Required to Have Written Asbestos Management Plan, Designated Planner
- Touch Base W/ Asbestos Management Planner
- Questions: Call Local Health Department, or CT DPH Asbestos Program (860-509-7367)
- ***Asbestos Should Not Become a Focus of TfS Team!!!***
  BUT – ***<u>Assure Responsible People are Aware</u>***

Non-Specific Building-Related Illnesses

(Sick Building Syndrome)

- Health Symptoms Diminish, Go Away Outside Building
- Symptoms:
  - Headaches
  - Lethargy
  - Eye, Ear, Nose Irritations
  - Stuffy/runny Nose
  - Dizziness
- Due to Ventilation Problems, Contaminants, Temp./Humidity

Building Related Illnesses

- Rhinitis
- Sinusitis
- Laryngitis
- Asthma
- Hypersensitivity Pneumonitis
- Infectious Diseases (e.g., Colds, Flu)
- Carbon Monoxide Poisoning

Asthma

➢ Burden of Asthma

- Chronic, Serious Respiratory Disease
- 88,000 Children in CT Diagnosed (DPH 2008)
- Leading Childhood Chronic Disease
- Leading Health-Related Cause of School Absences

➢ Attacks Triggered By:

- Dust
- Biological Agents
- ETS
- Some VOCs

What About "Testing the Air"?

Usually Not the First Move:

- You Have to Know What You Are Looking for
- There Are No Appropriate Standards for IAQ
- There Are No Standards for Indoor Molds Levels
- Results May Be Hard to Interpret
- Can Lead to Confusion, Mistrust

A Comprehensive Building Evaluation Is 1st Step

Coordinator Materials

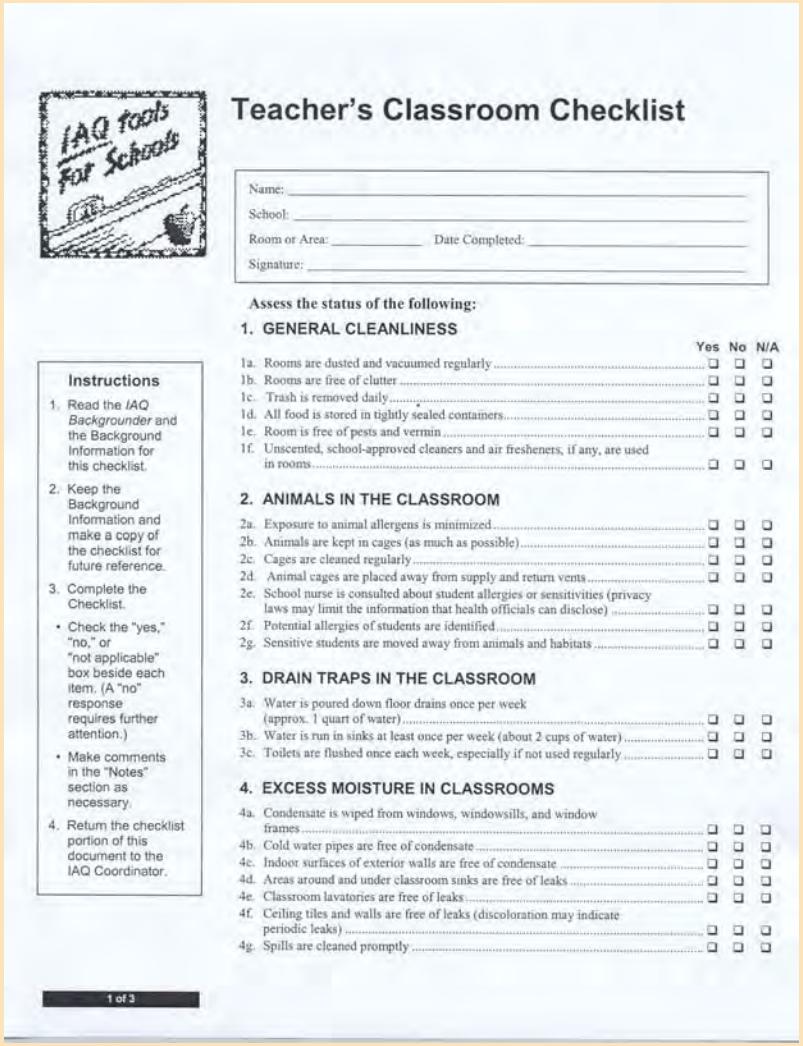
CD Materials

Resource Contact List	TfS Checklists and Backgrounders
Implementing Environmentally Preferable Cleaning Practices	TfS Coordinator Guide
TfS Success Stories	Bus Idling Materials
Sustaining Your TfS Program	Green Schools/Product Information
Training Session Slides	EPA N.E. IAQ Tools for Schools" Summer Maintenance Tips for Schools"
Teacher's Checklist	Radon: " CTDPH School Testing Program for Radon"
Refresher Walkthrough Checklist	Maintaining Acceptable IAQ During School Renovation
	ARC What's That Smell" brochure
	2003 School Indoor Air Quality Law
	Asbestos in Schools Regulations
	Healthy SEAT software tool

Implementing & Sustaining TfS

1. **Assemble/distribute Action Packets**
2. **Summarize Checklists/Map Out Problems**
3. **Walkthrough Investigation**
4. **Prioritize Results of Investigation**
5. **Taking Action**
6. **Communicate Improvements!**
7. **Present to School Board**
8. **Annual Kick-off Meeting**

Teacher's Checklist



IAQ tools for Schools

Teacher's Classroom Checklist

Name: _____

School: _____

Room or Area: _____ Date Completed: _____

Signature: _____

Instructions

1. Read the *IAQ Backgrounder* and the Background Information for this checklist.
2. Keep the Background Information and make a copy of the checklist for future reference.
3. Complete the Checklist.
   - Check the "yes," "no," or "not applicable" box beside each item. (A "no" response requires further attention.)
   - Make comments in the "Notes" section as necessary.
4. Return the checklist portion of this document to the IAQ Coordinator.

Assess the status of the following:

1. GENERAL CLEANLINESS

		Yes	No	N/A
1a.	Rooms are dusted and vacuumed regularly	☐	☐	☐
1b.	Rooms are free of clutter	☐	☐	☐
1c.	Trash is removed daily	☐	☐	☐
1d.	All food is stored in tightly sealed containers	☐	☐	☐
1e.	Room is free of pests and vermin	☐	☐	☐
1f.	Unscented, school-approved cleaners and air fresheners, if any, are used in rooms	☐	☐	☐

2. ANIMALS IN THE CLASSROOM

2a.	Exposure to animal allergens is minimized	☐	☐	☐
2b.	Animals are kept in cages (as much as possible)	☐	☐	☐
2c.	Cages are cleaned regularly	☐	☐	☐
2d.	Animal cages are placed away from supply and return vents	☐	☐	☐
2e.	School nurse is consulted about student allergies or sensitivities (privacy laws may limit the information that health officials can disclose)	☐	☐	☐
2f.	Potential allergies of students are identified	☐	☐	☐
2g.	Sensitive students are moved away from animals and habitats	☐	☐	☐

3. DRAIN TRAPS IN THE CLASSROOM

3a.	Water is poured down floor drains once per week (approx. 1 quart of water)	☐	☐	☐
3b.	Water is run in sinks at least once per week (about 2 cups of water)	☐	☐	☐
3c.	Toilets are flushed once each week, especially if not used regularly	☐	☐	☐

4. EXCESS MOISTURE IN CLASSROOMS

4a.	Condensate is wiped from windows, windowsills, and window frames	☐	☐	☐
4b.	Cold water pipes are free of condensate	☐	☐	☐
4c.	Indoor surfaces of exterior walls are free of condensate	☐	☐	☐
4d.	Areas around and under classroom sinks are free of leaks	☐	☐	☐
4e.	Classroom lavatories are free of leaks	☐	☐	☐
4f.	Ceiling tiles and walls are free of leaks (discoloration may indicate periodic leaks)	☐	☐	☐
4g.	Spills are cleaned promptly	☐	☐	☐

1 of 3

Summarizing the Checklists

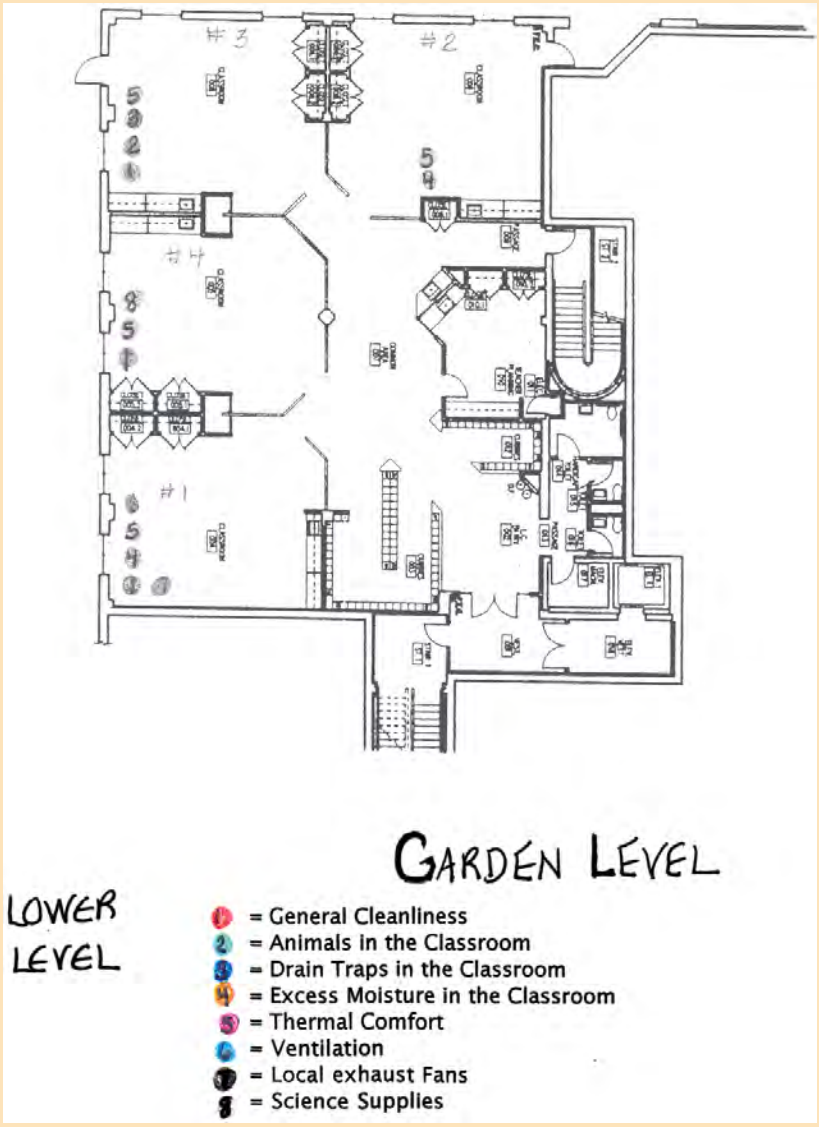
Floor/Room	*General Cleanliness*	*Animals in Classroom*	*Drain Traps in Classroom*	*Excess Moisture*	*Thermal Comfort*	*Ventilation*	*Local Exhaust Fans*
1st - 101	Dusty shelves	None	N/A		Too hot	Books on unit ventilator	
1st- 102			Yes	-Under sink -Near windows			-dirt around fan opening
1st- 103		Iguana in cage					
1st- 104					Too hot		
1st- 105		Bird cage		Wet ceiling tile	Too hot	Books on unit ventilator	
1st- 106					Too hot		

Data

Collect, summarize and analyze

- **Paper plus manual summary**
- **Paper plus spreadsheet**
- **Web-based**
  - **Existing School system**
  - **Commercial Survey tool**

Mapping the Checklist Results



Walkthrough Investigation

- **Team Effort**
- **Make Sure to Contact Local Health Dept**
- **View Walkthrough Video Before W. Investigation**

Developing Priorities

IAQ Problem	Priority	Action	Completed By?	Responsible party	Cost
Bus fumes from parking area	High, Cat. A	Enforce Bus Idling Policy	ASAP	Bus Drivers	$0
Moldy carpeting in Room 202.	High, Cat. C	Replace w/ Floor tiles	End of Summer	School Main. Dept., Contractor	$2000
High VOC floor stripper	Medium, Cat. B	Replace w/alternative	Start using in new school yr	School custodian/ purchasing office	$200

Put Together a Report

- Survey Data
- Building Maps
- Findings
- Prioritized Recommendations

Communication Plan

- Make Sure You Have One!
- Encourage Administration to Publicize TfS
- Present Program at Staff Meetings
- Inform Parents
- Communicate Committee Activities:
  - –Preliminary Findings
  - –Final Report
  - –Improvements Made
  - –Present to School Bd
- Avoid Finger-pointing

IAQ Management Plan

See IAQ Coordinator's Guide for Model Plan

Need District IAQ Coordinating Team W/ Coordinator

Important Components:

- ✓ Mission Statement
- ✓ Background/IAQ Findings
- ✓ IAQ Policies & Plans
- ✓ Procedures
- ✓ Role of Coordinator/Team
- ✓ Staff Responsibilities
- ✓ Local, State Requirements, Regs
- ✓ Emergency Response
- ✓ Steps for Prevention

"Green" Cleaning Chemicals

CT Public Act No. 09-81

- **Use Environmentally Preferable Chemicals in School Buildings**
- **Use Third Party Certified Approved Products:**
  - **Green Seal**
  - **Environmental Choice**
- **No Outside Cleaning Products**
  - **Prohibits Use of Cleaning and Disinfecting Products Brought in by Staff or Parents Without School Review & Approval**

Criteria for Green Seal Cleaners

- **Health-based**

  - No Carcinogens, Reproductive Toxins, Skin Sensitizers;

  - Low Volatile Organic Compounds

- **Environmental Properties**

  -Biodegradability, Toxicity to Aquatic Organisms, Combustibility, Recyclable Packaging

- **Verifies Performance**

Source: National Collaborative Work Group on Green Cleaning

Best Practices is Key!

Infection Control

Coordination With School Nurse & Town Health Officer

- **Good Personal and Hand Hygiene**
- **Keep Your Hands Away From Your Face**
- **Cough Etiquette**
- **Social Distancing**
- **Limited Use of Disenfectants**

Disinfectants & Their Hazards

- **Chlorine or Hypochlorite- Corrosive**
- **Phenolics - Rashes**
- **Quaternary Ammonium Compounds [Quats]- Work Related Asthma**
- **Alcohols- CNS Symptoms**
- **Hydrogen Peroxide- Slight Irritation**

If Possible, Choose an Environmentally Preferable Disinfectant

Preparing For The Walkthrough

Contaminant Sources

1. **The Occupants Themselves**
2. **School Activities**
3. **Non-Educational Activities in the Building**
4. **The Building Itself and its Systems**
5. **Outside the Building**

SOURCES:

1. The Occupants

- **Volatile Organic Compounds**
  - **Perfumes, Personal Products, Etc.**
- **Inorganic Gases**
  - **Carbon Dioxide From Breathing**
- **Biological Pollutants**
  - **Germs, Skin Flakes**

SOURCES:

2. School Activities

- **Particulates** - **Dirt, Chalk, Paper, Etc**
- **VOCs** - **Art & Science Materials, Shop Activities, Magic Markers, Mimeos, Printers & Copiers**
- **Ozone** – **Photocopiers**
- **Heat**

SOURCES:

3. Non-Educational Activities

- **VOCs - Cleaning, Cooking, Pesticides, Construction, Renovation, Copiers, Printers**

- **Particulates - Construction, Renovation, Cleaning**

SOURCES:

4. The Building & Systems

- **VOCs - new furnishing, carpets, floors, building materials**
- **Particulates - dust, dirt, fiberglass, asbestos, old carpet**
- **Bioaerosols - mold, bacteria**
  - **Spores**
  - **nutrient source**
  - **temperature (optimum 40-100F)**
  - ***WATER***

SOURCES:

5. Outside the Building

- **Particulates** - Pollen, Dirt/Dust, Spores, Constr.
- **Gases** - CO, Bus Fumes, Traffic
- **Bioaerosols** - Standing Water, Grass Cuttings
- **Odors** - Debris Near Intakes, Low Tide, Land Fills
- **Soil Gases**-underground Tanks, Radon
- **Nearby Industry, Other Sources**

Evaluating Hazards – The Walkthrough

In Classrooms

- Measure CO_2 (IAQ Indicator), Temperature, Humidity
- Check Movement at Each Air Vent
- Look for Cleanliness, Water Damage, Mold, Carpets, Animals, Art Supplies, Etc
- Ask About Activities & Occupancy
- Ask Teachers

Goat

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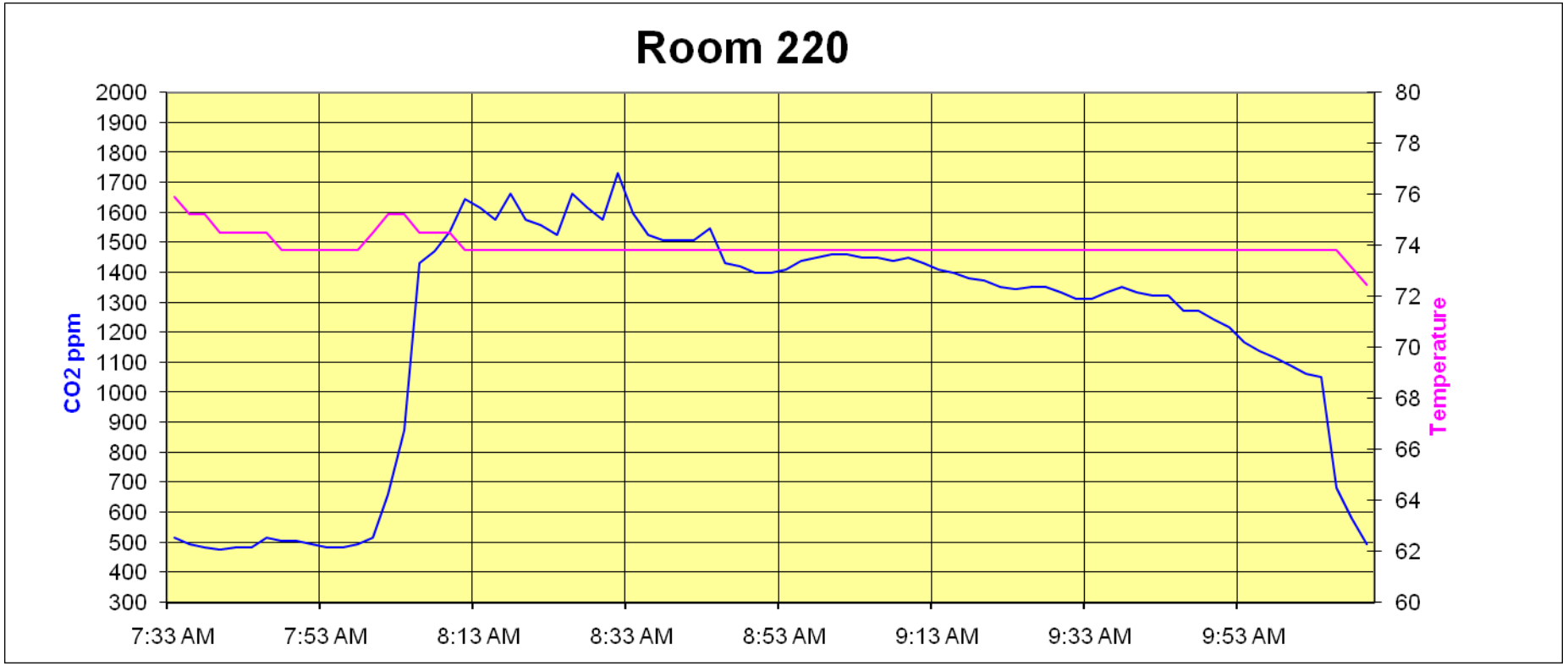
Mathematics

Results of CO_2 Test

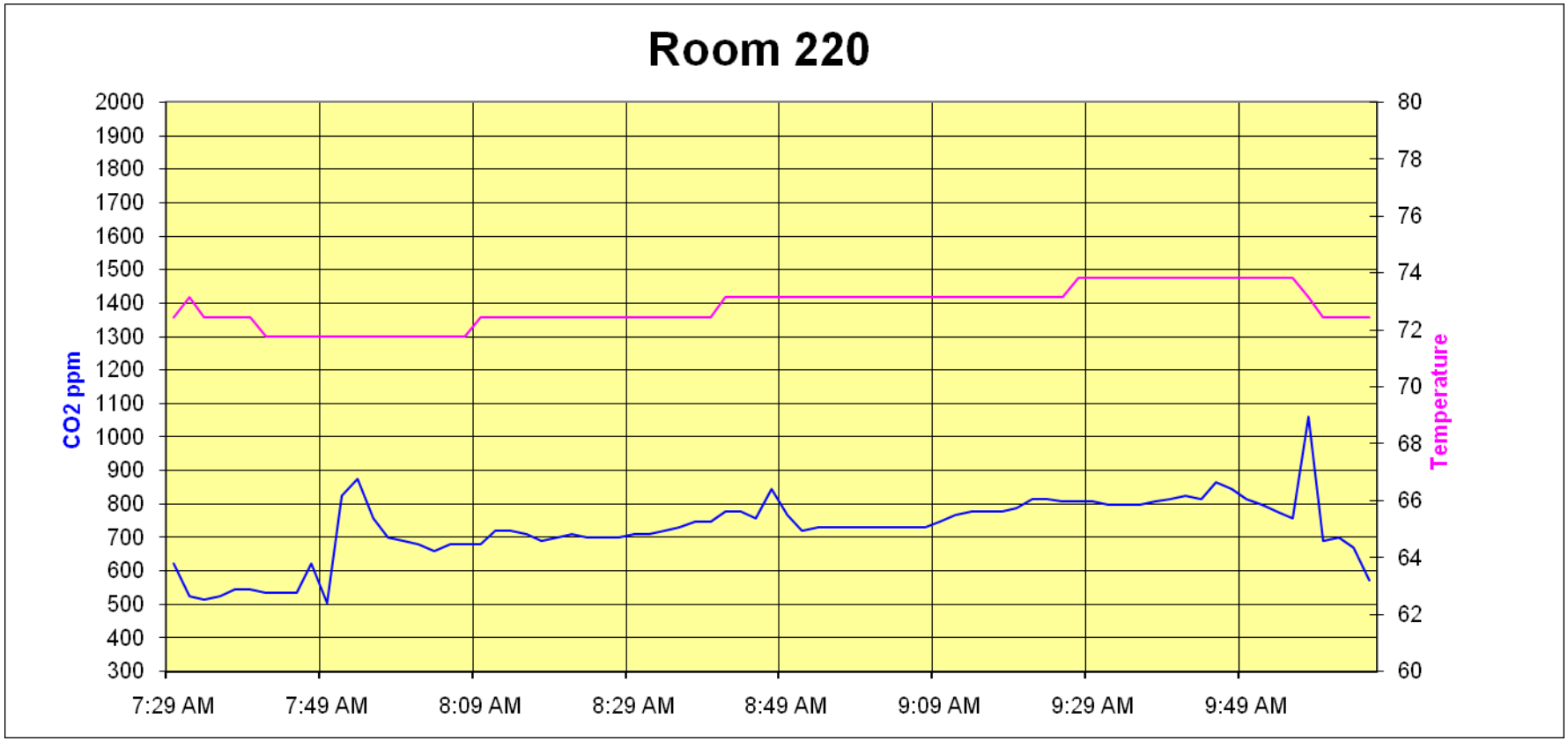
This is what happens when books are stacked on the unit ventilator



Credit:
Bill Thompson, Director of Facilities Management
Lockport Township High School District 205, IL

Results of CO_2 Test

Removed Books Off Unit Ventilator



Credit:
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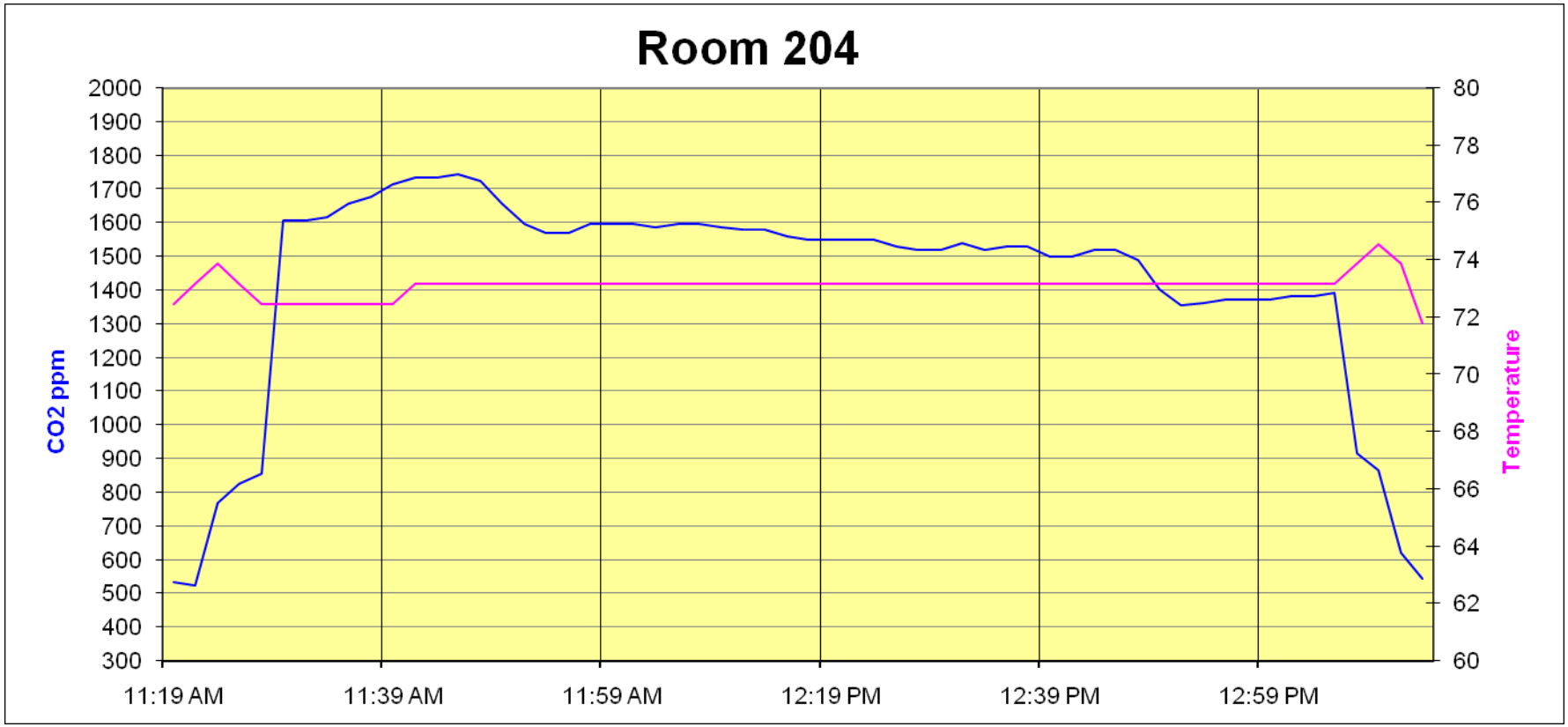
Lockport Township High School District 205 , IL

Results of CO_2 Test

Example of a Room with a Dirty Filter



Credit:
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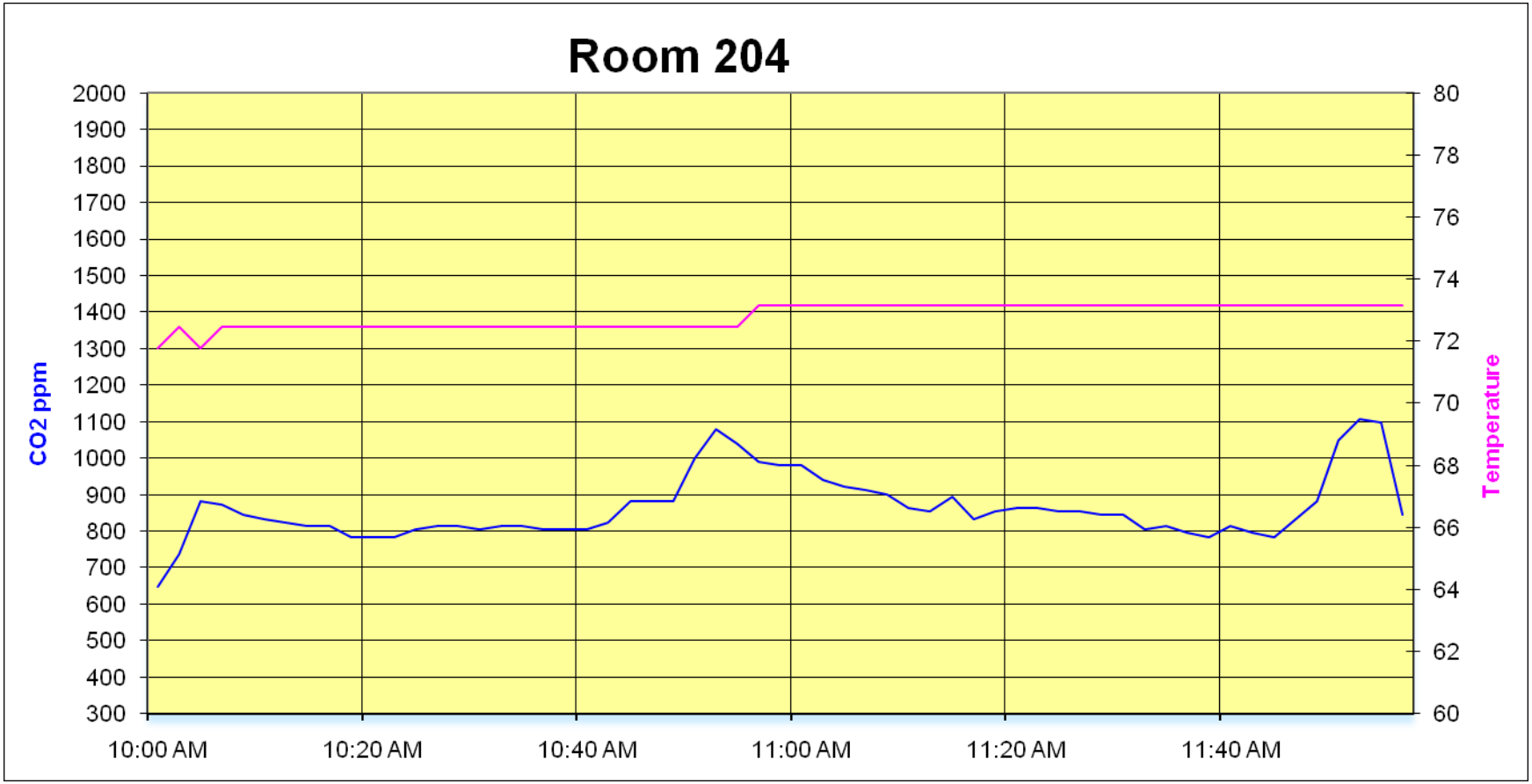
Lockport Township High School District 205 , IL

Results of CO_2 Test

Example of Same Room with a Clean Filter



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Lockport Township High School District 205, IL

Exhaust above toilet

Chronic Water Problems

EXIT
Alphabet
11/1/02

11 2 '02

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3
5
Hannaford
Graham Crackers

Johnson wax
Raid
ANT & ROACH KILLER
PENETRATING VAPOR KILLS BUGS DEAD!
NET WT. 11 OZ.
KEEP OUT OF REACH OF CHILDREN

Glade
Shur Fine
GLASS POWER
REFILL
WITH AMMONIA
DOZENS OF USES!

Evaluating Hazards: - the Walkthrough

Outside:

- Look for Standing Water, Outside Pollution Sources, Air Intakes
- Around Intakes, Check for Birds' Nests, Droppings, Leaves, Exhausts, Trash
- Check Air Intakes - Clear and Working
- AHU/HVAC Units - Are Dampers Open

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Walkthrough Investigation Exercise

Solutions

IAQ Problems Are Multifactorial

- Reduce, Substitute or Eliminate Sources
- Improve Ventilation
- Interrupt/Alter Pathways
- Communicate, Communicate, Communicate!
- Evaluate Changes
- Try Again If Necessary
- Communicate Some More!

Making TfS Successful!

1. **Coordinators – Keep Everyone Informed**

2. **Develop Written Report**

3. **Board of Education Presentation**

4. **District IAQ Management Plan/ Coordinating Structure**

5. **Fall Kick-off Meetings**

CT Success Stories

- **Waterford**

  IAQ Health Complaints Decrease of 66% or Greater in 9 Out of 13 Elementary Classrooms After TfS Implemented

- **North Haven**

  Decrease of 48% (256) of Reported Cases of Respiratory-related Illnesses After TfS

- **Chester**

  # Yearly Asthma-related Office Visits Decreased 463 Before TfS to 82 (Over 4 Yrs) After TfS

- **Hartford**

  # Of Asthma Incidents Declined 21% After TfS, Companion Nurse Training

- **EPA National Excellence Award Winners:**

- Hamden	- Waterford	- Ridgefield
- Norwich	- North Haven	- Technical High School System
- Hartford	- Amity Region 5	- Westport

Other CSIERT Resources

- ✓**Refresher Workshop**
- ✓**Custodian/Facilities “Advanced TfS” Workshop**
- ✓**CSIERT Web Site**
  www.csiert.tfsiaq.com
- ✓**New : Green Cleaning Consultations**
- ✓**IAQ Curriculum for Teachers**

New Green Buildings Law

(Amended General Statute Section 16a-38k)

- **Require State Buildings/Schools Built to High Performance Standard (LEED® Silver Rating)**

- **New School Construction: $5 Million or More**
  $2 Million or > State Funding
  on or After 1/1/09

- **School Renovation: $2 Million or More**
  $2 Million or > State Funding
  on or After 1/1/09

New Green Buildings Law

- **Sustainable Site Development**
- **Water Savings**
- **Energy Efficiency**
- **Materials Selection**
- **Indoor Environmental Quality**

Evaluations!

Thank You!