

MOLD IN SCHOOLS III

Mold and Water Remediation

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Wood PLC



INTRODUCTION AND AGENDA

Why are we here?

- Safe and clean educational facilities are more effective
 - Efficiencies in remediation increase:
 - Cost benefits of getting the work done
 - Children's exposures to education
 - Stakeholder buy-in

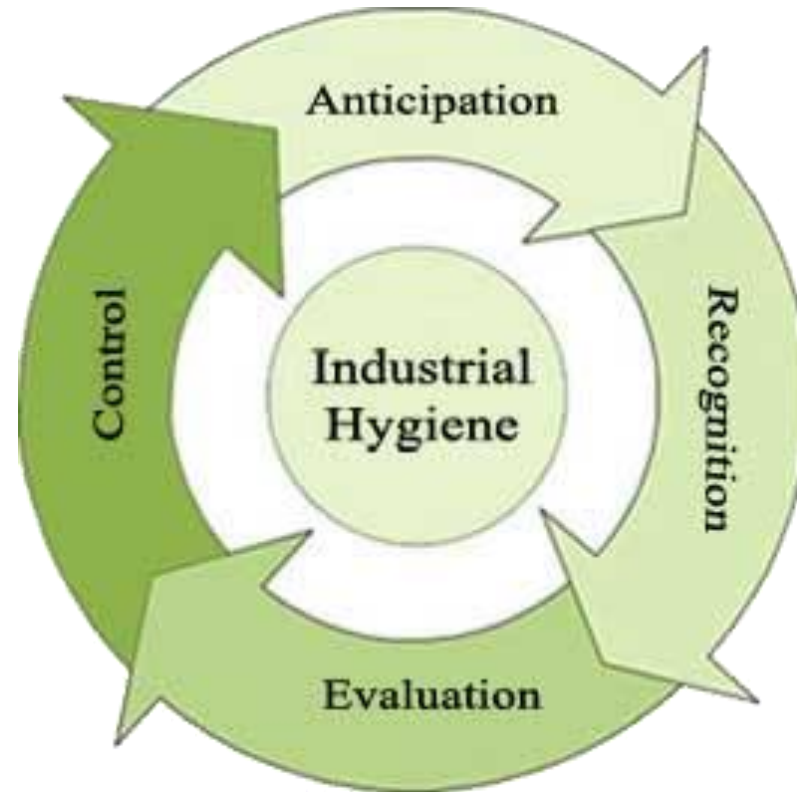
Why are we here?

➤ Challenges

- Lack of knowledge = vulnerability to exploitation
- Unintended exposure of students and employees to
 - Regulated hazards (lead, asbestos) and chemicals
 - Mold and irritants
- Failure to document projects for due diligence
- Non-compliance with regulatory requirements
- Distrust from union, employees, community, etc.

Introductions

- Michelle David, Senior IH

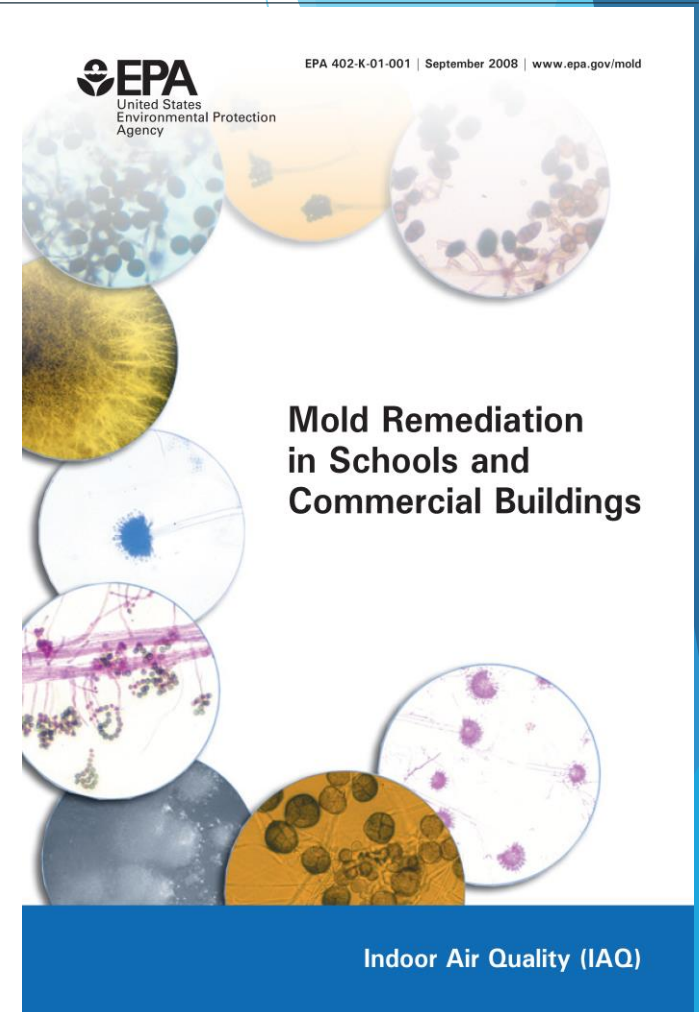


Overview & Objectives

1. Regulatory compliance requirements
2. Mold and remediation facts review
3. Guidelines and tools
4. Documentation basics
5. Contractor and expert selection
6. Examples of proper remediation

Resources

- EPA Mold Remediation in Schools and Commercial Buildings
- EPA IAQ Tools for Schools: Coordinator's Guide to IAQ (includes checklists)
- Healthy Cleaning & Asthma-Safer Schools
- Guideline for selecting professionals
- IICRC S500 Water Category Chart



REGULATORY COMPLIANCE

These are the requirements

What regulations do you need to know about?

- Before you remediate or cut inspection openings:
 - Legal requirements related to disturbance of “Regulated Building Materials”
 1. Asbestos
 2. Lead
 3. Other materials that may end up in waste stream
- Health and Safety regulations
 - Confined space entry (applies to attics, crawl spaces, vaults)
 - Hazcom
 - Biohazards

Common biohazards you could encounter

- Other non-regulated hazards and concerns you may encounter
 - Hantavirus (rodent droppings and urine)
 - Rats (allergenic)
 - Bird or bat droppings (Histoplasmosis)
 - Insects
 - Structural issues (ants)
 - Stinging insects (allergenic, painful)
 - Cockroaches (allergenic)
 - Bed bugs (hard to exterminate)

Asbestos Terms



Asbestos Containing Material

- More than 1% asbestos



Suspect ACM

- May contain asbestos



Assumed ACM

- Not tested, treated as ACM

EPA Environmental Regulations

1. Asbestos Hazard Emergency Response Act (AHERA) 1986 applied to schools K-12
2. Asbestos School Hazard Abatement Reauthorization Act (ASHARA) 1990 established Model Accreditation Plan
3. National Emission Standards for Hazardous Air Pollutants (NESHAP) focuses on visible emissions



Asbestos Requirements

1. Written, site-specific O&M Plan and trained personnel
 2. AHERA inspections/re-inspections in schools (no exemptions re: building age)
 3. Must sample previously un-sampled/unidentified materials or assume they contain asbestos
 4. Abatement takes precedence over mold remediation
 5. Permitting
- It's best to treat building materials with less than 1 % asbestos like asbestos:
- Asbestos-containing drywall mud
 - Ceiling tiles

Lead in 'Child Occupied Facilities'

- Child Occupied Facility: is **pre-1978** constructed building, where at least one child, under age 6, will visit and meets all three requirements:
 1. Visits are at least 2 different days within any week, for at least 3 hours each day
 2. Combined weekly visits at least 6 hours
 3. Combined annual visits at least 60 hours

- Remediation, repair, and painting work in Child Occupied Facilities requires:
 - RRP certification
 - Clearance by trained contractor prior to occupancy

Other regulated building materials

- These must not end up in the general waste stream:
 1. PCBs (ballasts, some caulking materials)
 2. Mercury (light bulbs, etc.)
 3. Radiological sources from:
 - Smoke and CO detectors
 - Exit signs

Washington Mold Law:

- RCW § 59.1S.060 (13)
 - Requires landlords to provide written information approved by DOH about health hazards and how to control mold
- RCW §§ 70.164.010–.070
 1. Establishes low-income weatherization program and services including indoor air quality improvements
 2. Establishes identification and correction of mold health hazards for low-income households

NOTE: There is no mold remediation certification requirement for contractors

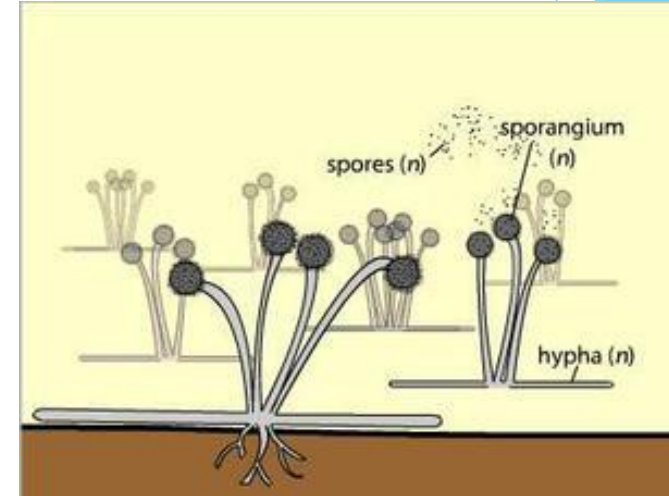
MOLD FUNDAMENTALS

Awareness

What is mold?

- Microscopic colonial fungi
- Each spore can produce a new colony

Mold Part	Plant Equivalent
Mycelia	Roots
Hyphae	Stems/branches
Sporangium	Flower
Spores	Seeds



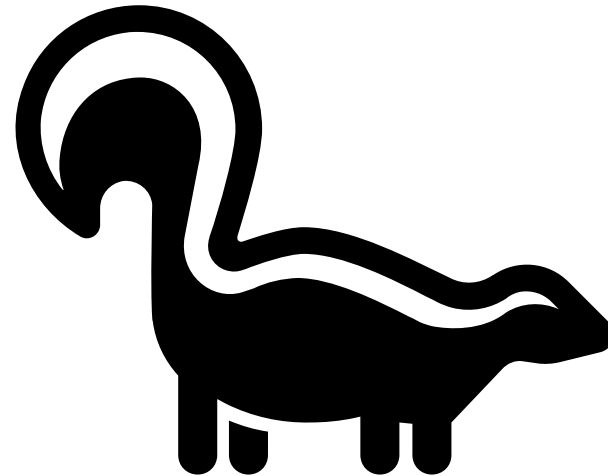
What does mold do?

- Molds decay cellulose
 - Wood rot
 - Plant pathogens (mildew, rust, smut)
 - Contributes to healthy soils and plants



What does mold do?

- Form metabolic by-products:
 - Mycotoxins
 - Not inhalation hazard but possible ingestion hazard
 - Regulatory limits of mycotoxins in food supply
 - Microbial volatile organic compounds (MVOCs)
 - Stinky
 - May be irritating
 - May be alarming



What is normal?

- Mold spores:
 - Release from colony due to physical or air disturbance
 - Blow into buildings as part of normal indoor dust
 - Tracked into buildings on shoes and clothing
 - Are always in the air and on surfaces
 - Are inhalable

Housekeeping: controls accumulations



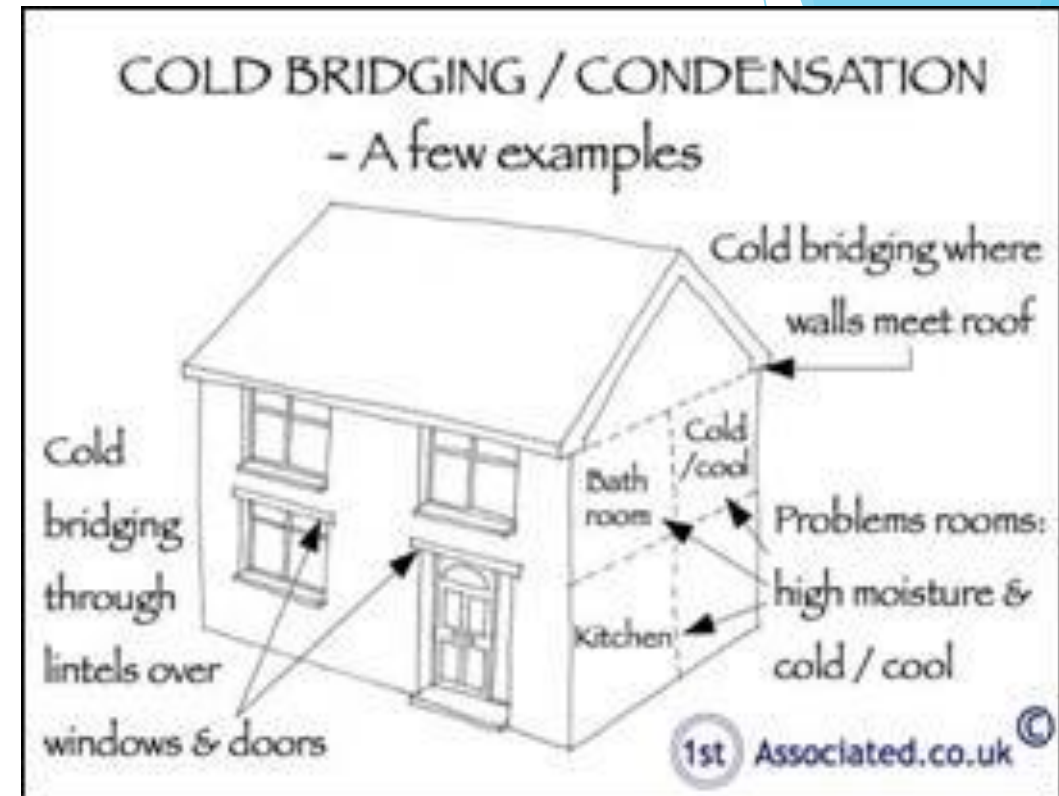
What makes mold grow?

1. Moisture
 - Bulk moisture
 - Condensation
2. Food
 - Cellulose
 - Bacteria
 - Protein
3. Oxygen
4. No air movement
5. 3-5 days of stable conditions

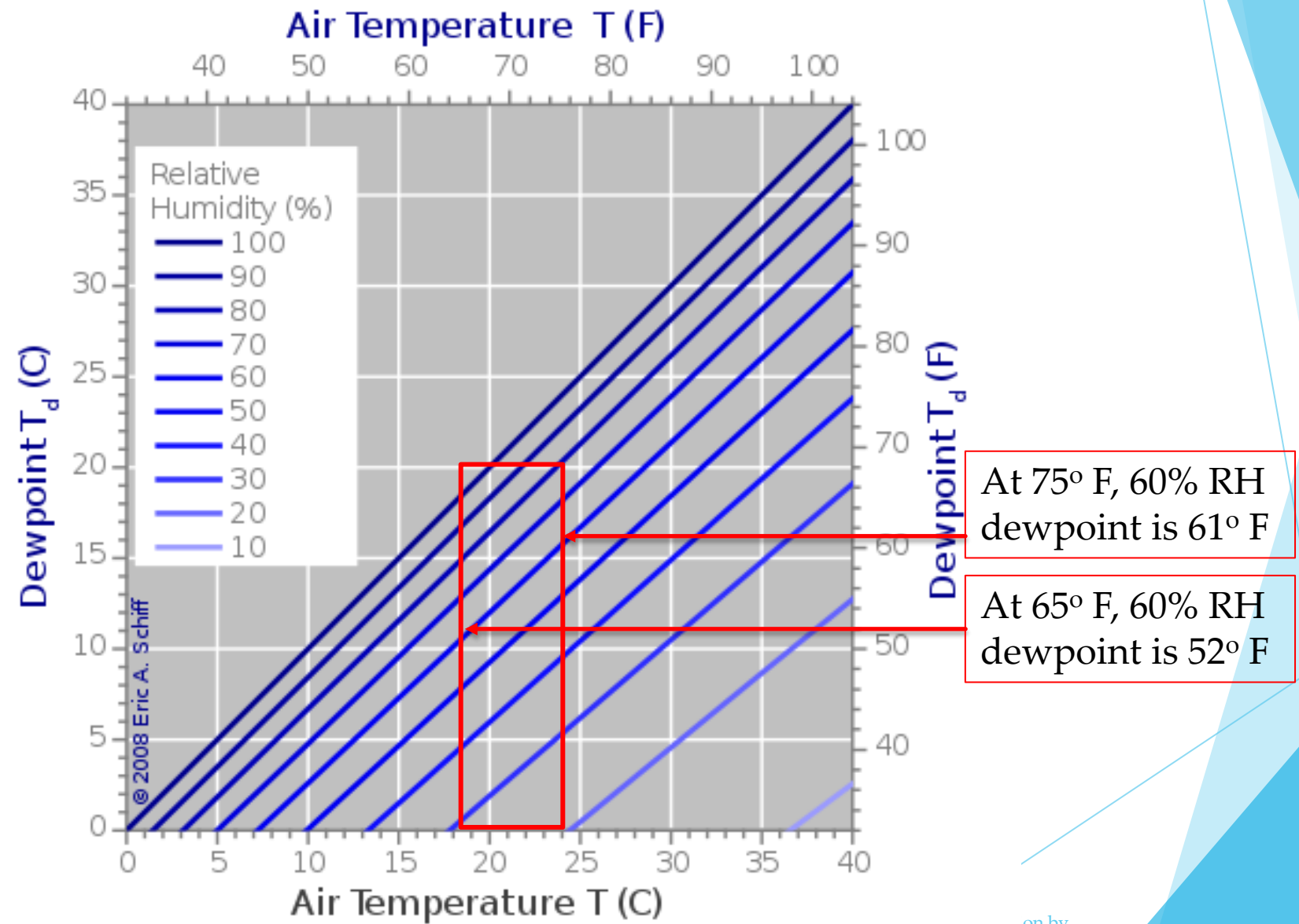


What are high-risk environments?

- Porous materials wetted by:
 1. Floods
 2. Plumbing leaks
 3. Condensation
 4. Water intrusion
- Cold, damp spaces with no air movement



➤ Dew Point Temperature layout (Segoe UI 28pt)



Mold exposure health impacts

- Mold spores and fragments are allergenic
- Allergic sensitization (allergies)
- Asthma exacerbation
- Hypersensitization (chronic or acute large exposure)
- Immune-compromised individuals susceptible to opportunistic pathogens (*Aspergillus*)
- Some fungi are true pathogens (Coccidia, Histoplasma)

Mold exposure health impacts

- 10 to 20 percent of population affected by allergies
- Approx. 8 % percent of US population has asthma
- 1 to 2 percent of population is immune-compromised
 - Infants
 - Elderly
 - Diabetics
 - Cancer, transplant, or HIV/AIDS patients
 - Pregnant women may be temporarily immune-compromised

MOISTURE FUNDAMENTALS

ANSI/IICRC S500 Water Categories

- Category 1 water (clean)
 - Low risk of contact, ingestion, or inhalation hazard
 - Supply line leak
 - Tub or sink overflows with no contaminants
 - Melting ice or snow
 - Fresh, clean rainwater

Note: if clean water flows through dirty spaces, it is no longer clean

Generally addressed by normal dry-in-place & cleaning procedures



ANSI/IICRC S500 Water Categories

- Category 2 water (low level contamination)
 - Moderate risk of contact, ingestion, or inhalation hazard
 - Water beds
 - Aquariums
 - Sprinkler head/pipe leak
 - Toilet overflows with urine (no feces)
 - Bathtub overflow (dirty water)

Generally requires normal dry-in-place, PPE, plus sanitizing procedures



ANSI/IICRC S500 Water Categories

- Category 3 water (high level contamination)
 - High risk of contact, ingestion, or inhalation hazard
 - Toilet overflow with feces
 - Sewer backup
 - Regional flooding

Requires removal of porous materials, sanitation, proper PPE



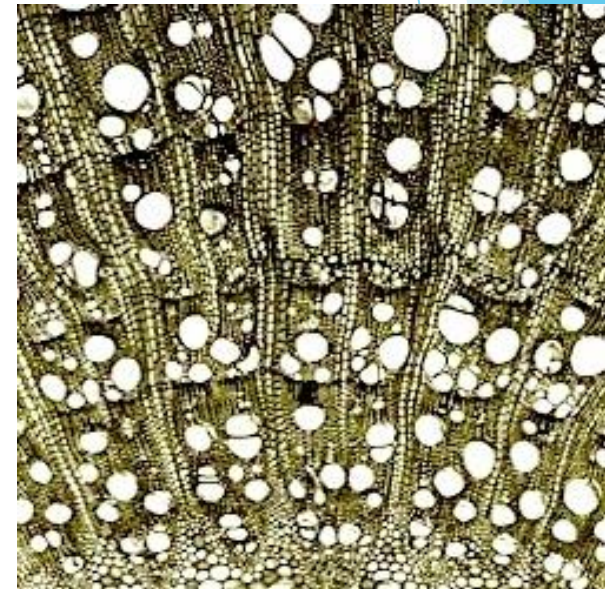
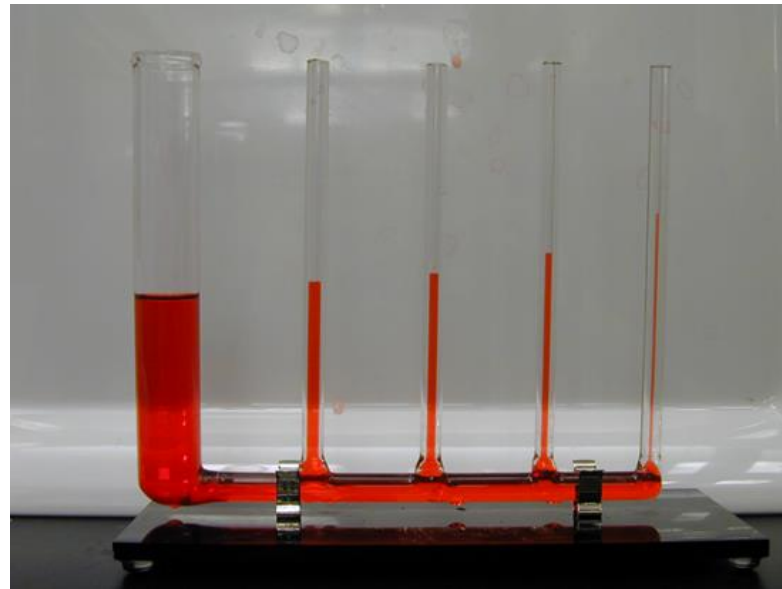
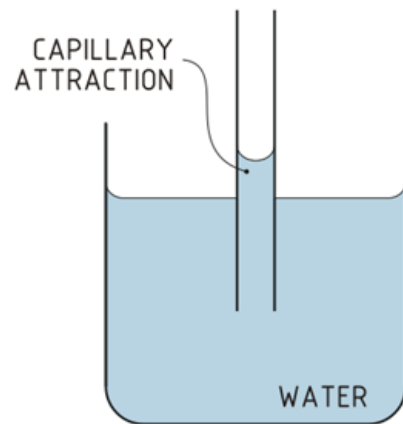
Moisture distribution processes

- Condensation on cold surfaces at or below dew point temperature
- Common locations:
 - Windows and window frames
 - Unheated closet exterior walls
 - Roof decking
 - Bathrooms with insufficient ventilation
 - Exteriors of cold, uninsulated ductwork or pipes



Moisture distribution processes

- Capillary action
 - Water wicks into wood, drywall, concrete
 - The longer the material sits wet, the longer it will take to dry



Moisture distribution processes

- Water intrusion
 - Exterior envelope problems
 - Gutters
 - Flashing and sealants
 - Roof leaks
 - Window failures
 - Landscape drainage
 - Look for these during maintenance inspections
 - Repair them quickly
 - Delays in maintenance can cause structural damage



Moisture distribution processes

- Gravity works
 - Water finds holes in floors
 - Pipes
 - Conduit
 - Duct shafts
 - Water moves laterally
 - Across floors
 - Through steel framing
 - Under cabinets



Moisture distribution processes

- These materials do not stop water
 - Cabinetry
 - Cove base
 - Framing
 - Vinyl wallpaper
 - Plastic or similar paneling
 - Ceramics
 - Vinyl flooring
 - Drywall



Likewise, these same materials prevent effective drying

Porous materials: Highest risk for moisture impacts

➤ Examples

- Drywall
- Carpet and padding
- Insulation
- Ceiling tiles
- Particleboard or fiberboard
- Medium density fiberboard (MDF)
- Sound-baffling panels/fabric



May need removal depending on:

- Water category
- Duration of moisture impact
- Cosmetic issues
- Condition

Semi-porous materials: Low to moderate risk

➤ Examples

- Wood framing
- Plywood and oriented strand board (OSB)
- Concrete and brick
- Stone and ceramic tile (if not installed over porous materials)

➤ Dry in place and clean if:

- Structurally sound
- Not delaminating



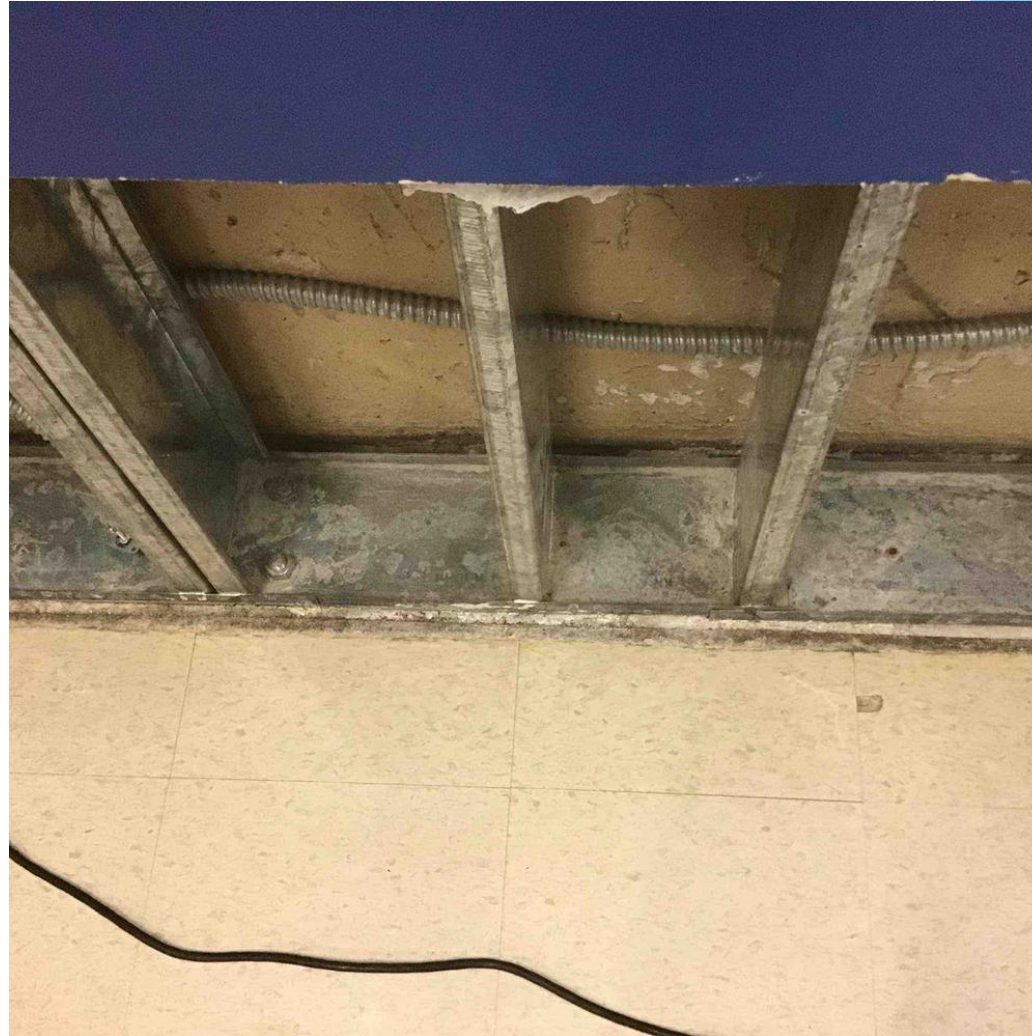
Non-porous materials: Low risk for moisture impacts

➤ Examples

- Vinyl tile, plastics
- Glass
- Metal

➤ Dry in place and clean if:

- Structurally sound
- Not corroded
- Not delaminating



Other concerns: Electrical

➤ Examples

- Floor-mounted outlets
- Switches and outlets
- Light fixtures
- Fire or smoke alarms
- Electrical panels

➤ Professional evaluation required

- Electrical safety
- Functionality



Watch for these conditions:

- Efflorescence or spalling on brick or concrete
- Mold or atypical deposits
- Unusual or musty odors
- Water stains
- Delamination
- Pests or deposits that indicate possible moisture issues:
 - Ants
 - Frass
 - Beetles

FIGURING OUT MOLD & MOISTURE IMPACTS

An example of an approach

Responding to an event: Initial approach

1. Secure the affected area and inform interested parties
2. Determine water category
3. If Category 2 or 3 water (or if you're not sure) don PPE
 - Gloves
 - Cleanable shoes (rubber boots are best)
 - Safety glasses
 - Kneepads?
 - Respirator? N-95 is an appropriate preliminary choice
4. Stop the leak, if applicable
5. Photograph impacts, if possible

Responding to an event: Secondary approach

1. Determine approximate quantity of water
2. Are there any immediate hazards such as:
 - a) Special conditions (electrical or structural)
 - b) Physical (slip/trip/fall, sharps, biological)
3. Decision time!
 - a) More than 30 gallons of water?
 - b) Are porous materials affected that won't dry intact?
 - c) Did this moisture travel to the floor below?
 - d) Has this condition been present for more than 2 days?
 - e) **If answer to the above four questions is 'yes', and you don't have experience, consider bringing in a remediation contractor**
4. Photograph impacts, if possible
5. Prepare to perform preliminary extraction to limit moisture impacts
6. Contact appropriate contractors

Responding to an event: If you're doing the clean-up

1. Ensure hazards are addressed appropriately
2. Extract or mop up bulk water
3. If Category 2 or 3 water, extract and wash surfaces until extracted surface is clean
4. Apply sanitizer according to manufacturer instructions
5. If no mold or dusts present, dry affected materials
6. Photograph cleaned area if possible
7. If no further remedial action is needed, release the area for occupancy

Pay extra attention to the following

- Things that conceal moisture also prevent drying
 - Multi-layer wall assemblies
 - Drywall installed against shear walls
 - Paneling and decorative finishes
 - Multi-layer firewalls
 - Insulation
 - Vinyl floor sheeting or floor tiles on drywall or wood floors
 - Wallpaper (especially vinyl)
 - Cabinetry
 - Cove base
 - Ceramic or stone wall tiles

MOISTURE TESTING

A quick overview of tools

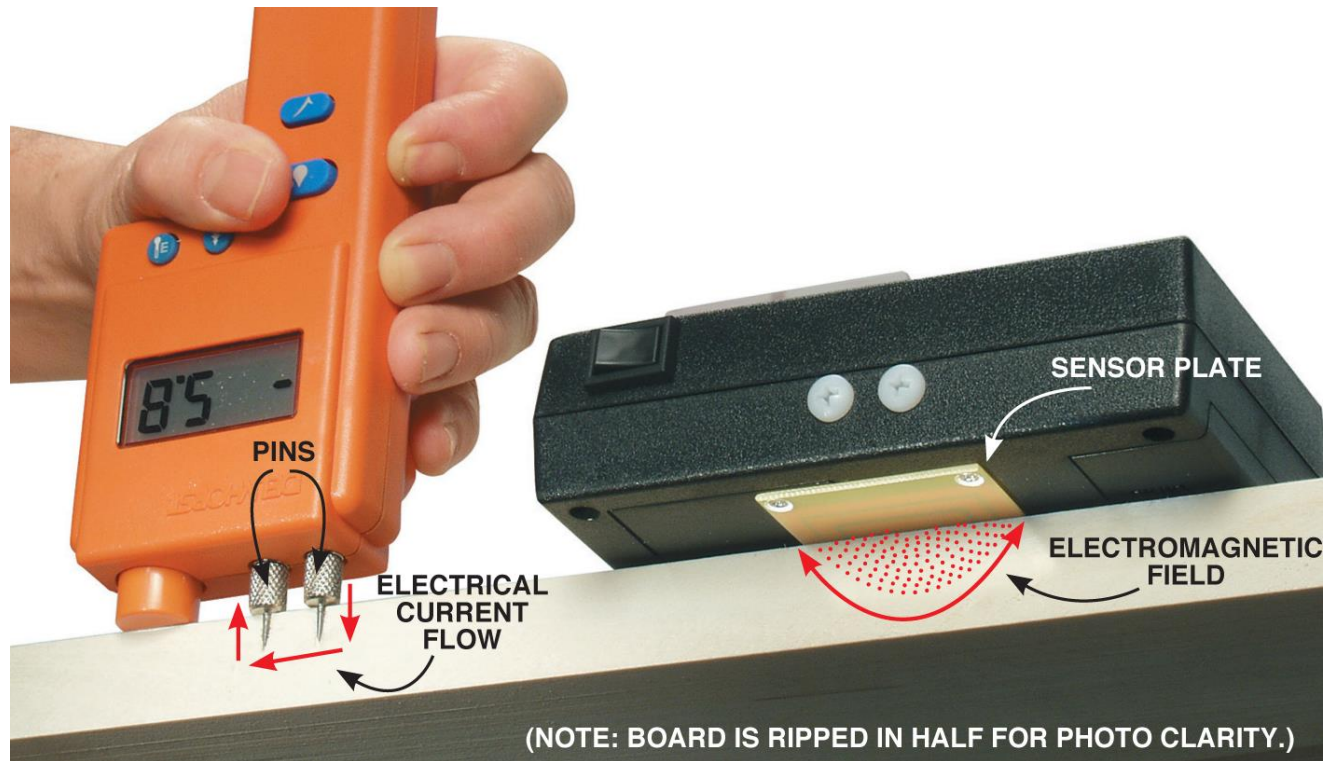
You should understand moisture testing

- If you have the tools, learn how to use them
- Awareness is helpful if you don't have tools
- Knowledge will help you with contractor oversight



Moisture meter types

1. Direct read (pin meters)
2. Indirect read (surface meters)



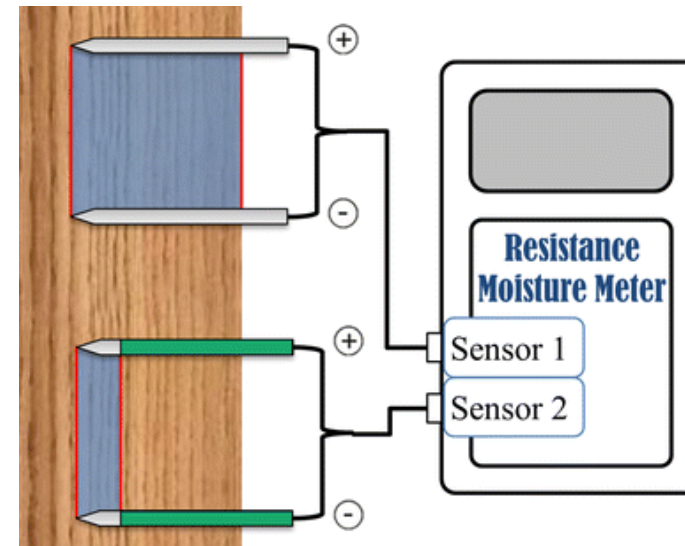
Moisture meter types

- Indirect read (surface meters)
 - Uses:
 - Non-destructive testing for moisture
 - Quick assessments
 - Limitations
 - False positives from metal objects
 - Confirm readings with pin meter
 - Different scales go to different depths in materials
 - Dry standard is critical



Moisture meter types

- Indirect read (surface meters)
 - Uses:
 - Direct read of moisture in materials
 - Can perform very deep tests
 - Limitations
 - Leaves 'fang marks' in test locations
 - Make sure deep pins are insulated
 - Fingers or metal foil on pins give false positives
 - Dry standard is critical



Dry standard

- Find unaffected material of interest
- Pick a scale on your moisture meter
- Test dry areas and document the range of measurements
- If possible, confirm your findings with a second meter
- Try using different scales and document those readings too



So many meters!

- Always note what meter you use—does it have the right scale?
- Document what meters vendors are using
- Scales differ for some manufacturers
- Compare your scales



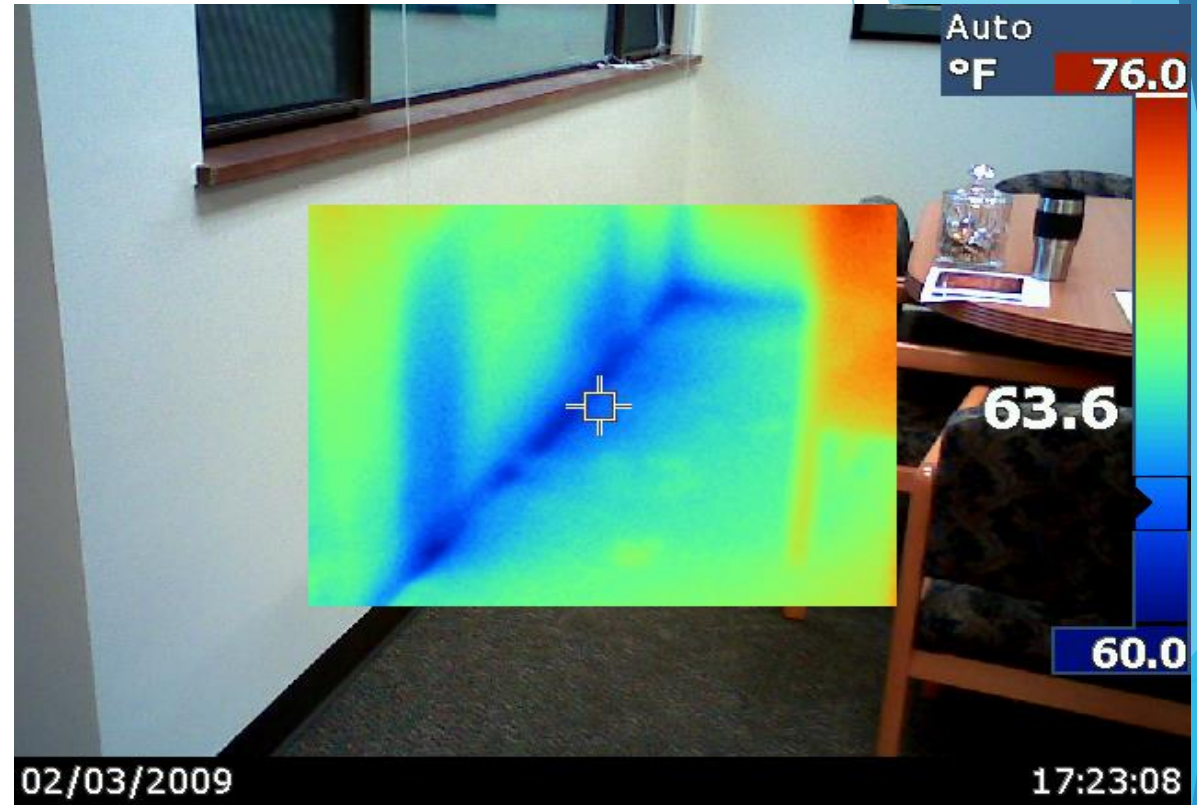
Infrared (IR) cameras

- Show temperature gradients on surfaces only
- Moisture causes evaporative cooling, and looks 'dark' in IR image
- They do not "see through" walls or objects



Infrared (IR) cameras

- Prone to false positives from:
 - Cold air movement
 - Missing insulation
- Always confirm suspect moisture using a moisture meter

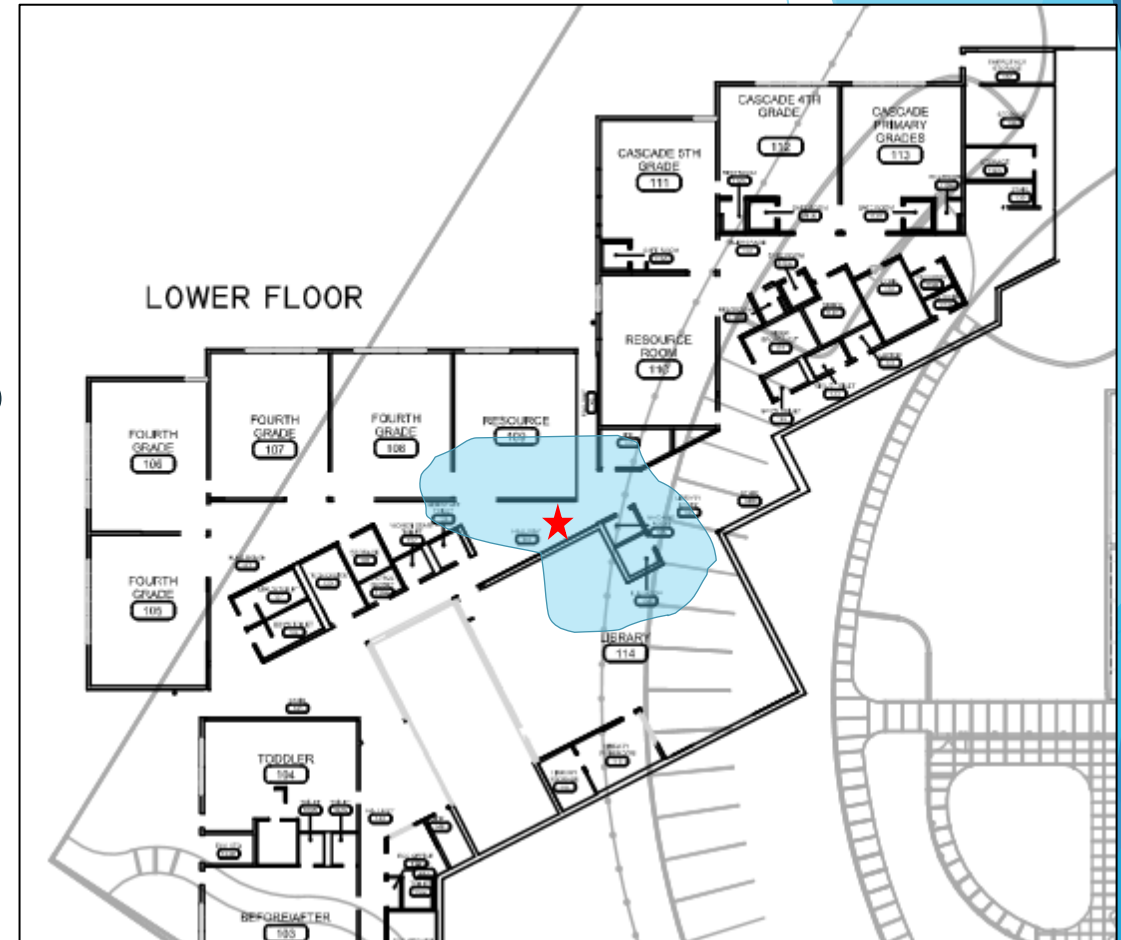


You found moisture. Now what?

- DOCUMENT
 - Where did the moisture originate?
 - How long has it been there?
 - What did it possibly impact?
- Make sure you found it all
 - Check downstairs
 - Check in the room next door
 - Don't forget to look up

Document your observations

- Use maps to 'solve the mystery'
 - Great tool for insurance claims
 - Are there cabinets in the moisture footprint?
 - Are there any slab penetrations to lower floors?
- Remediation contractors and consultants can use this information



Visual inspection: The gold standard!

➤ Tools

- Your eyeballs
- Camera (phone!)
- Flashlights
- Mirrors
- Borescopes
- Floor plans
- Saws*

*Don't disturb regulated building materials.

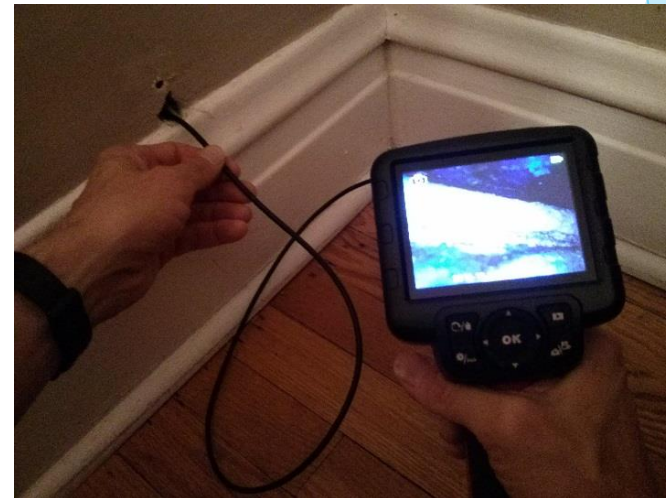
Do you have a good faith survey?



Telescoping inspection mirror with LED lights

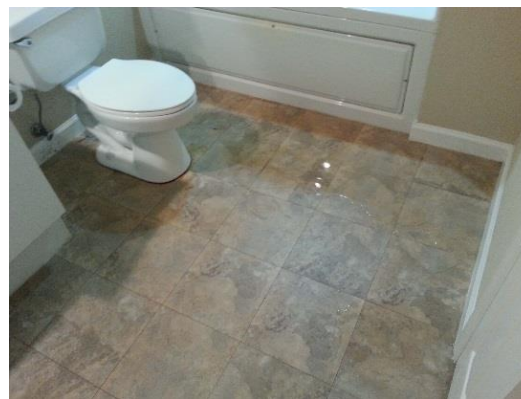


Boroscope



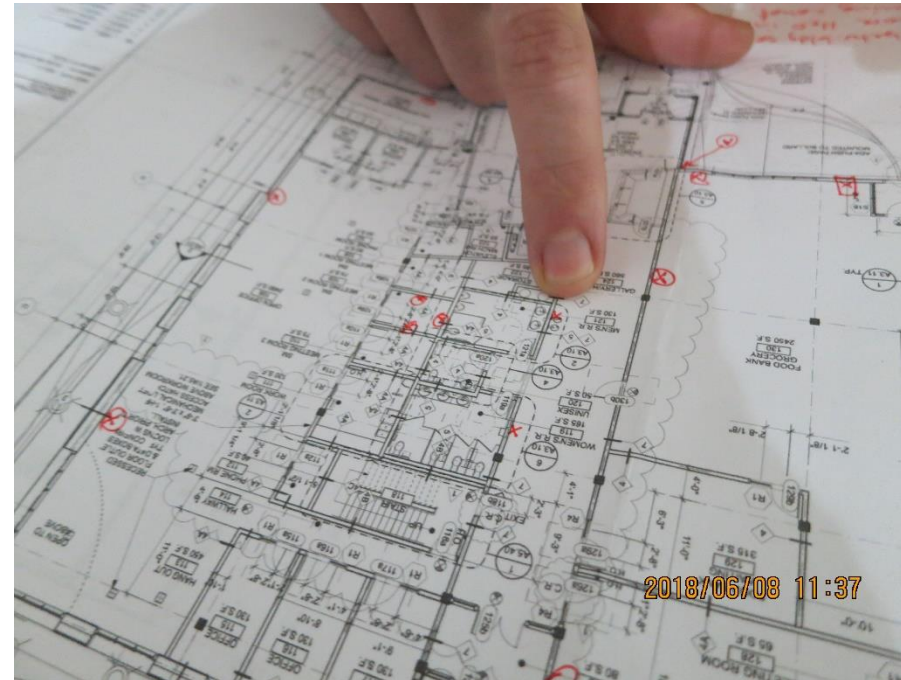
Visual inspection: The gold standard!

- Look for
 - Unusual deposits/suspect colonies
 - Water stains
 - Rust
 - Delaminated materials



Inspection openings

- Be aware of regulatory compliance issues (asbestos & lead)
- Take advantage of existing holes and openings
- Conceal openings if you aren't sure cavity is affected
- Map your locations



What certifications are needed to cut an inspection opening?

➤ Asbestos

- If no good faith asbestos survey exists:
 - 24-hour AHERA Building Inspector
- If good faith asbestos survey exists:
 - Lead awareness
 - O&M training

➤ Lead RRP

- If pre-1978 "Child Occupied Building"
- Lead awareness

How to find mold

- Use lights ***parallel*** to surface
- Look under and behind things (cabinets)
- Look in wall cavities
- Look above ceiling tiles

Clean up after yourself! Dusts (especially fiberglass) are environmental irritants



What about odors and indoor air quality issues?

- Ask occupants to document when and where odor or issue shows up
- Map unusual odor locations (rooms, walls, other)
- Document nature of odor
- Figure out origin
 - Musty/earthy odors are often related to wet wood
 - Chemical odors might be a spill or a rotten orange
 - Yeasty odors might be wet fabrics
 - Could it be HVAC?
 - Anything going on outdoors or next door?

SAMPLING

What to know

Why sample?

- Confirm if a deposit is actually mold
- Confirm presence of mold to support remedial action
- Identify mold types in environment to compare against air sampling later*

*Air sampling is NOT a requirement

Mold source sampling: The gold standard

- Source sampling types, in order from most shelf-stable to least shelf-stable:
 1. Tapelifts (ask the lab what tape they like)
 2. Bulk
 3. Swabs

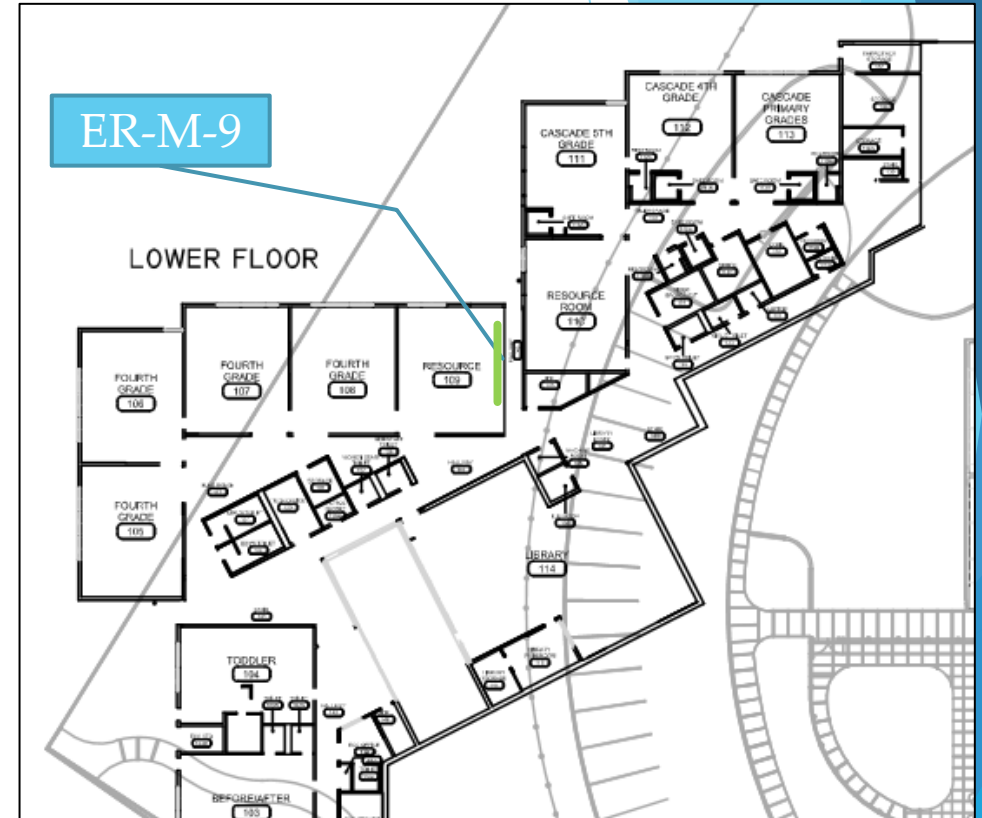


Before you sample

- Document distribution:
 - Photograph representative conditions
 - Map what you see
 - Slight growth/small colonies usually short-term event
 - Dark heavy growth usually long-term moisture



Mold sample documentation



— =Lower wall affected by mold growth

Source sampling results interpretation

- Common mold types (genera):
 - *Cladosporium*: Usually low-moisture, long-term issues related to condensation
 - *Aspergillus/Penicillium*: Usually moderate to low moisture, one-time event not remediated fast enough
 - *Stachybotrys, Chaetomium, Acremonium* long-term, high-moisture environments (weeks, months)
 - Wood rot takes months to years to develop

Air sampling: Is it appropriate?

- California Department of Public Health
 - Recommends AGAINST air sampling
 - Favors visual assessments and approaches that:
 - Find and correct moisture sources
 - Rapidly dry or remove damp materials
 - Clean and remove mold or mold-affected materials as quickly and safely as possible



ENVIRONMENTAL HEALTH LABORATORY BRANCH • CALIFORNIA DEPARTMENT OF PUBLIC HEALTH

Statement on Building Dampness, Mold, and Health

Air sampling problems

- Can give 'false positive' results
 1. Vacuuming or dusting 12-48 hours before sampling can artificially increase mold spore counts
 2. If snowing or frosty, outdoor spore counts tend to be low
 3. If raining, outdoor spore types and concentrations can be skewed low



What about settling plates?

- **Do not** use them
- **Do not** accept them
- Why?
 - They are **not** calibrated
 - There are mold spores in the air **always**
 - They only capture viable mold spores and miss the non-viable spores and fragments



Problems with air sampling

- Should NEVER be used as a substitute for inspection
- Don't collect air samples if visible growth is present
- Air samples are short-term and do not correlate with exposures
- There is no permissible exposure limit (PEL) for mold
- Easily influenced by:
 - Weather
 - Activities in the sample area
 - Housekeeping

Air sampling: Appropriate uses

- Perform only in cleaned spaces
- Post-remediation/pre-occupancy—usually after restoration and cleaning*
- Might be appropriate to look for other particles (e.g., glass fibers)
- Rare case use for IAQ assessments:
 - IF inspection finds no mold/moisture/other condition
 - IF performed with other assessments such as air quality parameter testing

*Not recommended or required

Air sampling: Appropriate tools for schools

- 10 minute 'spore trap', 15 minutes (150 liters)
- Need outdoor 'controls'
 - Before indoor sampling
 - After indoor sampling



Air sample results: Desired findings

1. No hyphal or mycelial fragments
2. Fewer total spores indoors than outdoors
3. No water-marker fungi:
 - *Chaetomium*
 - *Stachybotrys*
 - *Acremonium*
4. Same types of fungi indoors as outdoors



CONTRACTORS AND CONSULTANTS

If you need them, what should you look for?

Selecting Contractors

- Use your approved vendor list, if applicable
- All contractors
 - Licensed and bonded
 - Training per regulations
 - Asbestos
 - Lead
- Mechanical contractors
 - ASHRAE
 - NADCA (duct cleaning standard)
- Remediation contractors
 - IICRC training
 - S500 (water)
 - S520 (mold)

See student guide
'Selecting
Professionals'

Remediation contractor certification

- Mold and moisture remediation work does not require licensure and training in Washington State
- Select contractors who have at least supervisors and on-site managers with training in:
 - Lead RRP
 - AHERA
 - Asbestos awareness
 - Lead awareness
 - IICRC
 - Confined space awareness

Selecting Contractors

- Contractors should show up with appropriate tools such as:
 - IR cameras
 - Moisture meters
 - Flashlights
 - Dust control tools
 - HEPA-filtered vacuum cleaners
 - Plastic sheeting
- NOTE: They should not use your tools to do their work

Selecting industrial hygiene consultants

- Avoid consultants who:
 - Use air sampling assess moisture impacts to buildings
 - Use terms like 'toxic mold'
 - Ignore your concerns
 - Don't have their own tools
 - Aren't willing to get their hands dirty

DOCUMENTATION & COMMUNICATION

Risk management!

Who might need your documentation?

- Administrators
- Contractors
- Insurance companies
- Regulatory agencies



What should you document?

- Compliance with emergency response plan
- Initial event or concern
 - Timeline
 - Symptoms
 - Origin of issue
- Work performed
 - Initial response
 - Remediation process
 - Restoration process



Communications

- For contractors:
 - Chain of command
 - Emergency contacts
 - Information sharing rules
 - Where to go with questions
- Consultants
 - Define site impacts for protocol development
- Administrators, so they can:
 - Communicate with occupants, public, etc.
 - Communicate with insurance

Good documentation examples

- Procedures used for initial response
 - What was done
 - What products used
 - Who did the work
- Photographs
 - Initial impacts
 - Daily inspections (if remediation)
- Floor plans
- Emails
- Copies of contractor documentation
- Checklists!

See student guide
'Renovation and
Repairs Checklist'

What makes documentation good?

- Documentation should
 - Describe a project from beginning to end
 - Communicate your needs to other parties
 - Show what you need done
 - Show what was done, by whom, and how
 - Document any corrective actions
 - Confirm the work was completed



CERTIFIED
Restoration
FLOOD | FIRE | MOLD

Floor plans as tools

- Provide copies to contractors
- Keep a copy for yourself for reference/markup
- Use color-coding to describe areas of impact:
 - Source of problem
 - Moisture conditions
 - At-risk items
 - Work progress

How to document

➤ Photos

- Take photos from different locations in affected areas
- Don't forget to turn around for a different perspective
- Take photos of:
 - General site conditions
 - Equipment in use on day you were there
 - Condition of work enclosures
 - Tracked dirt and debris (there shouldn't be any)
 - Fans blowing on dirty surfaces

How to document

- Remember where you took your photos
 - Leave yourself “breadcrumbs”
 - Take photo of room number or point at location on floor plan
 - Take photo of ambient room condition that shows some object as landmark
 - Zoom to show specific area of concern with landmark, if possible
 - Point at something of interest if not obvious
 - Use note cards or small white board for notes in photos

How to document

- Make sure your photos are clear
- Carry lighting if you need it
- Does your cellphone have high resolution settings? Use them



Other things to document

- Phone calls and conversations with vendors
- Questions from occupants and administrators
- Daily progress
- Daily site conditions
 - Dust
 - Critical barriers
 - Security
 - Equipment in service
- Contractor action items

REMEDIATION

What is appropriate?

Remediation contractor

➤ MUST :

- Ask for good faith surveys and perform their own sampling if the school can't provide documentation or an AHERA inspector to support the work
- Comply with all regulations

Note: A copy of lab results is not equivalent to a 'good faith survey report'

Remediation contractor

- Should:
 - Install work enclosures (if any demolition/removal performed)
 - Use DUST CONTROL PRACTICES
 - Maintain their enclosures and equipment in good working order
 - Perform their work safely and follow rules
 - Perform their work in accordance with accepted standards and guidelines
 - Follow written remediation protocols, if available

Why a protocol?

➤ Goals

- Clarify the scope of work
- Prevent exposures to occupants and workers
- Remove moisture
- Remove mold growth
- Leave a clean, dry, odor-free area for restoration



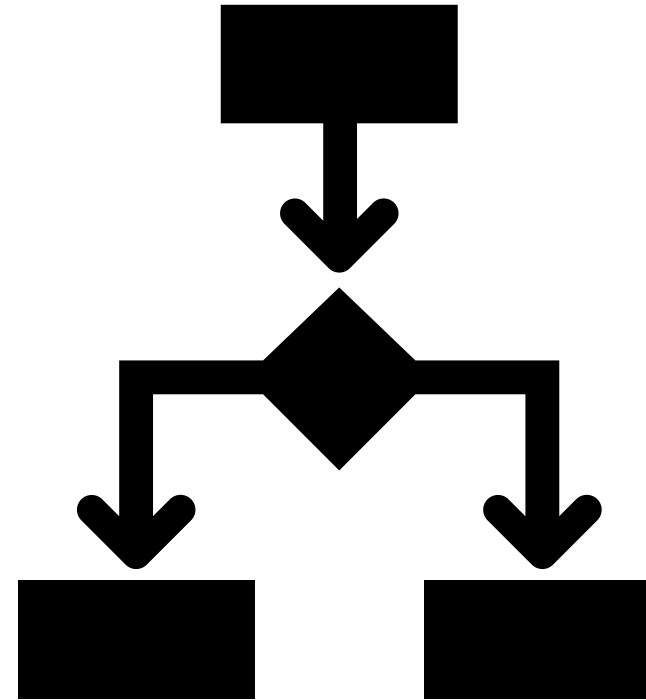
Protocol: Background Section

- Background
 - Site information
 - What happened
 - Who responded
 - When
 - Issues of interest
 - Reference applicable documents
 - Floor plans
 - IICRC, etc.



Protocol: Work Phasing and Security

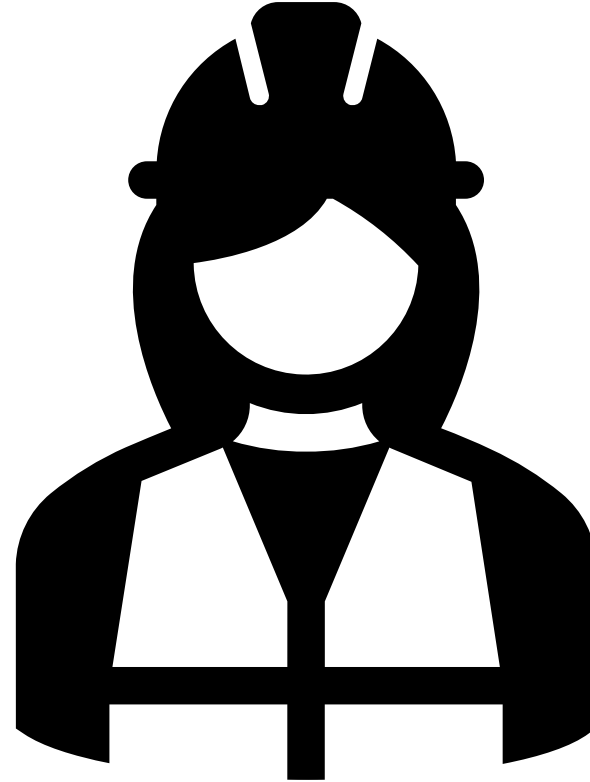
- Work phasing and responsible parties
 - What should be done first
 - Who's responsible
 - Site contacts and communication procedures
 - Have a chain of command
 - Inform vendors to direct all occupant questions to one or two people who have authority



Protocol: Worker Health and Safety Section

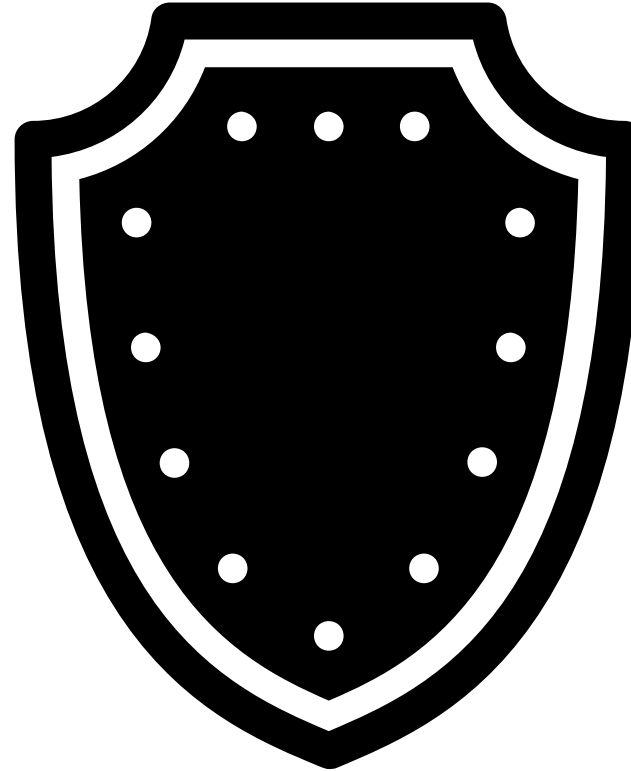
Health and Safety

- Applicable regulatory compliance concerns
 - Asbestos
 - Lead
 - Respirators & PPE
 - Other
- Training requirements
- Certification requirements



Protocol: Work Area Preparation

- Work area preparation goal is dust control
 - Contents
 - Removal
 - Protection
 - Load-out area protection
 - Doors
 - Windows
 - Floors
 - HVAC protection
 - Turn off/lock-out/tag-out
 - Cover grilles



Work area preparation = Protective measures

- When should protective measures be used?
 - During removal and gross cleaning activities
 - During abatement work
 - During restoration, if restoration is dusty

Work area preparation = Protective measures

➤ Security and Life Safety

- Select enclosure materials with proper fire resistance ratings
- Ensure fire extinguishers are available
- Proper signage for hazards
- Proper signage for egress changes
- Lockable waste containers
- Lock doors to work areas to prevent tampering or unauthorized entry



Work area preparation = Protective measures

- Enclosures and dust controls needed if:
 - More than 10 square feet of consolidated mold growth will be disturbed
 - Need to control access/egress to work area
 - Need to focus and speed drying of small affected area in large space



Mold Containment with Negative Air HEPA Filtering

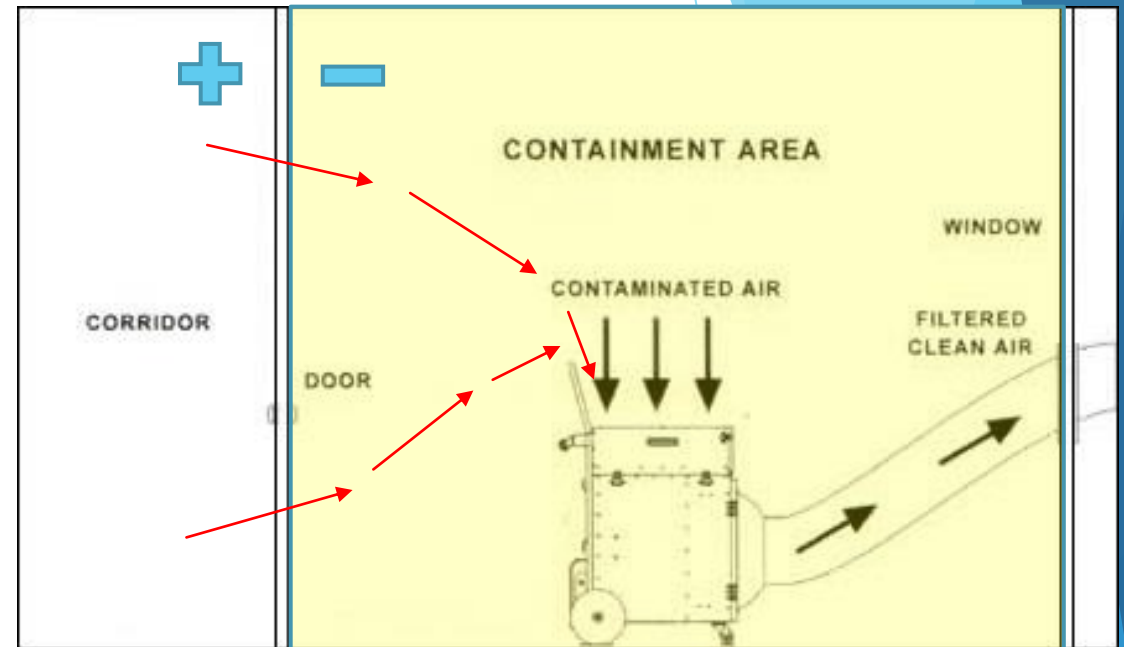
Work area preparation = Protective measures

- Enclosure design:
 - Should not block access/egress
 - Should be large enough to work in
 - Can have locked access point if needed
 - Must not block fire sprinklers
 - Must be made of fire-rated materials
 - Must have appropriate signage
 - Should be maintained intact
 - Should be properly pressurized with HEPA-filtered negative air machines



Work area preparation = Protective measures

- Negative air machines are industry standard
 - Large capture zone
 - Volume of air passthrough not impacted by filter load
 - Should be ducted outdoors whenever possible
 - Must be maintained to avoid seal failure
 - Must **not** be ducted into building exhaust systems (Exhaust ducts are dirty and can leak if over-pressurized)



Work area preparation = Protective measures

- Air scrubbers are inappropriate
 - Free-standing, un-ducted HEPA-filtered 'air cleaners'
 - Air scrubbers have small capture zones, large exhaust zones
 - They lose efficacy with filter loading
 - Like air-moving fans, they will disturb dusts in dirty areas

Note: Air scrubbers are only appropriate for cleaning air in cleaned spaces, and they are **not** required to achieve cleanliness

Work area preparation = Protective measures

- What's wrong with this photo?
 - Air movement in an uncleaned space
 - If suspended dust is mold, drywall, fiberglass, or a regulated material, everything in this room will need cleaning

Note: If your photos look like they were shot in a snowstorm, something's wrong with dust controls



Work area preparation = Protective measures

- **Manage risk:** Protect salvageable materials and HVAC from dust:
 - Cleaning and replacing damaged items is expensive
 - Soft goods are difficult to fully clean
 - Keep HVAC systems clean
 - Protect load-out areas from damage
 - Make load-out easier to clean if there's a breach

Work area preparation = Protective measures

- Work area preparation goal is dust control
 - Contents
 - Removal
 - Protection
 - Load-out area protection
 - Doors
 - Windows
 - Floors
 - HVAC protection
 - Turn off/lock-out/tag-out
 - Cover grilles



Work area preparation = Protective measures

- What is HEPA?
 - High-efficiency particulate air (HEPA) filtration
 - Used for dust control on:
 - Negative air machines
 - Air cleaners
 - Vacuum cleaners*

Note: Shop vacuums with 'HEPA' filters are not appropriate for remediation use in an occupied building



Protocol: Work Practices

- How to do the work
 - Tool selection and use
 - Cleaning solution guidance
 - Removal procedures
 - Cleaning procedures
 - Drying procedures
 - Disposal procedures



Protocol: Work Practices

- Remove and discard
 - Porous building materials affected by mold growth
 - Semi-porous building materials affected by rot or swelling
 - Non-porous building material affected by corrosion that impacts functionality
 - Mold- or sewage-affected, non-cleanable contents



Protocol: Work Practices

- Some materials may need removal to facilitate drying of other materials:
 - Wallpaper
 - Delaminated wood floors, carpet squares, or vinyl flooring
 - Cabinets (or at least toe kicks)
 - Wall paneling
 - Ceramic or stone wall tiles

Note: Some materials may be salvageable if they are materially sound and cleanable

Protocol: Work Practices for Category 1 Water

ANSI/IICRC S500 Water Category	Description	Possible Sources	Considerations	Remedial action
Category 1	Clean water: Low risk of contact, inhalation, or ingestion hazard	<ul style="list-style-type: none">• Supply line leak• Bathtub or sink overflows with no contaminants• Melting snow or ice• Fresh, clean rainwater (from above ground sources)	If the water flows through dirty spaces, it is no longer clean	<ul style="list-style-type: none">• Normal dry-in-place and cleaning procedures• Watch for difficult-to-dry building material assemblies

➤ Appropriate approaches:

- Remove cove base and drill holes in lower wall to facilitate drying
- Remove one side of insulated walls
- Remove toe kicks and dry under cabinets (expose drywall)

Protocol: Work Practices for Category 2 Water

ANSI/IICRC S500 Water Category	Description	Possible Sources	Considerations	Remedial action
Category 2	<p>Low level contamination:</p> <p>Moderate risk of contact, ingestion, or inhalation hazard</p>	<ul style="list-style-type: none"> • Water beds • Aquariums • Sprinkler head/pipe leak • Toilet overflows with urine only (no feces) • Bathtub overflow (dirty water) • Dish washer, laundry, or sink water (e.g., P-trap leak if not from sanitary sewer backup) 	<p>If water flows through dirty spaces or sits undisturbed for 24 to 48 hours it should be treated as Category 3.</p>	<ul style="list-style-type: none"> • Usually requires normal dry-in-place actions • Use of PPE • Sanitation procedures needed to address possible contaminants • Watch for difficult-to-dry building material assemblies

- Appropriate approaches:
 - Remove cove base
 - Remove one side of insulated walls
 - Remove toe kicks and dry under cabinets (expose drywall)
 - Remove any delaminated tile or wet vinyl floor sheeting
 - Sanitize carpets, floors, and any wetted materials

Protocol: Work Practices for Category 3 Water

ANSI/IICRC S500 Water Category	Description	Possible Sources	Considerations	Remedial action
Category 3	High level contamination: High risk of contact, ingestion, or inhalation hazard	<ul style="list-style-type: none">• Toilet overflow with feces• Sewer backup• Regional flooding	If performing extraction, use equipment that does not produce or release aerosols	<ul style="list-style-type: none">• Requires removal of porous materials• Use of PPE• Sanitation procedures• Post-remediation testing for coliform bacteria is prudent

➤ Appropriate approaches:

- Flood-cut all impacted walls
- Remove cabinets
- Remove and discard carpet and any porous goods impacted by moisture
- Remove any delaminated tile or wet vinyl floor sheeting
- Sanitize exposed, salvageable intact floors and wetted materials

Protocol: Work Practices

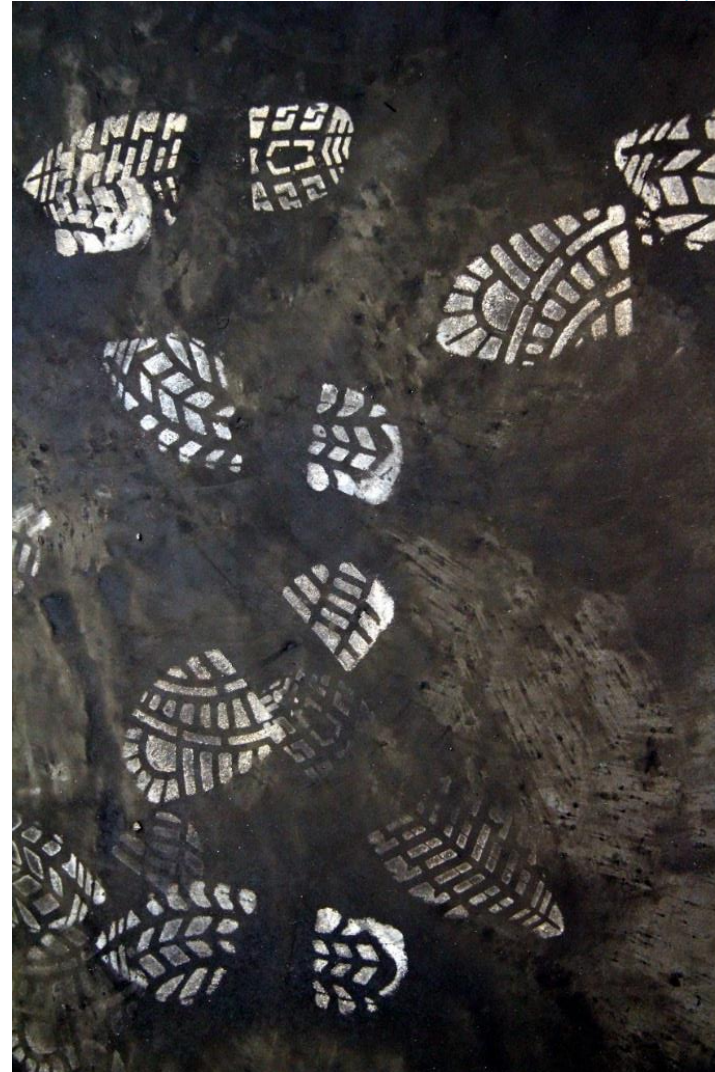
- What contents may be cleaned and dried?
 - Washable or cleanable soft contents (blankets, chairs, clothing) affected by Category 1 water or settled dusts (but not mold growth)
 - Hard furniture affected by Category 1 or 2 water
 - Upholstered furniture affected by Category 1 water (maybe Category 2)
 - Hard contents that can be cleaned and sanitized sufficiently to remove soils and microbes

Protocol: Work Practices

- What building materials get cleaned and dried?
 - Materially sound building materials:
 - Wood framing
 - Plywood or OSB
 - Wood-based cabinets
 - Materially and cosmetically sound semi-porous or non-porous building finishes affected by Category 1 or 2 water
 - Drywall and carpet affected Category 1 or 2 water and light soils or water stains
 - Carpet affected by Category 1 or 2 water that is not permanently stained

Protocol: Work Practices

- Dust control during removal
 - Vacuum visible colonies with appropriate brush attachment before removal
 - Hand tools, gentle actions
 - Shrouded tools
 - Direct placement into waste bags



Protocol: Work Practices

- Dust control
 - HEPA-filtered vacuum cleaners (**not** shop vacs)
 - Can be used to negatively pressurize very small work enclosures
 - Use for tool shrouding and collecting dust while cutting



Protocol: Work Practices

➤ Cleaning:

- Clean before drying to prevent disturbance of dusts and mold colonies
- Use dry cleaning methods before wet cleaning to prevent smearing
- Cleaning done in three phases:
 1. Gross cleaning dirty to clean
 2. Preliminary cleaning top to bottom
 3. Final cleaning after air movement turned off for 24 to 48 hours

Protocol: Work Practices

- Gross cleaning (remove gross construction debris and dust)
 - Pick up chunks and place in bag
 - Do not dry sweep
 - Use HEPA-filtered vacuum cleaners to pick up small loose debris

Protocol: Work Practices

- Preliminary cleaning:
 1. Remove loose soils and dust with HEPA vacuum
 2. Apply cleaning solutions, wait for the appropriate amount of 'dwell time'
 3. Wipe and scrub vigorously to remove all smearable deposits

Note: Goal of preliminary cleaning is to remove smearable residues that could get airborne and cause exposures



Protocol: Work Practices

- Cleaning solutions
 - Water or soap water solution to remove smearable deposits
 - Properly mixed anti-microbial soap/water solution (if approved for use by EPA and School District)
 - 10% bleach solution, if appropriate
 - 1 part bleach
 - 9 parts water

Protocol: Work Practices

- Antimicrobial solution approved by school district, provided requirements are met:
 - Solution must be approved by EPA for use
 - Solution selected must meet manufacturer's recommendations for application
 - Solution must be mixed and applied according to manufacturer's recommendations
 - Surfaces must be wiped off to remove residues after recommended dwell time
 - Solution must not leave irritating residual odors



Protocol: Work Practices

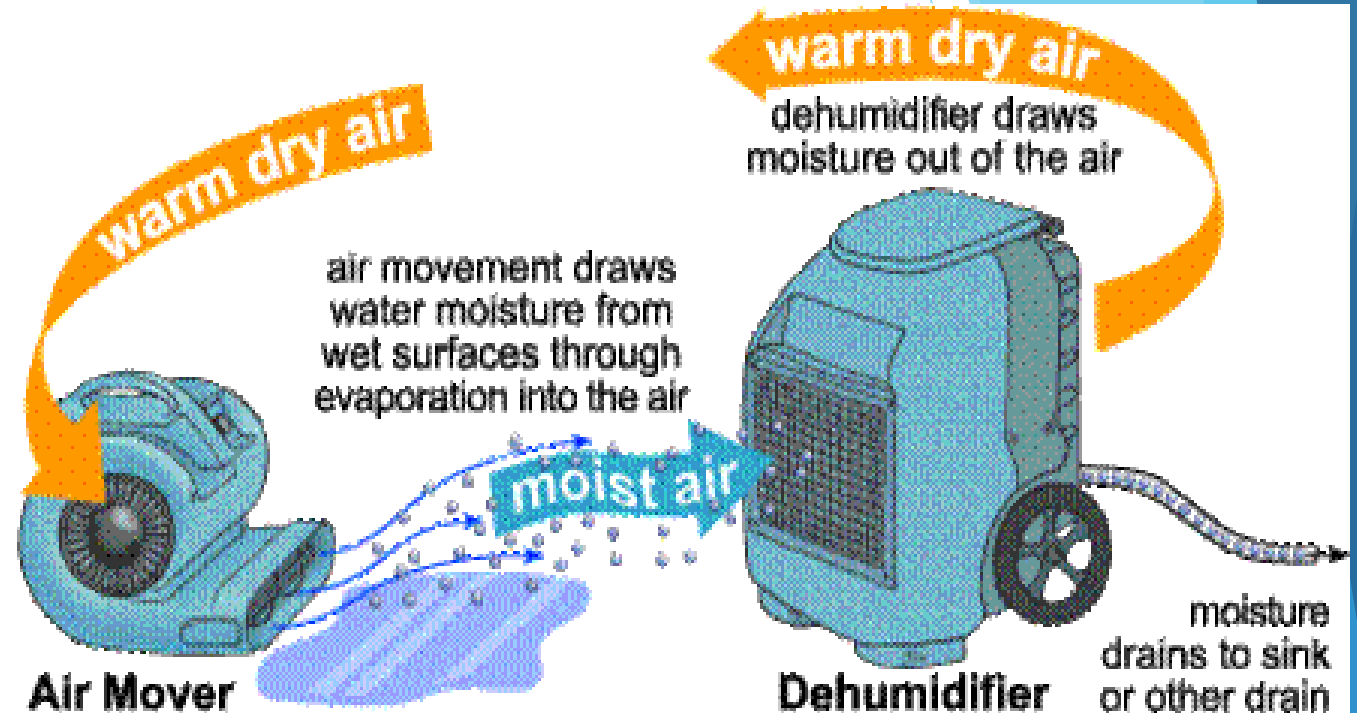
➤ AVOID

1. Adding wet cleaning solutions to dusty surfaces
2. Spraying antimicrobial solutions on dirty surfaces and not scrubbing
3. Saturating surfaces with cleaning solution
4. Using stinky solutions that might be irritating to occupants
5. Using ozone or hydroxyl units to 'kill mold'



Protocol: Work Practices

- Dry before final cleaning
- Drying requires three four things:
 1. Heat
 2. Air movement
 3. Dehumidification
 4. (sufficient electricity)



Protocol: Work Practices

- How is final cleaning done?
 - After site is cleaned, it should be dried
 - Once dry, turn off air movers and let air settle 24-48 hours
 - Re-clean to remove fine settled dusts as follows:
 - Use HEPA-filtered vacuum with brush attachment
 - Damp wipe surfaces or use static cloths to remove adhered dusts



Protocol: Work Practices

- Daily contractor expectations:
 - Test moisture in building materials
 - See that equipment is running
 - Test air moisture content and temperature
 - Check enclosures
 - Move equipment as needed
 - Confirm equipment is functioning
 - To remove unneeded equipment



Protocol: Work Practices

- Equipment should be clean and functional
- Dehumidifier types
 - Desiccant
 - Refrigerant (freeze up on cold sites)
- Dehumidifier size and type based on:
 - Site size
 - Air moisture content
 - Temperature
- Dehumidifiers need a drain location



Protocol: Post-remediation verification

- Perform after cleaning/before sealant application
- Goals
 - No residual excess moisture
 - No residual mold
 - No visible dust (especially drywall dust or insulation)
 - No mold or sewage odors
 - Stained building materials cannot be smeared with damp rag



Protocol: PRV

- Who should conduct the PRV?
 - Remediation contractor (preliminary)
 - District representative in charge of the remediation project (confirmation)
 - Industrial Hygienist (if used)

Protocol: PRV

FAIL



Protocol: PRV

FAIL



Protocol: PRV

FAIL



Protocol: PRV

FAIL



Protocol: PRV

FAIL



Protocol: PRV

FAIL



Protocol: PRV

Before



Protocol: PRV

**After
(PASS)**



Protocol: Post-remediation verification

➤ If PRV fails:

1. Document your findings clearly (not just verbal) Lists
 - a) Floor plans
 - b) Photos
 - c) Site markings
 - d) Provide contractor feedback so they can correct issues
2. Conduct follow-up PRV (repeat as needed)

Protocol: Post-remediation verification

- If PRV passes:
 - Air sampling could be conducted at this point (not recommended)
 - Treatments/sealants could be applied, if needed

Protocol: Treatment in place?

- When to treat in place?
 - Area is at risk for future moisture exposure
 - In limited locations where removal is infeasible due to cost/structural/other issues
- Options:
 - Glue drywall over problem area, caulk in place
 - Fungicidal coatings/encapsulants

AFTERSHOCK FUNGICIDAL COATING: 8390



Protocol: Treatment in place?

- Encapsulating paints or coatings should:
 - Be approved by EPA
 - Be approved for use by school district
 - Contain anti-microbial compounds
 - Contain pigments to show they have been applied
 - Provide good coverage



Thank You!

We appreciate your time and participation!

We invite you to complete the post-event survey.

Your feedback will inform our efforts to continually enhance the value of these events!

SUMMER/FALL 2022 TRAINING OPPORTUNITIES

- Presenter: Dr. Pyam Fallah, Phd, Idehl Laboratories
- Date: June 2, 2022
- Time: 10:00AM – 12:00PM
- Location: Teams Webinar

[Register Here](#)

Mold In Schools I:
Fact Vs. Fiction



- Presenter: Tim Reeve, Attorney, Reeve Law Firm
- Date: July 14, 2022
- Time: 10:00AM – 12:00PM
- Location: Teams Webinar

[Register Here](#)

Mold In Schools II:
Handling Mold
Exposure Claims



- Presenter: Michelle David, Sr. Industrial Hygienist, Wood, Plc
- Date: August 4, 2022
- Time: 10:00AM – 12:00PM
- Location: Teams Webinar

[Register Here](#)

Mold In Schools III:
Mold And Water
Remediation



- Fall Educational Workshop (*In Person/Hybrid*)
- Presenter: Nancy Bernard, WA State DOH
- Date: October 10, 2022
- Time: 8:00AM – 3:00PM
- Location: Teams Webinar

[Register Here](#)

WA State DOH:
School Environmental
Health and Safety



- Presenter: WCT/UP Loss Control Team
- Date: September 29, 2022
- Time: 10:00AM – 11:00AM
- Location: Teams Webinar

[Register Here](#)

ANNOUNCING
DISTRICT SAFETY
DASHBOARD



- Presenters: Reginald Reed; Principal, ReLife School
Kim Sanders; President, UKERU Systems & COO, Grafton Integrated Health Network
- Date: September 1, 2022
- Time: 10:00AM – 12:00PM
- Location: Teams Webinar

[Register Here](#)

Student Aggression
Awareness I:
Emotional Intelligence
for Classroom Safety



- Presenter: Tovah Denaro, Innovative Behavior Consulting, Tacoma WA Health Network
- Date: October 20, 2022
- Time: 10:00AM – 12:00PM
- Location: Teams Webinar

[Register Here](#)

Student Aggression
Awareness II:
Emotional Intelligence
for Classroom Safety



- Presenters: PSESD Student Support Services
- Date: November 3, 2022
- Time: 10:00AM – 12:00PM
- Location: Teams Webinar

[Register Here](#)

Student Aggression
Awareness III:
Emotional Intelligence
for Classroom Safety



AVAILABLE MEMBER SERVICES

Worker Compensation Trust

- Claim Intake / Reviews / Investigation
- Compensability Determination
- Disability Management / Vocational Rehabilitation
- Exposure Analysis
- Incident Reporting
- Legacy Claims Management
- Industrial Hygiene
- Litigation Management
- Loss Control and Prevention
- Management Reporting
- Medical Cost Management
- Return-to-Work Planning

Unemployment Pool

- Claim Management
- Compliance Management
- Legislative Updates
- Management Reporting
- Review, Hearings, Appeals
- Training & Education

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