



PROTECTING AND SALVAGING COLLECTIONS IN AN EMERGENCY

The following sections give basic emergency procedures for stabilizing artifacts involved in a disaster or an emergency. These procedures will stabilize artifacts, minimize further damage to the artifacts and prepare them for conservation treatment.

1. Salvage Methods

General Considerations

- Remove the wettest materials and items in the aisles first, then the merely damp materials.
- Start as close to the entrance as possible.
- Unload shelf units from the top down to avoid tipping.
- Be extremely careful when handling wet materials – all of them are very fragile, including any paper or cardboard storage boxes.
- If storage boxes have disintegrated replace them with new containers.
- If freezing the contents, don't unpack structurally sound containers (although they may be reinforced by packing inside plastic crates).
- If freezing materials such as books, pack the materials off the shelves directly into milk crates.
- Pack large flat material on bread trays.
- Fill containers only three-quarters full.
- The Recorder should record in a logbook what is being packed and label the packed containers. The logbook and labels should note the artifact numbers and storage location(s) of the containers, and the condition of the artifacts: soaked, partly wet or damp.
- All artifacts should be identified using tags/labels. Do not mark directly on the surface on any artifact.
- Artifacts that have defaced labels or no label at all should be given a label noting its storage location.
- Artifacts removed from boxes and re-packed should have all identifying information transcribed onto labels which are attached to the new packing containers.
- Vacated storage locations should be noted in a logbook.
- Special care must be observed in the handling of small, delicate or fragile artifacts. Before moving, determine a safe, out-of-the-way location where they cannot be bumped or hit.
- Do not lift or carry a fragile artifact by its handles, spout, rim, (or hand, foot, arm or head) or by any projecting part.
- Use one hand to support the bottom of the artifact and the other hand and arm to support the sides.
- Move the artifacts one at a time or use a container or cart.

Air-Drying

- Air-drying is a popular choice for drying, especially if a small number of artifacts have been affected and for certain artifacts, such as ambrotypes, which should not be frozen.
- Air-drying requires a large amount of space and is labour intensive.

Freezing

- Factors, such as time constraints, the number, the condition, the value, and replaceability of water-damaged items determine whether artifacts will need to be frozen.
- Freezing and cold storage at low temperatures have been found to be effective methods for the stabilization of water-damaged books, manuscripts, maps, prints and drawings (unframed), photographic materials and textiles. Freezing controls mould growth by inducing the dormant state in the spores. It is not a drying method and will not kill mould spores. Freezing prevents further damage caused by the diffusion of water soluble components and provides time in which to organize drying operations.
- The artifacts are packed into crates or boxes which are stacked on pallets in freezer trucks for transport to the cold storage facility. The materials should be frozen quickly to minimize the formation of large ice crystals.
- At the freezing facility the holding containers should be carefully stacked. Those containers without perforated sides should be separated from each other with wood slats to prevent crushing and to promote air circulation.
- The frozen material will eventually have to be dried.

Vacuum Freeze-Drying

- Vacuum freeze-drying is the most effective way to dry large quantities of wet and subsequently, frozen material. During the process, ice is sublimated directly from the solid state to the gaseous state.
- Care must be taken to ensure that the materials are neither under nor over dried.
- Freeze-drying reduces stains and reduces or eliminates odour caused by smoke.
- It also generally prevents further feathering of inks and dyes.
- The main drawback of vacuum freeze-drying is its high cost.

Vacuum-Drying

- Vacuum-drying uses a vacuum to pull the water out, after which, warm, dry air is pumped into the chamber to complete the drying.
- Since some water will first pass through the liquid state before vaporizing, vacuum-dried materials will show some feathering of inks and other water-soluble dyes.

2. Salvage of Paper

General:

- Paper is particularly vulnerable to damage by water or excessive humidity. Drawers and cabinets in the storage areas provide protection from water and smoke.
- Use plastic sheeting to cover drawers and shelves containing Solander boxes in the case of ceiling leaks. Do not open drawers or cabinets until the water has been dealt with and is no longer a threat to the collection.

- If an emergency occurs within storage area, the artifacts should be moved only if leaving them in the drawers and cabinets will cause further damage.
- Do not open Solander boxes. Remove them, if necessary, to a dry area. Clean the outside of the box before opening them carefully to inspect the contents.
- Always carry boxed prints with two hands. Carry the box horizontally at all times. Do not tilt the box or tuck it under your arm.
- Do not stack large unframed works on paper or paper artifacts lacking storage boxes. Carry them on a rigid support.

Wet paper:

- Do not attempt to separate wet sheets unless they are supported on polyester film or fabric.
- Stacks of wet documents or art on paper, with no water soluble or friable media, may be separated by following this procedure:
 1. Place a piece of damp polyester unwoven fabric or polyester film (3 mil) on top of a stack of wet, unbound papers.
 2. Rub gently with a brayer – surface friction will cause the wet paper to adhere to the fabric/film.
 3. Peel back the top sheet and place it on top of another piece of clean and dry polyester web.
 4. Remove the upper fabric/film. Place another sheet of polyester web on top of the paper sheet. This will form a sandwich of two pieces of web with a paper filling.
 5. Repeat the entire process, separating the wet sheets one at a time and interleaving them with polyester web (materials may be frozen at this stage).
- Do not blot the surface of watercolours, maps and manuscripts with soluble media. Quickly freeze or dry.
- Keep coated papers wet by packing in boxes lined with garbage bags, then freeze. Do not allow coated papers to dry or the pages will stick together permanently.
- If time and space permit, un-frame framed artworks and documents and pack as for single sheets.
- Sponge standing water out of map drawers. See below for freezing.

Air-drying:

- Small quantities of wet documents or artworks may be spread out on blotters or newsprint on tables to air-dry, or, if they do not contain water soluble or friable media, stacked interleaved with blotters and weighted down.
- Air-dry the sheets (supported by the polyester web) by placing them on absorbent paper on tables or on top of closely spaced monofilament lines. Air in the room should be kept circulating but fans should not blow directly on the materials.
- The papers may be flattened when they are almost dry by placing them between two sheets of blotting paper and applying even pressure with weights. Wet pamphlets may be suspended on lines by their central fold to save space.

Freezing/Freeze-drying:

- Packed boxes of paper can be placed in freezers or removed to freezer trucks for freezing and/or transportation to a freeze-dry facility.
- Do not try to separate single sheets of wet paper. Interleave every two inches with freezer paper and pack.
- Drawers of wet maps, plans, oversize prints and manuscripts should be removed from the cabinets and frozen stacked together with 1" x 2" strips of wood between each drawer.

- Pack loose, flat maps, etc. in bread trays, flat boxes, or on plywood sheets covered in polyethylene plastic.
- Loosely bundle together, in small quantities, rolled maps, etc. for freezing unless time and facilities are available for conservators to unroll and air-dry them.

3. Salvage of Books

General:

- Use plastic sheeting to cover the tops of the stacks in the case of ceiling leaks.
- Do not remove books from the shelves until a ceiling leak has been dealt with and the water is no longer a threat to the collection.

Wet books:

- Cover the tops of the wet books with layers of paper towels. Change the towels until the standing water has been absorbed.
- In the case of flooding, remove all materials from the wet lower tiers of shelves and store on dry higher shelves.
- Do not open or close wet books or remove book covers.
- If the water is dirty, wash the books before drying or freezing. Do not wash open books and those with water soluble media. Hold closed books firmly shut and lightly rinse and dab with a sponge to remove the worst dirt. Do not scrub. Time and facilities may limit this treatment.
- Books with coated papers should be kept wet by packing inside boxes lined with garbage bags, and then frozen.

Air-drying:

- Find a cool, dry area with good air circulation to air-dry books.
- Do not air-dry books with coated stock – these should be frozen immediately.
- Stand damp books on their tails and fan out the pages. Do the same for wet books, but also interleave every few pages with unprinted newsprint.
- Interleaving should not exceed one-third of the book's thickness. Do not interleave too much as this will cause the spine of the book to warp.
- Change the interleaving and flip books to their heads periodically.
- Heavy, saturated books should be stood upright on head end and air-dried with their front edges supported.

Freezing/Freeze-drying:

- Wrap freezer paper around the book cover and pack spine down in a milk crate or cardboard carton.
- Packed boxes of books can be placed in freezers or removed to freezer trucks for freezing and/or transportation to a freeze-dry facility.

4. Salvage of Parchment and Vellum

- Leather, parchment and vellum bindings are an immediate priority because they distort and disintegrate in water.
- Separate from other documents, pack in crates or flat boxes, and freeze.

5. Salvage of Photographic Materials

Prints, negatives and transparencies:

- Keep the photographs wet until they have been separated from envelopes, etc., and each other.

- Immerse in fresh cold water, preferably in plastic garbage cans (not metal) or garbage bags inside boxes until they are either air-dried or frozen. Photographs are much more stable at low temperatures. If allowed to partially dry, they will stick together. Keep the immersion time to a minimum before treatment or freezing.
- If the photographs are extremely fragile, place them in tightly sealed plastic bags to minimize drying and then place them in cold water.
- If needed, wash black and white prints and negatives for up to half an hour in changes of cold water. Use swabs to gently remove stubborn dirt from the surface. Rinse with Kodak Photo Flo solution.
- If needed, wash colour prints as for black and white negatives, but for a shorter time.
- If needed, wash colour negatives and transparencies as for black and white negatives. A few varieties require bathing in a stabilizer prior to drying: colour negatives should be rinsed for 1 minute using Kodak C41 stabilizer; Ektachrome transparencies should be rinsed for 10-15 seconds in Kodak E6 stabilizer; no stabilizer is required for Kodachrome; send Eastman Colour Film to a Kodak laboratory.
- Keep immersion time to a minimum.
- Air-dry if they can be treated immediately.
- Never allow photographic materials to dry while in contact with anything, as they will stick permanently together.

Nitrates with softening emulsions:

- Emulsions are water soluble and could be lost.
- Freeze immediately and make arrangements to freeze-dry.

Wet collodion photographs (ambrotypes, tintypes, pannotypes (collodion on leather or cloth) and wet collodion glass negatives):

- Salvage first and air-dry immediately.
- Both immersion and freezing will destroy the emulsion. The recovery rate may not be very high.
- Place emulsion side up on blotters to air-dry.

Daguerreotypes and other cased photographs:

- Salvage immediately.
- Remove the assembly from the case.
- Carefully fold back the preserver frame, cut the sealing tape (if present) and take the assembly apart.
- Place daguerreotypes face up on blotters with the case components beside them.
- Air-dry.

Air-drying

- If the photographs cannot be treated immediately, first freeze and then air-dry when time allows.
- Thaw the photographs if they have been previously frozen.
- If it appears that the photographs could dry and stick together during thawing, immerse again in cold water.
- Dry the photographs emulsion side up on blotters, paper or nylon screen.

Freezing/Freeze-drying:

- Place the materials into plastic bags, tightly seal them and place them in a freezer. They can remain frozen almost indefinitely.

- When ready to treat, allow the materials to thaw; it may be necessary to re-immense the materials in cold water to ensure that they do not dry before they are separated, otherwise they will stick together permanently (see air-drying).
- Gently rinse the materials in clean cold water to remove any surface dirt.
- Freeze-dry if time, supplies and space are not available for air-drying, following the same procedures for freeze-drying other archival materials.
- Freeze-drying can result in some damage to photographs such as dimensional changes, density loss, change in surface gloss, etc.
- Never freeze – thaw – vacuum-dry as this will cause everything to permanently stick into a solid block.

6. Salvage of Microfilm

Rolled film:

- Find out what type of microfilm is used.
- Do not remove the films from their boxes for packing.
- Secure cardboard boxes (and their labels) together with rubber bands.
- Fill the boxes with water, and then wrap 5 boxes of film into a block with plastic wrap.
- Pack the blocks into a heavy duty cardboard box lined with three garbage bags.
- Label the wet packed film and ship to a microfilm processor within 72 hours.

Microfilm strips in jackets:

- Pack and freeze.
- Cut the strips from the jackets with a knife or scissors.
- Wash and dry the film and insert into new jackets.

Aperture cards:

- Pack and freeze within 48 hours.
- At present, the only treatment is a time-consuming one.
- Remove the film chips from their mounts.
- Wash the chips and remount them.

Diazo microfiche:

- Pack and freeze.
- Check for readability. If the photograph has blistered, discard and replace with a print from the security copy. If it has not delaminated, wash in cool water and dry on blotters or a lint-free cloth.

7. Salvage of Motion Picture Film

- Open the film can, fill with water and replace lid.
- Pack into plastic pails or cardboard cartons lined with garbage bags.
- Ship the packed film to a film processor for rewashing and drying within 72 hours.

8. Salvage of Sound and Video Recording

Phonodisks (records):

- If storage boxes are badly damaged, transfer the disks to a milk crate.
- Pad the bottom and sides of the crates with bubble pack or ethafoam and load the disks vertically, interleaving with bubble pack every 25 records to pad against shocks.
- Avoid shocks and jolts during transport.
- Remove wet disks from their sleeves and jackets.

- Always support the discs vertically and hold the discs by their edges.
- If labels have separated, mark the centre of disk with grease pencil and keep track of the label.
- If dirt has been deposited on the disks they may be washed in a 10% solution of Kodak Photo Flo in distilled water.
- Air-dry the disks on supports that permit free circulation of air.
- Jackets, sleeves and labels may be dried like other paper materials.
- Prepare to air-dry. Freezing methods are untested but if it is absolutely necessary, freeze at above -18°C.

Reel-to-reel tapes:

- If the exterior of the tape is dirty, wash the tape (still wound on its reel) with lukewarm water.
- Support the tape vertically and air-dry it, or air-dry by laying it on sheets of newsprint spread over plastic-covered tables.
- The box can be air-dried as well.
- If the reels are still dirty, remove the tape and wash the reel with detergent and water.
- An alternative is to replace the reel.

Audio Tapes:

- Pack vertically into egg crates or cardboard cartons. Do not put excessive weight on the sides of the reels or cassettes.
- If there are no master copies, dismantle the cassette and air-dry the tape as for reel-to-reel tapes.
- Re-record the tape after drying.
- It is difficult to determine the condition of sealed cassettes. Copy them in any case.

Video Tapes:

- Pack as for audio tapes.
- Dismantle the cassette and dry as for reel-to-reel audio tapes.

9. Salvage of Computer Media

General:

- Because of the risk of humidity damage, remove all media from the disaster site.
- Separate the dry materials from the wet, checking labels and re-labelling if necessary.
- Do not touch magnetic media with bare hands.
- Since computer media and recovery methods change, check with vendor before proceeding.

5 ¼ " Disks:

- If the disks are wet, pack them upright in containers of cold distilled water. Make arrangements to air-dry.
- To air-dry, the disks should be removed from their jackets, washed and dried.
- Cut the edge of the jacket with non-magnetic scissors and remove the disk with gloved hands.
- Wash in several water baths (photo trays) or distilled water, and dry with lint-free towels.
- When the emergency is over, insert the disks into a new jacket (can be taken from a new disk) and copy with a disk drive. The drive heads should be cleaned frequently.

3 ½ " Disks:

- Currently, there is no known salvage procedure. Check with computer professionals about the possibility of recovery.

Magnetic Computer Tapes:

- If the tapes will be wet for longer than 48 hours, check with computer professionals about the optimum freezing methods or storage in ice-cold water.
- Handle the tapes by their hubs and pack them vertically.

- Remove the tape from its canister and wrap-around.
- Dry exterior wet surfaces with a lint-free cloth.
- Separate the reel flanges from the tape with a rubber grommet or similar material. This lets air flow around the tape and prevents the tape from sticking to the flange.
- Support the tapes vertically and let the tapes air with fans blowing on them. (Do not dry the tapes with hair dryers because the heat will make the tapes sticky and unusable).
- When the tape looks dry to the eye, run it reel-to-reel on a tape cleaner or winder.
- Run the tape twice over the cleaning tissues and not the blades (remove them if you can).
- Never run the tape on a tape drive because the wet tape could stick to the column wall or capstan.

10. Oil Paintings

- The order of removal and treatment is: first, the most highly valued; second, the least damaged; third, slightly damaged and fourth, severely damaged.
 - Ideally the paintings should be examined and treated by a conservator.
 - Take the painting to a work area for immediate drying.
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- Transport horizontally if possible. If not, carry the painting facing toward you, holding the side of the frame with the palms of your hands. Do not carry a painting by the top of the frame. Carry it with one hand under the frame and one hand to the side, or with a hand on either side of the frame. Larger paintings should be carried by two people.
 - Hold the frame where it is strongest, never by the fragile gesso decoration.
 - Never insert finger between the canvas and the stretcher bars.
 - Do not touch the front or back of a painting. Move the painting by holding the frame or stretcher bars.
 - Never allow any object to touch or rest against the front or back of the painting, however lightly.
 - Paintings should never be stacked. However, when rapid response is necessary and safe space is limited, paintings may need to be leaned together against a wall. If this is the case, place the paintings face-to-face and back-to-back, ensuring that the frames overlap and that nothing is in direct contact with painting surfaces, front or back. Watch for screw-eyes and wires on the backs of frames that could damage the paintings.
 - Drain off the excess water by tilting each painting to allow the water to drain from one corner.
 - Place fans in the work area to increase air circulation and accelerate drying.
 - Set up tabletops padded with blotters and covered with plastic. Several sheets of blotting paper are sufficient to pad paintings which have a flat paint surface. Paintings with impasto require extra padding, such as blankets, which should be twice the thickness of the greatest paint projection.
 - Separate the merely wet paintings from those showing structural damage. Signs of structural damage are tears in the canvas, flaking, lifting and dissolving of paint and ground layers.
- Structurally damaged paintings:*
- Air-dry the structurally damaged paintings face up in a horizontal position on the tables.
- Structurally sound paintings:*
- Structurally sound paintings with an impasto under 1 cm. high may be dried using the following procedure:
 1. Place several more layers of blotting paper over the plastic covered padded surface.

2. Place two layers of tissue or newsprint on top of the blotters. Ensure that padding and tissue are perfectly flat and uncreased. Wrinkles in the padding material can transfer to the painting's surface when the painting is subjected to pressure.
3. Un-frame the painting.
4. Remove hanging devices such as screw-eyes and hanging wire, as well as protective backing boards.
5. Working with one painting at a time, place each painting face-down on the clean, padded surface.
6. Cut blotting paper to fit the inside dimensions of the stretcher frame.
7. Cover the entire canvas back with blotting paper. Where it is necessary to use more than one piece, place the sheets edge to edge. Do not overlap the sheets, as the resulting line of double thickness can deform the paint surface.
8. If there are keys in the corners of the stretcher frame, slip the blotting paper under them.
9. Cut a board, preferably of plywood or thick masonite, to fit the inside dimensions of the stretcher frame.
10. Place it on top of the blotting paper to hold the canvas flat during drying. If there are keys in the corners on the stretcher frame, simply cut the board smaller, rather than attempt to force the board under the keys.
11. Place weights so that they are distributed evenly over the board.
12. Weights should also be placed on the stretcher corners to reduce warping. The amount of weight required to keep each canvas from distorting during drying will vary from one painting to the next.
13. Keep paintings being treated under surveillance to detect warping.
14. Change the blotting paper every ten minutes, replacing boards and weights each time, until blotting paper is almost dry.
15. Then change it every thirty minutes, or until it is dry to the touch. Shift work during the crucial procedure may be necessary to maintain dry blotters.
16. When the canvas is completely dry, replace dry blotting paper, boards and weights and leave for 24 hours maintaining sufficient air circulation with fans.
17. If, after drying, the tissue or newsprint paper on which the painting has been resting, face-down, does not separate from the paint surface, leave it intact. It should be removed by a paintings conservator.

11. Salvage of Textiles

- Begin drying within 24 hours to prevent mould growth.
- Freeze textiles that cannot be dried within 24 hours.
- Do not unfold delicate wet fabrics.
- Provide adequate physical support when moving heavy textiles.
- Bleeding dyes should be treated immediately by a conservator.

Air-drying:

- Rinse, drain and blot items with clean, lint-free towels to remove excess water.
- Air-dry slowly indoors using fans. Block and shape each textile to its original form.

Freezing:

- Separate textiles with freezer paper. Pack flat in clear polythene bags.
- Large rolled textiles should be kept rolled. Be careful of weakened cardboard tubes in the rolled textiles.

12. Salvage of Skin and Leather

- Wet leather is fragile – handle with care.
- Begin drying within 24 hours to prevent mould growth.
- Sponges, clean towels, paper towels and un-inked newsprint can be used to absorb excess moisture.
- Pad with un-inked newsprint or paper towels to maintain shape and provide support.
- Change padding as it becomes saturated.
- Air-dry slowly, using fans to keep air moving without blowing directly on the pieces.

13. Salvage of Bone, Hair, Horn, Ivory, Shell

- Individually wrap artifacts in paper towels or un-inked newsprint and place in a plastic bag since these materials tend to split or fragment into small pieces when wet or damp.
- Begin drying within 24 hours to prevent mould growth.
- Sponges, clean towels, paper towels and unlinked newsprint can be used to absorb excess moisture.
- Air-dry slowly, using fans to keep air moving without blowing directly on the pieces.

14. Salvage of Wood/Furniture

- Polychrome artifacts require immediate attention by a conservator.
- Carefully support the artifact when moving. Lift tables from the apron and chairs by the seat rails and not by the arms or the back.
- Do not drag or push furniture pieces even if they have wheels.
- Begin drying within 24 hours.
- Absorb excess moisture with sponges, clean towels, paper towels and unlinked newsprint.
- Partially wetted artifacts can be packed with dry blotting materials such as un-inked newsprint or acid-free blotters to remove as much moisture as possible.
- Thoroughly wetted unpainted artifacts should be wrapped with blotting materials, and then wrapped in polyethylene sheets to retain as much moisture as possible, since fast drying will cause irreversible damage.
- Air-dry slowly, using fans to keep air moving without blowing directly on the pieces.
- Tent the artifacts with polythene sheets to slow the drying.
- Raise items off the floor on trestles, pallets or lumber to allow air to circulate on all sides.
- Inspect painted surfaces. If paint is blistered or flaking, air-dry slowly without removing dirt or moisture.
- Hold veneer in place while drying with weights or clamps; separate the weight from the veneer with a protective layer.

15. Salvage of Metals

- Treat unstable (corroded) metal artifacts within 48 hrs.
- Stable artifacts can be dealt with last.
- Sponges, clean towels, paper towels and unlinked newsprint can be used to absorb excess moisture.
- If surfaces are stable, blot with lint-free towels (pat dry – do not rub).
- If an artifact has an unstable surface, do not blot.
- Air-dry artifacts with unstable surfaces, keeping flaking surfaces horizontal.

- Air-dry slowly, using fans to keep air moving without blowing directly on the pieces.
- Metal artifacts can also be dried with moderate heat (90-100°F) in an oven or with a hair dryer.

16. Salvage of Ceramics, Glass, Stone

- These materials can be dealt with last since they generally will suffer little damage from short term exposure to water.
- Sponges, clean towels, paper towels and unlinked newsprint can be used to absorb excess moisture.
- If the surfaces are stable, blot with lint-free towels (pat dry – do not rub).
- If an artifact has a rough-surfaced or an unstable applied finish, do not blot.
- If an artifact is broken, cracked or has mineral deposits or old repairs, place in clean transparent polyethylene bag until it can be treated. Seal the bag and monitor for mould.
- Air-dry slowly on a plastic screen or clean towel, using fans to keep air moving without blowing directly on the pieces.

17. Return to the Collection

- All dried materials should be placed on open shelving in a "rehabilitation" area separated from the other collections.
- Newly-dried material, including sterilized material, should be monitored for mould growth and/or corrosion.
- As a preventive measure, it is desirable to keep the materials in the rehabilitation area for 6 months after drying.
- Clean the walls, floor, ceiling, shelves and cupboards of the affected area. Make sure they are absolutely dry and humidity is under control before replacing materials. Surfaces should be sterilized, preferably with a bleach solution to eliminate, as much as possible, mould spores.