



# INDIANA UNIVERSITY

OFFICE OF THE EXECUTIVE VICE PRESIDENT  
FOR UNIVERSITY ACADEMIC AFFAIRS

University Environmental Health and Safety

## Water Damage Restoration Program

December 1, 2015

### 1. INTRODUCTION

#### 1.1. Purpose

Indiana University Environmental Health and Safety (IUEHS) has developed this Program to ensure that all water intrusions are handled safely and in a professional manner. The Program includes the most recent information and response procedures available.

#### 1.2. Scope

Guidelines, procedures and standards have been established not only to ensure the safety of everyone on IU campuses but also to include every means available to promote the preservation, replacement and/or repair of University property according to standards/recommendations contained in the IICRC S500 Standard and Reference Guide for Professional Water Damage Restoration, Institute of Inspection Cleaning and Restoration Certification.

### 2. AUTHORITY AND RESPONSIBILITY

#### 2.1. University Environmental Health and Safety (IUEHS) is responsible for:

- 2.1.1. Evaluating hazards present during water intrusion events;
- 2.1.2. Coordinating with Facility Services and/or Physical Plant for the respective campus to mitigate hazards;
- 2.1.3. Coordinating with the Facility Services and/or Physical Plant for the respective campus to ensure building materials are dried in a timely manner;
- 2.1.4. Assisting the respective campus with the development of procedures and call-out lists; and
- 2.1.5. Providing guidance for the removal of building materials affected by the water intrusion event.

#### 2.2. Facility Services and/or Physical Plant (FS/PP) are responsible for:

- 2.2.1. Working with IUEHS for the respective campus to establish procedures and call-out list for the response to large water release events in accordance with this Program;
- 2.2.2. Making the appropriate emergency contacts immediately upon receiving a report of a water intrusion event;
- 2.2.3. Coordinating with IUEHS to determine hazards present during the water intrusion event;
- 2.2.4. Coordinating with IUEHS to ensure building materials are dried in a timely manner;
- 2.2.5. Conducting the removal of building materials in coordination with IUEHS; and
- 2.2.6. Notifying IU Office of Insurance, Loss Control & Claims (INLOCC), appropriate departments, building managers, room occupants, etc. in the event of a water intrusion event.

#### 2.3. Departments are responsible for:

- 2.3.1. Assisting FS/PP with the coordination of clean-up activities, relocation of employees, and/or equipment.

2.4. **Employees** are responsible for:

- 2.4.1. Reporting water leaks and/or water intrusion events to FS/PP.

2.5. **IU Police Department**

- 2.5.1. Contacting IUEHS for the respective campus of a reported water intrusion event; and  
2.5.2. Contacting Facilities Services/Physical Plant when employees report flooding after hours to IUPD.

2.6. **IU Office of Insurance, Loss Control & Claims (INLOCC)**

- 2.6.1. Providing insurance and fire suppression systems support during major water intrusion events.

2.7. **IU Emergency Management and Continuity (EMC)**

- 2.7.1. Coordinating with outside entities during major water intrusion events.

3. **PROGRAM ELEMENTS**

3.1. **General Procedures**

The following procedures shall be followed (at a minimum) when water intrusion events affect building and/or building materials and shall follow the principles of Incident Command. IU employees, Zone Maintenance, Building Services, and/or contractors **shall not enter** a space that contains hazardous conditions (materials, asbestos, hazardous energy sources) until IUEHS has been notified and given approval for entry or until complete mitigation of the hazard has occurred.

- 3.1.1. Water intrusion event is reported;  
3.1.2. Appropriate maintenance/plumbing/custodial/response personnel are dispatched to the scene;  
3.1.3. **Before** entering the space, personnel shall evaluate whether any additional hazards are present that were created by the water intrusion event. The evaluation shall always include a review of potential hazards such as electrical hazards and spilled hazardous materials (chemicals, biological, and radiological materials). **Note:** Hazardous materials that are intact and unaffected by the water intrusion event should not prevent entry to an area to stop the water source;  
3.1.3.1. If additional hazards are present, personnel **shall not** enter those spaces without approval from the appropriate IUEHS officials for the respective campus and/or complete mitigation of that hazard (for example, interruption of power to the equipment that presents the electrical hazard). IUEHS approval for entry may be obtained over the phone in some situations.  
3.1.4. Persons not involved in the response should be excluded from the area by signage, locked doors, etc. If necessary, IUPD for the respective campus should be contacted to assist with perimeter control;  
3.1.5. All attempts shall be made to safely stop the water source as soon as possible;  
3.1.6. After the water source is contained and it is determined that additional hazards are not present or clearance has been obtained from the appropriate IUEHS representative for the respective campus the following need to be performed:  
3.1.6.1. The IU Office of Insurance, Loss Control & Claims (INLOCC), along with other appropriate departments, building managers, room occupants, etc. (i.e., those affected by the flood) shall be notified;  
3.1.6.2. If asbestos-containing materials have been damaged, IUEHS shall be consulted about appropriate cleanup procedures;  
3.1.6.3. If sanitary sewage is involved, see Appendix B of this Program;  
3.1.6.4. Standing water shall be removed by wet-vacuum or other means;  
3.1.6.5. Furniture and carpet shall be thoroughly dried utilizing fans, dehumidifiers, and manual methods. Furniture, file cabinets, etc. shall be moved to ensure moisture

is not present beneath it. The goal is to completely dry the area within 48 hours to prevent mold growth. For more information, see Appendix B;

- 3.1.6.6. Wet drywall and other building materials shall be dried according to Appendix B; and
- 3.1.6.7. Visible mold that develops in the space shall be immediately reported to the appropriate Facilities Services/Physical Plant personnel for further evaluation and/or action.

### **3.2. Indoor Water Intrusions Affecting Multiple Floors and/or Departments**

Response to large water intrusion events that affect more than one area and/or floor of a building shall comply with the following guidelines in addition to those indicated in the general procedures.

- 3.2.1. An Incident Command (IC) area shall be set up outside of the area affected by the water intrusion event;
- 3.2.2. A single person shall assume command of the response. IC may be a Facility Services and/or Physical Plant representative, but can also be a representative from IUEHS, IU Police Department, Insurance, Loss Control & Claims (INLOCC), or IU Emergency Management and Continuity (EMC).
- 3.2.3. The following groups may need to be notified during a water intrusion event by the Incident Commander;
  - 3.2.3.1. Indiana University Police – Perimeter control
  - 3.2.3.2. IUEHS – Health and safety
  - 3.2.3.3. IU Emergency Management and Continuity – Coordination with outside entities
  - 3.2.3.4. Public Affairs and Government Relations – Media inquiries
  - 3.2.3.5. INLOCC – Insurance and fire suppression systems
- 3.2.4. Response steps for large water intrusion events will be the same as for small ones, but will require more personnel, more time, and more organization. The priorities for the Incident Commander as they respond to the incident are:
  - 3.2.4.1. Life safety – the number one priority is to keep employees, responders and bystanders safe; and
  - 3.2.4.2. Property preservation.

### **3.3. Personal Protective Equipment**

Employees responding to a water intrusion event shall, at a minimum, wear waterproof, non-electrical conductive boots and gloves.

Employees removing contaminated water (Category 2 and 3 water) must, at a minimum, wear rubber knee-high boots, rubber gloves, and safety goggles (preferred) or safety glasses.

An evaluation must be made to determine the necessity for respiratory protection and protective suits. In the case of overhead hazards or contamination, hard hats must also be worn.

Any equipment exposed to sewage contaminated water must be disinfected prior to leaving the scene unless the equipment is disposed of as waste.

## **4. TRAINING**

- 4.1. All employees with the assigned responsibility of responding to water intrusion events must be trained in General Electrical Principles/Electrical Safety.
- 4.2. Employees performing category 2 water (gray water) and category 3 water (black water) damage restoration must be trained in the following:
  - 4.2.1. Universal Precautions in the Bloodborne Pathogens training; and
  - 4.2.2. General Electrical Principles/Electrical Safety training.

## **5. REFERENCES**

- IICRC S500

## **6. REVISIONS**

New Document: December 1, 2015

## APPENDIX A – GLOSSARY

**Category 1 Water** - Water originating from a source that does not pose substantial harm to humans. Category 1 water is also referred to as “non-contaminated water.”

Examples of category 1 water sources may include, but are not necessarily limited to the following:

- Broken domestic water supply lines;
- Tub or sink overflows with no contaminants;
- Appliance malfunctions involving domestic water supply lines;
- Melting ice or snow;
- Falling rainwater; and
- Broken toilet tanks and toilet bowls that do not contain contaminants or additives.

Category 1 water that has contact with structural surfaces and building materials may deteriorate in cleanliness as it dissolves or mixes with soils and other contaminants, and as time elapses.

**Category 2 Water** - Water containing a significant degree of chemical, biological and/or physical contamination and having the potential to cause discomfort or sickness if consumed by or exposed to humans. Category 2 water is also referred to as “gray water.” Category 2 water carries microorganisms and nutrients for microorganisms.

Examples of category 2 water sources may include, but are not necessarily limited to the following:

- Discharge from dishwashers or washing machines;
- Overflows from toilet bowls with some urine (no feces);
- Sump pump failures;
- Seepage due to hydrostatic pressure;
- Chilled and condensate water; and
- Fire protection sprinkler water.

Category 2 water may contain chemicals, biocontaminants (fungal, bacterial, viral algae) and other forms of contamination including physical hazards.

Time and temperature aggravate category 2 water contamination levels significantly. Category 2 water in flooded structures that remains untreated for longer than 48 hours may be reclassified to category 3 - black water.

**Category 3 Water** - Grossly unsanitary water containing pathogenic agents, arising from sewage or other contaminated water sources and having the likelihood of causing discomfort or sickness if consumed by or exposed to humans. Category 3 water is also referred to as “black water.” Category 3 water includes sewage and other contaminated water sources entering or affecting the indoor environment. Category 2 water that is not removed promptly from the structure may be reclassified as category 3 water.

Category 3 water also includes, but is not necessarily limited to all forms of flooding from:

- Toilet back flows that originated beyond the toilet trap are considered category 3 water contamination, regardless of visible content or color;
- Ground surface water; and
- Rising water from rivers or streams.

Such water sources carry silt and organic matter into structures and create black water conditions.

**Hazardous Areas** - Areas that present additional risk to personnel due to the water release. Examples of additional hazards are spilled hazardous materials, electrical dangers due to water, and disturbed/damaged asbestos-containing material.

## APPENDIX B – WATER DAMAGE RESTORATION GUIDELINES

**Excess Water Removal** - Excess water removal is essential at the beginning point of restoration procedures. Removal of excess water may be achieved by physical means such as mopping or soaking up excess moisture from hard surfaces or furnishings. However, water removal usually involves the use of more sophisticated techniques and equipment such as pumps, or specially designed commercial wet vacuuming equipment.

**Evaporation** - Once excess water is removed, remaining water must be changed from a liquid to a vapor by promoting evaporation. Normally, this is accomplished efficiently with specialized air-moving equipment.

**Dehumidification** - Once moisture is evaporated from structural materials and contents into the air, the moisture must be removed from the air through dehumidification, or it must be externally exhausted. Failure to dehumidify may result in substantial secondary damage and present a significant health hazard.

**Temperature Control** - Both evaporation and dehumidification are greatly enhanced by controlling the temperature in a confined environment. Additionally, microorganisms' growth is temperature related. Thus, temperature modification and control is an important basic principle for safe, effective drying.

**Monitoring** - The damaged structure must be monitored starting with the initial assessment and evaluation, and continuing throughout the restoration process. Monitoring procedures may include, but are not limited to the following:

- Temperature and humidity readings;
- Updating drying progress status; and
- Checking the moisture content of structural wood and other materials with a moisture meter.

When applicable, monitoring also must include checking equipment operation, work progress and indoor environment quality. Drying Standards have been developed and are available in Appendix C.

**Inspection** - Following the removal of excess water and installation of drying and dehumidification equipment, a detailed inspection must be conducted that considers the extent of water migration, the types and quantities of affected materials and the degree of apparent damage. The information obtained may be used to analyze the extent of damage and to determine the job scope. Professional testing equipment and the principles of psychrometry must be used to formulate a plan to dry and restore, or replace both structural materials and contents. A comprehensive inspection may include, but is not necessarily limited to, the following:

- Identifying and evaluating health and safety hazards;
- Determining the source of water;
- Determining the need to protect floor covering materials and contents;
- Determining the extent of moisture intrusion;
- Determining the job scope;
- Evaluating flooring materials;
- Evaluating inventories and/or contents;
- Evaluating the HVAC system, if affected;
- Assess other structural materials (walls, ceilings, etc.);
- Documenting preexisting conditions not related to the current loss (wear, urine contamination, delamination, etc.); and
- Establishing drying goals.

**Floor covering evaluation** - It is recommended that a determination be made as to whether floor-covering materials (e.g. carpet, cushion, vinyl, wood, laminates) are salvageable. Considerations may include, but are not necessarily limited to the following:

- Construction integrity; and
- Porosity and potential health effects from contaminants.

Disposition of floor coverings and the ability to salvage them will be determined according to Appendix C.

**Structural Materials** - Throughout the restoration process, it is essential that effort is directed toward anticipating secondary damage and attending to other structural components that may require drying, or demolition and replacement. This is especially important if water remains in contact with building materials longer than 24 hours, such as water on flooring in contact with gypsum board. These components may include, but are not necessarily limited to the following:

- Ceilings;
- Walls;
- Built-in furnishings and fixtures;
- Insulation; and
- Structural wood.

**Occupant Evacuation** - For areas with extensive water damage, determine if occupants need to be evacuated from the damaged area, and, if so, estimate the duration of time. Factors used to make this determination may include, but are not necessarily limited to the following:

- Contamination;
- Obvious indications of high levels of microbiological or chemical contamination; and
- Presence of occupants who are immunocompromised, have mold allergies, asthma or other applicable medical conditions.

**Training** - Employees performing category 2 water (gray water) and category 3 water (black water) damage restoration must be trained in Universal Precautions in the Bloodborne Pathogen training and General Electrical Principles/Electrical Safety training.

**Personal Protection** - Persons working in or around Category 3 water during the initial stage of decontamination, cleaning and biocide application must be equipped with personal protective equipment (PPE) including but not necessarily limited to the following:

- Rubber knee-high boots;
- Rubber gloves; and
- Safety goggles (preferred) or safety glasses.

An evaluation must be made to determine the necessity for respiratory protection and protective suits. In the case of overhead hazards or contamination, hard hats must also be worn.

## APPENDIX C – DRYING AND REMEDIATION STANDARDS

### Criteria for Determining When Building Materials Are “Dry”

The underlying principles that guided the development of these standards were:

1. The ambient conditions must be stabilized and be able to be held at normal room conditions;
2. The building materials must be returned to their equilibrium moisture content to prevent the active growth of fungal spores; and
3. The building materials must be returned to their pre-loss moisture state. When these three conditions are met, a building can be considered dry.

Drying services shall be considered sufficient when all three of the following conditions are met.

1. The interior ambient conditions are at or better than normal room conditions (50%RH @ 70° F);
2. The moisture in the building materials themselves will not support the active growth of mold and mildew; and
3. The building materials and contents will finish returning to equilibrium with normal room conditions by themselves without further damage to them.

Facilities Services/Physical Plant will provide measurement of moisture in building materials using a moisture meter. University Environmental Health and Safety will be available to consult for special circumstances or to verify adequate drying.

**Hardwood Floors** - For the purposes of this Standard, drying services on a hardwood floor shall be considered sufficient when all three of the following conditions are met.

1. The moisture content (MC) of the wood is decreasing;
2. All affected wood is within 2.5% of its normal moisture content as determined by actual measurement in a control point elsewhere in the same building preferably on the same floor.
3. The building environment is stabilized and the existing HVAC system is capable of maintaining normal room conditions.

**Drywall** – Drying services for drywall will generally be provided by the Facilities Services/Physical Plant. An outside contractor may be utilized for extensive water intrusion events. Drying procedures should be initiated within 24 hours of the initial water loss. Affected drywall should be dried within 72 hours of the water intrusion event. If drying is not completed within the 72 hour timeline, the drywall may need to be removed. When drywall is affected by a water intrusion event, the cove base of the affected drywall will need to be removed to allow for proper drying. If necessary, holes should be drilled at the base of the drywall to allow for adequate drying of the wall cavity. If insulation is present in the wall cavity adequate drying may not be possible. In this case, the affected drywall and insulation may need to be removed to allow for adequate drying. For the purposes of this Standard, adequate drying of the drywall shall be considered sufficient when all three of the following conditions are met.

1. The moisture content of the drywall is decreasing;
2. All affected drywall is within 10% of its normal moisture content as determined by actual measurement in a control point elsewhere in the same building preferably on the same floor. Normal is generally less than or equal to 0.5% or in the green scale on a meter; and
3. The building environment is stabilized and the existing HVAC system is capable of maintaining normal room conditions.

**Concrete Block/Concrete/Plaster** - For the purposes of this Standard, drying services on concrete block shall be considered sufficient when all three of the following conditions are met.

1. The moisture content at least 95% of the concrete block is decreasing.
2. 95% of affected concrete block is within 10% of its normal moisture content as determined by actual measurement in a control point elsewhere in the same building preferably on the same floor or the readings are within the green scale on the meter.
3. The building environment is stabilized and the existing HVAC system is capable of maintaining normal room conditions.

**Carpeting** - For the purposes of this Standard, drying services on carpeting may be effective if the following conditions are met.

1. The carpet is not wet with Category 1 or 2 water for more than 7 days.
2. The carpet is not wet with Category 3 (black) water for any amount of time.
3. The building environment is stabilized and the existing HVAC system is capable of maintaining normal room conditions.
4. If 1 and 2 are not met, the carpet must be removed and replaced. Carpeting shall be steam-cleaned and thoroughly dry prior to reoccupancy.

**Insulation:** For the purposes of this Standard, some types of thermal insulation materials used in walls or ceilings cannot be adequately dried and reused. Common insulation types containing mold growing ingredients are paper backed fiberglass and blown cellulose. If insulation material cannot be dried out within 72 hours or before it grows mold, it must be removed from the building. The area where it was installed must be thoroughly cleaned, and dried and if not cleanable, removed. New insulation may then be installed.

## APPENDIX D – WATER RESPONSE PROCEDURES

### Purpose

To identify the proper response procedure for Facilities Services/Physical Plant (FS/PP) when a water leak or damage is reported.

### Response Procedures

1. Customer reports leak to Facilities Services/Physical Plant (FS/PP).
2. Building Services and Zone Maintenance will respond to the location and contact the appropriate supervision upon arrival to discuss possible hazards, and the ability to stop the source of water without entering hazardous space. Zone Maintenance, Building Services, and/or Contractors **shall not enter** a space that contains hazardous conditions (materials, asbestos, hazardous energy sources) until IUEHS has been notified and given approval for entry.
3. If it can be done without entering a hazardous area, Zone Maintenance will isolate and stop the leak if appropriate and notify the responsible department for leaks occurring from the outside.
4. The Zone Maintenance Manager or Building Services Manager in charge will determine what category of water is involved and whether FS/PP staff can effectively remediate the water and dry, clean or remove as necessary (see table below) the affected area in-house or if an outside contractor should be utilized. INLOCC will be notified if an outside contractor is required.
5. Building Services will remove water from the damaged surfaces via the use of wet vacuums and floor dryers. Furniture and other items such as file cabinets will be removed or elevated above the flooring surface as needed to gain access to floors and walls.
6. Zone Maintenance will utilize moisture metering equipment to determine moisture content of affected materials utilizing the drying standards in Appendix C.
7. If building materials other than carpet are considered to be wet, Zone Maintenance or Building Services will place air drying equipment to dry out these materials as well. Holes should be drilled in the base of the wall every 18 inches to ensure adequate drying of the wall cavity. If insulation is present within the wall cavity, the wall might have to be opened up to provide adequate drying. Any mold that is discovered upon opening the space must be cleaned up (on non-porous materials) or removed (on porous materials) prior to air drying. If this is not done, mold spores will be spread throughout the area, increasing the chance that negative health consequences will be observed in the area.
8. Reassess the water damage and determine whether IU personnel can effectively dry all materials or if a contractor is necessary.
9. Building Maintenance will perform any additional remediation/restoration that may be required.

	Category 1	Category 2	Category 3
Hardwood floors	Dried	Expert opinion	Remove/replace
Dry wall	Dried	Remove/replace/dry if determined by IUEHS	Remove/replace
Concrete block	Dried	Disinfected & dried	Disinfected & dried
Plaster	Dried	Disinfected & dried	Disinfected & dried
Concrete	Dried	Disinfected & dried	Disinfected & dried
Carpeting	Dried	Expert opinion	Remove/replace
Insulation	Dried	Remove/replace	Remove/replace

## **APPENDIX E - ELECTRICAL SAFETY PROCEDURES FOR RESPONDING TO WATER INTRUSION EVENTS**

### **General Statement of Warning**

All personnel (whether contractual or University) are to consider standing water interior to any campus building as presenting an electrocution hazard until such a time that an investigation by appropriate University personnel determine that no electrical hazards exist or that any existing hazards are appropriately abated.

### **Campus Personnel**

1. All campus personnel with the assigned responsibility of responding to water intrusion events (building flooding) on campus will complete General Electrical Principles/Electrical Safety training available through FS/PP prior to responding to any flooding events.
2. All campus personnel responding to water intrusion events shall be issued and utilize appropriate personal protective equipment (PPE) including but not limited to quality, waterproof, non-electrical conductive boots and gloves.
3. No campus representative shall be allowed into flooded areas without proper PPE as specified within this Program.
4. University personnel shall make a conscious effort to avoid touching surfaces which could result in electrical grounding during the initial evaluation phase of the response. Examples of such surfaces include metal plumbing fixtures, electrical equipment, metal racks and storage shelves, door handles, etc.
5. As much as possible and practical, University personnel shall terminate electrical service to that equipment not deemed to be essential either by means of the area electrical panel or by unplugging power cords while wearing waterproof, non-electrical conductive boots and gloves.