CT School Indoor Environment Resource Team

Advanced Refresher Training

Welcome!

Indoor Air Quality Tools for Schools

11/17

- Thank participants profusely for being on the team and attending training – acknowledge that school staff have “full plates” now and that their time is valuable

- Stress the importance of school IAQ/IEQ as an ongoing important public health issue, especially addressing asthma triggers in schools

- Success stories fact sheet: We have outcome data that shows how TfS can be successful in addressing health complaints and identifying and correcting problems

Agenda:

- Welcome, Introductions
- Why School IAQ Is Important
- Indoor Air Quality Health Issues
- Sustaining TfS Process
- Importance of Communication Plan
- Walkthrough
  - IAQ Sources
  - Virtual Walkthrough
  - Walkthrough Exercise
- Green Cleaning Myths Video/Making TfS Successful
- Evaluations

EXPLAIN the following points:

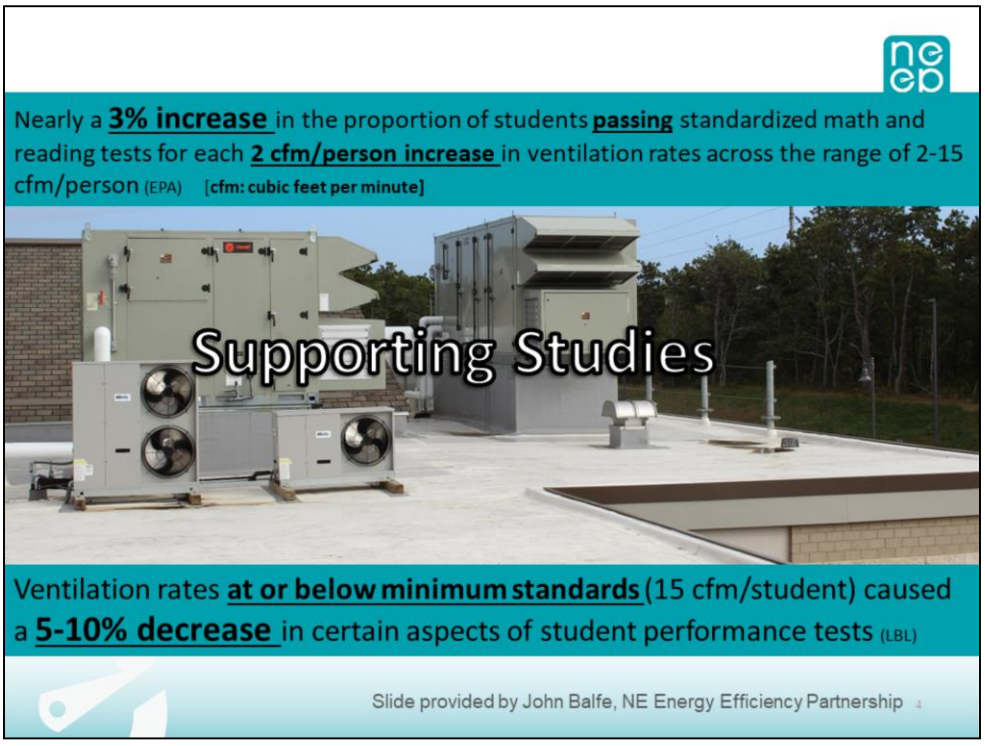
- As a result of poor IAQ, health problems can include coughing, asthma episodes, bronchitis, headaches, allergic reactions, toxic poisoning, and the spread of infectious diseases.

- Students don't learn as well and teachers don't teach as well when they are suffering health effects of poor IAQ.

- When schools aren't aware of IAQ problems, and don't act to prevent them, the eventual costs may be much higher than would have been the case otherwise. Identifying and fixing a problem early, or taking preventive measures, may save many dollars in the long run. For example, if schools must be closed for repair, if substitute teachers must be hired to replace sick ones, or if equipment must be replaced rather than maintained, large costs may be incurred.

- Negative publicity resulting from poor IAQ may have parents and community members upset, generating lack of trust for the school system.

- The school system may even be sued for damages caused by poor IAQ.



The Importance of good ventilation

- School IEQ not just a health issue

This slide shows the connection between ventilation rates and academic performance:

Most importantly it links actual ventilation rates with standardized test scores – which are key drivers in evaluating school performance.

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

EXPLAIN briefly why these causes are common in schools.

- Budgets are frequently tighter than for office buildings, for example, especially for costs related to building maintenance.

- Schools have less space per person (higher occupancy) in a classroom than in most work places. Occupants share a smaller volume of air.

- School buildings may be old or poorly designed, making them difficult or expensive to maintain. However we have seen serious problems in school buildings!

- Unique sources of pollution and odors may come from art and science labs, locker rooms, and vocational teaching areas.

- Space may be used for different purposes than the original intention. For example, extra walls may be added to previously "open classrooms."

- Additions to existing school buildings may not include adequate ventilation systems. Temporary space, such as portable classrooms, may present special problems, such as inadequate ventilation.

Tools for Schools Building Team Training

Video:

"Taking Action"

- Mention viewing video Taking Action as a useful activity to do at a later time, especially for new members
- Video, although old, presents a good overview of how TfS teams work.

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.

Read the definition, say main focus of problem is contaminants, ventilation issues and temp/humidity

- We like to divide the problem into 3 areas:
  - Thermal Comfort – too hot, too cold, too dry, too humid. Thermal comfort is generally the most common complaint and difficult to address (people have different tolerances).
  - Ventilation: getting fresh air into the building and moving airborne contaminants out of the building.
    - What kind of ventilation system?
    - Is it working correctly?
  - Contaminants: Main contaminant is dirt and dust!

Tools for Schools Building Team Training

Symptoms & Sources Exercise

Use the Symptoms and Sources Exercise in handout

Goals:

- work together as a group
- see that most symptoms are common (headaches, asthma, upper respiratory, fatigue, etc)
- Identify sources (ventilation issues, mold, dirt/dust, etc), link to symptoms

- Have each team answer the 3 questions as a group, have them recruit a scribe.
- Give 8-10 minutes time
- Report back on flipchart
- Have each answer each question, encourage repetition (put √ by repeated symptoms, sources
- Ask participants to link specific sources with symptoms

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

Mention the importance of the word “Potential” - exposure does not automatically mean health effects

Bioaerosols:

-these are very important asthma triggers to address

- mold: this is about moisture identification and control

- dander: animals in the classroom - discouraged

Formaldehyde - solvent widely used in building materials, some products: furniture, carpets (though most carpets now use alternatives), school laboratories

Other VOCs - cleaning solvents, wood preservatives, phenols used in equipment such as copiers

School Indoor Air Contaminants (2)

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

Nitrogen Oxides: from combustion processes, combustion appliances: typical source may be buses, trucks and cars (parents) parked near building air intake vents, windows

- **Stress that the anti-idling law includes all vehicles: parents who idle waiting to pick up students can cause IAQ problems in the building**

Carbon Monoxide: comes from incomplete combustion

Sources: gas and oil furnaces, gas water heaters, blocked flues, vehicle exhaust

higher levels can cause asphyxiation, death

Law: all schools must have CO detectors near combustion appliances

Particulates

Bus exhaust contains fine particulates

- Pollen, etc may be brought in by ventilation system, especially unit ventilators next to areas that are mowed

- Construction debris – dust, etc from renovation during occupancy is a source of many complaints – need to follow guidelines (CTDPH– on CD)

School Indoor Air Contaminants (3)

This image cannot currently be displayed.

ETS - Not so much of a factor because of Smoking Regulations

Lead: from deteriorating paint -specifically dust. could be issue in drinking water due to pipes

most schools evaluated for lead through state program

Radon: naturally occurring gas produced by breakdown of radium,

all or most schools evaluated for radon

Pesticides:

- state legislation mandates all pesticides be applied only by licensed professional, parents to be warned
- Stress importance of supporting IPM –Integrated Pest Management:
- Address food storage issues in classrooms

Dust/Dirt

- usually the # 1 problem – TfS mobilizes staff, building occupants to find ways to prevent dirt from entering, help custodians get the dirt out-

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 – ***Assure Responsible People are Aware***

- All Schools built before the 1970's probably contain asbestos. However, the vast majority of schools have had friable asbestos removed.

- Schools are required to have a written asbestos management plan.

- These schools must have a designated asbestos management planner.

- If TfS teams have questions about the location and/or condition of asbestos in their building, find out who the designated asbestos management planner is and talk to that person. If further questions arise, call your local health department, or the State of CT Department of Public Health's Asbestos program (860-509-7367).

- Start by asking the principal, facilities director, or superintendent for a copy of the asbestos management plan for that building, and the name of the designated asbestos management planner.

Asbestos should not become a focus for the TfS Team!!! The Team can act as an interested party to ensure that the school or school district is aware of its responsibilities. *Leave it at that!*

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**

These symptoms usually are the most prevalent health complaints relating to IAQ problems -

These symptoms are common complaints - difference is symptoms seem to go away when people leave the building

Main Source: Ventilation Problems: poor ventilation (uneven and/or insufficient airflow)

exacerbated by contaminants

temperature and/or humidity may be a factor

Building Related Illnesses

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

Allergic Reactions - stuffy itchy nose, sneezing (rhinitis)

•**Rhinitis** is an inflammation of the mucous membrane that lines the nose, often due to an allergy to pollen, dust or other airborne substances

Sinusitis
Inflammation of the sinuses or a sinus, especially in the nasal region.

Asthma- pervasive health problem (see next slide) often exacerbated by biological agents

Hypersensitivity Pneumonitis – **rare** serious lung disease - recurrent pneumonia caused by fungi, bird droppings (**no cases in schools seen**)

Infections: viral and bacteriological infections such as flu, staph infections can be more frequent with poor IAQ –

Asthma

➢ Burden of Asthma

- 89,300 Children in CT Diagnosed (DPH 2010)
- 1 Of Every 7 (13.9%) CT Public School Students
- Leading Childhood Chronic Disease
- Leading Health-Related Cause of School Absences

➢ Attacks Triggered By:

- Dust
- Biological Agents
- ETS
- Some VOCs

Stress importance of reducing asthma triggers as major goal of TfS

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

Note: Useful Tests:

- Temperature
- Water Vapor
- CO_2

•There are no appropriate standards for use in indoor environments such as schools and residences. There are some industrial standards for permissible exposure limits for certain chemicals used in manufacturing and other work place settings, but these standards **should not be used for children, sensitive populations such as pregnant women, the elderly, or people with certain illnesses.** There are no standards for indoor levels of molds so mold testing is not recommended:

•Find and fix the moisture source, kill and remove mold spores

•Testing as a first response does not usually lead to an answer or solution. Very often air testing is conducted as a knee-jerk reaction to a reported IAQ problem. Such testing done in the absence of a hypothesis, or as part of a well-planned investigation, usually produces data that raises more questions that it answers. It can raise expectations that a solution will follow, and subsequently raises suspicions if no answer is found.

•Refer participants to fact sheet:
Indoor Air Quality Testing Should Not Be The First Move

- in coordinators folder
- on DPH CD

•Suggest that fact sheet be posted on district web site

Tools for Schools Building Team Training

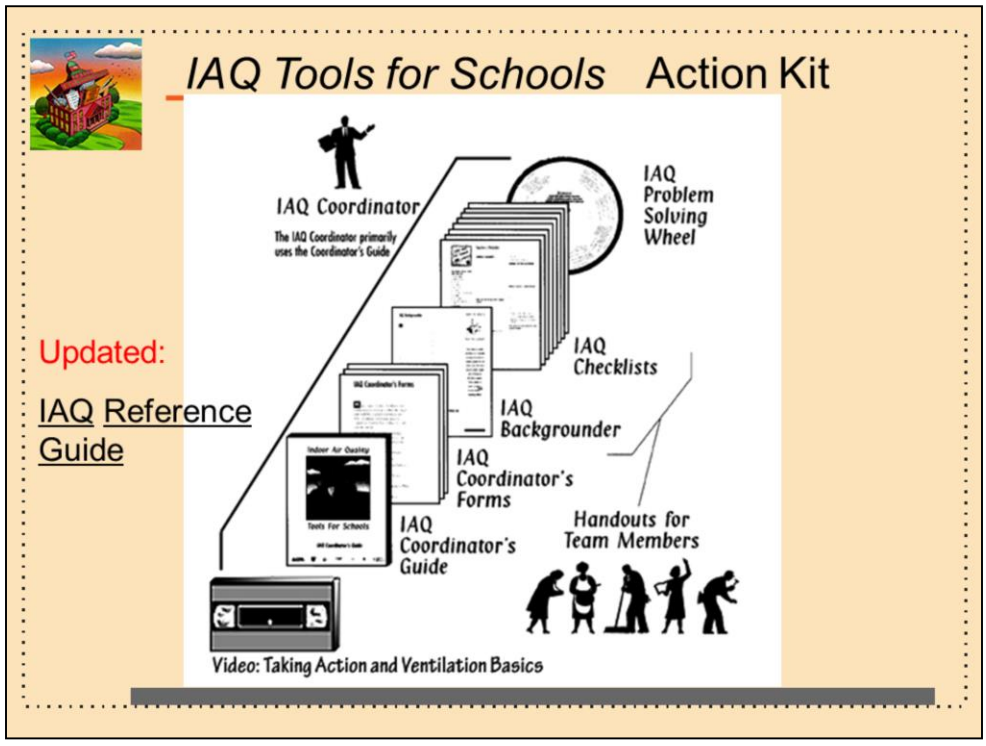
Tools for Schools Kit:

What's In The "Box"?

http://www.epa.gov/iaq/schools/toolkit.html

Now we will go over the nuts and bolts of the Tools for Schools process.

- Mention that physical kits are harder to obtain, Coordinators Guide contains a TFS kit on CD
- Most important part is the actual teams and their actions.



- **EXPLAIN** that everything the TfS Building Team needs is on the TFS CD provided

- Mention:

¨ Coordinator's Guide

¨ Backgrounder – the Basics

¨ Checklists

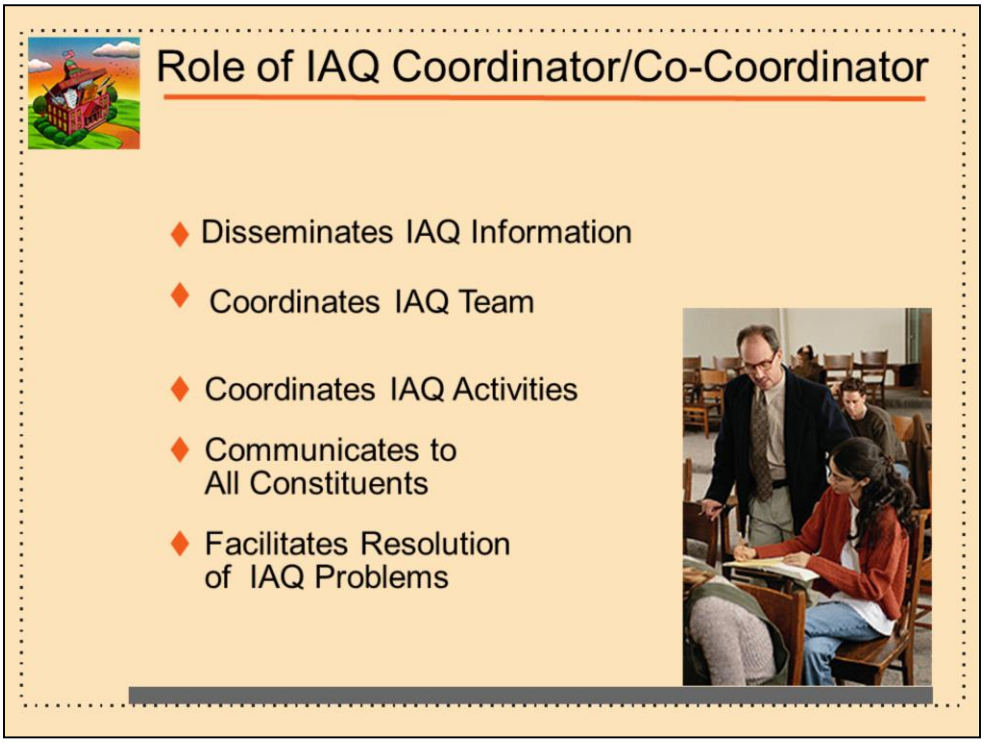
- DVD: 3 sections:
  - Taking Action
  - Ventilation Basics
  - Walkthrough Investigation

EXPLAIN the following points:

- There is a checklist for every staff person and issue in the school
- Each area needs to use the checklist specific to it, i.e., administrators, food service is different that what teachers would encounter

The TfS Action Kit contains all the checklists the TfS building team needs

Teachers checklist – most important -



Each team needs to identify a coordinator, or co-coordinators

Main role is to lead group, be contact person for administration

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

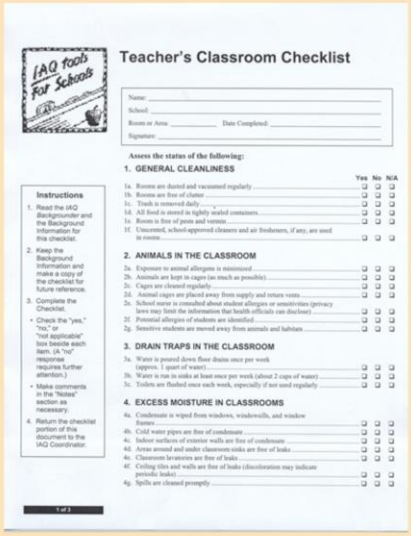
- Mention each step, say I will go into each step in more depth.

-Stress need for annual kickoff meetings, preferably in the early fall

TfS Action Packet

- Memo To Staff
- IAQ Backgrounder
- Appropriate TfS Checklist

Teacher's Checklist



Teacher's Classroom Checklist

IAQ Tools For Schools

Name: _____

School: _____

Room or Area: _____ Date Completed: _____

Signature: _____

Assess the status of the following:

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.

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	☐	☐	☐

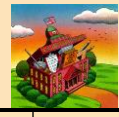
1 of 3

- Discuss our new checklist that is on the CD

EXERCISE:

- allow a short period (5 minutes or so) for teams to go through the checklist

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		

Table illustrates the idea of summarizing the teachers' checklist –

- mention later recommendation that district/schools use web-based survey to collect teachers checklist information

- Be ready to explain what a drain trap is, addressing sewer odor problem

Data

Collect, summarize and analyze

- **Paper plus manual summary**
- **Paper plus spreadsheet**
- **Web-based**
  - **Existing School system**
  - **Commercial Survey tool**
    [i.e., Survey Monkey, Google Docs]

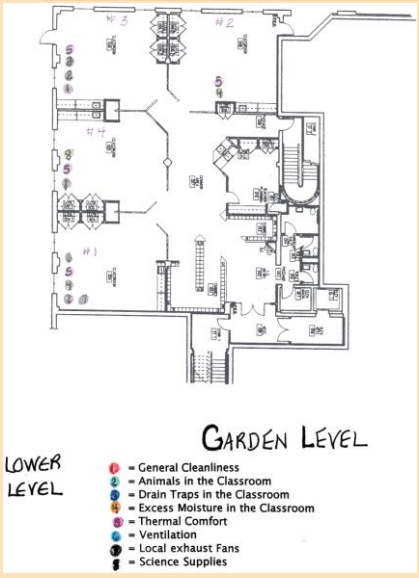
[Make Sure You Have Field For School!]

Strongly suggest district/schools use web based survey tool

- Survey Monkey
- Google Docs
- Uploaded on district intranet
- If district wide survey, make sure there is a clickdown field for school name

- Reports generated by IT person

Mapping the Checklist Results



Map the checklist results on a blueprint of the school

- School nurses may map health complaints

Useful when doing walkthrough investigation – team can focus on areas with most number of identified problems

- More efficient use of walkthrough investigation time

Walkthrough Investigation

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

Stress that the building team can conduct effective walkthroughs-
"this is generally not rocket science"
(the rocket science items are referred to HVAC, IAQ Consultants)

-be sure to remind them to contact LHD – they should help the team

-In a few minutes, we will learn the basics, and then do a walkthrough exercise

Developing Priorities

IAQ Problem	Priority	Action	Completed By?	Responsible party	Cost
Vehicle fumes from parking area	High, Cat. A	Enforce Vehicle Idling Policy	ASAP	Vehicle 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

This is a key step in TfS process!

Using checklist results, school maps, and walkthrough investigation results, prioritize recommendations

Prioritizing Criteria:

- the severity of associated health effects and/or the number of people affected
- ease of implementation and/or cost:
    - Category A: no or low cost
    - Category B: medium cost
    - Category C: high cost

Focus should be on looking for High need (complaints, # people affected) and no or low cost (low hanging fruit)

Put Together a Report

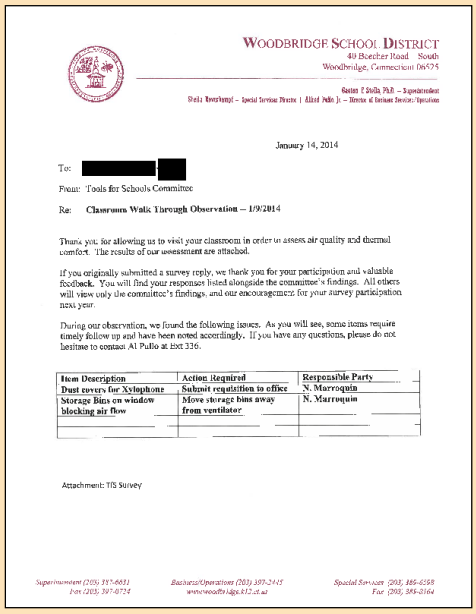
- Survey Data
- Building Maps
- Findings
- Prioritized Recommendations

-Stress value of documenting your team's work

-Produce short report - this is a needs assessment to be used by the district to make improvements

-Compilation of these items

Classroom Follow-up Memo



WOODBRIDGE SCHOOL DISTRICT
40 Beecher Road South
Woodbridge, Connecticut 06525

January 14, 2014

To: [redacted]

From: Tools for Schools Committee

Re: **Classroom Walk Through Observation – 1/9/2014**

Thank you for allowing us to visit your classroom in order to assess air quality and thermal comfort. The results of our assessment are attached.

If you originally submitted a survey reply, we thank you for your participation and valuable feedback. You will find your responses listed alongside the committee's findings. All others will view only the committee's findings, and our encouragement for your survey participation next year.

During our observation, we found the following issues. As you will see, some items require timely follow up and have been noted accordingly. If you have any questions, please do not hesitate to contact Al Puffo at Ext 336.

Item Description	Action Required	Responsible Party
Dust covers for Xylophone	Submit requisition to office	N. Marroquin
Storage Bins on window blocking air flow	Move storage bins away from ventilator	N. Marroquin

Attachment: TfS Survey

This is a great idea that we learned from the Woodbridge School District.

The letters “close the loop” after all the steps by communicating with the individual teachers regarding their room –

- Thanks the teachers for participating in TfS
- Provides information on:
    - Specific problems found
    - Action required
    - Responsible party (teacher, custodian, etc)

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

Re-stress value of having a good communication plan

Green Cleaning

&

Infection Control

"Green" Cleaning Chemicals

CT Public Act No. 09-81

- Use Environmentally/Healthy Preferable Chemicals in School Buildings
  - No Carcinogens, Reproductive Toxins, Skin Sensitizers;
    No Asthmagens
- Use Third Party Certified Approved Products:
- No Outside Cleaning Products
  - Prohibits Use of Cleaning & Disinfecting Products Brought in by Staff or Parents Without School Review & Approval

Law is a very important public health intervention:

Important points:

- Bans asthmagens as well as carcinogens, other toxins
- Law requires cleaners to be third-party certified to verify that they have minimal impacts on human health and the environment – Green Seal or Eco Logo (Not just any chemical that says "green' on the label)
- Most important point: "No parent, guardian, teacher or staff member may bring into the school facility any consumer product which is intended to clean, deodorize, sanitize or disinfect."

This is a major problem identified by DPH, facilities directors, custodians!

Mention green cleaning myths video to be shown at end of workshop

Best Practices is Key!

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Third-party certified products come as concentrates that are used in dilution stations. (photo on right)

These stations control portions automatically, so that one product can be diluted at different rates for different tasks.

One product is used as a glass, bathroom, all-purpose, carpet, and neutral floor cleaner. This eliminates packaging, transportation costs from shipping gallons of water, and storage space. The closet on the right shows how much better cleaning can be!

Healthy IAQ & Energy Conservation

- **Energy Cost-saving Measures Should Not Include Reducing Fresh Air!**
- **Less Energy Costs → More Funding for IEQ Improvements, Maintenance**
- **TfS Teams Should Encourage Energy Conservation**

-Suggest having TfS teams encourage staff to save energy

- more money for schools, not utility companies!

-However, do not reduce fresh air intakes to save energy!

Get Involved In Saving Energy:

- ❑ **Encourage Staff To:**

Sweaters Are Cool!

  - ✓ **Keep Heat At 68° In Winter**
  - ✓ **Turn Off Lights When Not In Use - Lighting May Be Nearly 50% Of Electric Bill**
  - ✓ **Keep Classroom Doors Closed (With Heat Turned Down In Hallways)**
- ❑ **Form a Student "Energy Patrol"**
- ❑ **Involve Whole School/District –**
  Schools w/ Effective Conservation Programs: Up To 25% Drop In Utility Bills

-Consider setting thermostats at 68-70 degrees during the heating season, and 78 degrees in the warmer months if the building has air conditioning, as suggested by the Alliance to Save Energy. **For every temperature degree, energy costs go up or down 2-3%.**

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Tools for Schools Building Team Training

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

Now we are going to focus on how to identify IAQ sources by these categories-

The Occupants Themselves:
(personal products, dirt, CO_2, other)

School Activities:
(chalk boards, markers, paper, lab chemicals, etc)

Non-Educational Activities in the Building:
(cooking, cleaning, pest management, etc)

The Building Itself & its Systems:
(entry points, ventilation system, roof, etc)

Outside the Building:
(idling fumes, pollen, grass clippings, nearby industry, etc)

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

Here are some things to make sure to do when you do a walkthrough of the classrooms:

If possible, talk with the teacher from each classroom -

Tools for Schools Building Team Training

A "Virtual" Walkthrough

Now we will go on a "virtual" walkthrough –
I will show a photo and you tell me the problem or problems

Clutter!

Ask custodians: What would you do if you opened the door and saw this?

- This is an extreme case but clutter is a common problem

- Hard or impossible to clean, dust accumulates

- Response: educate staff, offer assistance with storage
    - Do not embarrass teacher
    - Suggest having an “anti-clutter” day on National Healthy Schools Day

Walk-off Mats

- Up to 80% of Soil in Buildings Tracked by Feet
- 15-20' of Multi-level Scrubber Matting

Walk-off mats are a relatively low-cost way of keeping dirt, mud, snow out

What is this? Ventilation system return
Is it working?

Point out “high tech” useful tool

Example of good air flow out of room.

What is this?

Unit ventilator – provides heat and ventilation, connected to outside for fresh air, still used in older schools, inefficient.

What is the problem?

Books, etc blocking ventilation, heat dispersal

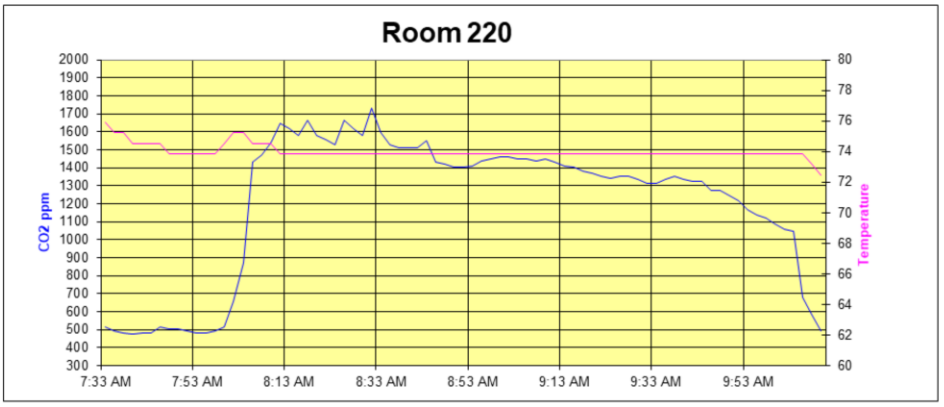
Question?

Does removing the books, etc; reminding staff, make much of a difference?

Next slide

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

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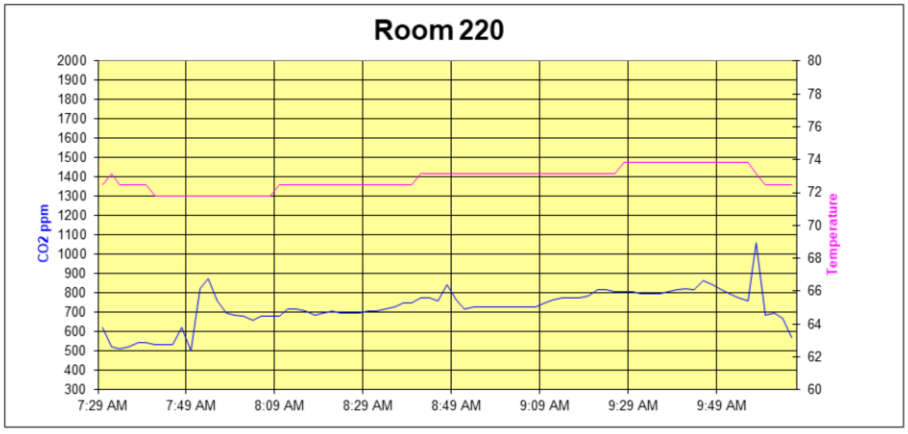
Illinois school facility director wanted to test this out – how much of an effect.

- Red Line: temperature -stable
- Blue line: Carbon Dioxide levels –
  - High level – above 1700 ppm – likely headache, fatigue symptoms
  - Recommended level: below 1000 ppm, generally between 700-900 ppm.

Results of CO_2 Test

Removed Books Off Unit Ventilator



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Lockport Township High School District 205 , IL

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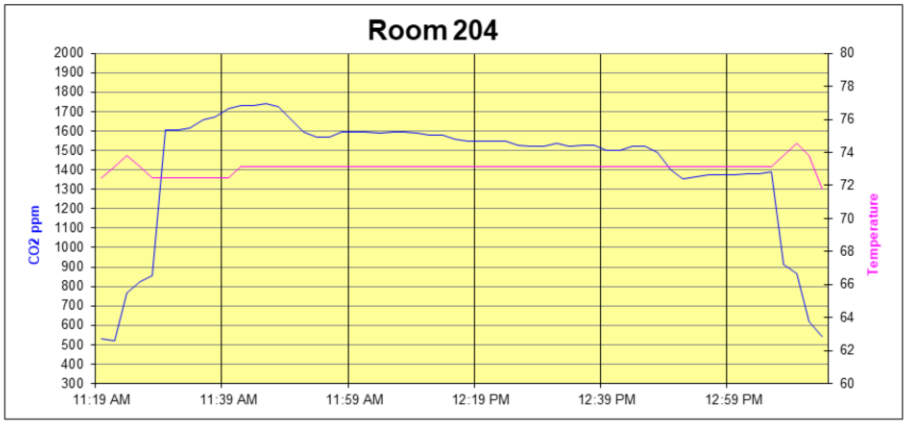
Removed books - radical drop in CO2 levels

Message: a no cost intervention (removing books) make a significant improvement in IAQ

Results of CO_2 Test

Example of a Room with a Dirty Filter



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Similar results with Unit Ventilator with Dirty Filter…….

Results of CO_2 Test

Example of Same Room with a Clean Filter

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

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Since unit ventilators are in individual classrooms, it is important for staff (and students) to help keep the filters clean:

- Keep plants off to prevent dirt, water from contaminating filters
- Keep young students from putting things down the vents

Example of chronic water problems – moldy ceiling tile, flaking paint

Mention that brown spots on ceiling tiles are generally water stains – need to identify moisture source, was it fixed, replace tile

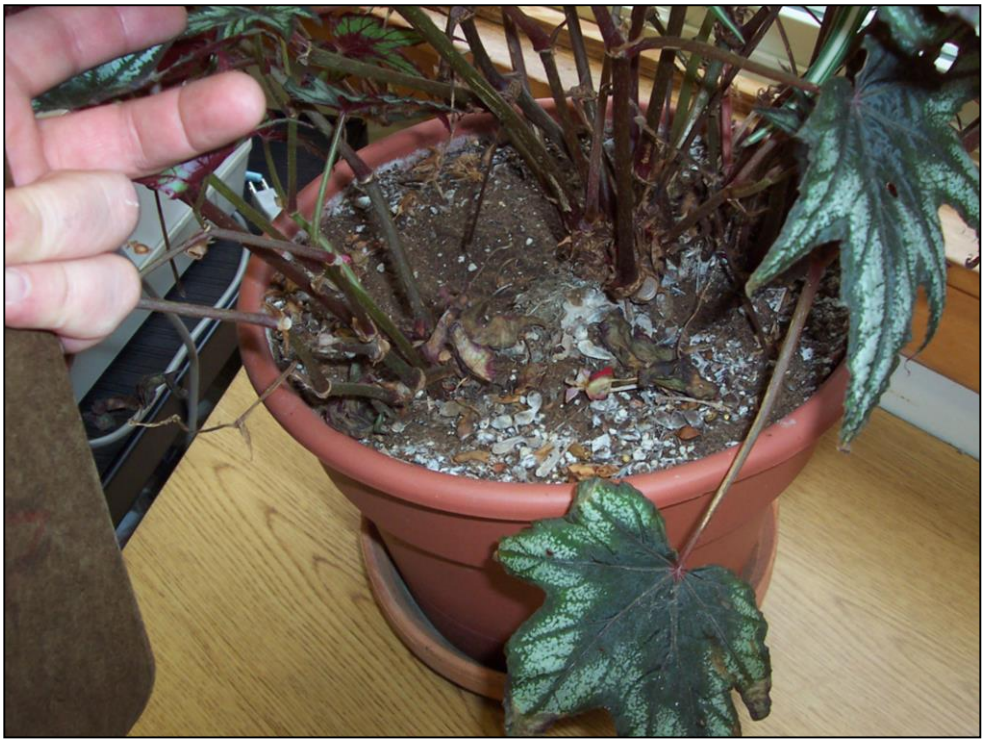
Mold growth after room shut up all summer (2003 – “humidity hurricane”)

Scenario: facilities washed carpets during the summer, did not ensure that they were dry, no air movement.

Discovered mold after opening schools in fall.

Generally discourage permanent carpets in classrooms, halls:

- Hard to clean, reservoirs of moisture, mold, dirt, contaminants
- Recommend “reading rugs” in elementary school rooms – easy to clean or discard



Mold growing in plant soil

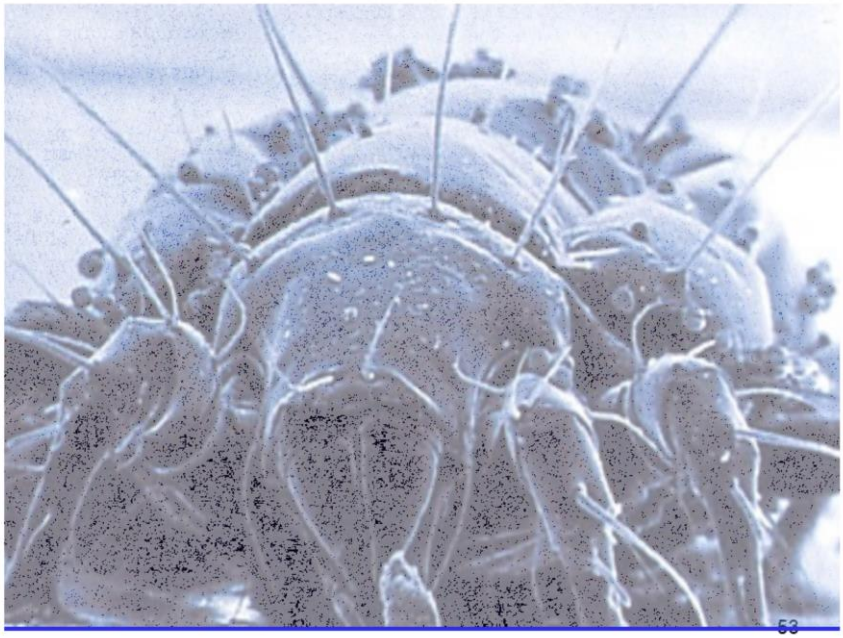
- Have schedule for repotting plants
- See fact sheet “Indoor Plants and Indoor Air Quality” on DPH CD

What might be hiding in that couch?

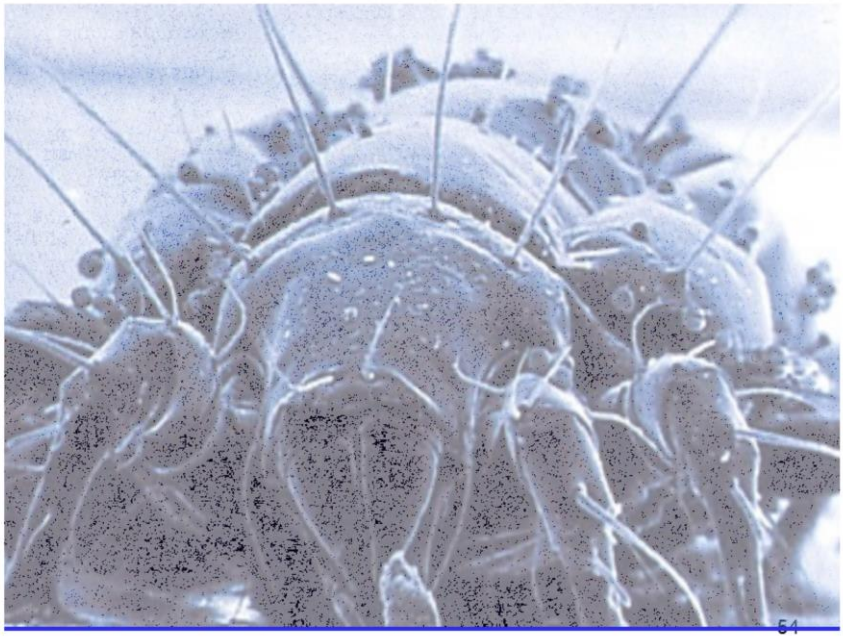
Scenario: teacher needed a place to read to children, parent offered old couch from home –

Likely full of:

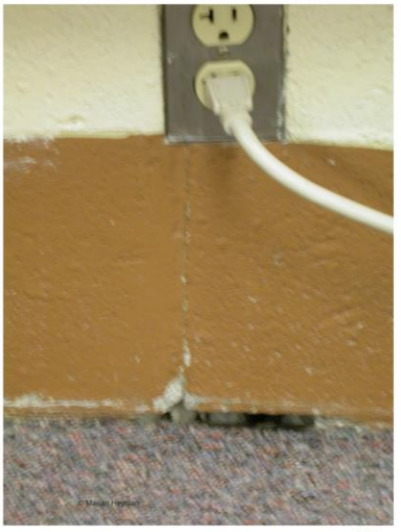
- Dirt/dust
- Animal dander
- Mold?
- And….. DUST MITES!
- (and maybe bedbugs?



This is a dust mite



This is a dust mite on steroids!



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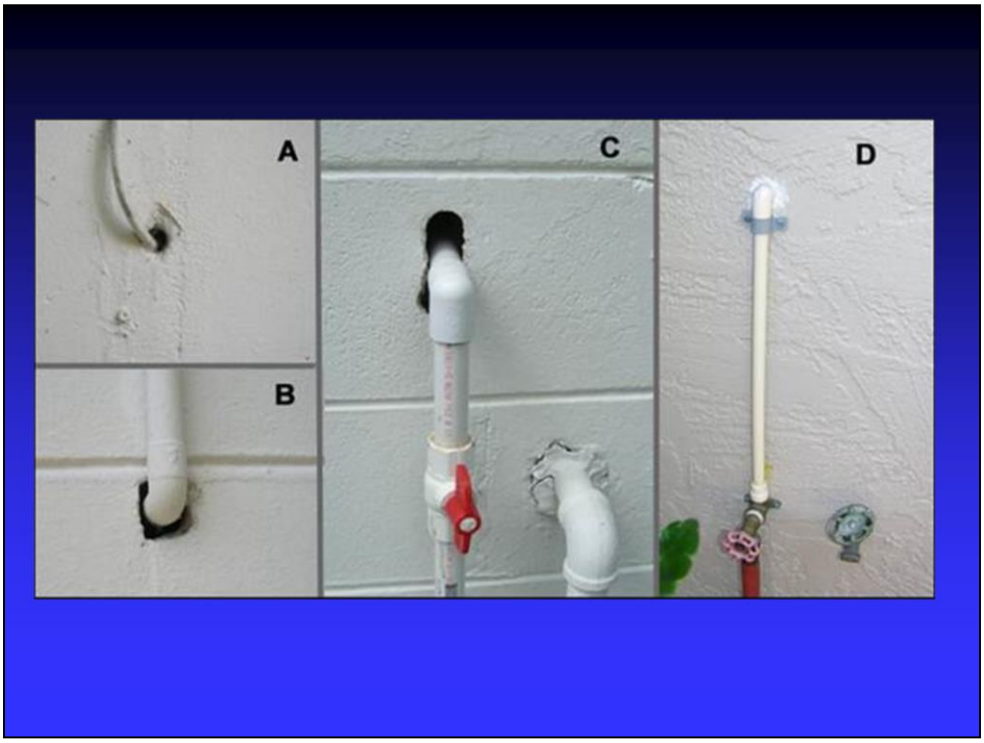
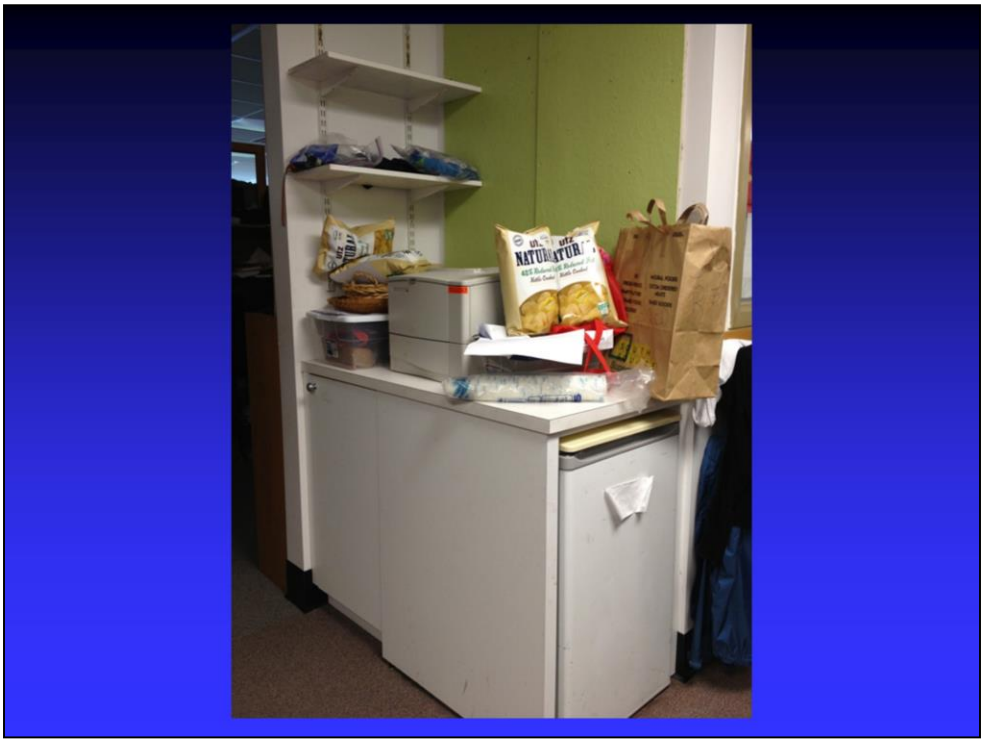
Holes where insects (bees) and rodents (mice) can get into room.



See pathways for rodents, insects to enter building



Improper storage of food –

Will attract pests

Explain that food stored in classrooms should be in metal tins or thick Tupperware containers.

Against the Law!

only licensed applicators can apply pesticides within any building or on the grounds of a public school (except in emergencies)

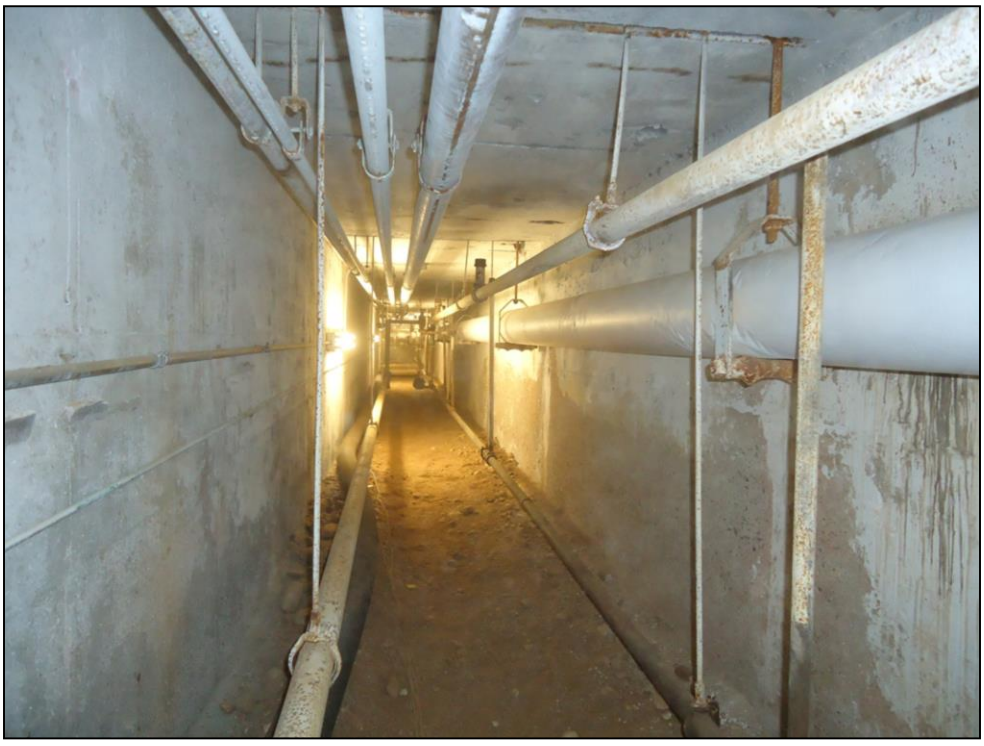
TfS Teams & IPM

Work with Staff to:

- Educate Staff About IPM Policies
  - No Staff Use of Pesticides
- Store All Food In Sealed Containers
  - Includes Instructional Food Items (beans, seeds, macaroni)
- Remove Trash, Clean Up Spills ASAP
- Clean Refrigerators, Microwaves & Vending Machines Regularly
- Get Students Involved – Put IPM in Curriculum

TfS Teams should be involved in supporting Integrated Pest Management (IPM) program.

- Note chlorine bleach container next to window cleaner with ammonia



What is this?

Utility tunnel under a school (Cheshire High School).

Scenario: After multiple odor complaints and subsequent investigations, someone remembered that there was a utility tunnel under area with strongest odor. Tunnel full of water, mold, dirt, etc the area was cleaned and a fan was installed to outside to ensure negative air pressure in tunnel.

Moral of story: If the source is not immediately apparent, keep searching!

Evaluating Hazards: - the Walkthrough

Outside:

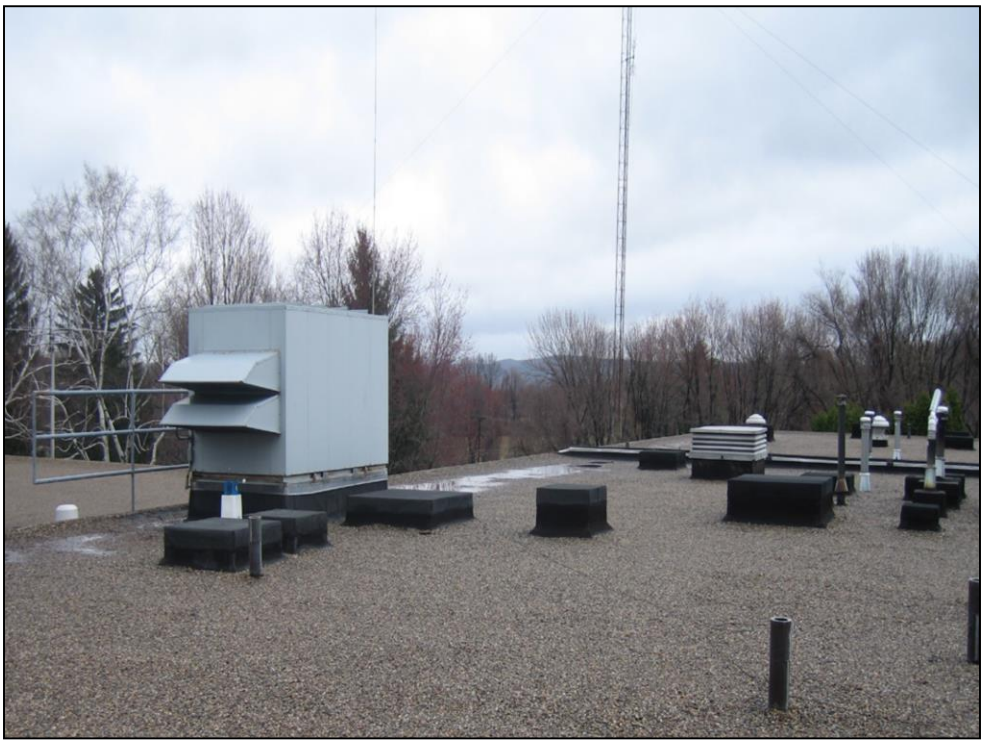
- Look for Standing Water, Outside Pollution Sources, Air Intakes
- Around Intakes, Check for Birds' Nests, Droppings, Leaves, Exhausts, Trash
- Check Air Intakes - Clear and Working
- AHU/HVAC Units - Are Dampers Open

In addition to looking for standing water, note holes or other areas near building where the grade may not be away from the building

Examine rain pipes – are they draining away from the building?

Note the outside condition of unit ventilators:

- are they functional (not bent closed or covered),
- are there bushes growing too close, does it look like mowed grass may be entering?



Roof top air handling unit as well as exhaust for other systems

Note sewer vent close to air intake - sewer smell entering building

Remedy: raise height of the sewer pipe above AHU

Air intake unit damaged. Will decrease the amount of fresh air being brought into the room.

Drainage pipe (left) allowing water to drain into building.

Land is sloped <u>toward</u> the building. Water was flowing into building
Also, plantings too close to foundation (left).

Remedies:

- Put in French drain system
- Regrade landscape away from the building.

Weep Holes

What are weep holes? Are they a good or bad thing?

Weep holes are necessary so that water cannot accumulate behind walls. They permit air circulation making the walls unreceptive to molds that can cause damage to the building's structure.

- Check to make sure weep holes are not blocked by insect nests, bubble gum, dirt, etc.

Tools for Schools Building Team Training

Walkthrough Investigation Exercise

-walk through at least 1 classroom, preferably 2, and outside briefly, using the refresher walkthrough checklist

- use one of the participants to lead the walkthrough by reading through the questions

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!

As you can see, IAQ/IEQ is not just one or two issues, but multifactorial –

What are some examples of these interventions?

Reduce, Substitute or Eliminate Sources
(substitute green cleaners; reduce/eliminate idling; store food properly; reduce classroom clutter, use walk-off mats)

Improve Ventilation
(make sure AHU working, change filters regularly, prevent blocking of unit ventilators,

Interrupt/Alter Pathways
(block pest entryways; fix roof, pipe leaks;

Developing an Activation Plan

Objectives:

- **Develop, Implement Communication Plan**
- **Train Staff to Use the Checklists**
- **Dissemination of Action Packets**
- **Get the Checklists Back**
- **Tabulate the Results**

This is an exercise to help the teams “hit the ground running” after the training.

Time permitting, have the teams work together for 8-10 minutes to develop a plan for each of the objectives, then come back together to report.

Suggest that the teams might plan to present TfS at an upcoming school staff meeting.

Mention that if the district/schools are using web-based survey, the results will be electronically tabulated.

Making TfS Successful!

1. Coordinators – Keep Everyone Informed

2. Develop Written Report

3. Board of Education Presentation

4. Fall Kick-off Meetings

5. District TfS Coordinating Structure

1. Coordinators – Keep Everyone Informed

It is important to keep all team members in the loop as things proceed, keep staff and parents updated on progress – use newsletters, web site, etc

2. Develop Written Report

important to put down findings, recommendations in written report after walkthrough, prioritization steps – see examples in Coordinator's Packet

3. Board of Education Presentation

At least once a year, make presentation to Bd of Ed: basics of school IAQ, present report, focus on longer term needs

4. Fall Kick-off Meetings

Each fall, have district-wide "kick-off mtg to review summer improvements, plan year's work

5. District TfS Coordinating Structure

Good idea for district coordinating committee for TfS program.
Could use Health & Safety Committee
Should include facilities director, business manager

Internet Resources

- ✓ CT DPH Healthy School Environments Web Page:
  www.ct.gov/dph/schools
- ✓ CT School Indoor Environment Resource Team Web Site: www.csiert.org
- ✓ EPA School IAQ Web Site:
  https://www.epa.gov/iaq-schools
- ✓Green Cleaning Video Resources for Teachers:
  http://www.csiert.org/index.php/teachers

Green Cleaning Myths Video

Wastebusters Green Cleaning Video

How many watch Mythbusters on TV?

CT DEEP came up with great idea of Wastebusters series:

- Anti-idling
- Wood Stoves

- This video was developed in conjunction with DPH and other partners to educate staff, parents, students about CT School Green Cleaning Products law-

- Specifically to address problem of staff, parents bringing in their own cleaners – which is against the law!

Tools for Schools Building Team Training

Evaluations!

Thank You!

Also, any last questions?