



See Tip Sheet *“The First 48 Hours”* for information on how to get started in a range of emergencies.

SMOKE, SOOT, AND ASH

WARNING: If hazardous materials, such as heavy metals, asbestos, and polychlorinated biphenyls were possibly in the fire, testing should be done on fire-affected objects by an industrial hygienist prior to other activities. If the soot/ash contains any of these materials, all common for building construction in the 20th century, professional abatement may be required.

Overview

- SMOKE: the gases and particles resulting from the burning of materials present during the fire, including food, plastics, fabrics, wood, and metals.
- SOOT: the carbon-based deposits that did not complete combustion during the fire.
- ASH: the inorganic, incombustible particles left from the fire.

All three can cause serious respiratory problems. While smoke is visible, soot and ash are especially problematic because of particle size; they can be so small that they are not visible to the naked eye, yet can still be easily inhaled.

Personal Safety

Do not enter an area where a fire has been until first responders/local authorities have given permission to do so, as harmful gases can linger for several days. When you do, wear appropriate personal protective equipment (PPE):

- N100 disposable respirator (NIOSH-approved) or half-mask respirator fitted with P-100 cartridges
- Disposable gloves
- Goggles (with a full seal around your eyes, NOT safety glasses)
- Tyvek suit (or similar disposable outer layer), preferably with hood and shoe-covers
- Long-sleeved shirt and long pants under a disposable outer-layer
- Sturdy, closed-toed shoes
- Something to tie back/secure long hair

Handling Affected Materials

- Full PPE should be worn throughout the recovery and cleaning process.
- Keep handling as minimal as possible: soot and ash are abrasive, so excessive handling can scratch the object.
- Handle objects carefully: even if the object looks sturdy, heat can cause glass, ceramics, and metals to become brittle, plastics to become soft, and fabrics to become weak.

- Lift objects carefully, especially if they are sooty and/or wet: avoid weak or damaged areas.
- Use supports under items (e.g., sheet plastic, board, sheets) to assist with movement.
- Place items in containers or boxes to avoid further direct handling until ready to clean.

Soot and Ash Removal

- Remove soot from dry materials only. If items are wet, dry the materials first (see NHR Tip Sheet: Water - Drying Wet Collections).
- Use dry methods to clean items only. Do not use water or chemicals.
 - Compressed air or air blowers
 - HEPA-filtered vacuum cleaner, with cheesecloth/mesh over the nozzle to prevent fragile parts from being sucked into the vacuum
 - Soft, natural bristle brushes to dust soot/ash into the nozzle of a HEPA-filtered vacuum
 - Soot sponges (also known as chemical or smoke sponges), cut into small pieces. Trim off surface layers when they become dark to reveal a fresh surface.
- Avoid wiping or rubbing as much as possible, especially on porous surfaces.
 - Too much mechanical action can cause abrasion and drive the soot further into some materials, such as porous or upholstered objects.
- Remove soot/ash from exterior surfaces before opening/unfolding items, such as upholstery or books.

Odor Removal

Smoke odors can be difficult to remove and will take time (months to years). 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. Remove lids from storage boxes when safe to do so.
- For closed storage containers, include molecular traps/air-purifying materials if possible, such as activated charcoal cloth or Zeolite filters. Avoid direct contact between these materials and the object by wrapping them in tissue or placing them in an open bag, as they can shed fibers.
- Avoid ozone treatments, hydroxyl generators, thermal fogging, and deodorization techniques. Some vendors may offer these services, but they can cause more harm in the long-term. Ozone and hydroxyl generators degrade organic materials, while chemical applications of any kind are unnecessary and often just cover up odors instead of eliminating them.

Resources

FAIC 'After the Fires' video series, available on YouTube.

Federal Emergency Management Agency (FEMA). 2023. "After the Fire: Advice for Salvaging Damaged Family Treasures." *Disasters & Assistance: Save Your Family Treasures*.