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

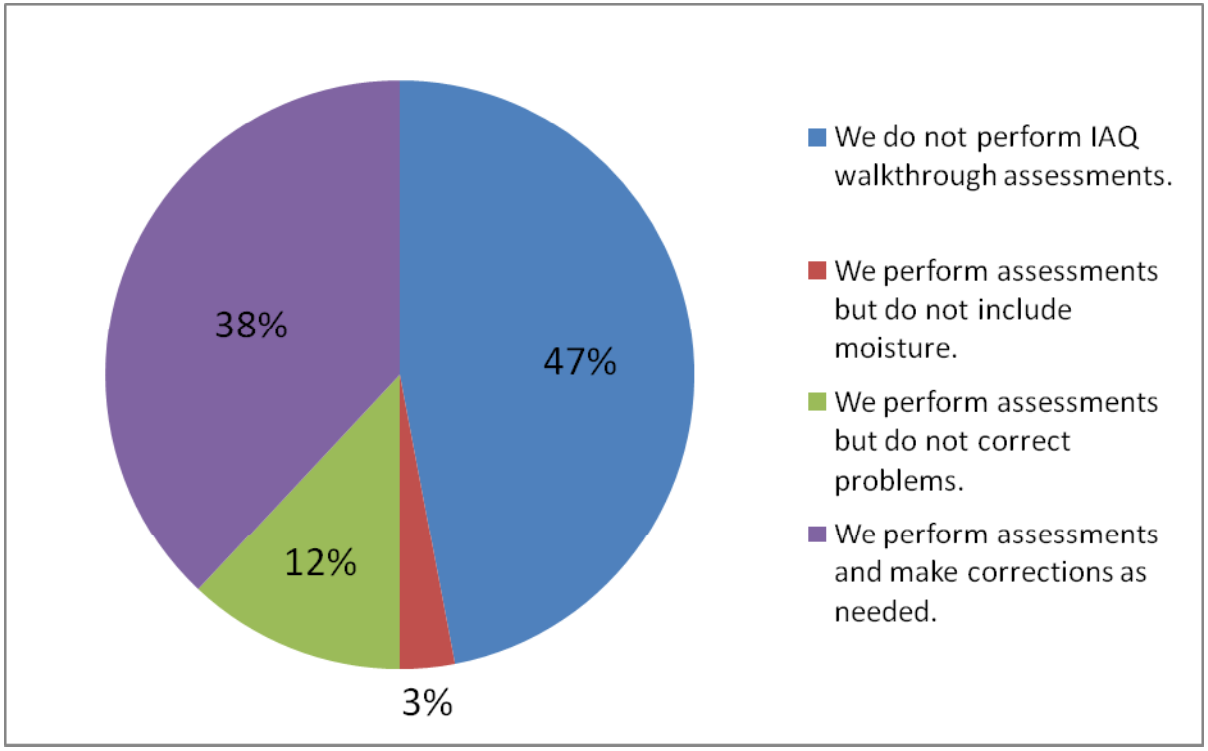
Today's Webinar Presentation and Materials

- 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.

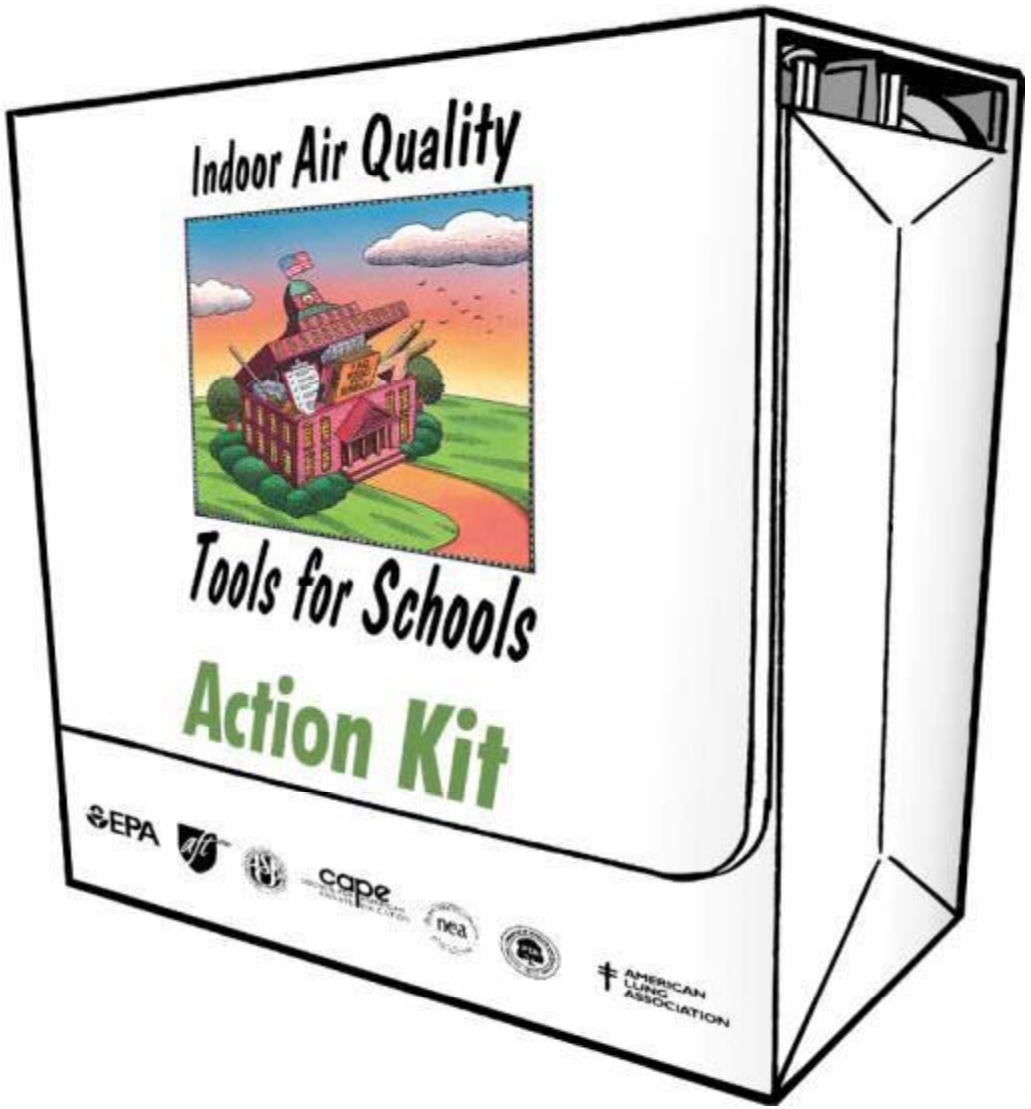
  - www.epa.gov/iaq/schools/webconferences.html

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

EPA Disclosure

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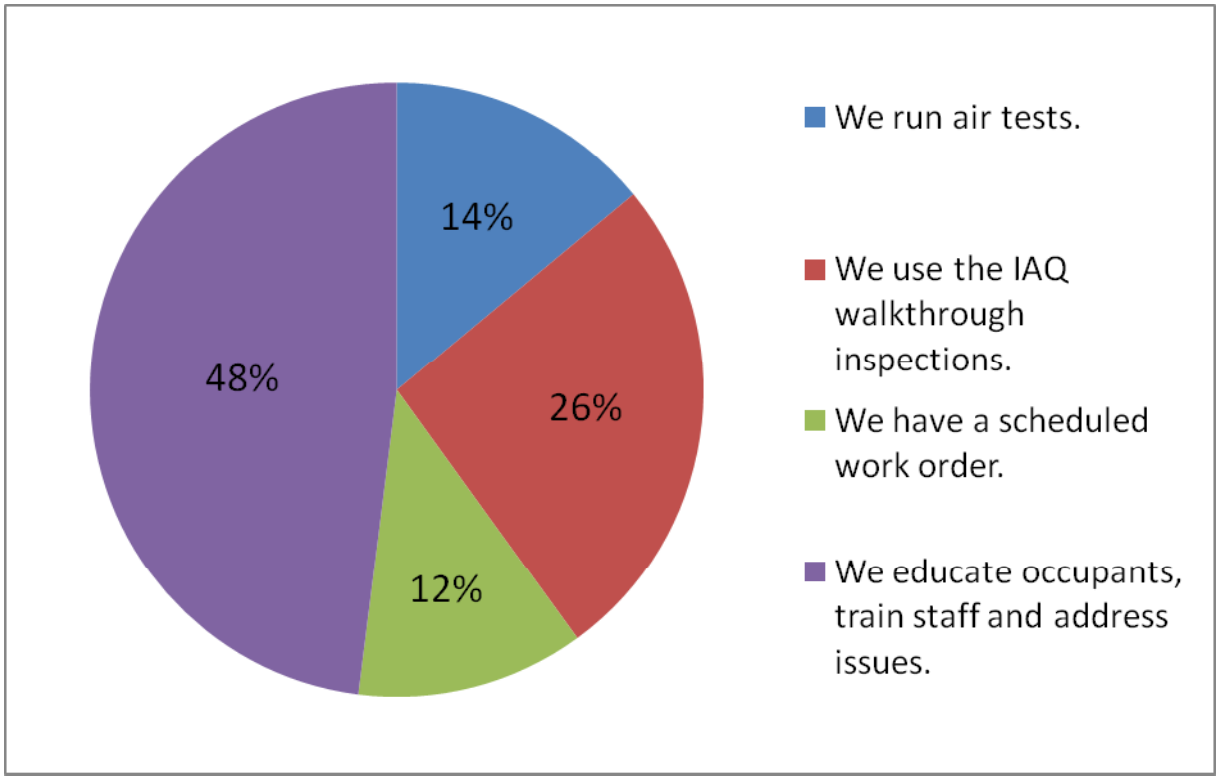
Polling Question

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 <u>ONE</u> OF THESE THREE CONDITIONS AND WATER CAN<u>NOT</u> PENETRATE THE BUILDING ENVELOPE."

Mold and Moisture:
DOUBLE TROUBLE FOR SCHOOLS

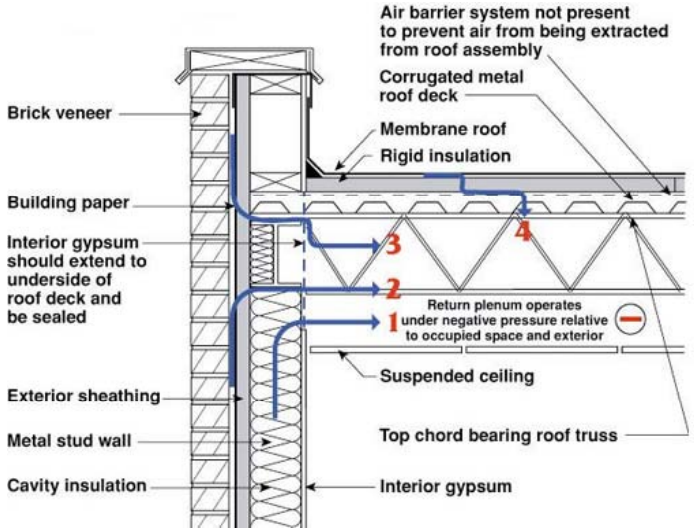
Ensuring a tighter *Building Envelope* is essential for controlling *MOLD* and *MOISTURE*

"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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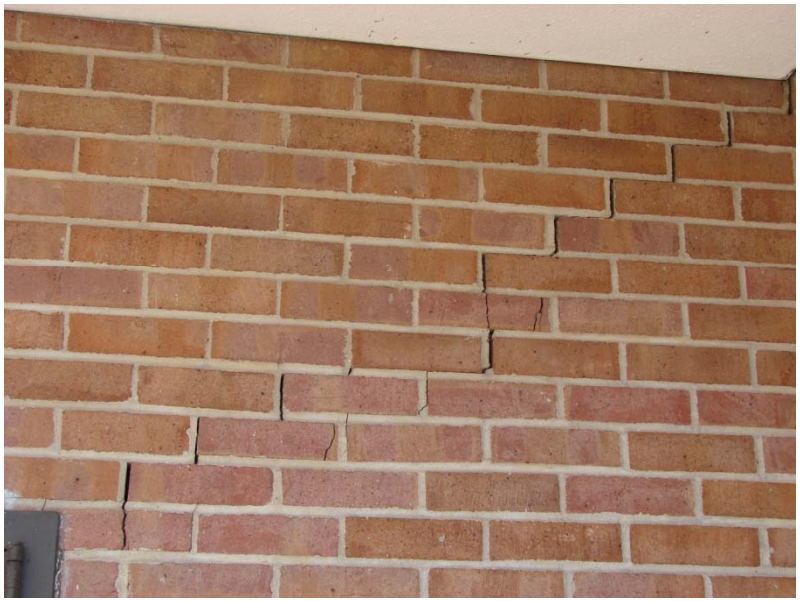

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DOUBLE TROUBLE:
Mold & Moisture

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

ON
LEARNING
3rd Grade

Plumbing

No Insulation With Plumbing

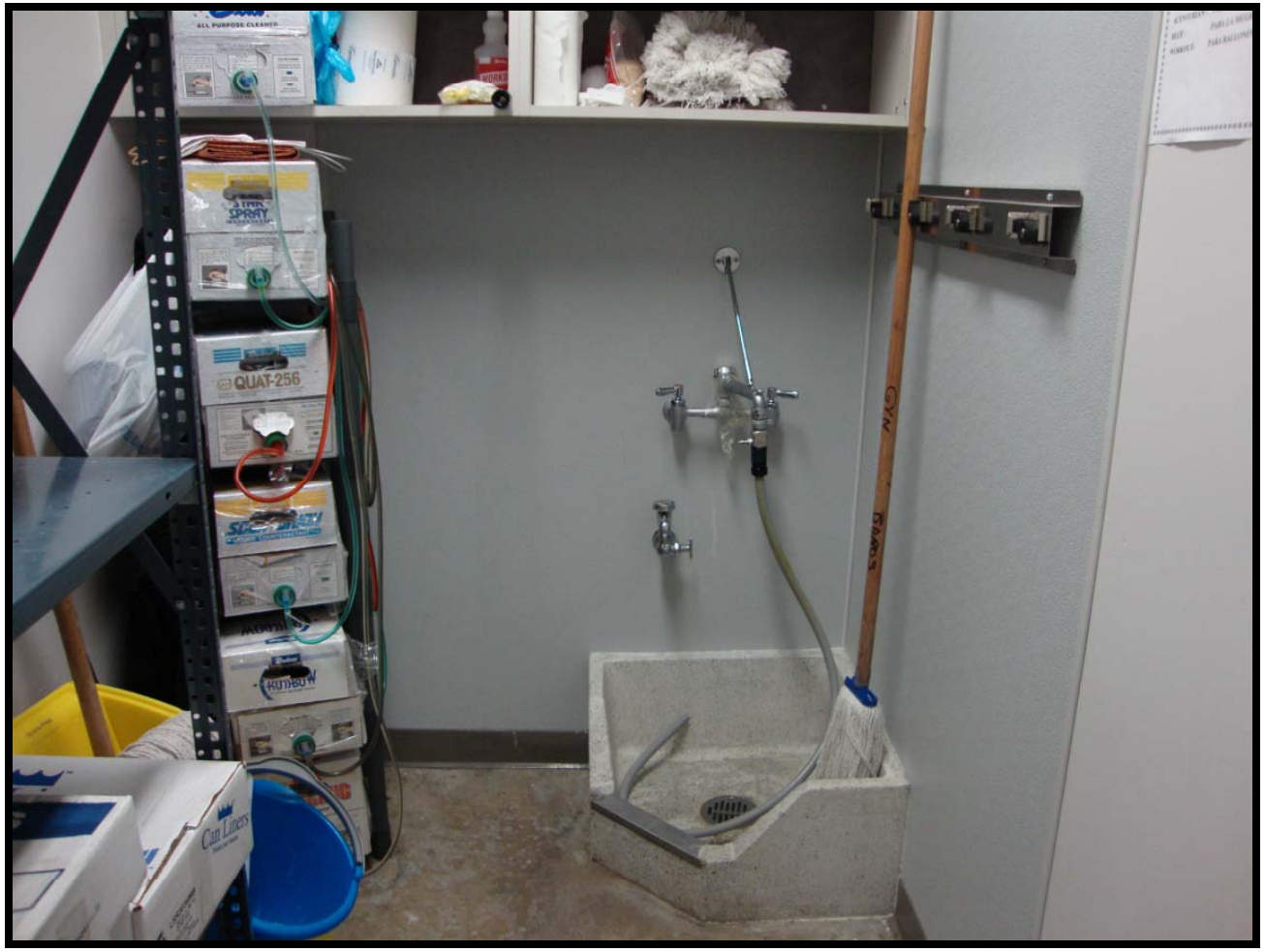
What Fiberglass Insulation Can Do

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

607
07/15/2009

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

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

PLAN

KISD M O
Environmental Section
2010 Summer Projects

School/Facility	Description	Respo
THS field house	RH/air monitoring	Ta
MRHS field house	RH/air monitoring	Ta
MCHS field house	RH/air monitoring	Ta
CRHS field house	RH/air monitoring	Ta
SLHS field house	RH/air monitoring	Ta
KHS field house	RH/air monitoring	Ta
THS Band/Orchestra/Choir	RH/air monitoring	Ta
KHS Band/Orchestra	RH/air monitoring	Ta
WMJH - campus	RH/air monitoring	Ta

Portable Buildings Entry 2009	Description	Respo
OAC-A191	Install floor tile entry	Is
WME-A49 (Also replaced carpet in T-3)	Install floor tile entry	Is
Central Maintenance A50 & A151	Install floor tile entry	Is
		Is
		Is

Vinyl wallpaper reglue/drywall removal	Description	Responsibility	Project Mgr.	Start	Completed
RES	Removal/Replacement	Islas	Anderson		August 2, 2010
	Removal/Replacement	Islas	Anderson		August 2, 2010
BHE	Removal/Replacement	Islas	Anderson		postpone
	Removal/Replacement	Islas	Anderson		August 2, 2010
	Removal/Replacement	Islas	Anderson	July 28, 2010	August 3, 2010
Thresholds	**Description**	**Responsibility**	**Project Mgr.**	**Start**	**Completed**
BHE		Mancilla	Caruso		
CJH		Mancilla	Caruso		
WCE		Mancilla	Caruso		
		Mancilla	Caruso		

Katy ISD
Date Created: 4/15/2011 7:45AM

Page 1 of 1
Printed on: 4/29/2011

Work Order ID	256577	Craft	Roof	Completion Date	4/19/2011
Description	preparation for the heavy rains & strong winds - check all of the ninth grade roof and windows for openings.				
Location	Katy High School - 001			Request Date	4/15/2011
Building	KHS 9GR Center			Status	Closed Work Orders
Area	Roof			Priority	Emergency
Area Number				Purpose Code	
Equip Item No.				Budget Code	
Equip. Desc				Requester	Peggy Caruso
Assigned To	Newmans, Brian			Requester Phone	281-396-2519
Notes					

Labor **To Date: 27.00 h**

Date	Name	Hrs

Purchases **To Date: $191.87**

Date	PO	Description	Supplier	Qty	Cost Each

Inventory **To Date: $0.00**

Date	Item No	Description	Qty	Pool

Action Taken checked roof for openings, splits and tears along roof edges, cover plates and expansion joints. Roof cemented all openings, checked windows for leaks.

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

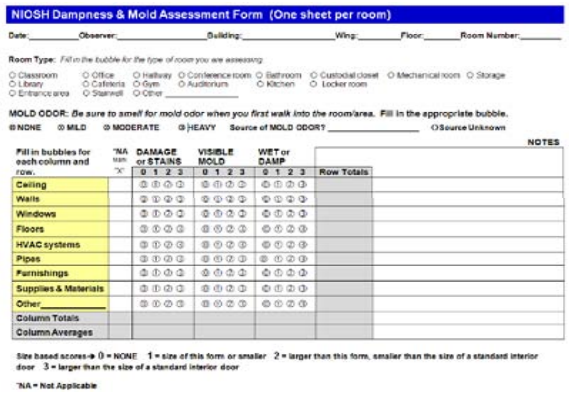
Dampness and Mold Assessment Resource

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.uchc.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 Source of MOLD ODOR? _____ ○ Source Unknown

Fill in bubbles for each column and row.	*NA (N/A) "X"	DAMAGE or STAINS 0 1 2 3	VISIBLE MOLD 0 1 2 3	WET or DAMP 0 1 2 3	Row Totals	NOTES
Ceiling		⊘ ① ② ③	⊘ ① ② ③	⊘ ① ② ③		
Walls		⊘ ① ② ③	⊘ ① ② ③	⊘ ① ② ③		
Windows		⊘ ① ② ③	⊘ ① ② ③	⊘ ① ② ③		
Floors		⊘ ① ② ③	⊘ ① ② ③	⊘ ① ② ③		
HVAC systems		⊘ ① ② ③	⊘ ① ② ③	⊘ ① ② ③		
Pipes		⊘ ① ② ③	⊘ ① ② ③	⊘ ① ② ③		
Furnishings		⊘ ① ② ③	⊘ ① ② ③	⊘ ① ② ③		
Supplies & Materials		⊘ ① ② ③	⊘ ① ② ③	⊘ ① ② ③		
Other_____		⊘ ① ② ③	⊘ ① ② ③	⊘ ① ② ③		
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

- Jennifer Lemon
  Lemon.Jennifer@epa.gov

- Peggy Caruso
  PeggyLCaruso@KATYISD.org

- Todd Spore
  Todd.Spore@PBK.com

Questions and Answers