NATIONAL ARCHIVES AND RECORDS ADMINISTRATION
PRESERVATION PROGRAMS

The information provided below is intended for emergency recovery and response, not general treatment recommendations.

MAGNETIC TAPES – AUDIO, VIDEO, and DATA STORAGE TAPE

Priority Action:

- Air dry within **48** hours. **Do not freeze** magnetic tapes.

- **Do not freeze dry**. This can result in hardening of contaminants and adhesion of debris/contaminants on the tape surface.

- Damage to wet tapes is **time sensitive**
  - Short-term exposure to water will not destroy most tapes
  - But delay in recovery is likely to destroy most tapes

- **NEVER** attempt to play back wet tapes (this will cause irreversible damage)

- Salvage tapes according to the following priorities:
  - Unmastered originals over masters
  - Masters over reference copies
  - Older tapes over newer tapes
  - Acetate over polyester-based tapes
  - Smaller sized tapes over larger tapes

Recommendations:

- Bring relative humidity in the work area to 50%
- Use portable dehumidifiers to remove moisture from the area/objects
- Keep tapes in an area that is cool and well ventilated until recovery begins

- Handle wet tapes very gently
- Water compromises the physical structure of magnetic tapes, making them much more susceptible to stretching, tearing, and edge damage

- Do not touch magnetic media with bare hands
- Do not unwind or remove tapes from the reel
- Do not change the physical orientation of tape

- Separate out dry tapes, wet tapes, and wet boxes only
- Keep wet tapes at their initial level of wetness
- If water has condensed inside a cassette, treat as a wet tape
- It is not necessary to immerse tapes that are wet only on the outside of the tape pack

- Magnetic tapes can remain wet for several days as long as water is cool and clean
- Older tapes may not survive long immersion in water
- Metal particulate (MP) and metal evaporate (ME) tapes (used for high density records, high grade video, and digital applications) and acetate-based tapes do not withstand long immersion in water
- Water-soluble labels will be affected
- Remove all paper inserts and wet cardboard to reduce the possibility of fungal growth

- Air dry tapes in cool, dry air
- **Never** use heat to dry tapes. Heat can cause distortion and can accelerate damaging chemical reactions
- Air dry by supporting the reels vertically on edge (preferred) or by laying reels on sheets of clean blotter paper
- Do not put heavy weight or pressure on the sides of reels
- Leave the tapes to dry next to their original containers (if salvageable)
- Try to keep labels on tapes to help identify content
- Use fans to keep air moving without blowing directly on the items
- Be aware that in-house drying attempts can result in deformation of the tape and/or tape sticking to the inside of the cassette
- Be aware that incomplete or partially dry tapes can result in damaging fungal growth
- Once dry, tapes can be assessed for further cleaning and duplication by specialized professional vendors.

- Pack tapes individually in plastic bags, keeping loose labels with tapes
- Then pack tapes vertically in plastic crates or cardboard boxes for moving
- Do not move items until a place has been prepared to take them
- If shipping wet tapes, wrap in at least two layers of bubble wrap and pack in sturdy boxes to protect against shock and exposure

Contamination:

- If the water is contaminated, best results are obtained when professional restoration experts can begin working on the tapes while they are still wet

- Contaminants must be rinsed off wet tapes as soon as possible
- Contaminants in the water can do more immediate harm than the water itself
- The most common and dangerous contaminants in water are salt, chlorine, and sewage
- Contaminants, especially sewage, may require special health precautions. Follow advice of your local health officials. Protective gloves/clothing must be worn at all times when handling contaminated tapes

- Ferric oxide formulation tapes (such as 2" Quad, 1" helical, 3/4" U-matic, VHS and polyester-base audio tape) can usually be held in very cold, distilled water for extended times to rinse contaminants without substantial damage
- Do **not** immerse Metal Particle and Metal Evaporated tapes (such as Hi-8, Beta-SP and most modern digital tapes such as Min-DV, DVCAM and DVC-PRO or acetate-base audio tape) in water for extended periods of time; this will cause permanent damage.
- Most Metal Particle and Metal Evaporated tapes can be identified by the ME or MP designation stamped or printed on the top of the cassette. Acetate tapes are generally limited to early reel-to-reel audio tapes and can be identified by holding the reel up in front of a light. If diffused light shines through the reel of tape, the tape is acetate.

Procedures for rinsing tapes in-house:

- If you attempt to rinse contaminants off tapes yourself, be gentle and use only cool **distilled water**
- **Never** rinse tapes with tap water that might contain chlorine
- Rinse tapes by gently pouring distilled water over the tape or by submerging the tape in distilled water and gently moving the tape from side to side
- Only professionals should remove tapes from reels and cassettes to rinse them
- Initial decontamination/rinsing done by inexperienced individuals should be done with the

tapes still on their reels or in their cassettes to avoid damage
- Wet tape is very delicate and can be easily damaged during handling by untrained personnel
- If contamination by water and other substances is confined to the outer layers of the tape, wash just the exposed edges with distilled water

Specific in-house salvage procedures for cassette and reel-to-reel tape:

Cassettes

- Remove from bath of distilled water and wipe surfaces with a wet cloth
- Pour distilled water into the cassette housing to fill tape compartments
- Flip the tape gate to clean area, if applicable
- Shake remaining water around in the cassette, then empty excess water from cassette
- Repeat the steps above two more times
- Shake as much water as possible out of housing
- Stand cassette vertically with the empty hub on the bottom
- Allow to air dry

Reel-to-Reel

- Agitate the bath of distilled water
- Remove tape from water
- Discard water and replenish with cool, clean distilled water two times for a total of three
- Separate flanges from tape pack with inert spacers (encourages drainage and air flow)
- Stand the reel vertically to air dry while supporting the hub
- Do not allow tape to rest on its flanges

- For tapes in good condition, follow the drying with an application of tape cleaner, burnishing, and cleaning with a non-abrasive cloth
- After cleaning, copy the tape

Recommended Supplies:

- Dehumidifier
- Fans
- Plastic trays
- Distilled water
- Scissors
- Sponges
- Blotter paper
- Cheesecloth
- Bubble wrap

Future Maintenance:

- Store all tapes in suitable plastic cases to avoid future water damage
- Rewind tapes
- Maintain proper tape wind tension. How well a tape is wound will influence recovery
- Store cassette cases spine up to shed falling water
- Keep tapes off floor
- Activate erase lock-out device on cassette tapes

- Store tapes in a cool, dry area, with good air exchange, to help slow down damage from any residual moisture

Additional Information:

American Moving Image Association. *Fact Sheet 13 — Disaster Preparedness and Response*. http://www.amianet.org/resources/guides/fact_sheets.pdf

Brothers, Peter. *SPECS BROS Audio and Video Tape Restoration*. http://www.specsbros.com/h_flood.htm

Iraci, Joe, *Disaster Recovery of Modern Information Carriers: Compact Discs, Magnetic Tapes, and Magnetic Disks.* Ottawa, Canada: Canadian Conservation Institute, 2002. Technical Bulletin 25.

Contact information for selected vendors can be found at:
http://www.archives.gov/preservation/disaster-response/vendors.html

Related media:
[Link to CD/DVD]
[Link to Magnetic Diskettes]
[Link to Hard Drives]

The information and links provided by NARA are offered as a service and do not imply endorsement of any company, institution, or person. The scale of the emergency and types of materials affected will determine the specific actions or techniques to be taken and whether in house salvage is possible or whether external resources and expertise are necessary.