Indoor Environmental Quality

- Purpose of this presentation
  - Provide an overview of relationship to indoor environmental quality and public health
  - Demystify Indoor Environmental Quality
  - Illustrate a model for identifying, evaluating, and promoting healthy indoor environments

Background

- First building codes were health based addressed issues such as
  - Clean drinking water, sanitation, pest control, adequate ventilation, thermal extremes (heat or cold), overcrowding, adequate light, means of egress
- Addressing indoor environments include elements of the 10 essential public health services
  - Diagnosing and investigating health problems and health hazards in the community
  - Providing unbiased information/education to empower people to make choices that promote health and wellbeing
  - Developing partnerships at the local level to identify and solve problems
  - Enforcing laws and regulations that protect and ensure public health and safety (not necessarily public health law)

Indoor Environmental Quality Model

Purpose of buildings

- Provide healthy, and productive environment
- Maintain a stable and comfortable temperature and humidity
- Provide adequate lighting
- Limit objectionable sounds or vibration
- Limit objectionable odors
- Reduce exposure to chemical, physical, and biological agents that might adversely affect people

Principles of Healthy Buildings

- Dry
- Clean
- Well Maintained
- Well Ventilated
- Contaminant Free
- Pest Free
- Safe

Adapted from Seven Principles of Healthy Homes-National Center for Healthy Housing

Buildings are interactive systems

Components
- Building shell, i.e. The roof, exterior walls, insulation, windows, and foundation

Mechanical
- Electrical, plumbing(water and gas), Heating, ventilation and air-conditioning systems (HVAC), sanitary systems (waste water) and exhaust ventilation systems

Materials, equipment and contents
- Interior walls furniture, other contents, wall & floor coverings, appliances, and equipment

People and their activities
- Metabolic byproducts, airborne infectious diseases, tobacco smoke, scented cleaning products, pesticides, consumer products paints, glues and adhesives, pets

Outdoor Conditions
- Temperature, humidity, wind speed & direction, solar radiation, precipitation, pests

Changes in one part of the system may cause unintended changes in other parts of the system

Health effects associated with indoor environments

- Building related illness
- Building related symptoms
- Building related triggers

Building Related Illness

- Characteristics
  - Affects several to many people
  - Similar clinical picture
  - Most all who are exposed are affected
  - Objective clinical and laboratory diagnosis and;
  - Environmental agent(s) at levels known to cause adverse health effects and a pathway for people to be exposed
    - Carbon monoxide poisoning
    - Legionnaires disease
    - Childhood lead poisoning

Primary goal: identify and correct obvious conditions that could cause building related illness

Building related symptoms

- Characteristics
  - Relatively few affected with non-specific and varied clinical picture
  - Mimic other illnesses: flu-like symptoms, breathing problems, headache, fatigue, malaise or irritation (skin, eyes, nose and throat),
  - Impact health quality of life, productivity, morale
  - May not have clear, definitive and objective clinical or laboratory diagnosis
  - Difficult to identify specific causal agents
  - May not be related to the indoor environment
  - People with underlying condition or disease may be more sensitive and experience more severe symptoms
  - Costly (financial, social and emotional)
  - Frustrating to affected people, investigators and health care providers

Building related triggers

- Charteristics
  - Affect people with some underlying condition or disease
  - Symptoms may vary
  - May have clinical signs or laboratory tests suggestive of sensitivity or susceptibility
  - May or may not be able to identify causal agent at levels known to cause adverse health effects
  - Sometimes known as allergy, atopy, multiple chemical sensitivity, toxin induced loss of tolerance

Allergy and Inflammation

- Hypersensitivity of the immune system to something in the environment that normally does not cause a problem in most people
  - Hay fever, allergic rhinitis anaphylaxis. Symptoms may include red eyes, an itchy rash, runny nose, shortness of breath, or swelling. Minor inconvenience or life threatening
- Diagnosis is typically based on medical history.
  - Skin or blood testing may be useful in certain cases.
  - Can determine if a person is sensitized but can't determine where exposures occur
- Allergies are common--about 20% of people are affected by allergic rhinitis
- Inflammation– primary cellular, organ and system response to irritation or infection
  - symptoms include swelling, increased blood flow, redness, high temperature

Asthma

- Restrictive lung disease—harder to exhale
- Chain reaction—
  - Tissue inside airways become inflamed and swollen and may produce excess mucus that can further narrow the airways.
  - Muscles around airways them tighten causing constriction and less airflow
- Symptoms
  - Whistling and wheezing, chest tightness, shortness of breath and unexplained coughing
  - Prevalence -- about 10% of population has asthma

Asthma information and resources http://www.asthma.ncdhhs.gov

Case study--applying healthy homes principles

A telephone call is received from a tenant who is concerned about toxic black mold in the home.

- Tenant says landlord won't due anything
- Called Local Housing Code Enforcement– no help
- Called local DENR Office – told to call Raleigh
- Children are sick (one has asthma and has missed school)

How can we help this person?

  - Structured interview using healthy housing principals to empower caller
  - Identify options
  - Identify other resources

Dry
Flooding

Electrical hazard

Dry
Grading and landscaping

Dry
Roof Drainage

Dry
Construction Issues

Location of vapor retarder

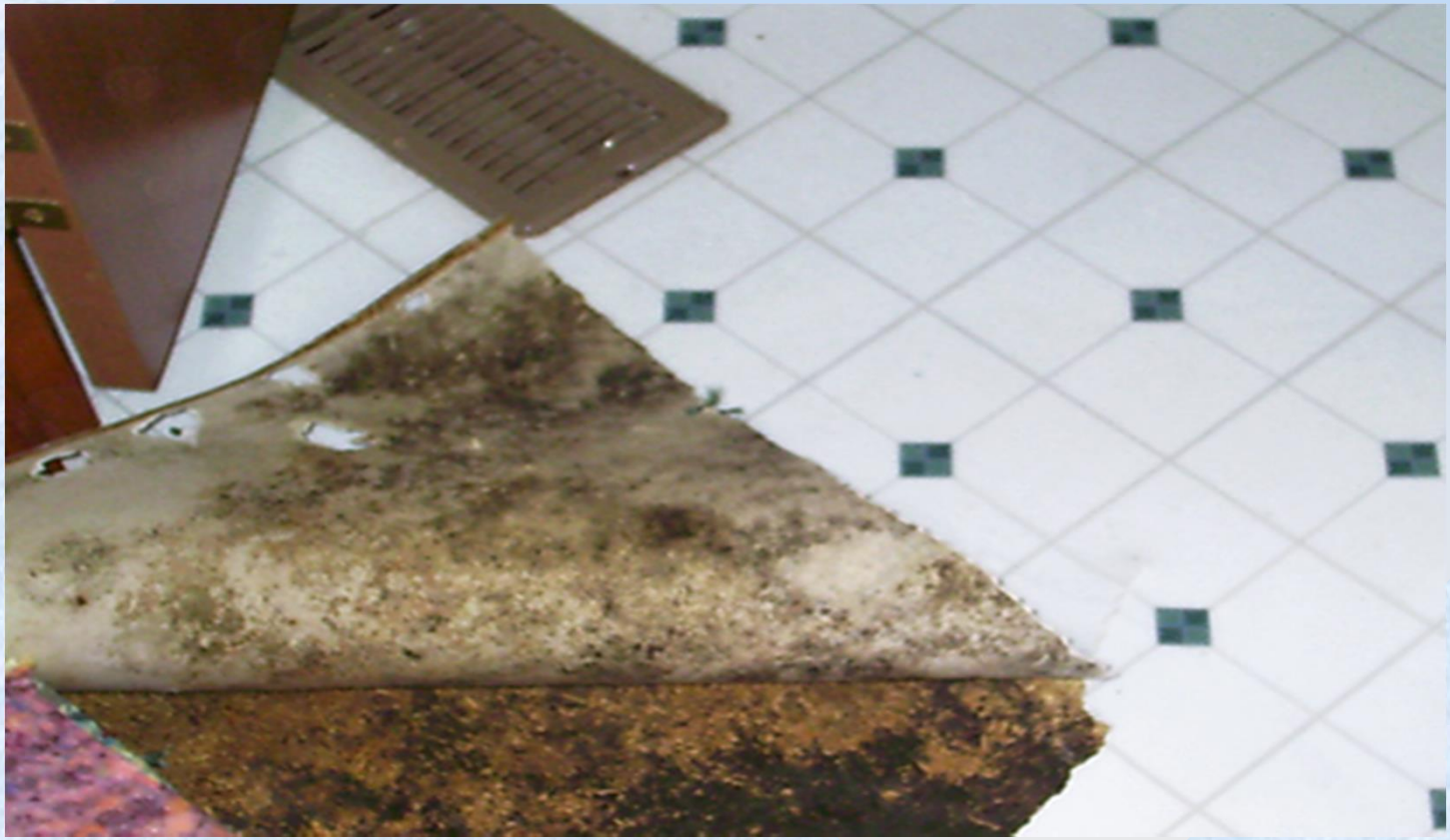
Condensation under vinyl wallpaper

Foundation drainage

Ground water accumulation against the foundation

Dry

Plumbing leak in belly of manufactured home



Dry

Crawlspace issues

Crawl space design and construction

Wall Vented

- Ground vapor retarder
  - 6 mil poly, lapped seams smooth
  - Ground graded flat and to low spot-drain to daylight
  - No debris
- Exterior grading/drainage
- Exterior foundation damp proofing
- Floor leakage control
- Air duct leakage control

Sealed, closed, or conditioned

- Vapor retarder extends to about three inches below sill
- Mechanical Drying Potential
  - Dehumidifiers
  - House air
  - Supply air
  - Conditioned air
  - Exhaust fan

Section R408 and R409 of NC 2012 Residential Building Code

Clean
Clutter

- Place for dirt, dust and debris to accumulate
- Hard to clean
- Blocks airflow
- Hoarding Disorder – recognized as a mental illness
  - Persistent difficulty and distress at parting with possessions because of a perceived need to save them. Excessive accumulation of items, regardless of actual value
  - Limited insight /reluctant to seek help
  - Severe cases -fire hazards, collapse hazards, unsanitary conditions (especially if animals or spoiled food involved)

Clean
Clutter

Computer equipment under temperature sensor

Clean – Carpet

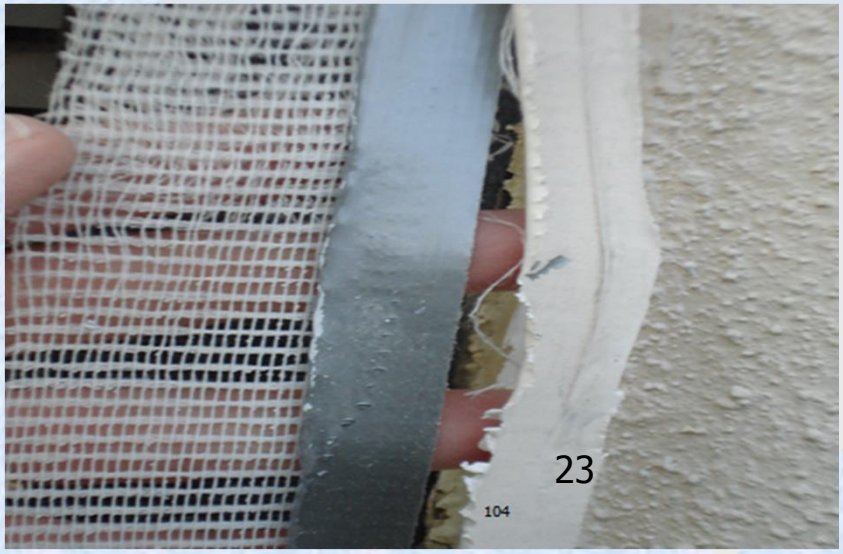
- Benefits
  - Aesthetics
  - Noise attenuation
  - Slip/trip Resistance
- Disadvantages
  - Reservoir for pollutants
  - Slip/trip hazard
- Managed by
  - Used in appropriate locations
  - Cleaned/Well maintained
  - Cleaned
  - Frequency/When and how

Rules Governing the Sanitation of Childcare Centers 15A NCAC 18A .2800

15A NCAC 18A .2824 Floors

- No carpet in food preparation, food storage, utensil-washing areas, toilet rooms, and laundry areas shall be constructed of nonabsorbent, easily cleanable material.
- Carpeted floors shall be vacuumed daily when children are not present in the room, except to clean up spills or using a vacuum equipped with a High Efficiency Particulate Air (HEPA) filter.
- Wall to Wall carpet shall carpets shall be cleaned using extraction methods at least once each six months. Cleaning materials including surfactants, solvents and water shall be removed from the carpet before the space is reoccupied. When hot water extraction is used, carpet shall be completely dry within 12 hours of cleaning.

Well Maintained –
Window flashings



Well maintained
Deteriorated window frame

Lead-based paint hazard?

Well Maintained
Rusty drain pan

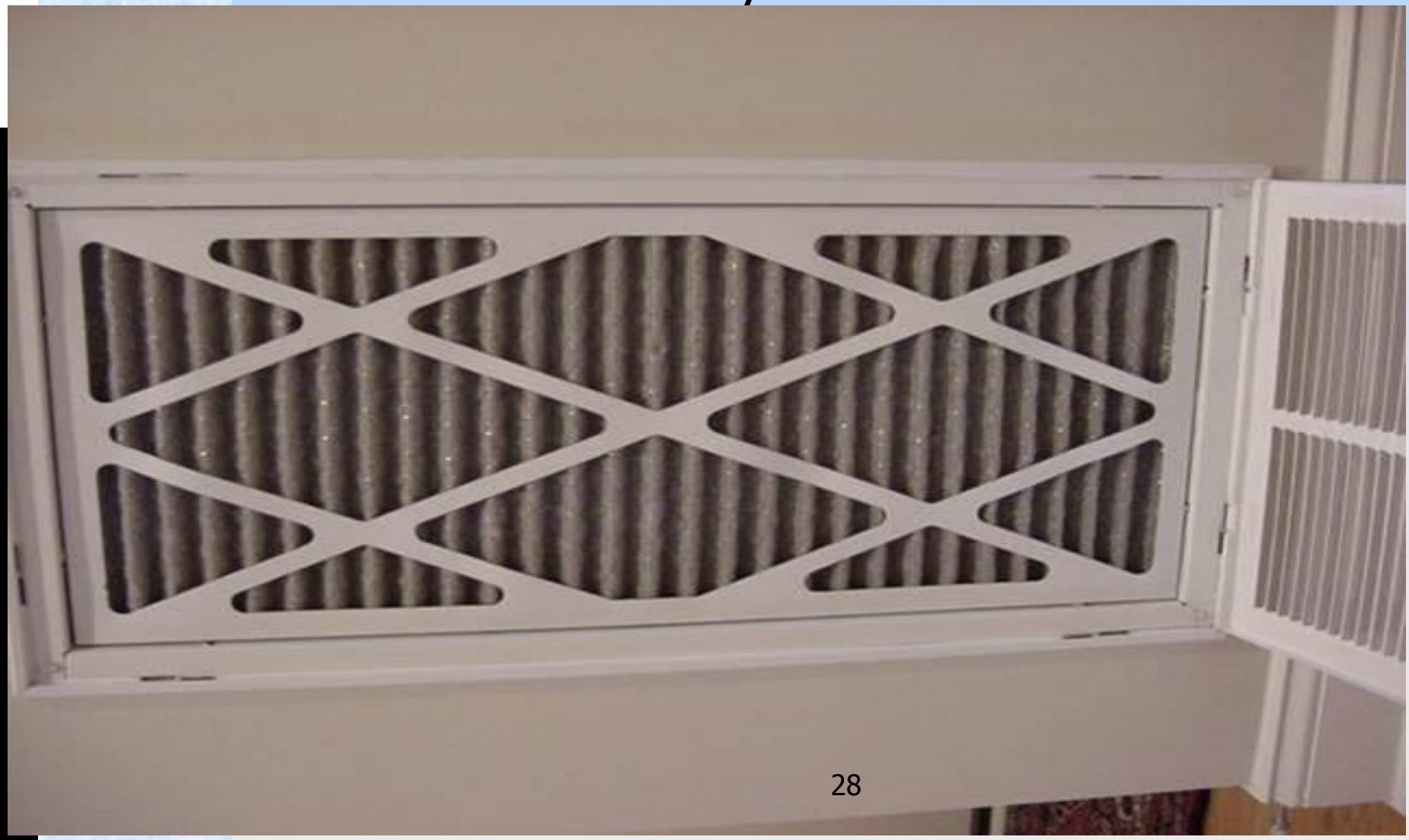
Well Maintained
Condensate drainage

Well Ventilated

Location for outdoor air intake

Well Ventilated

Medium efficiency Pleated Filter



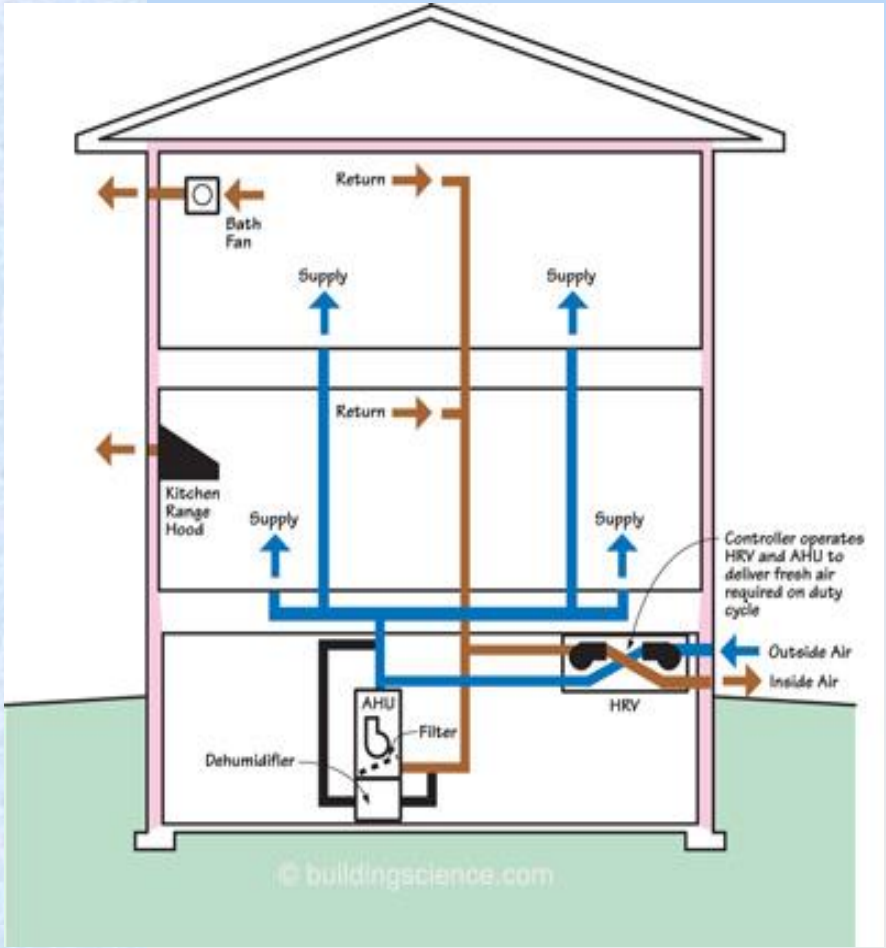
Air Cleaning Devices

- Source Control is always first and best option
- As part of heating and air-conditioning systems
  - Use Medium Efficiency Pleated Filters with Minimum Efficiency Value Rating of 8-11 to provide best filtration, lowest cost and least resistance to air flow
  - No effective filters for gases available

Portable Air Cleaners

- Work best for removal of particles
- No proven reliable and inexpensive air cleaners for gas phase pollutants
- Efficiency depends on
  - Room ventilation (air changes per hour)
  - room volume
  - efficiency of air cleaner
  - volume that flows through the cleaner
- May not be effective for
  - strong intermittent sources,
  - or when exposure to the allergen exposure occurs in close proximity to source (dust mite allergen)
- **No Ozone Generators in Occupied Spaces**
- Photocatalytic Oxidation and Ionization may effective but not a substitute for cleaning and source control

Well Ventilated



- Heat or cool air
- Dehumidify air
- Filter air
- Circulate air
- Outdoor air to dilute contaminants

Well Ventilated
Thermal Comfort

- Narrow band for thermal comfort
  - **Summer 74-80°F and 30-60% relative humidity**
  - **Winter 65-76°F and 30-60% relative humidity**
- Assume light sedentary activity with appropriate clothing
- Thermal comfort is a balance heat generated by a person and gains/loses to environment
- Does not account for heat sinks, radiant sources or air drafts
- Comfort is subjective and variable- ideal comfort criteria satisfy 80-95% of people

American Society of Heating Refrigeration and Air-Conditioning Engineers (ASHRAE) Standard 55

Well Ventilated
Humidity Control

- Ideal relative humidity is between 30% and 60%
- **<30%**
  - Drying and irritation of skin and mucous membranes, including eyes and nasal passages
  - Increased survival Influenza and Corona Viruses
- **>60%**
  - Increased potential for mold and microbial growth, dust mites and insect infestations
  - Increased risk for chemical emissions
  - Increased risk for condensation surfaces (warm moist air contacting cool surfaces)
  - "Free moisture" content of wood, paper and other hydrophilic materials (water loving) depends on temperature and relative humidity of surrounding air

Well Ventilated
Relative humidity and Dew point

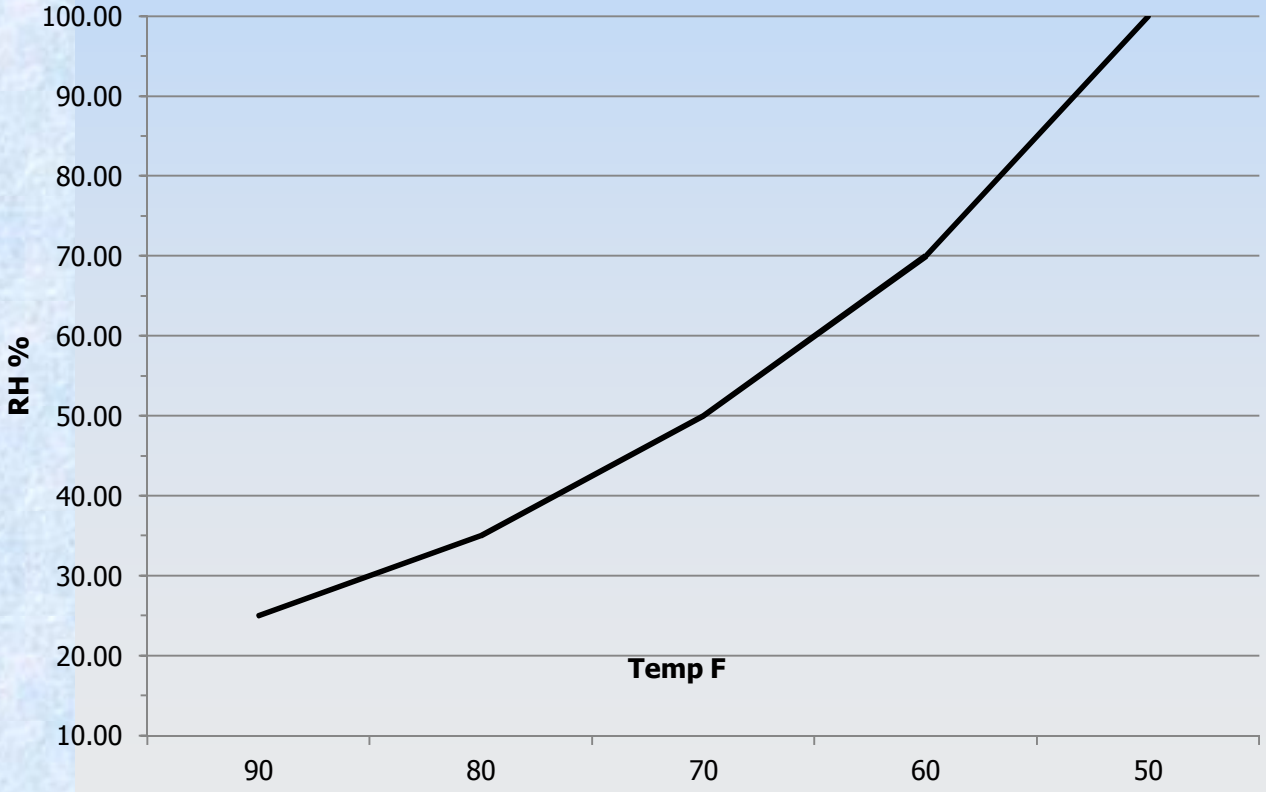
Relative Humidity (RH) – shortened to Humidity

- Ratio (%) of amount of moisture in air compared to amount air could hold if saturated *at a given temperature*
- Warm air holds more moisture than cool air.
- When moisture content is constant, warming air lowers RH and cooling air raises RH
- *Always measure both temperature and relative humidity*

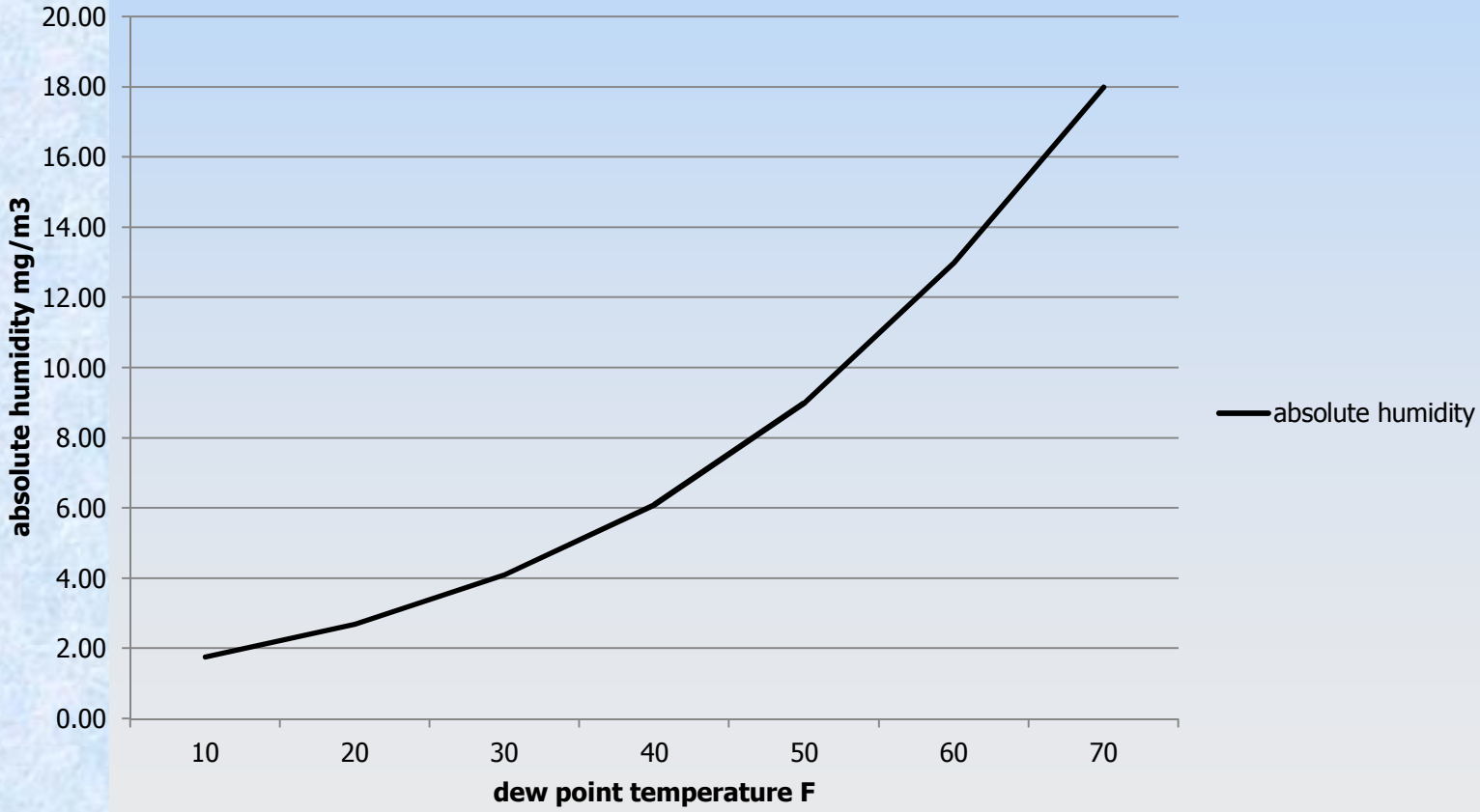
Dew Point (DP)

- Used to for a surrogate for absolute humidity, (milligrams/cubic meter) of water vapor in the air
- Temperature at which the RH equals 100%; moisture condenses out of the air when air or surface temperature is less than dew point
- Total amount of moisture air doubles when dew point temperature increases by 20°F

Relative Humidity and Temperature at constant dew point temperature of 50 ▯ F



Dew point and absolute humidity (mg/m^3) at constant temperature of 76° F



Well Ventilated
Exhaust Ventilation

Remove contaminants from point sources

- Bathroom Fan exhaust ventilation
  - Vapor equivalent of 1 pint of water per 10 minute shower
- Clothes Dryer exhaust—must terminate outside the building
  - Keep ducts clean to promote clothes dryer efficiency
  - Prevents excess moisture problems
  - Prevent possible fire hazard
- Kitchen range hoods
- Flues from furnaces and hot water heaters
- Prevent stack gases from reentering the building
- Adequate makeup air for exhausts to work effectively, prevent air flow through unintended locations, and back drafting of combustion equipment

HVAC return and Hot water heater flue

Well Ventilated

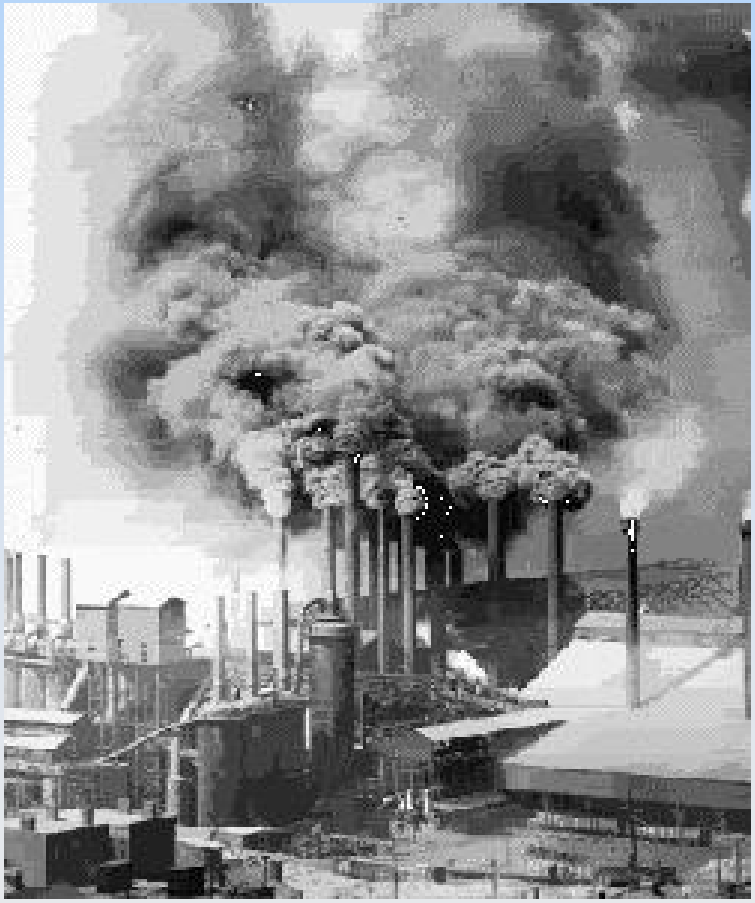
poorly vented clothes dryer

Well ventilated

Space heaters for prime heat source

Contaminant free
Nearby outdoor air pollution sources

- EPA criteria air pollutants
  - Ozone
  - Carbon Monoxide
  - Nitrogen Dioxide
  - Lead
  - Sulfur Dioxide
  - Particulates
- State Air Quality – 105 toxic air pollutants
- Pollen
- Wildfires
- Non regulated air pollutants



Contaminant free

Lifestyles/activities that create contaminants

- Smoking indoors
  - Second hand smoke- pollutants from burning end of tobacco product or exhaled by smoker
  - Third hand smoke– residues left after tobacco has been extinguished
- Misuse of pesticides
  - Total release foggers
  - Mothballs for vermin
- Misuse of cleaning products
  - Mixing cleaning products—acid and bleach or ammonia and bleach create toxic gases
  - Read and follow label instructions

Contaminant Free
Occupant generated pollution sources

- Scented Candles
  - –Black soot (Respirable Particles)
  - –Combustion products
  - –Volatile Organic Compounds

Contaminant Free

Air fresheners and plants

Contaminant Free—
Body odors and Personal Care Products

"PUBLIC B.O. Notice --Persons emanating foul body odors in confined spaces may be reported and cited for olfactory violations"

Advertisement for deodorant in Washington DC subway

Contaminant Free
Materials and Contents

CBS Report-- Lumber Liquidators Is Selling Formaldehyde-Laden Laminate Flooring—March 2, 2015

Contaminant free
Asbestos

Health Hazard Control Unit in Division of Environmental Health regulates

- Asbestos under NESHAPS (national emission standard for hazardous air pollutants for construction and demolition
- Asbestos Hazard Management Program (AHMP) Rules (10A NCAC41C .0600) for inspections, air monitoring and permitted removals and regulated materials
- Single family homes exempt from NESHAPS but not AHMP
- HHCU recommends inspection by accredited asbestos inspector as part of demolition, renovation and construction
- One page letter attached

Contaminant free
lead based paint

Health Hazard Control Unit in Division of Environmental Health regulates Lead-based Paint Renovation, Repair and Painting

- Applies to any dwelling built before 1978 or child occupied facility
- Assume lead-based paint is present unless inspection by Certified Lead-based Paint Inspector determines no lead-based paint exists
- Paint disturbing activities must be performed by Certified Renovator with employees trained and using Lead-Safe work practices
- Lead-Safe Guide Certified Guide to Renovate Right http://epi.publichealth.nc.gov/lead/pdf/RenovateRight.pdf
- One page information letter attached

Contaminant Free

Unintended Consequence of using an unvented gas space heater for primary heat source

Vapor equivalent of 1 gallon of water per 40,000 BTU of gas or 1 gallon of Kerosene Consumed and Lack of air circulation and cold surface behind furniture

Contaminant Free
Dust mites

- Thrive when relative humidity >60%
- Feed of dead skin cells
- Fecal pellets & body part contain allergens
- Beds and bedding (mite proof covers)
- Upholstered Furniture
- Carpets
- Upholstered furniture
- Carpet
- Frequent hot water washing

*"Dust mites **POPUL8** in warm and humid environments, like your old bed, and it can **AGGRAV8** allergies in children and adults"*
Advertisement from Mattress Firm

Pest Free
Rodents

Roof rat

House Mouse

Pest Free
Insects

- Droppings and parts contain allergens, inflammatory agents or carry disease
- Integrated Pest management
  - Understand biology and behavior of pests to select controls
  - Keep pests out
  - Keep clean to deny pests food, water, and place to hide (harborage)
  - Used pesticides to target pest which limits residues and harm to the environment

Smokey Brown Roach

German Roach

Safe Carbon Monoxide (CO) Alarms

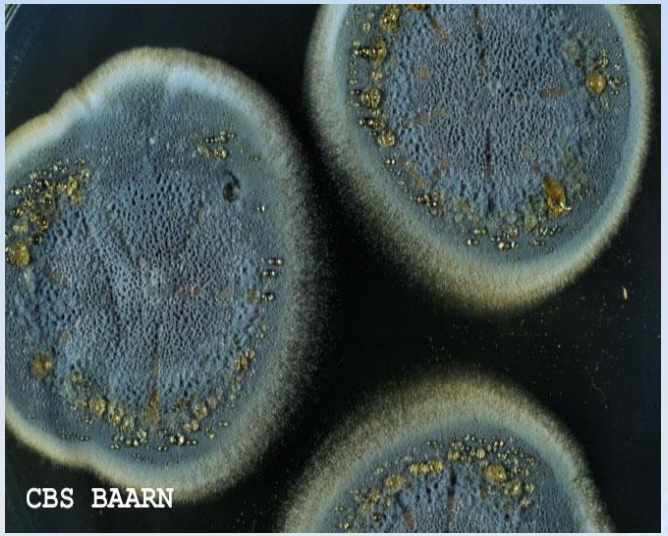
- Alarm versus detector
  - Alarm provides warning of dangerous condition based on concentration and time
  - Detector senses presence and amount of contaminant
- Currently CO alarms required in all rental dwellings with combustion source or attached garage
- 2009 Energy code requires CO alarms in all residential construction
- 2013 required in lodging places in rooms with combustion appliances and adjacent sleeping rooms
- 2014 building code council to review 2009 energy code requirement for CO alarms in <u>all</u> dwellings built after 2009
- *Alarms may not protect against low level chronic exposure– importance of equipment maintenance and supply/exhaust ventilation*

Safe– slips trips and falls

- About 2.5 million nonfatal falls were treated in emergency departments in 2013
- Of those, 734,000 people were admitted to the hospital
- That year, 25,500 older adults died from unintentional falls
- More than 250,000 hip fractures are reported every year, and 95 percent of those are from falls

Responding to Concerns about indoor Mold

- Kingdom of Fungi, molds yeasts and mushrooms including spores, fragments, and metabolic products.
- Identified by Genus and species *Penicillium roqueforti*



Four things molds need to grow

- *Presence of Mold Spores* - always a some in the air and a few on surfaces.
- *Appropriate Food Source (s)* – cellulose-based materials (paper, wood, cardboard, fabrics, etc.) and soap scum, dead skin cells, fats, oils, bio-films
- ***Water Availability* – Free moisture in materials is limiting factor that determines whether mold growth will occur environment.**
- *Time/temperature* - growth begins within 24 hours and 10 days when conditions are favorable. Temperature comfortable to people is optimum for mold growth

Potential Health outcomes from indoor dampness & mold growth

- Allergy and inflammation
- Immune mediated and opportunistic infections
  - Hypersensitivity pneumonia
- Virulent Infections such as Histoplasmosis,
  - Always associated environmental reservoir such as bird or bat droppings that is disturbed
- Mycotoxin Poisoning
- Dust mites, insects, other pests and abnormal chemical reactions are associated with damp buildings

Evidence of an association between exposure to damp indoor environments and mold growth with

- Upper respiratory (nasal and throat) symptoms,
- Cough,
- Wheeze,
- Asthma symptoms in sensitized persons bronchitis
- hypersensitivity pneumonitis,
- chronic rhinosinusitis,
- allergic fungal sinusitis

Institute of Medicine, *Damp Spaces and Health (2004)*

World Health Organization *WHO guidelines for indoor air quality dampness and mold (2009)*

National Institute for Occupational Safety and Health (NIOSH) *Preventing Occupational Respiratory Disease from Exposures Caused by Dampness in Office Buildings, Schools, and Other Nonindustrial Buildings (2012)*

"Black Mold"

1993-1996 Centers for Disease Control *Mortality and Morbidity Weekly Report*

- Publication of a series of investigations and case reports on clusters of cases of infants with of bloody pneumonia (pulmonary hemosiderosis) concluded that concluded that exposure to *Stachybotrys chartarum* was associated with the disease. The result was:
  - Attention in the scientific community,
  - Development of the mold remediation industry
  - Media attention and public concern
- In 2000 a CDC workgroup reviewed 1993-1996 investigations and case reports and found serious shortcomings in the collection, analysis, and reporting of data and concluded that association between exposure to *Stachybotrys chartarum* and cases was **not** proven.

Still number one question– Do I have toxic black mold?

Insufficient Evidence of health symptoms associated with dampness and mold growth

- Headache, memory loss and other neurological symptoms
- Memory loss,
- Nausea, Diarrhea, Diabetes, Fatigue, Fever

Limitations of available evidence

- Based anecdotal accounts, poor studies or lack of rigorous research.
- Relied on self-reported visual or odor presence of mold instead of actual measurements of some kind
- Did not adequately consider multiple exposures or evaluate potential additive or synergistic from other environmental exposures,
- Symptoms are nonspecific and may have many causes.

What do you tell the concerned citizen?

- The presence of water damage, dampness, visible mold, or mold odor in other indoor environments is unhealthy.
- Recommend addressing water damage, dampness, visible mold, and mold odor by
  - (a) identification and correction of the source of water that may allow microbial growth or contribute to other problems,
  - (b) the rapid drying or removal of damp materials, and
  - (c) the cleaning or removal of mold and moldy materials, as rapidly and safely as possible
  - (d) Consider healthy housing principals to promote health and well being

Susceptible Populations

- Children and the Elderly
- People with allergies or pulmonary disease
- People with compromised immune systems
  - Preexisting disease
  - People taking certain medications
  - Post operative patients
  - HIV/AIDS
  - People being treated for cancer

Questions to ask about dampness and mold growth

- **Why**
  - Sources of moisture (liquid or vapor) floods, roof leaks, plumbing leaks, water in basement and crawlspace, poor drainage, condensation.
- **When/Where**
  - Locations, of wet, water damaged or moldy materials. Where does moisture flow through materials and where it might it accumulate. When and where are moldy odors present. Summer or winter? Is heating and air conditioning affected?
- **What/How**
  - Kinds of materials are water damaged or moldy; the size of affected areas. What is the degree damage or the degree that damp materials are colonized by mold growth
- **Who**
  - Has property owner been notified of maintenance or repair needs? Who has done work to prevent further damage or solve problem?
  - Are occupants reporting health complaints or sought medical care; Are there sensitive or susceptible people exposed?

Informed and visible inspection is the most important initial step

- Informed
  - Prior information about construction, operations, maintenance and occupant activities in the building
- Visual inspection to concentrate on
  - Sources, and duration of excess moisture
  - Pathways for moisture movement through building materials
  - Places, types of materials, and extent, of mold growth
  - Degree that materials are colonized with mold growth or water damaged
  - Impact on heating and air-conditioning systems
- Transform dampness and mold growth from a "mold issue" to issues concerning design, construction, maintenance, operations and repairs.

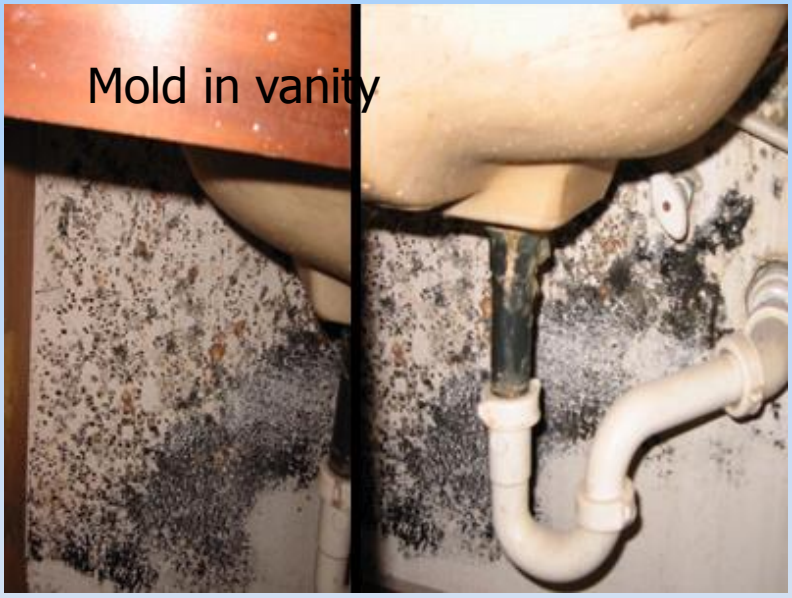
Basic response to dampness & mold growth in a building

- Find and fix moisture source(s)
- Remove mold from environment
  - Clean mold from hard, nonporous inorganic materials
  - Remove soft, fluffy, porous and organic based materials colonized with mold growth
  - Use appropriate containment, isolation, and work practices to suppress dust
- Also consider
  - The amount/locations, types of materials and degree of damage
  - Value of damaged contents or materials, time, cost, experience and perception
  - Clothing and textiles can often be laundered
  - Place mold growth in context

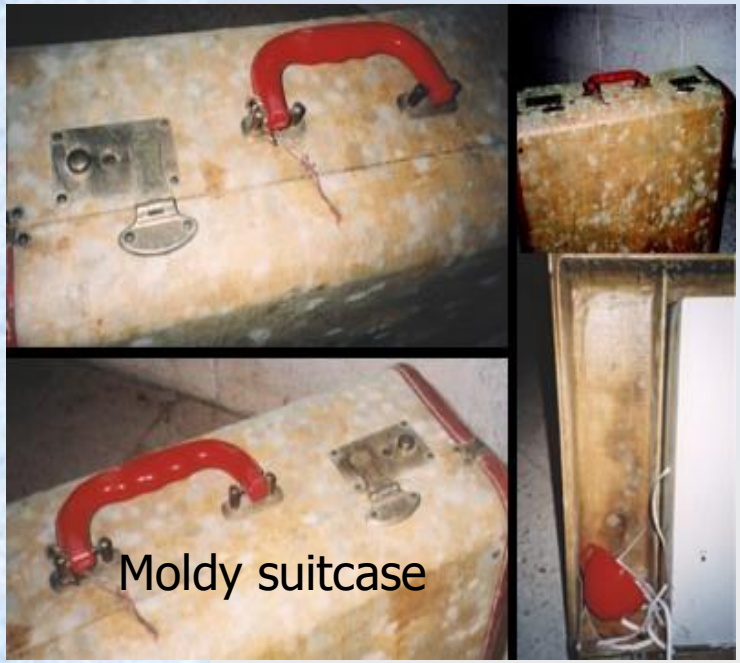
Other dampness and mold growth cleanup considerations

- Clean up of small amount of mold can be a do-it-your self job
- Degree of difficulty increases with size of project, types of affected materials and degree of damage. Larger projects with extensive damage may require outside help
- No specific licensing requirements for mold abatement contractors
- Using biocides or painting over mold growth instead of cleaning or removal is unacceptable
- Make sure hidden spaces are clean and dry before rebuilding

Moldy shower curtain



Mold in vanity



Moldy suitcase

Landlord and Tenant issues

- Statewide about 30% of people rent
- Range by county 18 to 45%
- 70% percent of dampness and mold complaints come from renters
- Best outcome is when both parties understand their roles, communicate and cooperate to follow healthy homes principals
- "mold" is a four letter word

Option One

Frame dampness and mold growth as maintenance and repairs

- Common ground- both parties should want a home that is dry, clean, well maintained, properly ventilated and contaminant free.
- Educate landlord of consequences dampness and mold growth
  - Accelerated deterioration of materials, equipment and contents;
  - Structural damaged and decay by infestations of wood destroying organisms and termites and;
  - Increased repair costs and possible reduction in property values.
  - Be specific about maintenance and repair needs, provide list in writing

Option Two
Contact Minimum Housing Code Officials if available

- About 100 towns and cities and 10 counties have Minimum Housing Codes
- Emphasize structural, maintenance, and repair items that may be code violations instead of mold
- Be as specific as possible about needed maintenance or repairs that would prevent dampness or related to water damage
- Mold is not directly regulated by minimum housing codes
- Code Officials are react poorly when complaint is about mold

Option Three
Enforce terms of lease agreement

- Read lease agreement
- Landlord must perform repairs --North Carolina General Statute § 42-42. Landlord to provide fit premises
- Do your--Part North Carolina General Statute § 42-43. Tenant to maintain dwelling unit
- Don't withhold rent to force landlord to make repairs
- Could end up in small claims court

- http://www.ncdoj.gov/getdoc/65f98289-61ec-4d13-b2dc-133bb5c44999/landlord-tenant-booklet.aspx

Testing for mold

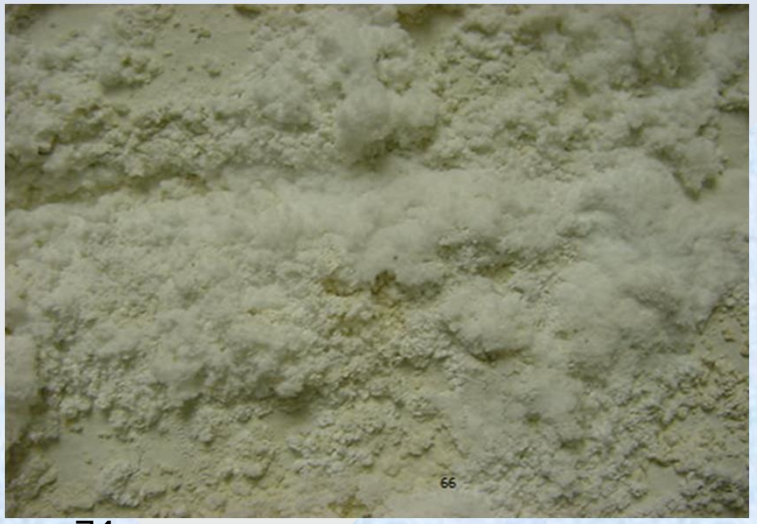
- EPA and CDC don't recommend mold testing as first step to assess problems
- No recognized airborne exposure limits
- North Carolina does not have oversight of
  - Certified Mold inspectors
  - Certified Mold Remediation Contractor
- We don't know about the curriculum, content and quality of training, or specific requirements to obtain 3rd party certifications

Limitations of mold testing

- Spore count varies over time and space
  - may or may not be representative of actual conditions
  - difficult to make inferences about other times and conditions
- From public health perspective
  - response is always to correct underlying moisture issues and
  - remove mold growth from the environment
- Linking mold with specific causation is difficult
- May or not be helpful to get a party to respond appropriately
- Divert attention from underlying issues causing moisture problems or other IEQ issues

When might testing be appropriate

- When all of the following conditions can be satisfied:
  - The testing or sampling is to prove or disprove a specific theory
  - The sampling methods, strategy and analytical methods generate sufficient & robust data that can prove or disprove the theory
  - Everyone understands the uncertainties/limitations
  - A method to interpret the results been established
  - The test results provide useful information to make decisions about the next actions



Useful Instruments

- *Eyes and nose and flashlight*
- *Temperature and humidity meter (always measure both temperature and humidity simultaneously*
- Nondestructive moisture meter
- Wood moisture meter
- Infrared thermometer

Conclusion

- Indoor Environmental Quality is a public health issue
- Buildings should be places that promote health and wellbeing
- Systems approach is best method to prevent and correct Indoor Environmental Quality issues--Keep Principles of Healthy Homes in mind
- Priority is to recognize and correct conditions that could cause Building Related Illness
- Take Building Related Symptoms seriously but in context
  - Not every case of building related symptoms is an Indoor Environmental Quality issue
  - People need to have complaints taken seriously and treated in a empathetic manner

Resources

- Federal government
  - Environmental Protection Agency http://www.epa.gov/iaq/
  - Department of Energy http://www.iaqscience.lbl.gov/
  - National Institute for Occupational Safety and Health http://www.cdc.gov/niosh/topics/indoorenv/
  - Occupational Safety and Health Administration https://www.osha.gov/Publications/3430indoor-air-quality-sm.pdf
- State of North Carolina
  - North Carolina Public Health http://epi.publichealth.nc.gov/oee/programs/iaq.html
  - North Carolina Cooperative Extension Family and Consumer Sciences http://fcs.ces.ncsu.edu/fcs-housing/
- Professional Associations
  - American Society of Heating, Refrigeration and Air Conditioning Engineers https://www.ashrae.org/about-ashrae/position-documents
  - American Industrial Hygiene Association https://www.aiha.org/about-ih/Pages/Consumer-Resources.aspx

Questions ??

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