

Environmental Health and Safety

Water Damage Restoration Guideline

Purpose

The NAU Water Damage Restoration guideline was developed to ensure that all water incursions are handled in a professional manner which includes the latest information / procedures available. Every effort will be made to ensure the health and safety of all NAU faculty, students, staff and visitors to the campus in a timely fashion.

Goal

Guidelines, procedures and standards have been established not only to ensure the safety of everyone on campus 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 Institute of Inspection Cleaning and Restoration Certification (IICRC) S500 Standard and Reference Guide for Professional Water Damage Restoration. For prolonged water incursion events that lead to the formation of mold growth, remediation efforts shall follow the IICRC Standard for Professional Mold Remediation (S520). Typically an outside contractor that is trained and familiar with the IICRC remediation protocols is retained to perform water, mold and sewage restoration efforts due to the amount of training, vaccination, personal protective equipment (PPE), and other safety requirements associated with the work activities. University personnel that are familiar with water extraction/cleanup activities may assist with small isolated clean water, or Category 1 water, restoration activities if it is safe to do so but should check with their supervisor or NAU Regulatory Compliance.

Flood Category Definitions

Certain terms and definitions associated with water damage restoration exist. The following are definitions of terms used:

Category 1 Water - Water originating from a source that does not pose substantial harm to humans. Category 1 water is also referred to as "clean water."

Examples of clean 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.

Clean water that has contact with structural surfaces and content 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.” Gray water carries microorganisms and nutrients for microorganisms.

Examples of gray 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.

Gray 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. Gray water in flooded structures that remains untreated for longer than 48 hours may change 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 or exposed to humans. Black 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. Toilet back flows that originated beyond the toilet trap are considered black water contamination, regardless of visible content or color.

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

- Sewage/rainwater mixed; and
- Rising water from rivers or streams.

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

Restoration Guidelines & Criteria

Excess Water Removal - Excess water removal is essential as 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 presented in **Appendix A**.

Inspection - Following the removal of excess water, 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 principals 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 items;
- 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.

If the inspection conclusions require that any materials be removed, the project manager, building manager, or other responsible party is responsible to providing information regarding the presence of **asbestos** to the restoration contractor. This information is ONLY available through the Asbestos Program Office (3-6435). In addition, the contractor must receive, sign, and return a job-specific FS-13 form prior to the start of work or any change in the scope of work. This document is an auditable document required by purchasing in order to process payment for any work performed by contractors on the NAU campus.

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 the appended Drying Standards.

Structural Materials - Throughout the restoration process, it is highly recommended 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
- 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:

- Type of contamination (e.g., Category 1,2, or 3 water);
- Obvious indications of high levels of microbiological or chemical contamination; and,
- Presence of occupants who are immunocompromised or have mold allergies, asthma or other applicable medical conditions.

Technician Training - Technicians performing category 2 water (gray water) and category 3 water (black water) damage restoration must be trained in risks of exposure and procedures for safe cleanup of these materials.

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 gloves
- Eye protection
- Protective suit
- Rubber boots

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

APPENDIX A – 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 organisms; and
3. The building materials must be returned to their pre-loss moisture state. When these three criteria are met, a building can be considered dry.

Drying services shall be considered sufficient when the following three conditions have been achieved.

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.

Hardwood Floors - For the purposes of this Standard, drying services on a hardwood floor shall be considered sufficient when all four 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 on the same floor.
3. The differential of MC in wood from the top ¼” to the bottom ¼” is no more than 1%.
4. The building environment is stabilized and the existing HVAC system is capable of maintaining normal room conditions.

Drywall - Drying services for drywall will be provided by an outside contractor. If drying procedures are not initiated within 48 hours of the initial water loss or dried within 72 hours, all wet drywall should be replaced. For the purposes of this Standard, drying services on drywall shall be considered sufficient when all four 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. (Example: Taking several readings in unaffected areas of drywall showed that the MC that should be expected in the building is 14%. Therefore, the maximum reading at the end of the job should be no more than 24 %.)
3. The differential of MC in wood from the top ¼" to the bottom ¼" is no more than 1%.
4. The building environment is stabilized and the existing HVAC system is capable of maintaining normal room conditions.

Concrete Block - For the purposes of this Standard, drying services on concrete block shall be considered sufficient when all four of the following conditions are met:

1. The moisture content of the concrete block is decreasing.
2. All 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. (Example: Taking several readings in unaffected areas of concrete block showed that the MC that should be expected in the building is 10%. Therefore the maximum reading at the end of the job should be no more than 20%).
3. 95% of the affected concrete block area meets criteria 1 & 2.
4. The building environment is stabilized and the existing HVAC system is capable of maintaining normal room conditions.

Plaster - For the purposes of this Standard, drying services on plaster shall be considered sufficient when all four of the following conditions are met:

1. The moisture content of the plaster is decreasing.
2. All affected plaster is within 10% of its normal moisture content as determined by actual measurement in a control point elsewhere in the same building. (Example: Taking several readings in unaffected areas of plaster showed that the MC that should be expected in the building is 10%. Therefore the maximum reading at the end of the job should be no more than 20%).
3. 95% of the affected plaster area meets criteria 1 & 2.
4. The building environment is stabilized and the existing HVAC system is capable of maintaining normal room conditions.

Concrete - For the purposes of this Standard, drying services on concrete shall be considered sufficient when all four of the following conditions are met:

1. The moisture content of the concrete is decreasing.
2. All affected concrete is within 10% of its normal moisture content as determined by actual measurement in a control point elsewhere in the same building. (Example: Taking several readings in unaffected areas of concrete

showed that the MC that should be expected in the building is 10%. Therefore the maximum reading at the end of the job should be no more than 20%).

3. 95% of the affected concrete area meets criteria 1 & 2.

4. 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 48 hours.

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/sanitized and thoroughly dry prior to reoccupancy.

Insulation: For the purposes of this Standard, thermal insulation materials used in walls or ceilings cannot be adequately dried and reused. If insulation material is determined to be wet, it must be removed from the building. The area where it was installed must be thoroughly cleaned, disinfected and dried. New insulation may then be installed.

APPENDIX B – FLOOD RESPONSE PROCEDURE

Purpose

To identify the proper response procedure for University and other personnel when water/sewage flood damage is reported.

Response Procedures

A. Notifications

1. Upon discovery of a flood, call FAST 3-4227 during normal business hours. After business hours and on weekends notify the **Central Plant Operator** (3-6412). Provide information to the Operator regarding the location, intensity and type of flood (i.e., sewage, stormwater, plumbing line, etc.). The Operator will notify the On-Call Supervisor. The Supervisor will then notify appropriate NAU staff. Outside vendors* may be necessary if the scope of damage exceeds the capability of NAU resources-especially if sewage is involved.

Outside Vendor Assist (24/7).....	Qualified Vendor List*
Operations & Maintenance.....	3-1660
NAU Police	3-3611
Custodial Services (small Category 1 water).....	3-6565
NAU Industrial Hygienist.....	3-6109 or 3-6435

* Qualified vendor is one that has met minimum State requirements concerning Insurance. An emergency purchase request should be sent to Purchasing within twenty-four (24) hours after calling the outside vendor to assist.

* A Damage Report should be submitted as soon as possible (for non-criminal damage) to initiate the insurance claim process. The Damage Report is located on the NAU "Police/University" website (<https://www4.nau.edu/police/>). The Damage Report is not a police report and will be issued a claim number by the Insurance Officer at Property and Liability Insurance Services. However, if the damage is due to vandalism/criminal damage, immediately contact NAU Police Dispatch, 523-3611, to file a police report. For additional information about filing a claim for damages, contact NAU's Insurance Officer with Property and Liability Insurance Services (523-2009).

B. Evacuation/Perimeter Control

1. In a situation where floods are uncontrolled or involve infectious waste or other hazards (electrical), staff may be instructed to evacuate the area by NAU Regulatory Compliance, appropriate Capital Assets and Services Staff, or other responders (NAU PD or outside contractor).
2. Perimeter control must be established by staff in the area with assistance

from NAU Regulatory Compliance, Custodial Services, or other responders.
3. The remediation contractor will tape off affected areas and divert traffic in such a fashion to minimize public exposure to the affected areas.

C. Pre-Restoration Action

1. Responders entering the affected areas will wear the appropriate personal protective equipment (i.e., impervious boots, impervious gloves, goggles, and face shield and protective clothing if splashing is likely).
2. Photographs should be retained for insurance documentation and submitted to the Insurance Officer, Property and Liability Insurance Services, as supporting documentation for the property damage claim. Please write the claim number on all supporting documentation sent.
3. Responders will establish a Decontamination Zone as follows:
 - a. An approved disinfectant (see Definitions) shall be used to decontaminate equipment that is removed from the contaminated area.
 - b. To control the spread of potentially infectious material to clean areas, all persons leaving the affected area shall walk across the Decontamination Zone barrier, which consists of:
 - i. Disinfectant soaked disposable absorbent pads placed on a clean area of the floor,
 - ii. Clean disposable absorbent pads dampened with water placed on the clean side of the floor,
 - iii. Clean, dry disposable absorbent pad placed at the end of the Decontamination Zone to dry material passing through.
 - c. All materials used for remediation of the flood must either be decontaminated with an approved disinfectant prior to leaving the flood area or discarded. This includes all plumbing tools and reusable flood response equipment.

D. Containment Materials

1. Responders shall maintain spill containment materials.
2. Responders shall place spill barriers around the affected areas in order to contain the flood from potential migration to unaffected areas.
3. Reusable spill barriers shall be decontaminated by responders with a disinfectant and returned to storage.

E. Exposure Procedures

1. If university personnel or students have come in contact with sewage flood water, the following should occur:
 - a. Remove contaminated clothing.
 - b. Wash affected area with soap and water.
 - c. Go to the Fronske Health Center for follow-up treatment.

F. Asbestos Precautions

1. Because asbestos is present in various building materials of many buildings on campus, no disturbance including removal of flooring or wall materials may be conducted without prior authorization by the Asbestos Program Office.
 - a. Contractors, building managers, project managers, or other responsible parties may contact the asbestos program office directly at 3-6435.
 - b. Restoration Contractors must sign and return a copy of the NAU FS-13 form prior to the commencement of work. This is an auditable document which confirms that the contractor has received asbestos information pertinent to the project at hand. Purchasing requires this document to complete processing of payment for any work performed.