Nothing Compares
NORTH CAROLINA

Update: Managing Inquiries About Dampness and Mold Growth

Outline

- Introduction
- Purpose
- Community Partners
- Empowering citizens to address dampness and mold growth
- Why mold grows in buildings
- Potential health effects
- A systems approach to assess dampness and mold growth
- Cleanup recommendations

Purpose

- Enable and prepare county environmental heath professionals to be a primary contact point for citizen inquiries about moisture and mold growth concerns

- Provide evidence-based tools to manage these inquiries

- Use information develop community partnerships to address indoor air quality, dampness and mold growth

- Empower people about options or develop action plans using the Eight Principals of Healthy Homes outlined by HUD and the National Center for Healthy Homes

Principles of Healthy Housing

To promote health and well being keep homes

- Dry
- Clean
- Well Ventilated
- Properly Maintained
- Pest Free
- Contaminant Free
- Safe
- Thermally Controlled

8 steps to a healthier home
http://portal.hud.gov/hudportal/documents/huddoc?id=HH8Tips.pdf

Community Partners in the Public Health System

"All public, private, and voluntary entities that contribute to the delivery of essential public health services within a jurisdiction." Includes but not limited to:

- Public health agencies at state and local levels
- Healthcare providers
- Public safety agencies
- Human service and charity organizations
- Economic and philanthropic organizations
- Environmental agencies and organizations

How does addressing indoor dampness & mold growth align with public health services?

- First building codes were health based

- Addressing dampness and mold growth in homes is aligned with several of 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 improve indoor environments
  - Developing partnerships at the local level to identify and solve problems
  - Enforcing of laws and regulations that protect and ensure public health and safety (not necessarily public health law)

http://www.cdc.gov/nphpsp/essentialservices.html

Value of Community Partners

- Solutions to dampness and mold growth in homes are best solved at the local level.
- Solutions often require cooperation between local government agencies and other service providers
- Cooperation and consistency may reduce the frustration of occupants and owners from being passed between multiple agencies with no resolution

Why Address Dampness & Mold Growth?

- Dampness and mold growth in buildings and associated health effects are society-wide issues.
- Occurs in homes, schools, public and commercial buildings
- Transferable to preparedness and response activities
- Health and economic consequences
- Need to protect vulnerable populations
  - Children
  - Economically disadvantaged
  - Elderly
  - People with weakened immune systems

Lack of evidence-based information, awareness, education & interest

Economic Consequences

- Health care costs attributable to dampness and mold and allergic rhinitis in North Carolina $81 million
- Health care costs attributable to dampness and mold and acute Bronchitis in North Carolina $ 13 million
- Health care costs attributable to dampness and mold and asthma in North Carolina 32 Million *
- Mold sampling: $100-150 per sample for three samples
- Hourly rate: $ 80-100 for mold professionals
- Most insurance has limitations of mold coverage

* Adapted from Valuing the Economic Costs of Allergic Rhinitis, Acute Bronchitis, and Asthma from Exposure to Indoor Dampness and Mold in the US, Journal of Environmental and Public Health Volume 2016, Article ID 2386596,

Environmental Conditions Promoting Mold Growth

- Presence of viable mold spores

- Food sources—organic matter
  - Building materials and contents: gypsum board, ceiling tiles, wall paper, wood products, paints, glues, textiles
  - Organic matter: dirt, dust, dead skin cells, biofilms and oily residues on inorganic surfaces or materials; concrete, fiberglass, metal and plastic

- Proper temperature--optimum temperature range for many common indoor molds is 68°F- 86°F

- **Adequate amount of water**

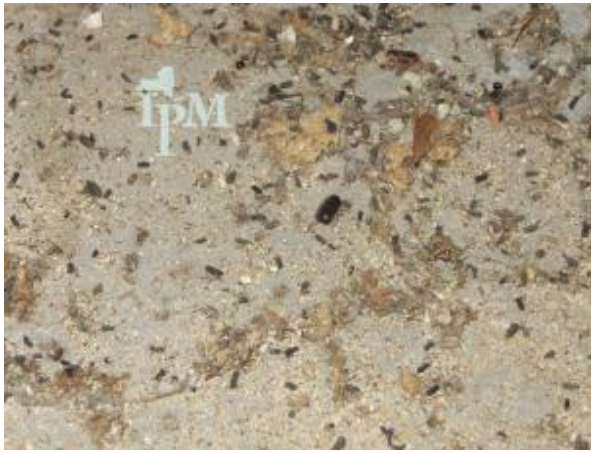
- *Dampness-related contaminants also include other environmental microorganisms, dust mites, cockroaches, other insect pests and volatile organic compounds (VOC)*

Institute of Medicine, Damp Spaces and Health (2004)

Mold Growth on Materials

Mold Growth on Contents

Roaches, Mites and Rodents



How building materials & contents become damp

Water and moisture movement

- Water can be solid (ice), liquid or vapor
- Water moves by:
  - ✓gravity
  - ✓Capillary action (wicking)
  - ✓Transported in air
  - ✓Vapor diffusion
- Characteristics of the materials and environmental conditions determine moisture content

Sources:

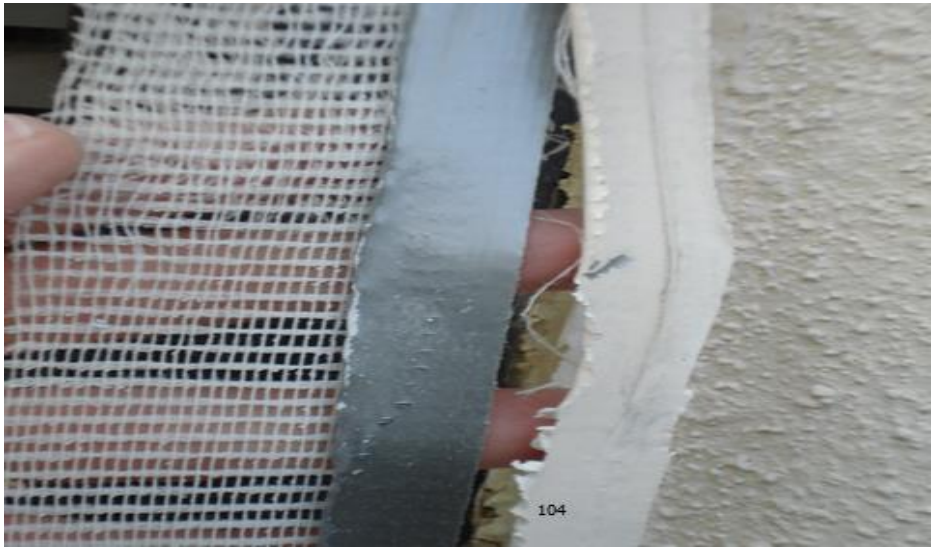
- Rainwater and groundwater
- Infiltration of hot and humid air
- High relative humidity
  - ✓ Condensation surfaces
- Plumbing or fixture leaks
- Water vapor generated by occupants
- Poorly designed, operated and maintained Heating, Ventilation, and Air-Conditioning (HVAC) Systems

Water Accumulation on Flat Roof

Site Grading & Landscaping

Basements and crawlspaces

Infiltration - window flashings



Condensation

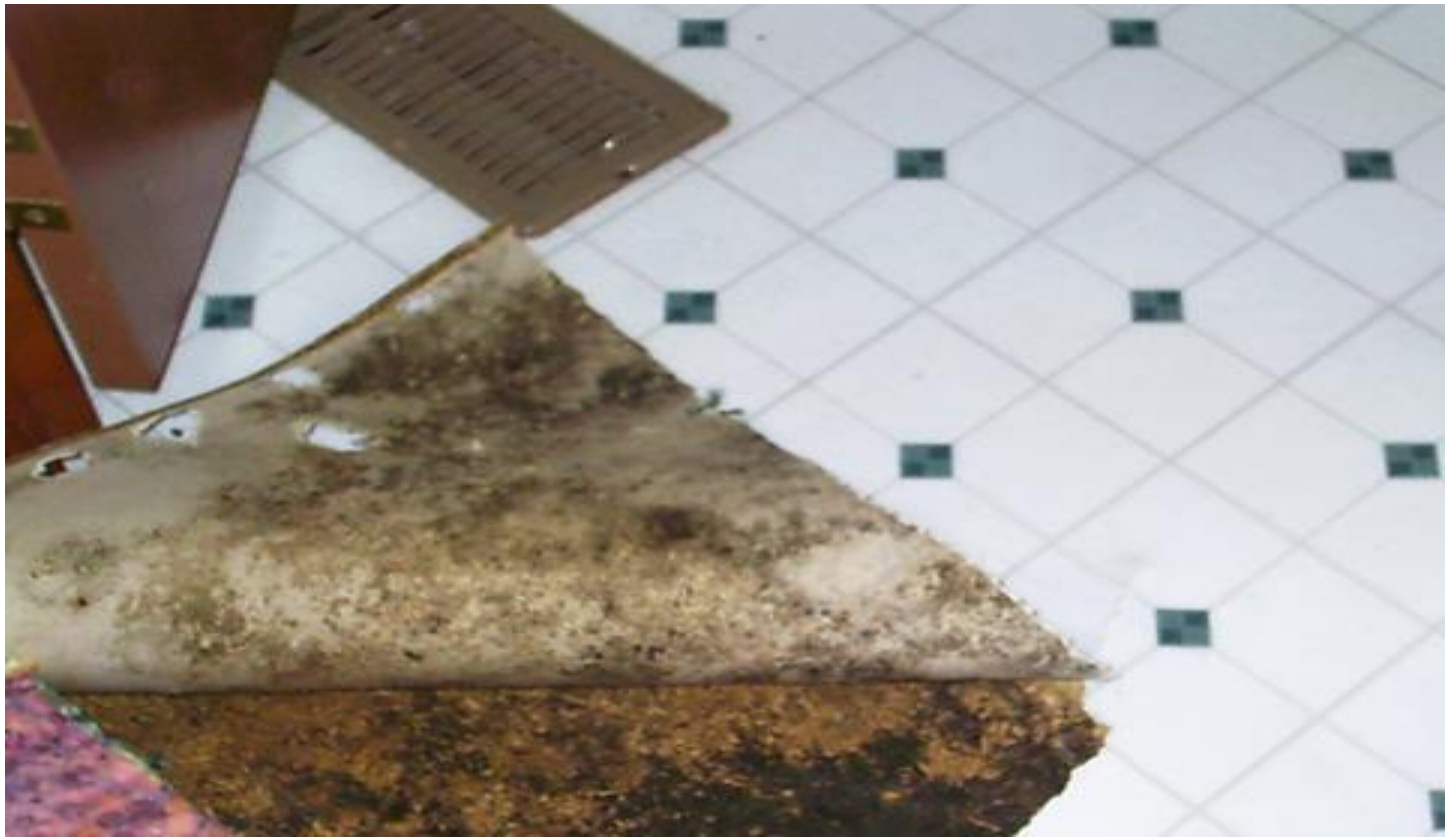
Condensation on cold window

Warm surface prevents condensation

Condensation from too much water vapor

Moisture problems in manufactured homes

Mold growth on particleboard under vinyl flooring



Moisture problems in manufactured homes, Understanding their causes and finding solutions https://www.huduser.gov/portal/publications/moisture.pdf

Hot air, vapor diffusion and condensation surfaces

Poorly maintained air-conditioning coil & condensate drain

Poor air-conditioning condensate drainage

Poorly vented clothes dryer

Dampness and mold growth impacts to health

- Most healthy adults can inhale large numbers of mold spores without ill effects
- However, indoor mold growth consists of spores, fragments, volatile organic compounds (the musty smell), waste products and other substances.
- Usually associated with other dampness-related contaminants
- Sensitive populations and people with certain conditions may be at greater risk

Susceptible populations and conditions

- Children and elderly
- People with allergies/hypersensitivity or pulmonary disease
- People with compromised immune systems:
    - Pre-existing disease
    - People taking certain medications
    - Post-operative patients
    - HIV/AIDS
    - People being treated with cancer

*Health effects associated with dampness and mold growth-- NIOSH Alert (2012)**

Sufficient epidemiological evidence that occupants of damp and moldy buildings are at greater risk of developing :

- Upper and lower respiratory tract symptoms - cough and wheeze
- Respiratory infections
- Asthma, and exacerbation of asthma
- Shortness of breath (dyspnea)
- Allergic rhinitis

Limited evidence of an association between damp and moldy buildings and bronchitis .

Clinical evidence that exposure to mold and other microbial agents in damp buildings increases the risk of hypersensitivity pneumonitis, chronic rhinosinusitis, and allergic fungal sinusitis.

Association is not causation!

* Reference: 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

Symptoms people associate with dampness and mold growth

- Fatigue and weakness
- Muscles aches, cramps, joint pains, morning stiffness
- Abdominal pain, diarrhea
- Headache, memory loss, concentration difficulty, confusion, learning difficulties, difficulty finding words, disorientation, mood swings, anxiety or panic

Scientific evidence is insufficient or unavailable to determine whether an association exists between damp buildings and these symptoms

Assessment of dampness and mold growth

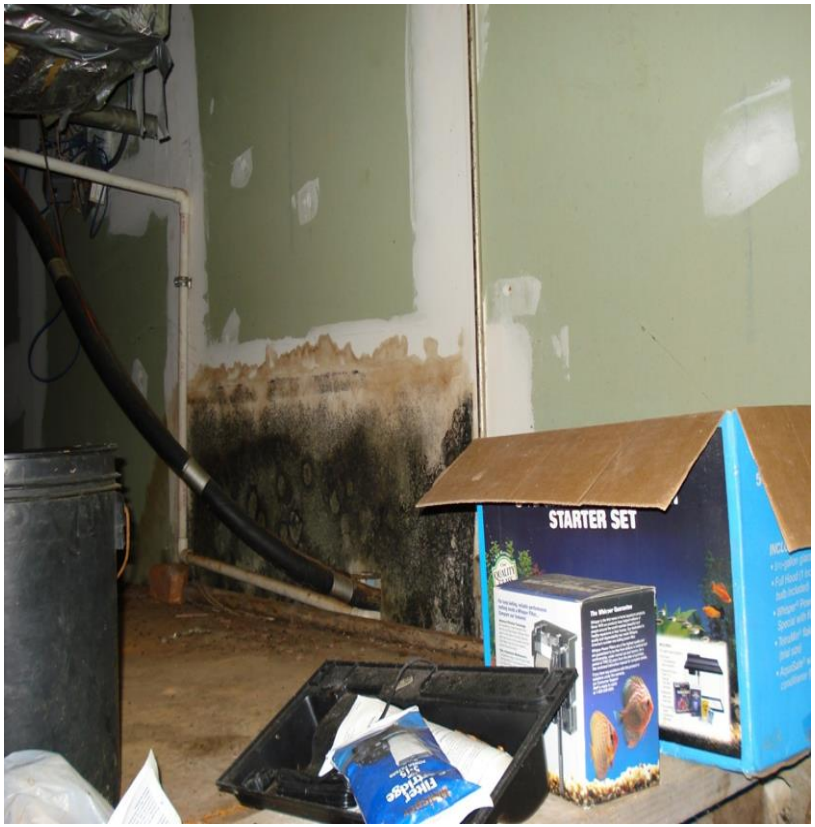
First and most important first step– systematic and informed survey

- Informed
  - ✓Prior information about construction, operation, and maintenance
  - ✓Type of occupancy, activities, and presence of sensitive occupants

- Survey to concentrate on
  - ✓Sources, duration, character of source water
  - ✓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 “mold” into dampness and mold growth along with maintenance, repairs, changes in operations and other actions that promote health and wellbeing

Which is the biggest health risk?



Other sources of indoor pollutants

Outside Assistance: Consultants and Contractors

- Mold professionals
- Licensed Home Inspectors
- Pest Control Professionals for Wood Destroying Organisms
- Residential Services Energy Network (RESNET) Certified Home Energy Raters and Building Performance Institute (BPI) Certified Building Analysts
- Others

Professional services to assess and remediate mold growth can be very expensive

Selecting an air quality consultant

- Do the service(s) lead to an evidence-based action plan that promotes health and wellbeing that is realistic and affordable?
- Ask for references, experience, and training. Ask about licenses, bonding and insurance. Get a written contract for scope of services
- Make sure proposal includes a through and informed survey

EPA states that in most cases, if visible mold growth is present, sampling is unnecessary. CDC does not recommend routine sampling for molds

- ✓Mold sampling cannot determine that mold growth is the cause of symptoms.
- ✓Mold sampling should never be used to dismiss complaints or defend inadequate efforts to investigate and solve potential problems

- If environmental testing is proposed ask about :
  - ✓ The specific theory being tested, the sampling strategy and analytical plan, how the results will be interpreted and how the results will inform the next actions

Are resources better used to fix the underlying problem?

General Principles of Mold Remediation

Goal is to restore the building to a clean and dry condition

- Identify potential sources of excess moisture
- Follow moisture flow through materials and contents
- Fix source of moisture intrusion or accumulation
- Develop and implement a plan to get mold growth out of environment
  - ✓ Clean and dry hard, nonporous and inorganic materials
  - ✓ Remove and dispose organic and porous materials

- Protect workers, non-impacted materials and areas of the building
- Federal, state, and industry standards for best practices

Other Considerations: Lead-based Paint and Asbestos

Asbestos

- The Health Hazards Control Unit administers the North Carolina Asbestos Hazard Management Program.
- Regulates building demolition and renovation activities
- Accredits workers, inspectors, and project designers and other asbestos professionals

Lead-based Paint

- The Health Hazard Control Unit administers the Lead-based Paint Abatement Program and the Lead-based Paint Renovation Repair and Painting Program (RRP)
- The RRP program requires that firms and individuals disturbing lead-based paint in child occupied facilities (homes) built before 1978 to be certified and to follow “lead safe” work practices to prevent environmental contamination
- Certifies contractors and firms that perform these activities

Contact the Health Hazard Control Unit at (919) 707-5950 for details

How Can Local Health Departments Help?

- Use a “systems approach” and transform “mold” into maintenance and repairs to find and fix dampness and mold using healthy homes principals.

- Coordinate response with partners

- Inform and educate for better use of existing laws, codes, and resources

Strategies to Empower Callers

Screen calls to identify mold/moisture issues (see handout)

Provide caller with “Self-assessment Survey (see handout)

Help caller use survey results to identify options and actions (see handout)

- Do-it- yourself
- Educate landlord about importance of maintenance and repairs
- Contact minimum housing code officials if available
- Enforce terms of lease agreement

Future role of Occupational and Environmental Epidemiology Branch (OEE)

- Mold/moisture inquiries are best handled at the local level
- Moving from “retail” to “wholesale” customer service model
- OEE will provide technical support to environmental health staff other organizations interested in healthy homes, dampness and mold growth
- Local health departments will transition July 1, 2017

Questions?

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