

Managing Water Infiltration Into Buildings

A systemized approach for remediating water problems in buildings due to floods, roof leaks, potable water leaks, sewage backup, steam leaks and groundwater infiltration.

Initial Policy Developed By:

Neil Carlson, M.S., CIH
Division of Environmental Health and Safety
University of Minnesota
612-626-6002

Policy Adopted and Modified for MSU By:

The Office of Radiation, Chemical and Biological Safety
Michigan State University
517-355-0153

Background

As our understanding of both acute and chronic health problems associated with indoor pollution increases, the importance of managing moisture infiltration into buildings becomes very critical. Water damaged building materials and furnishings, if not appropriately handled, can become significant sources of microbiological contamination in building environments leading to potential health problems for occupants ranging from simple irritation to allergic responses to hypersensitivity diseases.

All buildings, during their lifetime, will have some form of water problems. Appropriate management of these water problems to reduce microbial growth will ensure that health risk to building occupants is minimized.

The following protocol for managing moisture problems in buildings was developed in response to the lack of comprehensive information on industry accepted protocol for dealing with water problems in buildings. The information contained in this document was developed from a review of a range of sources and from Mr. Carlson's experience in dealing with building environment problems.

MSU CONTACTS

To report a water infiltration/damage event:

MSU Physical Plant- Maintenance
353-1760

For information regarding indoor air quality:

MSU Office of Radiation, Chemical and Biological Safety
355-0153

Water Damage Remediation Protocol

Following a water damage event (i.e. fire extinguished with water, flooding, water intrusion), the Physical Plant should be contacted to assess the extent of the water damage and to determine appropriate response (using procedures outlined in the following sections) to eliminate sources of potential microbiological growth.

GENERAL

1. Inventory all water damaged areas, building materials and furnishings. Special attention should be given to identify carpet under cabinets, furnishings, etc. Also, utilize a moisture meter to identify the extent of water damage to drywall.
2. Once the water damage inventory is completed, document the type of damage, i.e. clean water (potable sources), steam, unsanitary water (rain, ground water), or contaminated water (sewage).

CEILING TILE

3. Remove and dispose of all wet ceiling tiles within 24-48 hours of water damage. The only exception would be if ceiling tile has become wet due to a small steam leak and the shape of the tile has not been altered. In this situation, the ceiling tile can be air dried and reused. In situation where the tile has been impacted by unsanitary water (>24 hours or previous water damage) or contaminated water, controlled methods should be utilized for removal and disposal. Controlled methods can range from personal protection to full abatement under negative air conditions dependent on the extent to the damage.

DRYWALL/LATHE PLASTER

4. Remove and replace all water damaged drywall and insulation within 24 hours. If the drywall is not removed within 24 hours, if previous water damage has caused microbial growth, or the sheetrock has been damaged by unsanitary or contaminated water, then extensive controls will be necessary for the removal process. Use a moisture meter and cut sheetrock at 12" to 48" above the moisture mark.

All hard surfaces such as block walls, etc. should be scrubbed with a mild detergent followed by a rinse of the surface using a solution of ¼ cup bleach per gallon of water. Follow this with a clean water rinse. After work is completed, turn the heat UP (if possible) and utilize dehumidifiers to dry the area. CAUTION: The chlorine in the bleach may cause corrosion; therefore avoid using on metal surfaces. Instead, use the

aforementioned cleaning procedure with only a wash with a mild detergent. Also, bleach may fade colors. Therefore, test the bleach solution in an inconspicuous location before proceeding. USE BLEACH IN A WELL-VENTILATED AREA. DO NOT MIX BLEACH WITH OTHER CLEANING CHEMICALS, ESPECIALLY THOSE CONTAINING AMMONIA. POISONOUS VAPORS WILL RESULT.

Wet lathe and plaster leach the minerals from the wall and form a chalky surface. The loose material on the surface will need to be removed under controlled conditions and the surface allowed to dry. The surface can then be painted with an antimicrobial paint.

If the plaster/lathe wall develops a strong odor, with or without visible mold growth, remove people from this area of the building. Eliminate the source of the water and replace the water damage plaster. During replacement of the plaster/lathe, the following general procedures are recommended.

Controls to limit the spread of contamination include: setup of critical barriers, the creation of a negative air differential, and the use of appropriate respiratory protection, gloves and coveralls for the workers. Excellent personal hygiene, including hand washing and showering after work in the area is also recommended.

ELECTRICAL

5. Consider all wiring, light fixtures, and electrical outlets to be shock hazards until they have been checked by a building inspector and/or electrician. Until then, turn the power off in the area of water damage. (Note: Only persons knowledgeable about electrical shock hazards should shut the power off.) Replace all electric circuit breakers, GFIs (Ground Fault Interrupters) and fuses that have become wet. Switches and outlets that were wet can be cleaned and reused but, when in doubt, replace them.

All electrical motors, light fixtures, etc. that were wet need to be opened, cleaned and air-dried by a qualified person. Before being put back into service, inspect the motors, light fixtures, etc. to ensure there is no visible moisture/water droplets.

FURNITURE

6. Dispose of upholstered furniture that has become wet due to floods, roof leaks, sewage backup and groundwater infiltration. Upholstered furniture damaged by steam leaks or direct contact with potable water should be dried within 24 hours and monitored for fungal growth and odors.

Hardwood furniture or laminate furniture whose laminate is intact should be air dried and cleaned with a detergent solution and rinsed in clear water and dried. See caution statements in #4.

Laminate furniture experiencing delamination should be disposed of because the pressed wood under the laminate absorbs water readily and is hard to dry.

Furniture made of particle board or pressed wafer board should be discarded. The exception would be if the furniture has become wet due to a steam leak or direct contact with potable water. In this situation, the furniture can be dried and monitored closely for fungal growth/odor. If fungal growth occurs or the furniture develops an odor, the particle board/pressed wood furniture should be discarded.

FILES/PAPER

7. Remove and disposed of nonessential files and paperwork. The exception again would be if the moisture was due to steam leaks; then these can be dried. Essential wet paper from water damage areas should be moved to a location where it can be dried, photocopied and then discarded. Professional conservators should be contacted for information on handling these types of wet products.

If a large amount of files and paper work cannot be dried within 24-48 hours, essential files/paperwork may be rinsed with clean water and temporarily frozen until proper drying can be completed. Discard any paper products that develop mold.

CARPET

8. Any carpet that has been contaminated over a large area with sewage backup should be discarded under controlled negative air conditions and the entire area disinfected with bleach and water (or hospital-grade detergent).

Small areas of carpet contaminated with sewage backup may be cleaned using the procedure listed for other sources of water.

Carpet that has become wet from floods, roof leaks, steam leaks, potable water leaks and groundwater can be treated as per the following:

Carpet wet less than 24 hours

- Remove all materials (e.g. furniture, file cabinets) from the carpet.
- Extract as much water as possible from the carpet using wet vacuums.
- Shampoo the carpet with a dilute surfactant.
- Soak with a ¼ cup of bleach to 1 gallon water solution. Maximum concentration: a solution of 1 part bleach to 10 parts water. (See bleach caution in #4 above.)

- It is preferable not to use a biocide. If a decision is made to use a biocide, consult a microbiologist. Reason: People may have a reaction to biocides. Often, quaternary amine compounds will be used as a biocide/clean compound. The compound may reduce levels of bacteria but is often ineffective in killing fungal spores.
- Rinse and extract the carpet with clean water to remove detergent/bleach residues.
- Commercial steam cleaning of carpet can be used in place of bleach. The vacuum system is housed in a truck. The water is heated above the boiling point and is used to clean the carpet.
- Dry the carpet within 12-24 hours of treatment. After work is completed, increase the room temperature and use commercial dehumidifiers, floor fans or exhaust fans to aid in drying the carpet.

Carpet wet more than 48 hours

Wintertime:

- If carpet becomes wet during the winter with relatively clean water, the previous protocol can be used to manage the carpet and salvage it.

Summertime:

- Drying carpet is usually more difficult in the summertime than the winter if the carpet is not in an air-conditioned space or dehumidifiers are not available. Water damaged carpets in humid environments often do not dry adequately. Disposal of water damage carpets in humid environments is often the best option.

TESTING

9. Air and building material/furniture testing for microorganisms may be performed immediately after the water problem and periodically thereafter to ensure that there is no excessive human exposure to microbial growth. This testing should be performed by a contract professional who specializes in biological indoor air quality. Post cleanup clearance sampling and inspection are necessary to ensure no excessive concentration of microbes will exist in the building.

Areas that are harder to access for cleaning should be specifically tested and any areas of carpet that had material on top should be tested.

If the carpet develops an odor or visible mold growth is apparent, the carpet should be removed under controlled conditions. If mold sensitive persons react when entering a space with previously water damage carpet, with no odor or visible growth, the carpet should be tested or discarded under controlled conditions.

An exception to the testing would be materials that had moisture infiltration for the first time and are being discarded. However, the decision on testing needs to be made on a case-by-case situation after all the variables have been considered.

Note on Personal Protective Equipment

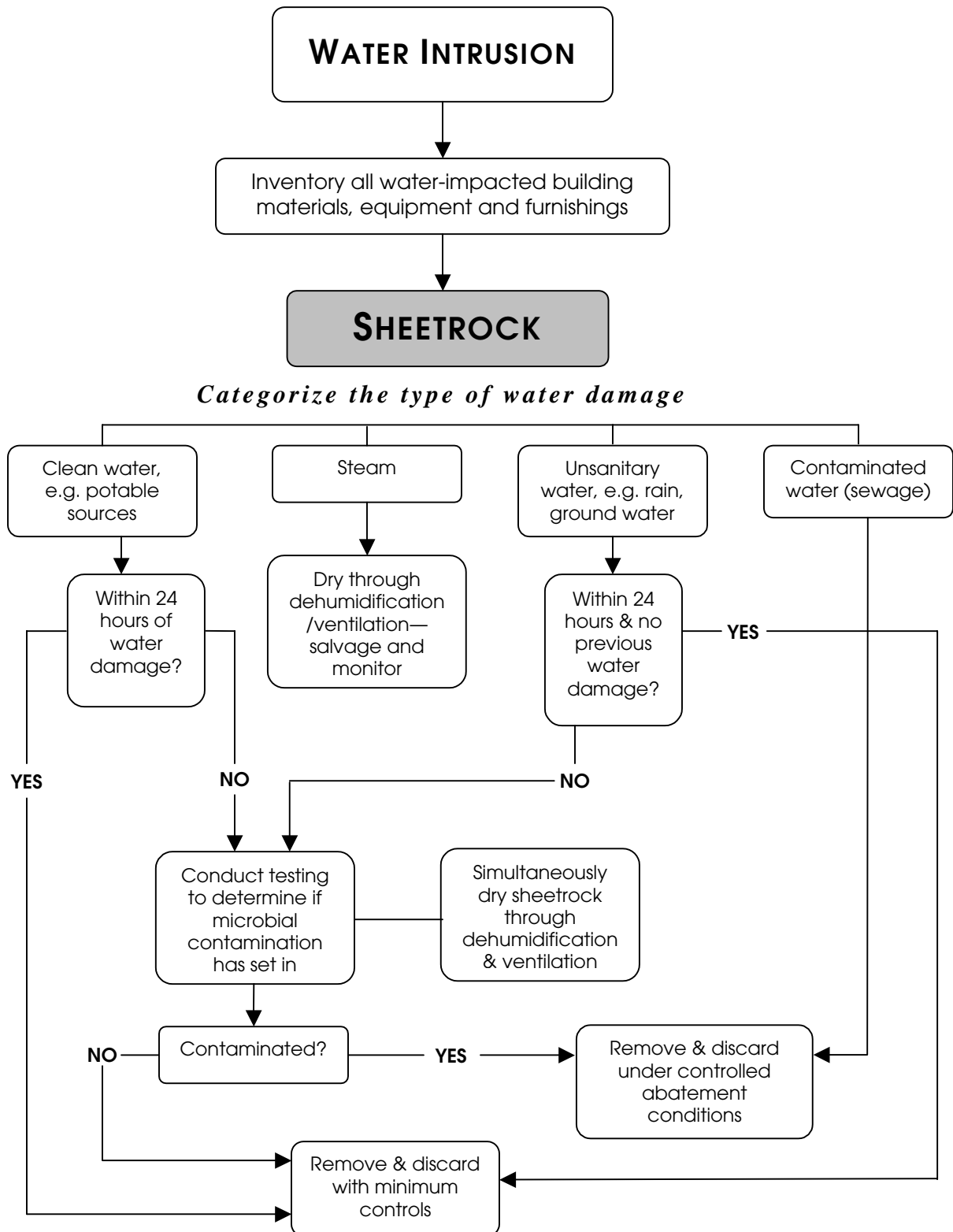
If testing has confirmed microbial growth on previously wet materials, then appropriately trained personnel with appropriate respiratory and personal protection should be used. Negative air enclosures may also be set up for limiting cross-contamination from damaged areas.

SOURCES

- *Federal Occupational Health Protocol for Controlling Microbial Growth After a Flood.*
- *Tips for the Care of Water-Damaged Family Heirlooms & Other Valuables,* Phoenix Business Group—Consumer Protection Services—& Cambridge Energy Management Department.
- *Dealing with Flood & Sewage Waters in Your Home,* Fort Wayne Sewage Task Force, Fort Wayne Planning Department, Fort Wayne Utilities, Indiana State Board of Health, & Area County Board of Health.
- *Health & Safety Universal Precautions for Post-Flood Buildings,* Mathew Klein, Indoor Air Quality Solutions & Mark Flemming, Blue Chip Builders, Inc.
- *Making Choices About Cleaning Wet Carpet,* Iowa State University, Extension Textiles & Clothing.

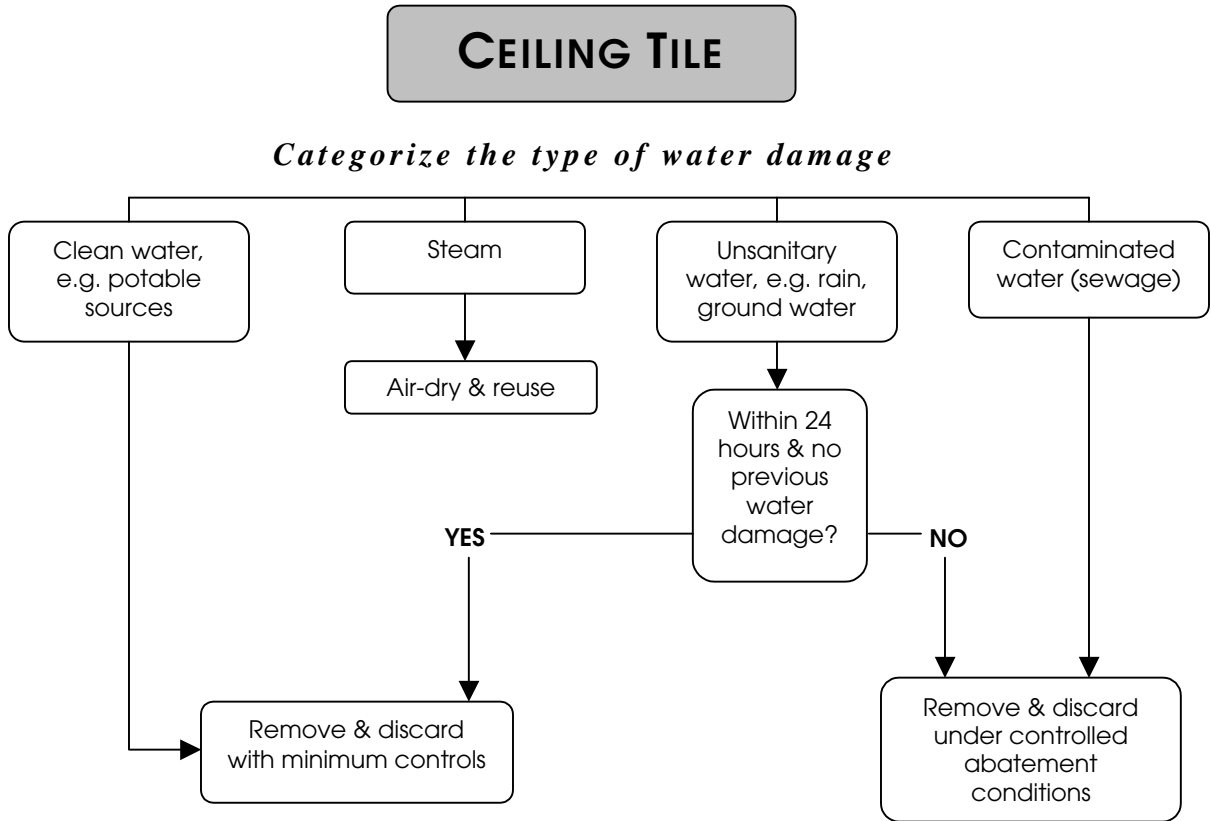
Managing Water Intrusion into a Building

A Decision Algorithm



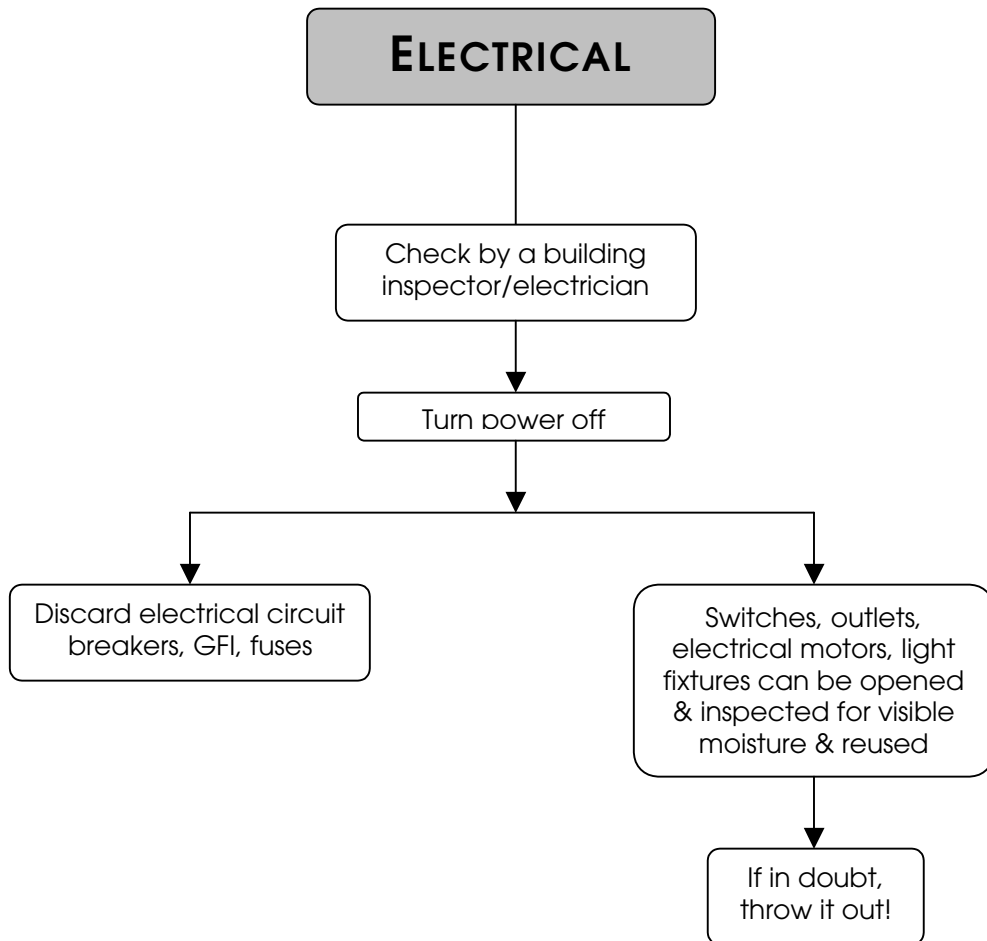
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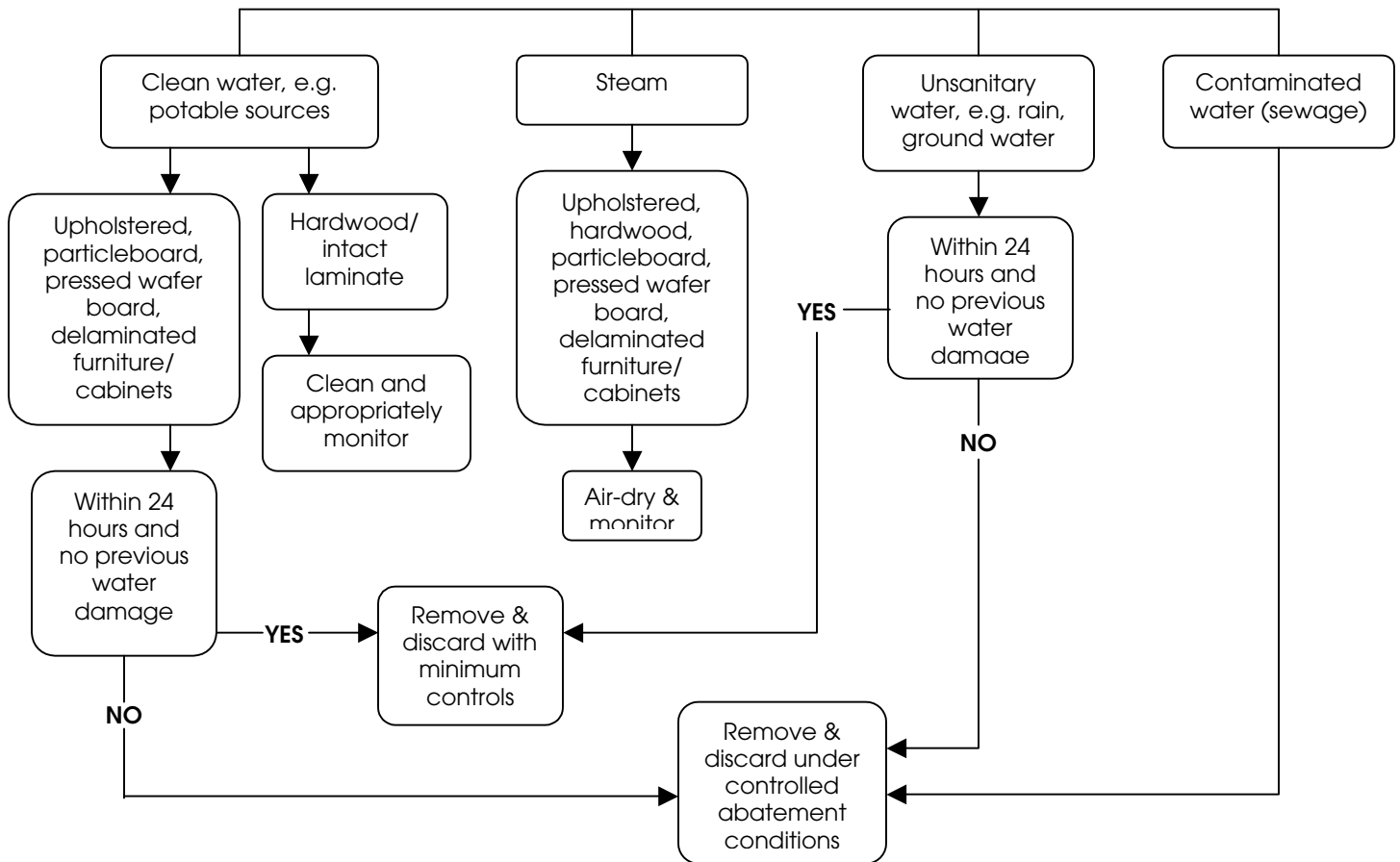


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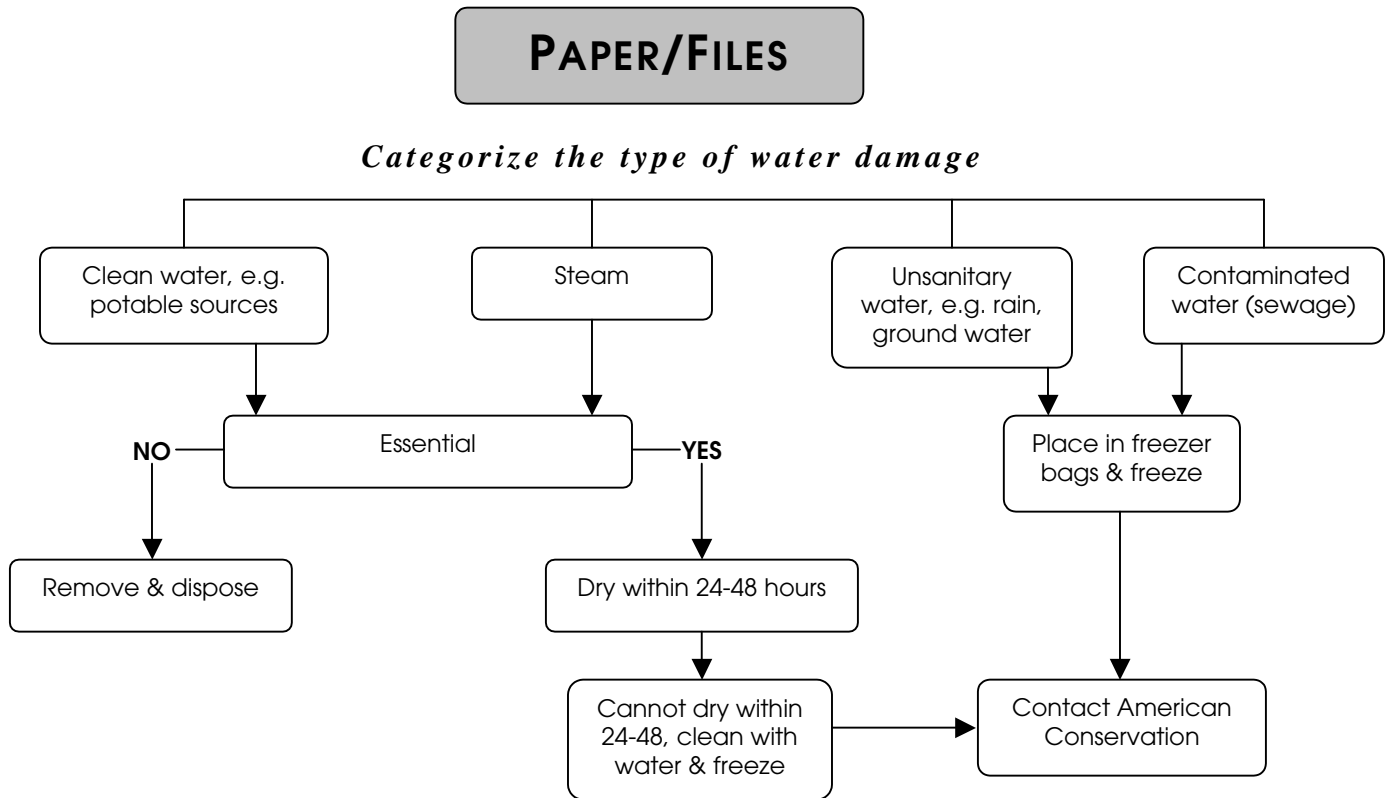
FURNITURE/ CASEWORK

Categorize the type of water damage



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