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**Protecting Cultural  
Heritage**

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# Fire Smoke, Soot, and Ash Recovery Tips

## What Is Fire Smoke, Soot, and Ash?

Fire smoke is composed of gases and particles resulting from the burning of materials present during the fire, including food, plastics, fabrics, wood, and metals. Soot is the carbon-based deposits that did not complete combustion during the fire. Both substances can cause serious respiratory problems. Ash is the inorganic, incombustible particles left from the fire. Soot and ash are especially problematic because of particle size; smoke is obvious, but not all soot and ash particles are visible to the naked eye. Soot and ash particles contained within smoke are incredibly small and easily inhaled, which can cause breathing problems.

If heavy metals, asbestos, and/or polychlorinated biphenyls (PCBs) are of concern<sup>1</sup>, it is highly recommended that testing be done on soot-contaminated objects by an industrial hygienist. If the soot contains any of these materials, professional abatement may be required.

## Personal Protective Equipment (PPE)

Do not enter an area where a fire has been until first responders/ authorities have given permission to do so. Even several days after a fire, there may be harmful gases, so do not immediately attempt to go into the area.

Because of the respiratory hazards associated with soot, it is highly recommended that one wear an N95 disposable respirator, approved by NIOSH. Another option is a half-mask respirator fitted with P-100 cartridges. Additional PPE should include disposable gloves, goggles (NOT safety glasses), and Tyvek outer clothing, or other protective clothing (e.g., long-sleeved shirt, long pants).

## Material Handling and Soot Removal

Please note: It is important to remove soot as soon as possible; the longer it sits, the harder it is to remove.

### Before you begin soot removal:

- ✓ Be sure to always wear PPE while working on or handling items.
- ✓ Take photographs of your damaged items for insurance purposes.
- ✓ Soot is abrasive; excessive handling can scratch the object.
- ✓ Too much mechanical cleaning can drive the soot further into some materials, such a porous or upholstered objects.

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<sup>1</sup> Lead paint was common in buildings before 1960 and banned from use in 1978. Asbestos was banned in 1989 but was used in home construction between the early 1940s through the 1970s; asbestos is found mostly in thermal insulation on pipes and boilers. PCBs were in use from 1929 through 1979 in a variety of materials.





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- ✓ Handle objects carefully. Heat can cause glass, ceramics, and metals to become brittle; plastics may be soft and fabrics weak.
- ✓ Lift objects carefully, especially if they are sooty and/or wet, and avoid weak or damaged areas. Use supports under items (e.g., sheet plastic, board, sheets) to assist with safe movement.
- ✓ Place items in containers or boxes to avoid further handling, until you are ready to clean.

### Removing Soot and Ash from Materials:

- ✓ Remove soot from dry materials only. If items are wet, dry the materials first.
- ✓ Use dry methods to clean items only. Do not use water or chemicals.
- ✓ Avoid wiping or rubbing as much as possible, especially on porous surfaces.
- ✓ Dry cleaning methods to try:
  - Compressed air or air blowers
  - Soft, natural bristle brushes to dust off soot into a HEPA-filtered vacuum cleaner nozzle
  - HEPA-filtered vacuum cleaner with cheesecloth or mesh over the nozzle to prevent fragile parts from being sucked into the vacuum cleaner.
  - Soot sponges (best for stone, fired ceramics, walls)

### Other helpful hints:

- ✓ Vacuum exterior surfaces before opening or folding items, such as upholstery or books.
- ✓ Cut soot sponges to reveal a fresh surface. Cutting the sponge into small pieces makes cleaning and handling easier.

## **What About Odors?**

Odors, such as smoke and mildew, can be difficult to remove and will take time. Some helpful hints for reducing odors on objects:

- ✓ Use fans and open windows to increase fresh air circulation. Turn up HVAC systems and change out HEPA filters regularly.
- ✓ The Northeast Document Conservation Center (NEDCC) has some excellent suggestions on how to reduce odors in collections.
- ✓ Avoid ozone treatments, hydroxyl generators, thermal fogging, and deodorization techniques, as some vendors may offer these services. Ozone and hydroxyl generators degrade organic materials. Chemical applications of any kind are unnecessary and often just cover up odors instead of eliminating them.





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