West Virginia University

Environmental Health and Safety

STANDARD OPERATING PROCEDURES FOR MOISTURE INTRUSION

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Contents

1. Purpose

The purpose of this document is to provide those with roles for responding to flooding events with an easily understandable source of information concerning these types of events and the steps needed for a successful response.

2. Scope

Floods are intrusive water release events that result in the presence of unwanted water. This can include "clean" potable water, sewage, steam condensate, high ambient humidity, rain, ground and surface run-off. Such events can create a range of physical and health hazards, such as slips/trips and shock/electrocution. Water can also cause serious damage to equipment and building materials.

Successful flood response may require close cooperative interactions of many individuals & departments. Regardless of the source, prolonged moisture conditions can create an environment suitable for growth of micro-organisms such as mold and mildew. If these conditions persist long enough, other organisms may develop causing even more problems (i.e. termites, mosquitoes, etc.).

The severity, event and duration of such impacts are largely based on the extent of the water intrusion and the speed with which the moisture intrusion is restored.

This standard procedure applies to all West Virginia University (WVU) facilities.

3. Definitions

A. Flood: Water released in intrusive events that result in the presence of water in unwanted locations.

B. Category 1: Water that originates from a clean source that poses the lowest health risk to building occupants and clean-up crews. Water in Category 1 may include:

- Broken water supply lines
- Tub on sink outflows
- Melting ice/snow
- Rain water

C. Category 2: Water that contains a significant degree of contamination due to its source, from microbial growth, or from contamination after the initial release. Sometimes referred to as Gray Water, Category 2 water presents a higher risk of disease or infection to people who come into direct contact with the contaminated area. Water in Category 2 may include:

- Storm backup drains

- Treated cooling water
- Fire suppression systems

Category 1 water left for more than 24 – 48 hours will have increased microbial growth that will lower the water quality to a Category 2.

D. Category 3: Water that is highly contaminated and will likely contain infectious viruses, bacteria, and parasites. Sometimes referred to as Black Water, Category 3 water has the highest risk for causing disease or infection from direct or indirect contact. Water in category 3 may include:

- Sewage
- Flooding-containing silt and organic matter
- Water-contaminated with pesticides, heavy metals or toxic organic substances

E. Mold: Any of various fungi that can cause disintegration of organic matter.

F. Mildew: A superficial coating of discoloration of organic material, caused by fungi, especially under damp conditions.

4. Roles & Responsibilities:

4.1. Environmental Health & Safety

- Respond to reported water related incidents involving suspected mold growth, or other safety/health concerns and assist Facilities Management with assessing the extent of moisture intrusion/flooding.
- Respond to complaints by building occupants and investigate potential cause of symptoms.
- Evaluate areas suspected to be contaminated by mold growth and provide recommendations to Facilities Management for remediation.
- Respond to events involving sewage backflows or other Category 2 or Category 3 water intrusions
- Define the scope and procedures for mold remediation activities.
- Provide training to FM employees and other WVU staff on moisture response and mold remediation.
- Provide health and safety oversight for mold remediation; including visual inspection and sampling/testing when needed.

- Communicate with building occupants and FM regarding health concerns and sampling results.

4.2. Facilities/Custodial

- Provide prompt clean- up to various emergencies including floods and other water intrusion events using approved methods and personal protective equipment.
- Assist zone management in the cleaning and drying process using wet/dry vacuums, water extractors, fans, industrial de-humidifiers. Disinfectants may also be used to clean up small areas of mildew and other microbial contaminated surfaces and objects.

4.3. Facilities/Zone Management (FM)

- Provide trained professional tradesperson for response to building floods.
- Assist in the evaluation and repair of damages to building materials and furnishings, and post-event return to normal operating condition.
- Coordinate various entities response (i.e. Engineering, contractors, EHS, trades, custodial, etc.) to water intrusion and flooding.
- Provide routine maintenance on critical building systems to ensure appropriate indoor conditions and to help prevent water infiltration and floods (i.e. clearing indoor plumbing and drainage systems, window repairs, roof and gutter inspections and repairs).
- Ensure proper PPE available to employees responding to water and/or mold conditions.

5. Procedure for eliminating moisture

5.1. First 48 hours

In the event of water infiltration into building areas, remediation within 24 to 48 hours is critical in prevention of mold growth. The following steps should be taken:

a) **Identify the source of the moisture:** Following the discovery of water intrusion into building spaces, the first step is to identify what category the water source is. Category 1 water generally requires the least amount of personal protective equipment and has the best potential to salvage damaged building materials and furnishings. Category 2 and Category 3 require additional personal protective equipment, disinfectants, and are much more difficult to salvage damaged materials.

If the water source is Category 2 or Category 3, , contact Environmental, Health and Safety (EHS) at 304-293-3792 for guidance on cleanup strategies and personal protective equipment. If mold growth is believed to have been found, refer to the Mold Remediation Standard Operating Procedure.

b) **Prevent further moisture intrusion**: The next step is to halt further moisture intrusion by repairing the water leak.

c) **Document damage:** Conduct an assessment and document all water damaged areas, building materials, and furnishings. Pay special attention to identifying wet carpet under cabinets, furniture, and furnishings.

d) **Determine whether materials are "dry":** Response equipment will include moisture monitoring and evaluation equipment. If materials are wet, restorative drying equipment like dehumidifiers and air movers (like fans) should be used. Water intrusion clean-up strategies for common materials are summarized in section 5.3 of this document.

The sooner repair, clean up and drying are accomplished, the likelihood of preventing mold growth is increased. If EHS consultation is needed, contact 304-239-3792 or complete a request form at ehs.wvu.edu.

5.2. Personal Protective Equipment (PPE)

Unless verified as clean water, contact EHS to assist in determining appropriate PPE.

5.3. Water-damage cleanup guideline

Water Damage- Clean-up and Microbial Growth Prevention*

*Guidelines for response to clean up water damage and to help prevent microbial growth. These guidelines are **only** for response to water intrusions that can be verified as originating from Category 1 (**clean**)water sources.*

Water- Damaged[1] Material	**Recommended action(s):**
Books & Papers	○ For non-valuable items, discard books and papers. ○ Photocopy valuable/ important items, discard originals. ○ Freeze (in frost-free freezer or meat locker) or freeze-dry.
Carpet & Backing (dry within 24-48 hours)	○ Remove water with water extraction vacuum. ○ Reduce ambient humidity levels with dehumidifiers. ○ Accelerate drying process with fans. ○ Ensure the subfloor (under the carpet) is clean and dry.

Ceiling tiles	o Discard and replace.
Cellulose Insulation	o Discard and replace.
Concrete or cinder block surfaces	o Remove water with water extraction vacuum. o Accelerate drying process with dehumidifiers, fans, and/or heaters.
Fiberglass insulation	o Discard and replace.
Hard surface, porous flooring[2] (linoleum, ceramic tile, vinyl)	o Vacuum or damp wipe with water and mild detergent and allow to dry, scrub if necessary. o If suspected to be in need of attention, check to make sure sub-flooring is dry, dry sub-flooring if necessary.
Non-porous, hard surfaces(Plastics, metals)	o Vacuum or damp wipe with water and mild detergent and allow to dry, scrub if necessary.
Upholstered furniture	o Remove water with water extraction vacuum. o Accelerate drying process with dehumidifiers, fans, and /or heaters. o May be difficult to completely dry within 48 hours. If the piece is valuable, you may wish to consult a restoration/ water damage professional that specializes in furniture.
Wallboard (drywall and gypsum board)	o May be dried in place if there is no obvious swelling and the seams are intact. If not, remove, discard, and replace. Ventilate the wall cavity, if possible and safe to do so. Do not direct fans toward contaminated (i.e. asbestos, mold, etc.) building materials.
Window drapes	o Follow laundering or cleaning instructions recommended by the manufacturer.
Wood surfaces	o Remove moisture immediately and use dehumidifiers, gentle heat, and fans for drying. (Use caution when applying heat to hardwood floors.)

- Treated or finished wood surfaces may be cleaned with mild detergent and clean water and allowed to dry.
- Wet paneling should be pried away from wall for drying.

* If mold growth has occurred, Refer to the Mold remediation SOP. If you know or suspect that the water source is contaminated with sewage, or chemical or biological pollutants, **Consult EHS at 304-293-3792.**

1. If a particular item(s) has high monetary or sentimental value, you may wish to consult a restoration/water damage specialist**.**

2. The subfloor under the carpet or other flooring material must also be cleaned and dried. See the appropriate section of this table for recommended actions depending on the composition of the subfloor.

5.4. Post-restoration verification

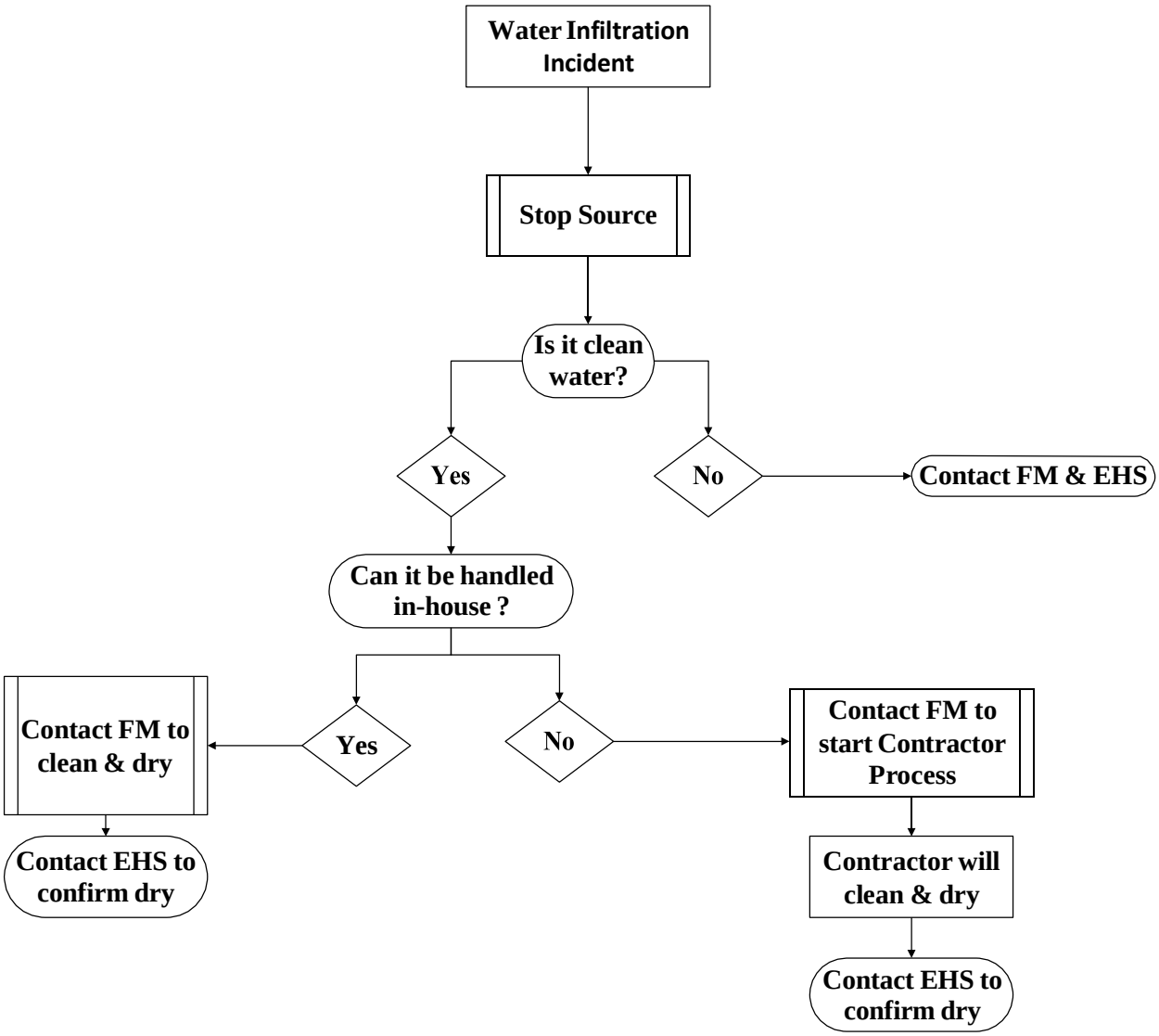
After 48 hours, Facilities Management should ascertain the level of damage to building surfaces and materials, and determine if replacement or repairs are immediately needed. EHS may be requested to assist with this assessment and provide moisture meter readings. For clean water intrusions, removal and replacement of damaged surfaces and materials can be minimized by drying the affected area within 24-48 hours, potentially up to 72 hours depending upon the time of year and ambient humidity levels. It is particularly important to remove water completely from carpeting within this time frame, because mold will begin to form readily on the backing. However, if this is not possible or if the carpeting and/or backing is damaged from mold, then it may need to be removed and replaced. Where building materials and surfaces require removal, or more aggressive cleaning, it is essential to communicate the work needs with occupants and provide temporary relocation.

5.5. Guidance on Moisture Intrusion after 48 hours

When water intrusion has remained uncorrected or building materials are not “dry” after 48 hours, mold growth may have begun. There may be visible evidence of growth or a moldy, damp smell. Recommendations for cleanup or remediation by EHS will depend on the extent of the damage, the types of materials affected, and the presence/type of mold growth. EHS will make recommendations on whether current occupants should be relocated; on the containment/cleanup methods to be used (including whether

remediation can be done by in-house personnel or if professional contractors are required); and on the types of personal protective equipment required for clean-up by custodial staff. **In the event that mold growth is suspected or discovered, refer to EHS SOP on Mold Remediation.**

5.6. Water Intrusion Response Plan Flow Chart



6. References

- **Cornell University Environmental Health and Safety. Facility Flood Response Standard Procedure.**
- **The National Institutes of Health. Moisture and Mold Remediation ORS and ORF Standard Operating Procedures. HTML version of the file http://www.ors.od.nih.gov/sr/dohs/Documents/MoldSOP.pdf.**
- **The Ohio State University. Facilities Operations and Development. Indoor Flood Cleanup and Mold remediation Standard Operating Procedure (SOP)**
- **U.S. Environmental Protection Agency. Mold Remediation in Schools and Commercial Buildings EPA 402-K-01-001.**