

Flooded House Clean-up

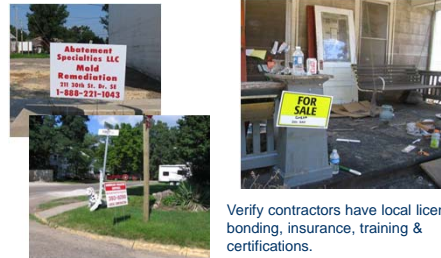


Kenneth Hellevang, Ph.D., P.E.

NDSU Department of Agricultural and Biosystems Engineering North Dakota State University, Fargo ND NDSU Extension Service

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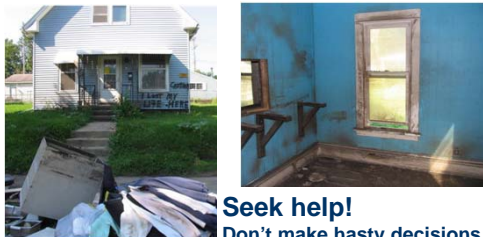
Flood Sights



Verify contractors have local license, bonding, insurance, training & certifications.

Flood Sights

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Seek help!
Don't make hasty decisions.

Delayed Cleaning/Restoration

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- Dry to prevent mold growth



Hazards

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- Structural
- Electrical (telephone & cable)
- Mold
- Biological
- Lead Dust
- Asbestos
- Carbon Dioxide
- Cuts and Punctures




Categories of Water

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- Clean Water – Category 1
 - Broken water pipes, rainwater, etc
- Gray Water – Category 2
 - Contains contamination & microorganisms
 - Toilets with urine, sump pump, dishwashers
- Black Water – Category 3
 - Contains pathogenic agents
 - Sewage, surface water flooding, pesticides




Health Effects of Mold



Scientific evidence links mold and other factors related to damp conditions in buildings to:

- Asthma symptoms in those with the chronic disorder
- Coughing, wheezing, and upper respiratory symptoms in otherwise healthy individuals
- Hypersensitivity Pneumonitis in susceptible people
- Lower respiratory illness in children


Institute of Medicine of the National Academies 2004



Health Effects of Mold




- World Health Organization: Sufficient epidemiological evidence is available in different countries and under different climatic conditions to show that the occupants of damp or moldy buildings are at increased risk of respiratory symptoms, respiratory infections and exacerbation of asthma. Some evidence suggest increased risks of allergic rhinitis and asthma.
- There is clinical evidence that exposure to mold and other dampness-related microbial agents increases the risks of rare conditions such as allergic alveolitis, chronic rhinosinusitis and allergic fungal sinusitis.
- Toxicological evidence supports these findings, showing the occurrence of diverse inflammatory and toxic responses after exposure to microorganisms isolated from damp buildings, including their spores, metabolites and components.

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Respiratory Protection

- Respirators
 - Minimum
 - N-95 respirator or mask
 - HEPA filter – P-100
 - Proper fit
 - Labored breathing


Eyes, Feet, Hands, etc.

- Goggles must prevent entry of dust and small particles









Limited Benefit from Air Cleaners



- Filters remove only some spores & do not remove Volatile Organic Compounds
- Ozone units should not be used in an occupied space and are not effective!
- Hydroxyl and Ultraviolet units of limited benefit


Inspections





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Structural Evaluation



- Look for any movement, check alignment, bowing, cracks, separation
- Basement wall/foundation
- Check floors & ceiling

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Check Structural Integrity




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Utilities

- Shut off electricity
- Verify electricity is off before starting work.
- Use Ground Fault Circuit Interrupter
- Shut off gas if heating system has been affected



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Preparation

- Electrical power
 - Carbon dioxide hazard of generators
- Lighting
- Tools and equipment
- Garbage containers
- Bathroom
- First Aid Kit



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Mold Occurs within 2 to 3 days



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REMOVAL OF MOLD CONTAMINATION

People react to active, dormant and dead mold - Biocides are not adequate!

- **Porous Materials**
(ceiling tiles, carpeting, upholstered furniture, wallboard)
 - Remove and replace
- **Non-porous surfaces**
 - Vacuum with HEPA filters
 - Wash with a detergent solution
 - Sanitize with a biocide if desired
 - Thorough drying
- **Semi-porous** (floor joist, sill plates)
 - Remove mold, dry

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Mold Test Kits



Test Results are Not Accurate!

Mold Hazard



Air moves from stud wall cavity into living space

Containment

- Isolate HVAC system
- Polyethylene enclosure
- Negative air pressure
- Protect contents

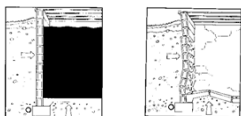


Clean-up Steps

- Remove water
- Empty Contents
- Remove water, mud & muck
- Remove wall materials and etc.
- Wash
- Sanitize
- Ventilate & dry

Remove Water Slowly

- Remove 2 to 3 feet of water from the basement
- Wait 24 hrs, if the water level rises, wait 24 hrs.
- Remove another 2 to 3 feet
- Continue process until water is removed.



Water Damage Restoration

- IICRC S500 Standard and Reference Guide for Professional Water Damage Restoration Third Edition 2006
 - Institute of Inspection Cleaning and Restoration Certification
 - Authored by application and technical experts

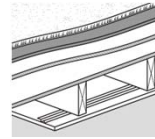


Contaminated Water Restoration

- Discard carpet saturated with category 3 water
 - carpet cushion
- Category 2 water carpet contamination may be cleaned with hot water extraction and biocide
- Remove floor if water reached subflooring
 - Subflooring must be cleaned, disinfected, dried



Subflooring



- Vinyl or ceramic tile flooring
 - Dry & clean under vinyl

Contaminated Water Restoration

- Dispose
 - absorbent stuffed fabrics
 - Stuffed furniture
 - Saturated absorbent materials
 - Ceiling tile, dry wall, paper, etc.
- Evaluate structural materials for degree of contamination and physical damage



Clean-out Sequence



- Air out
- Small objects
- Large objects
- Appliances (Tape doors shut)
- Cut and remove carpet
- Remove items from closets and cabinets

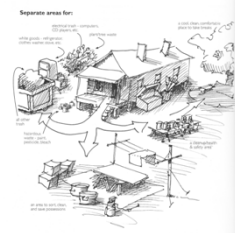
Grand Forks 1997



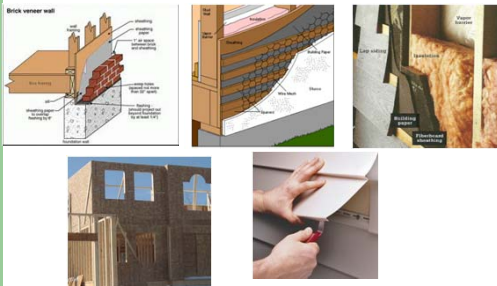
Sorting



- Follow local waste management guidelines
 - Hazardous materials
 - Electronics
 - Appliances
 - Furniture
 - Building materials



Exterior Walls



Electrical



- All electrical fixtures (switches, outlets, breakers) submerged in flood water need to be replaced.
- Electrical motors will need to be professionally reconditioned.
- Wire (consult electrician)
- Contact an electrician or an electrical inspector.

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Photographs & Valuables

- Damage arrested by freezing
- Wax paper between layers
- Important papers should be copied after drying
- CDs and DVDs rinse with clean water, dry

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Crawl Space



- Dry soil
- Fans face out
- Place plastic

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Cleaning



- Flush non-porous surfaces with water
- Clean non-porous walls starting at the bottom or where damage is worst
 - Scrub with detergent (non-phosphate)
 - Two bucket system (detergent bucket, rinse bucket)
- Rinse with clean water
- Sanitize

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Biocide – Clean then Sanitize

- Must be used according to label (**specific application**)
 - The label is the law
 - Non-porous material?
- Must be applied to clean surface
- Must have required exposure time
- Must use PPE
- Ventilate the area
- Common biocides
 - Alcohol, sodium hypochlorite (chlorine bleach), hydrogen peroxide, iodine, quaternary ammonium chloride, synthesized phenolic compound



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Chlorine Bleach

- Follow the Label!
- Only non-porous & hard materials & surfaces
- PPE
- Ventilation
- ¼ cup bleach per gallon water
- Surface wet for 5 minutes
- Rinse
- Dry



Biocide Registration

- Disinfectants are a pesticide
- EPA reviews efficacy data
- Use registered disinfectants
- <http://www.agdepartment.com/>
– <http://www.kellysolutions.com/nd/>
- People applying disinfectants in buildings for hire need to be commercially certified in the in the Home and Industrial category.

Structural Drying

- Open enclosed areas (walls, floors)
- Drying may take several days or weeks



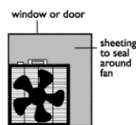
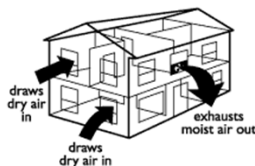
Structural Drying

- Long Process



Drying Process

- Circulate air across drying surfaces
- Ventilation – exchange air

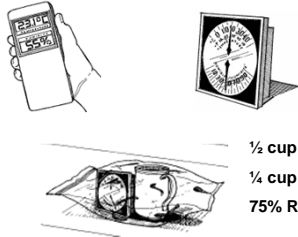


Dehumidification

- Dehumidification < 50% RH
 - Open system: ventilation
 - Closed system: mechanical dehumidification
- Minimum RH is about 50% with typical home unit.



Measure Humidity



½ cup water
¼ cup salt
75% RH @ 12 hrs.

Temperature Control

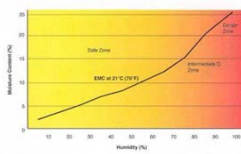
- Ambient temperature <72 F
 - Balance evaporation, dehumidification, microorganism growth
- Need both ventilation and heat



Acceptable Moisture Level

- Material type affects potential for mold growth
- Wood moisture >15% may lead to mold growth
- Potential for mold growth if relative humidity >70%

Figure 4: Moisture Content vs. Humidity and the Risk of Mold Growth



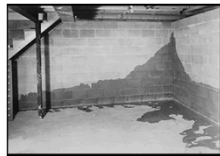
Do not enclose wet/damp materials

Moisture Meters



Saturated Soils

- Soils contain water for a long time
- Moisture moves through concrete into basement in liquid or vapor form.
- Gallons per day



Test for Water Vapor Movement

- Clear plastic taped to surface
 - Watch for several days
 - Moisture accumulation indicates problem
- Basement wall or floor



Mold or Salt



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Search for NDSU Flood Information
<http://www.ag.ndsu.edu/flood>