CONSERVATION LEAFLET

March 2003

RESPONDING TO A MOLD/MILDEW OUTBREAK

Various types of fungi, including mold and mildew spores, are in the air at all times. They begin to grow as a result of high humidity, high temperature, and poor air circulation. Generally, mold will begin to grow at 70 degrees F and 70% relative humidity (RH), but poor air circulation creates stagnant air which can enable mold to grow at lower temperatures.

Mold attacks the surface of organic materials in branching threads resembling dense cobwebs. The threads release spores which burst and are carried by the air. There are a variety of species of mold. Active mold will stop growing when the temperature and RH are under control, but it will not be killed. Mold will begin to grow again as soon as conditions are right. Mold excretes enzymes that allow it to digest organic materials (paper), altering (softening) and weakening it. Mold also attacks the starches and glues in paper and books. In its later stages, mold causes paper to softly crumble when handled and may cause pages to adhere to each other so they are impossible to separate.

Mold is especially hazardous to the health of individuals. It can cause or exacerbate respiratory and other health problems. Precautions must be taken when active mold is found in a collection. Isolation of the affected material is good, but will only be possible if a small portion of a collection is involved. If a large area is involved or if the outbreaks are recurring, the organization should contact a mycologist or industrial hygienist to assist in identifying the type of mold or mildew and for advice on its removal. It may be necessary to contract with a vendor to clean the collection and the affected area with a commercial fungicide.

MOLD/MILDEW REMOVAL

In the event of a mold/mildew outbreak, staff members should: 1) identify the source of the problem; 2) lower the RH - operate dehumidifiers if RH is above 60%; and, 3) increase air circulation by operating fans.

If possible, move mold damaged collections to a dry, well-ventilated area to avoid further spreading of the contamination and to provide maximum protection for staff who are responsible for mold removal.

For short-term contact with mold infested collections, staff should wear a cloth respirator mask. Carefully read the instructions to ensure a proper fit. Also wear latex gloves when handling mold damaged collections.

- The safest and most effective method of mold removal is to use a vacuum cleaner with a High

Efficiency Particle Air (HEPA) filter and the round dusting brush attachment. HEPA filters pull very small microns of dust and mold off of volumes and out of the air and trap them in the vacuum. Keep books closed and vacuum the cover and the edges of the volume. Place individual documents under mesh or screen wire to avoid damage during vacuuming.

- The second method for removing mold is using a wet vacuum. Place a small amount of water and a cup of liquid Lysol in the vacuum's canister to kill mold/mildew as it enters the vacuum cleaner. Thoroughly clean the vacuum canister and the brush attachment with Lysol and water following mold removal.

- The following option requires working in a well ventilated area to avoid breathing the fumes. Lysol contains a chemical which kills mold. Bleach is less effective. Also be aware of the potential for bleach to lighten dark book covers. Dampen a sponge in one of the following solutions and squeeze out excess moisture before cleaning volumes**:**
  1 cup liquid Lysol in 1 gallon of warm water or,
  1 part chlorine bleach to 9 parts water

Following a severe infestation, vacuum the floor, walls, ceiling, and shelving units in the affected area(s) to reduce the number of mold spores available to grow in the event of future outbreaks.

REMOVAL OF MOLD/MILDEW OR SMOKE ODORS

Once the mold/mildew residue is removed by vacuuming or sponging clean, then, 1) create an enclosed chamber using two garbage cans - one large can with a lid and a small can that will fit inside the large one. Place some type of odor-absorbing material (baking soda, charcoal briquettes (without lighter fluid), or kitty litter) in the bottom of the large can. Place the material to be "deodorized" in the small can, place the small can inside the large can, and put the lid on. Monitor the material every few days to determine if the odors have dissipated. This could take two to three weeks; or, 2) air the materials out-of-doors protected from the elements - sun, wind, etc. until the odor dissipates. 3) Temporary (non-permanent/short-lived collections) can be placed in a room with an ozone generator for a couple of days. Ozone should not be used to remove odors from permanent collections as it speeds up the deterioration of paper. In the event of a fire, remove soot by vacuuming and follow one of the above methods for odor removal.

For the removal of smoke or mold/mildew odors from a large number of records, contact a vacuum freeze dry company. They place the materials in a vacuum chamber, pull the vacuum to remove oxygen from the unit, and allow the items to out gas. There are no chemicals involved.

Sources of additional assistance. Nyberg, Sandra. "The Invasion of the Giant Spore" SOLINET Preservation Services Leaflet, Atlanta, Georgia: Southeastern Library Network, 1987 or at www.solinet.net. For more information on this or other conservation issues, contact: Linda Overman, ADAH Conservation Officer, at

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