



Mold and Moisture: Double Trouble for Schools

Wednesday, July 20, 2011
1 – 2 p.m. EST



Objectives

- Learn how to visually detect mold growth and when to test.
- Discover practical and cost-effective solutions to prevent and control mold and moisture.
- Learn about the most common sources of mold and moisture in schools and the technical information and resources available to help you remediate mold.
- Hear from a school district that struggled with mold issues and has used the *Indoor Air Quality (IAQ) Tools for Schools* guidance to successfully implement mold and moisture prevention practices.



Introductions

Facilitator:

- Jennifer Lemon, *IAQ Tools for Schools*, U.S. Environmental Protection Agency

Speakers:

- Peggy Caruso, Katy Independent School District, Texas
- Todd Spore, Building Envelope Consulting Division, PBK Architects



Today's Webinar Presentation and Materials

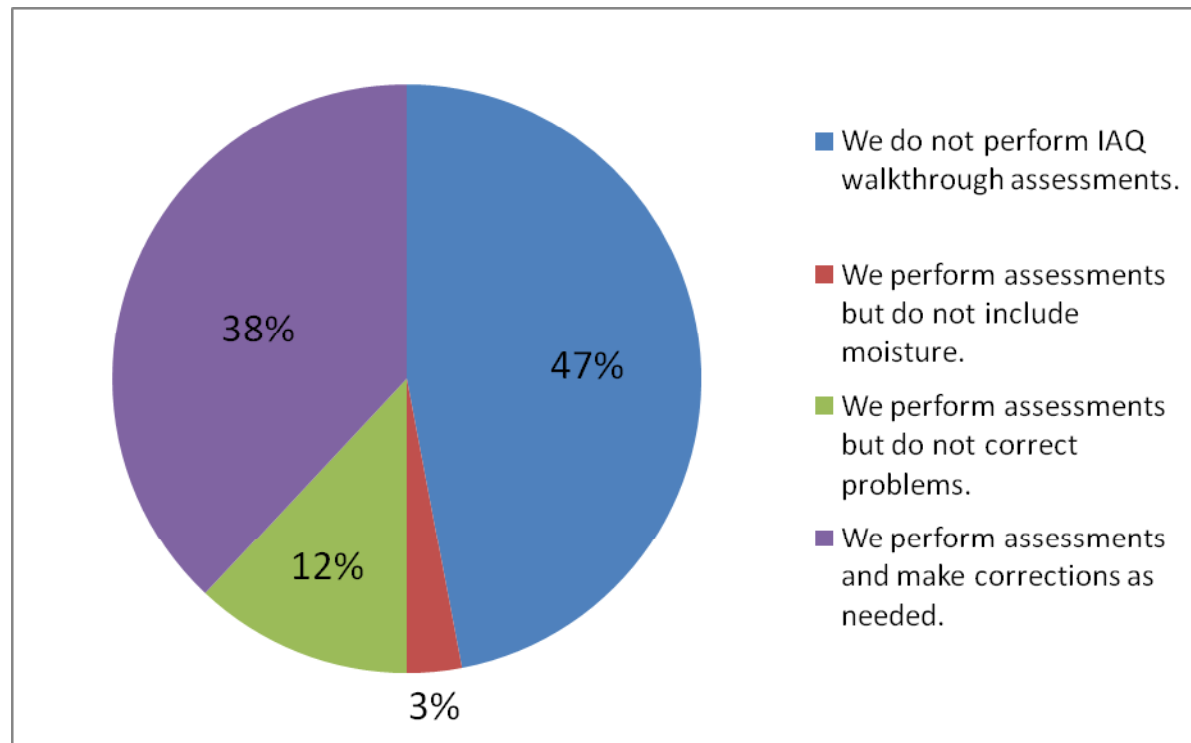
- PowerPoint slides, a Questions and Answers document and a list of resources will be available to you in a few weeks on the *IAQ Tools for Schools* website.

- www.epa.gov/iaq/schools/webconferences.html

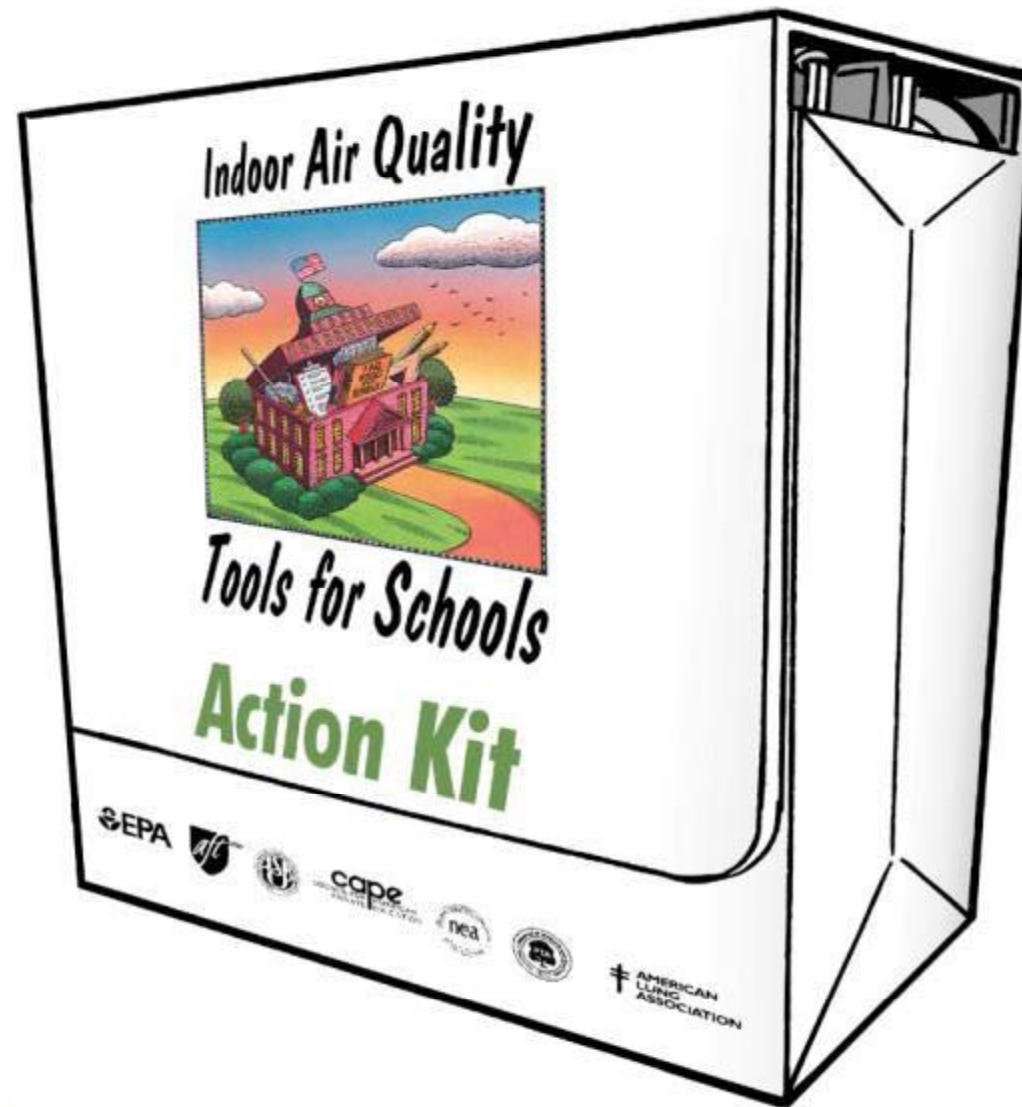


Polling Question

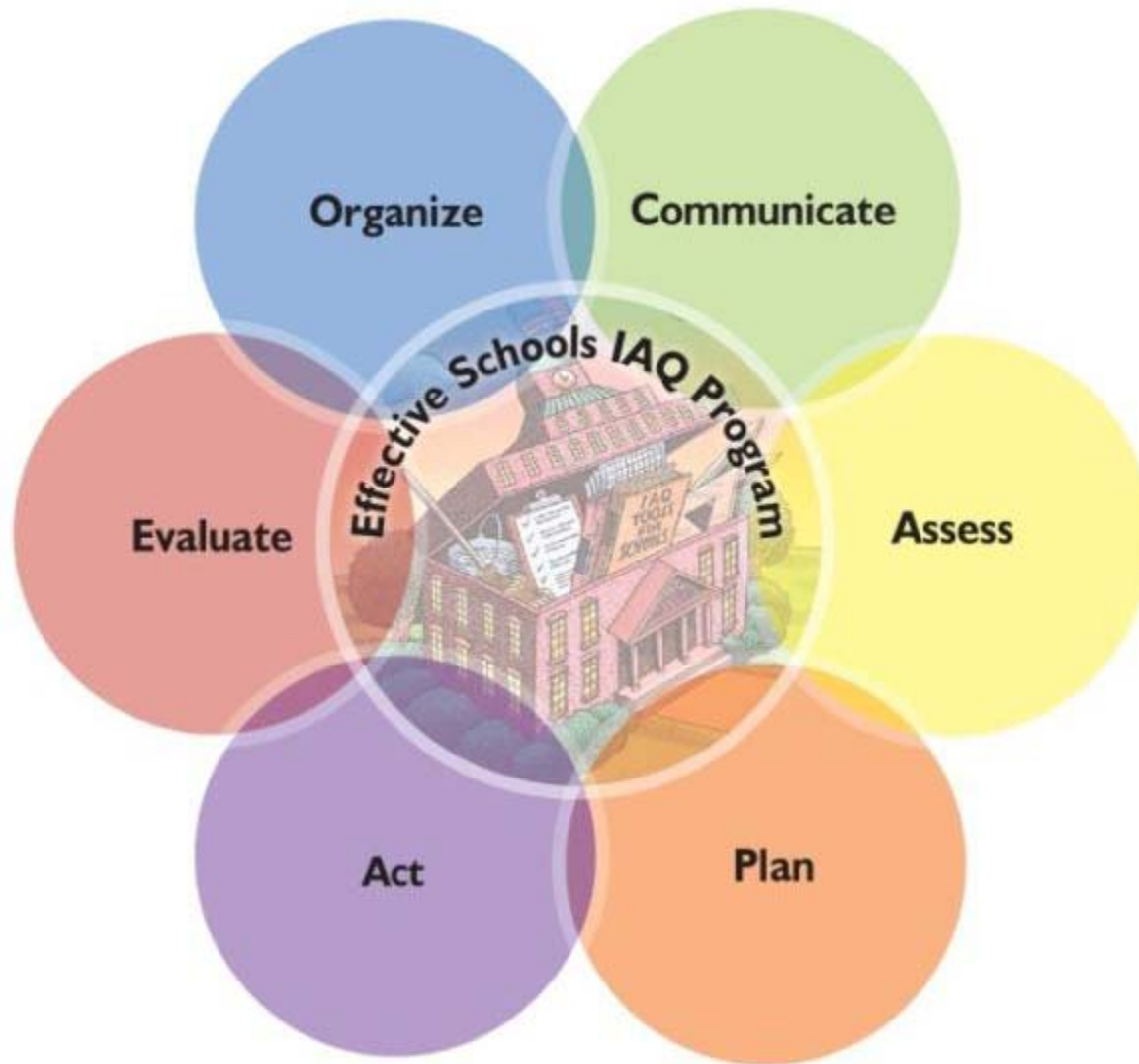
Do you use the *IAQ Tools for Schools* walkthrough assessment to monitor for moisture prone areas?



IAQ Tools for Schools



The Framework for Effective School IAQ Management



The Framework for Effective School IAQ Management: Six Key Drivers



The Framework for Effective School IAQ Management: **Six Technical Solutions**



The Framework for Effective School IAQ Management:

Six Technical Solutions

Quality HVAC

- Inspect HVAC systems regularly
- Establish a maintenance plan
- Change filters regularly and ensure condensate pans are draining
- Provide outdoor air ventilation according to ASHRAE Standard or local code
- Clean air supply diffusers, return registers, and outside air intakes
- Keep unit ventilators clear of books, papers, and other items

Control of Moisture/Mold

- Conduct routine moisture inspections
- Establish mold prevention and remediation plan
- Maintain indoor humidity levels between 30% and 60%
- Address moisture problems promptly
- Dry wet areas within 24-48 hours

Strong Integrated Pest Management (IPM)

- Inspect and monitor for pests
- Establish an IPM plan
- Use spot treatments and baits
- Communicate with occupants prior to pesticide use
- Mark indoor and outdoor areas treated with pesticides



Effective Cleaning & Maintenance

- Conduct routine inspections of school environment
- Develop a preventative maintenance plan
- Train cleaning/maintenance staff on protocols
- Ensure material safety data sheets (MSDS) are available to staff
- Clean and remove dust with damp cloth
- Vacuum using high-efficiency filters

Smart Materials Selection

- Maintain products inventory
- Develop low-emitting products purchasing and use policies
- Use only formaldehyde-free materials
- Use only low-toxicity and low-emitting paint
- Select products based on product rating systems
- Use least toxic cleaners possible (only those approved by the district)

Aggressive Source Control

- Conduct regular building walkthrough inspections
- Test for radon; mitigate if necessary
- Implement a hazardous materials plan (use, label, storage and disposal)
- Establish a school chemical management and inventory plan
- Implement Smoke-Free policies
- Establish an anti-idling school bus policy
- Use walk-off mats at building entrances
- Conduct pollutant-releasing activities when school is unoccupied

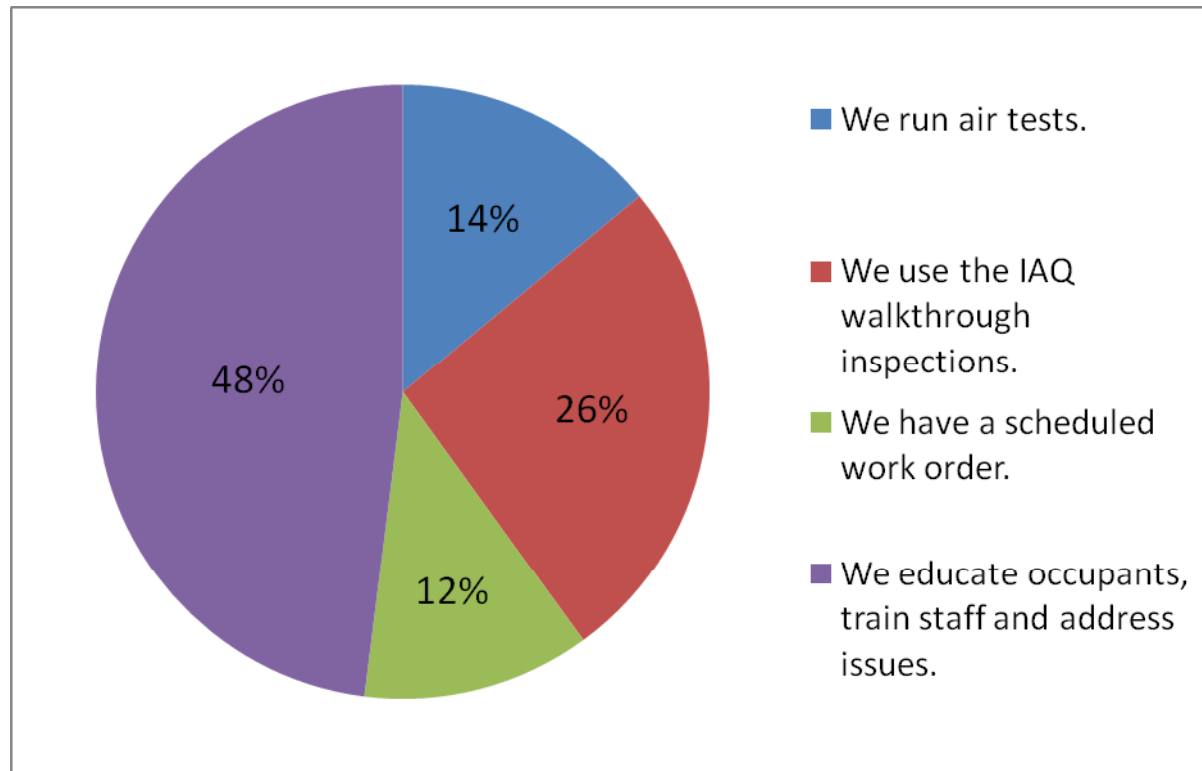
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Polling Question

Do you have a plan for monitoring moisture in your school buildings?





Mold and Moisture: DOUBLE TROUBLE FOR SCHOOLS

Common Defects and Failure Modes in the EXTERIOR BUILDING ENVELOPE

Presented By:

**Todd Spore, President
PBK Facility Consulting**

July 20, 2011



Mold and Moisture: DOUBLE TROUBLE FOR SCHOOLS

OVERVIEW

- FORCES AT WORK ON THE EXTERIOR BUILDING ENVELOPE.
- IMPORTANCE OF EXTERIOR BUILDING ENVELOPE.
- EXAMPLES OF COMMON DEFECTS AND FAILURE MODES IN EXTERIOR BUILDING ENVELOPE.



Mold and Moisture: DOUBLE TROUBLE FOR SCHOOLS

- Approximately 80% to 90% of all building problems are associated with **WATER**
- **WATER** can penetrate building envelope as vapor, liquid or solid state
- **ALL EXTERIOR BUILDING ENVELOPE** components are subject to **WATER** infiltration/migration or “leaks.”
 - ROOF, WALLS (windows, doors, veneers), FOUNDATION



Mold and Moisture: DOUBLE TROUBLE FOR SCHOOLS

- **Leaks occur when three conditions exist simultaneously:**
 - ***Rain water*** – (momentum; saturation)
 - ***Openings*** – (doors, windows, cracks, joints, holes)
 - ***Natural Forces*** – (pressure differentials, gravity capillary; air currents)

“ELIMINATE ANY ONE OF THESE THREE CONDITIONS AND WATER CANNOT PENETRATE THE BUILDING ENVELOPE.”

Mold and Moisture: DOUBLE TROUBLE FOR SCHOOLS

Ensuring a tighter
Building Envelope is
essential for controlling
MOLD and **MOISTURE**

***“Leaks aren’t just for
roofs anymore!”***

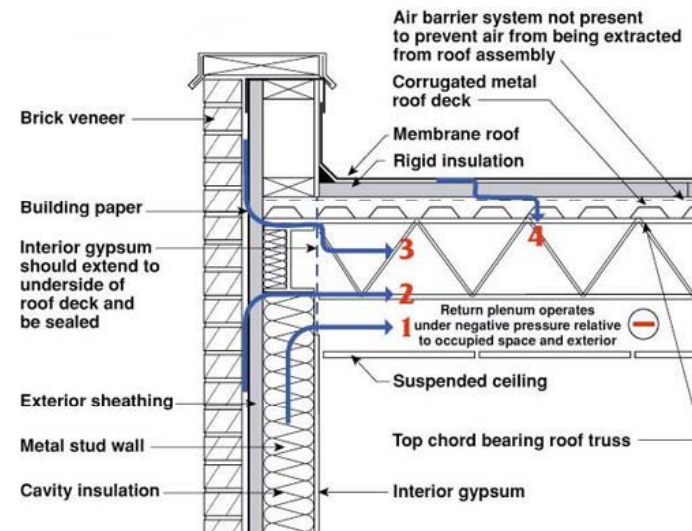




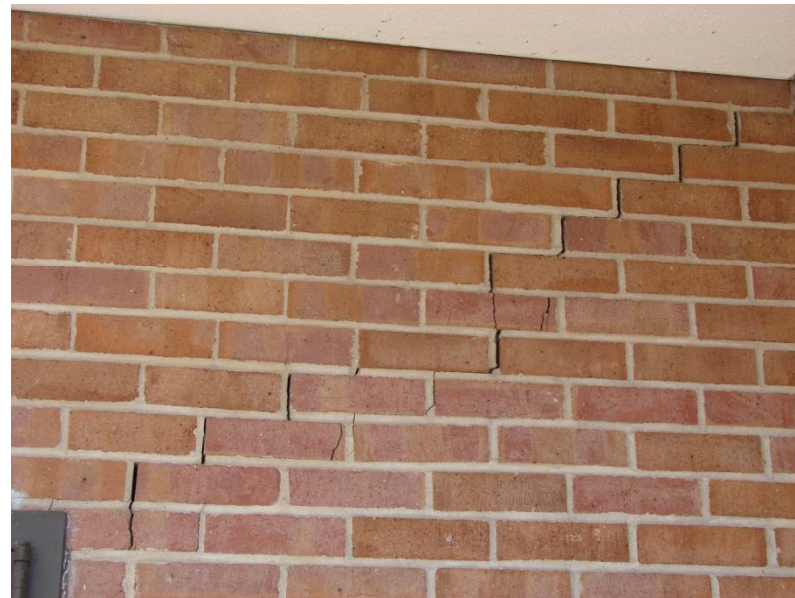
Mold and Moisture: DOUBLE TROUBLE FOR SCHOOLS

- **Water can enter through numerous **openings** commonly found in any exterior wall assembly: *(as small as 0.005")***
 - **Cracked/porous brick & plaster – *(Absorption)***
 - **Improperly installed / cracked mortar joints**
 - **20,000 sf wall surface = 135,000 modular brick; 22.7 miles of mortar joints; 45.5 miles brick/mortar interface**
 - **Poorly bonded “dissimilar materials” or “movement type” joints**
 - **At top of wall, or through sills and copings**
 - **Various other types of wall penetrations:**
 - **Doors, Windows, Pipes/Conduits, Ductwork, Signage,**

Mold and Moisture: DOUBLE TROUBLE FOR SCHOOLS



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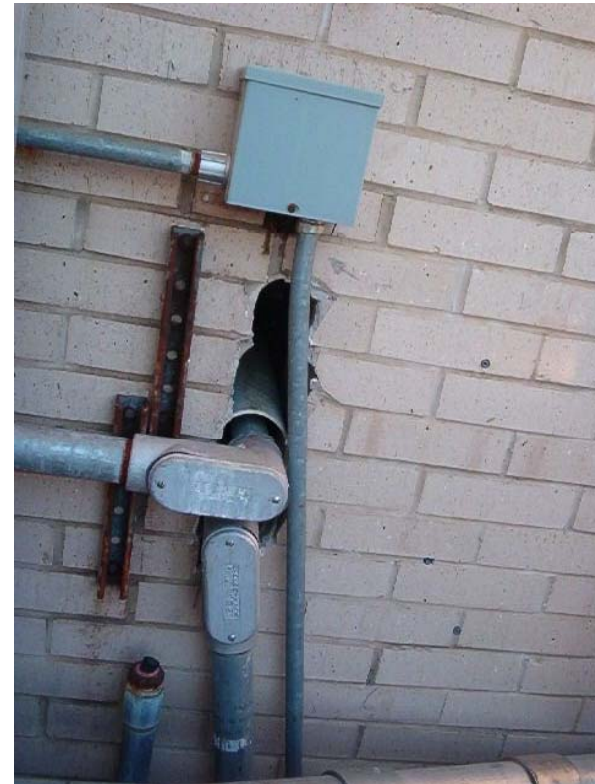
Mold and Moisture: DOUBLE TROUBLE FOR SCHOOLS



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DOUBLE TROUBLE: Mold & Moisture



Deadly Mold

If you believe that mold is a crisis in the past,
you are mistaken.

“A woman who is accused of murdering her husband
told a Michigan court that the real culprit is toxic mold
in her house.”

Indoor Environmental Connection
April 2011

**Implement Best Practices:
Protect Health and Property.**

Indoor Mold Food Sources

- Drywall
- Wood
- Carpets
- Ceiling tiles
- Books
- Paper
- Furniture
- Organic



Prevent Mold: Clean

- Dry area.
- Remove moldy items.
- Remove wet items.
- Clean mold off all hard surfaces.



Costs of Clutter

- Saves money by making cleaning more effective and time-efficient.
- Saves money by making inventory more efficient: fewer items lost, fewer items broken, and less money spent because old still-useable supplies are available and you don't waste money on buying things you already have or won't use.
- Makes classrooms healthier by trapping fewer harmful particles, which research shows can decrease absenteeism and increase student performance.
- Decreases the risk of student or teacher injury and decreases fire hazards.
- Increases student and teacher concentration due to decreased distractions (centers focus on teacher).
- Leads to more efficient teaching and time management because supplies are easily located.
- Increases positive media: a clean and organized school shows parents and community members that we are using their tax dollars responsibly.

FAST FACT: On average, 80% of what we keep we never use

IAQ Tools for Schools in Katy ISD



BEFORE

IAQ Tools for Schools in Katy ISD



AFTER



Plumbing



No Insulation With Plumbing



What Fiberglass Insulation Can Do



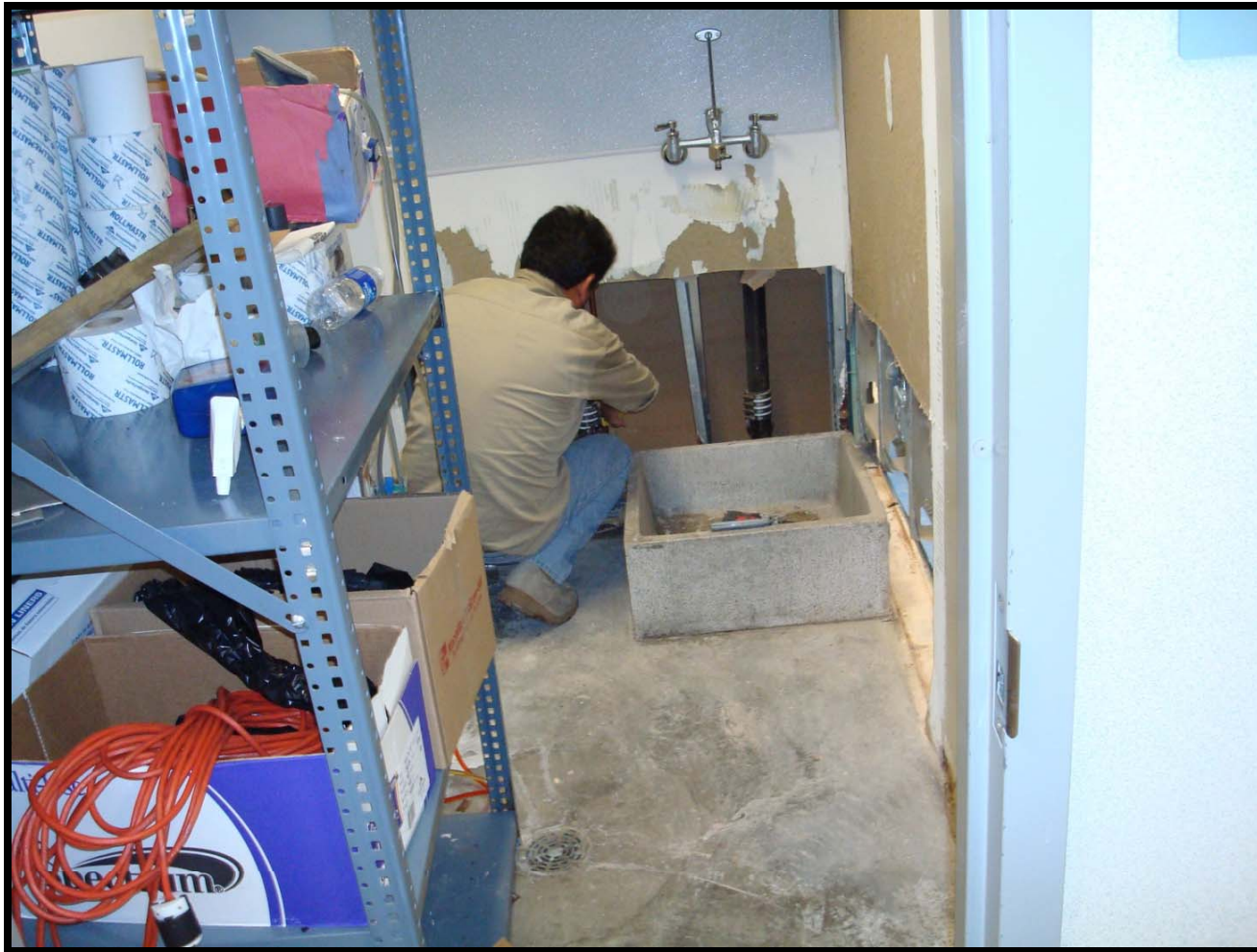
Tramex Moisture Meter



Moisture Travels



BEFORE



AFTER



Look for Visual Signs



Evidence of Exterior Water Intrusion





Caulking at Sinks



Portable Buildings



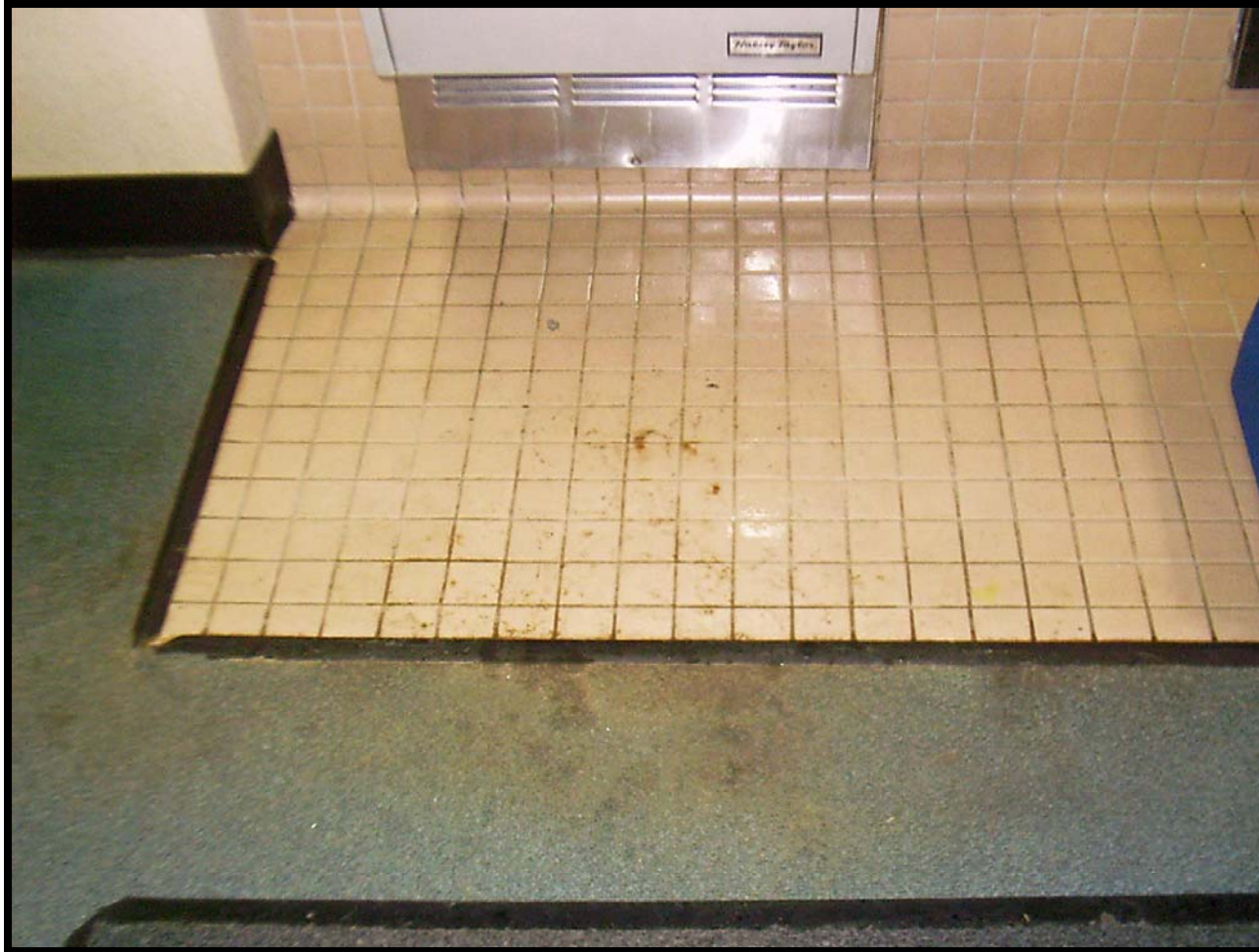
Summer Humidity in Portable Buildings



Cafeteria Tables



Not Mud but Mold!



Occupant Behavior



Water Extraction



Drying Equipment





Cost Savings

- Improve student attendance.
- Lower risk mitigation costs.
- Prolong the building life.
- Reduced pest management costs.



KEY DRIVER:

Act to Address Structural, Institutional and Behavioral Issues

ACT

- Educate Staff About IAQ to Change Behavior.
- Train Occupants to Address IAQ Risks.
- Address the Source of Problems.

Mold and Moisture Resources

- EPA's "Mold Remediation in Schools and Commercial Buildings:

http://www.epa.gov/mold/mold_remediation.html

- Building Science's "Mold, Moisture, & Indoor Air Quality" and "Humidity Control in the Humid South" by Joseph W. Lstiburek:

<http://www.buildingscience.com/index.html>

- Works by Terry Brennan, available on the EPA website and elsewhere. Read "Building Air Quality: A Guide for Building Owners and Facilities Managers"

http://www.epa.gov/iaq/largebldgs/pdf_files/iaq.pdf

IAQ Tools for Schools Resources

- *IAQ Tools for Schools* Guidance:
 - www.epa.gov/iaq/schools
- *IAQ Tools for Schools* Connector E-newsletters and Emails:
 - Send an email to: IAQTfSConnector@cadmusgroup.com
 - View archives at: www.epa.gov/iaq/schools/bulletins.html
- Schools Connector Email Discussion List:
 - Send a blank email message to schools_iaq_connector_subscribe@lists.epa.gov. Then, check your email inbox for your confirmation and membership details.
- *IAQ Tools for Schools* Webinar Resources:
 - www.epa.gov/iaq/schools/webconferences.html



Dampness and Mold Assessment Resource

The Center for Indoor Environments and Health and the University of Connecticut Health Center (UCHC) is working with the National Institute for Occupation Safety and Health (NIOSH) on efforts to improve indoor air quality in school environments. NIOSH has developed a **one page Dampness and Mold Assessment Sheet** to help identify areas with moisture and mold in classrooms and school buildings.

Contacts:

Paula Schenck, schenck@nso2.uhc.edu

Michele R. Martin, moldsheet#1@cdc.gov

NIOSH Dampness & Mold Assessment Form (One sheet per room)

Date: _____ Observer: _____ Building: _____ Wing: _____ Floor: _____ Room Number: _____

Room Type: Fill in the bubble for the type of room you are assessing.

Classroom Office Hallway Conference room Bathroom Custodial closet Mechanical room Storage
 Library Cafeteria Gym Auditorium Kitchen Locker room
 Entrance area Stairwell Other _____

MOLD ODOR: Be sure to smell for mold odor when you first walk into the room/area. Fill in the appropriate bubble.
 NONE MILD MODERATE HEAVY Severity of MOLD ODOR: _____ Source Unknown

Fill in bubbles for each column and row.	NA	DAMAGE or STAINS			VISIBLE MOLD			WET or DAMP			Row Totals	NOTES		
		0	1	2	3	0	1	2	3	0			1	2
Ceiling		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Walls		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Windows		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Floors		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
HVAC systems		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Pipes		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Furnishings		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Supplies & Materials		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Other		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Column Totals														
Column Averages														

Size based scores: 0 = NONE, 1 = size of this form or smaller, 2 = larger than this form, smaller than the size of a standard interior door, 3 = larger than the size of a standard interior door.

NA = Not Applicable



Contact Information for Webinar Speakers

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Questions and Answers

