After A Wildfire: Homeowner's Checklist of Possible Services

Introduction:

Wildfires, also known as wildfire urban interface (WUI) fires, consume hillsides and buildings where they become part of the firestorm. Temperatures that consume vegetation burn around 800 to 1,200C (1,472 to 2,192F), where fully-engulfed houses burn around 600 to 800C (1,112 to 1,800F) (Wildfire Today), 2,000F (Verisk), where radiating heat, smoke, and wind can damage neighboring properties and properties across a street.

Depending on the burn and wind conditions, hockey-puck size embers can be found blowing in wind 100 mph that landed a distance away from a wildfire. (NOAA) The measurement of

sustained winds produced a condition known as "straight-line wind." Straight-line winds are often the result of a phenomenon known as a fire-induced or pyro-convective wind. These winds are generated by the intense heat of the fire, which causes rapid upward movement of air. As the hot air rises, it creates a low-pressure area near the ground. Cooler air from the surrounding areas rushes in to fill the void, creating strong, horizontal winds that blow in a straight line, hence the name "straight-line winds." These winds can significantly increase the speed and intensity of a wildfire by fanning the flames and carrying embers to new areas, potentially causing the fire to spread more rapidly. In some cases, the interaction between the fire and the atmosphere can lead to the formation of fire whirls or even fire tornadoes, which are extreme manifestations of fire-induced winds. (2024, Wildfire Glossary for Restorers, Insurance Adjusters, and Environmental Professionals)

In April 2022, the National Academies of Sciences, Engineering, and Medicine (NASEM) published a report on the chemistry of wildfires in an effort to summarize existing research and identify its holes. It said that WUI fires produce pollutants that are known to be toxic to humans, including carbon monoxide, formaldehyde, hydrogen cyanide, which can all swiftly enter the lungs and bloodstream and cause tissue damage and respiratory irritation. These fires also release benzene, a known carcinogen. All these compounds, among others in the plume, are known broadly as volatile organic compounds (VOCs,) which a category of chemicals commonly found in materials used to build and furnish homes.

Downwind of a wildfire, people are exposed to pollutants in the smoke plume as they evacuate homes and businesses. But for homes and businesses that did not burn, a secondary type of exposure can occur, which are not easily apparent, weeks and months following the fire. For example, heat from the initial blaze warms building materials inside standing structures, opening pores in siding and wood framing. Once opened, they can fill with gases and particulates. As temperatures cool, gases and particulates become trapped inside. As winter gives way to spring and summer, those pores reopened and released trace amounts of gasses back into the air, where smoke odor is one telling sign of this exposure.

Investigation of Standing Structures:

Before completing an investigation, the safety of occupants and property loss investigators is of prime importance, where the property is to be made safe from falling debris, electrical, and gas hazards. In addition, if the property is tagged by a government agency as having hazardous waste or hazardous conditions, corrective measures are required to eliminate them by hazardous materials experts or licensed contractors. In California and other states, it is a felony for individuals and companies to complete work on behalf of a property owner or agent when they are not properly licensed.

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1. **Hazard Assessment:**

   When the government did not post "Warning Signs" on the property that identified specific hazards, it is up to the property owner to complete their own "Hazard Assessment." A hazard assessment checklist includes but is not limited to:

   - Neighboring properties having hazardous materials that can affect your property.
   - Electrical and gas hazards, including burnt building wiring and burnt gas lines.
   - Piles of ash on your property and your neighbor's property.
   - Falling power poles and electric lines.
   - Falling tree limbs including palm leaves and fronds.
   - Burnt vehicles that have gas tanks and batteries, including lithium batteries.
   - Propane and gas tanks and experienced heat exposure.
   - Containers experiencing exposure to heat which can explode or become reactive.
   - Loose roofing and siding.
   - Unstable decks and siding, walkways and driveways.
   - Heated soils and burnt trees, that left behind holes in the ground.
   - Window and door glass that was exposed to heat where it can shatter.
   - Household lithium-ion (Li) batteries that can still catch on fire or explode.
   - Burnt hillside retaining walls and supports, including steps leading down or up.
   - Erosion resulting in unstable hillsides.
   - A future rainstorm washing hazardous waste, ash, and mud towards your property.

2. **Burnt Property Hazards, Hazard Waste Management and Protective Clothing:**

   The Los Angeles County Department of Public Health issued an order prohibiting the unsafe removal of fire debris which can pose a substantial risk to human health and the environment when it is improperly treated, stored, transported, or disposed.

   Independent removal of debris is prohibited without an inspection from approved agencies, including the EPA and the California Department of Toxic Services. "The health department said, "the combustion of building materials such as siding, roof tiles, and insulation result in dangerous ash that may contain asbestos, heavy metals, and other hazardous substances." In addition, hazardous substances include paint, gasoline, cleaning products, pesticides, compressed gas cylinders, and chemicals stored in homes, garages, and sheds. When homeowners find their property is partially or completely burnt, they should contact their local government official for an inspection, where the state of California is expected to complete the cleanup.

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The Public Works Director Cid Tesoro urges residents that they should not cleanup their own outdoor debris that can contain sharp objects and toxic materials, including asbestos, lead, mercury, and other chemicals.

When homeowners decide to cleanup their own properties having burnt materials or they hire licensed cleanup contractors, everyone is expected to wear appropriate protective clothing (e.g., boots, coveralls or suits, gloves, and respirators), where after, salvageable "protective clothing" should be washed before reuse. In other words, protective clothing and exposed personal clothing such as shirts, pants, boots and shoes should be removed "before" stepping into a work truck or their home. This follows the recommendations by the Los Angeles County Fire Department's hazmat team to "sheriffs who are exposed to air that contains toxic substances," which means, homeowners who remove ash and debris from around homes that remain standing, they can experience a higher risks of exposure from burnt debris and liberated ash and hazardous substances floating in the air as they complete cleanup.

3. **Tree and Landscape:**

Inspection requires a damage assessment of your landscape having signs of charring, discoloration, or complete combustion. The extent of damage often varies depending on the fire's heat temperature and the duration in time of being exposed to heat:

- Basal scorched or burnt vegetation (trees, plants, shrubbery), where bark at the base may be blackened or cracked, which is a common indicator of heat damage to roots and ground fire.
- Defoliation, where trees and plants may have lost or will lose leaves and needles, due to heat stress or direct exposure to the fire.
- Crown damage, where the upper part of trees may show brown or black foliage, which indicated the fire reached the canopy.
- Ash and soot layers having gray or white ash covering the ground, indicating the complete combustion of organic matter.
- Hydrophobic soils experiencing heat from the fire resulting in the soil to become more water repellant, leading to poor water absorption and erosion.
- Cracking or hardening of the ground, resulting from prolonged exposure to heat.

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4. **Fencing:**

When inspecting fencing, it may be one of the first exterior features to show visible signs of damage. The extent of damage to fencing depends on the materials used (wood, metal, vinyl, etc.), the intensity of the fire, and its proximity to the flames:

- Manual and electric gates may not work because of heat damage, warping and melting.
- Electrical systems are heat damaged, including their components and boards.
- Metal fencing can experience corrosion and the weakening of welded connections.
- Wood, metal, and PVC fencing can be heat damaged, and/or the soil around the post is loose or eroded, resulting in post failure.
- Chain-link fences can experience its galvanized coating being discolored, with areas turning gray, white, or black, where painted posts may bubble or peel.
- Stone or brick fencing can be damaged by intense heat causing stones or bricks to crack or spall (flaking or breaking of the surface). Also, mortar may weaken or crumble due to thermal stress.

5. **Hardscape:**

Hardscape features (e.g., patios, walkways, driveways, retaining walls) often exhibit distinct signs of damage due to intense heat, falling debris, soot, ash, and firefighting efforts. These signs can vary depending on the material and the severity of the fire, such as:

- Cement and asphalt driveways and sidewalks can become cracked or experience spalling (flaking, chipping, or peeling of the surface layer due to extreme heat causing water inside the concrete to evaporate explosively).
- Asphalt is highly susceptible to heat due to its petroleum-based composition, where it melts or warps resulting in surface deformation, softening, or blistering caused by high heat, there us uneven or sagging areas where asphalt has melted or flowed. In addition, thermal expansion may create cracks or widen existing ones.
- Brick paver and stone walkways can cause individual pavers or tiles to crack, especially if improperly installed or already stressed. Intense heat or erosion from firefighting water may cause pavers or tiles to shift or sink.
- Other issues include black soot buildup or discoloration from ash and smoke, and stains can occur from fire-retardant chemicals or water residue.

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6. **Swimming Pools:**

Swimming pools can exhibit various signs of damage caused by the intense heat, falling debris, ash, soot, and suppression efforts. These damages can range from surface-level contamination to structural and mechanical system failures.

- Swimming pools accumulate significant amounts of ash and soot from the wildfire, which can affect water clarity and pH levels. Ash and soot can also cause corrosion or pitting of the surface and interior.
- Wildfire debris alters the pool's water chemistry, often increasing alkalinity and pH levels.
- Pools can be filled with toxic residue where harmful chemicals, such as heavy metals (e.g., lead, arsenic) and organic compounds from burned materials, can leach into the water. Indications include unusual odors or oily films on the water's surface.
- Pools can become heat damaged, where extreme heat from the fire can warp or melt vinyl liners in above-ground pools.
- Prolonged exposure to intense heat can cause thermal expansion, leading to cracks in concrete or plaster pool surfaces.
- High heat and falling debris may crack or dislodge tiles along the pool edge or floor.
- Pump and filtering systems and other equipment may be damaged by heat, smoke, or soot, and may fail to operate efficiently.
- Pool lights, pumps, and heaters may experience electrical damage from soot buildup or heat.
- Pools having heat exchangers in pool heaters can warp or become clogged with soot and debris.
- Pools having solar panels, the panels and electrical systems can be damaged.

7. **Lawn Furniture:**

When inspecting lawn furniture, it often shows visible signs of damage due to intense heat, smoke, soot, falling debris, and firefighting efforts. The type and extent of damage depend on the material of the furniture (wood, metal, plastic, fabric, etc.) and the proximity to the flames.

- Plastic and resin furniture are highly vulnerable to heat and flames due to their low melting points. Deformed, sagging, or melted areas on chairs, tables, or other

components can occur, along with holes or gaps where the material has completely burned through. Other things to look for include yellowing, blackening, or browning due to heat exposure or soot deposits, uneven discoloration indicates varying exposure to heat intensity, plastic becomes brittle and easily cracks or breaks when touched. A layer of soot or ash clinging to surfaces, often requiring deep cleaning to remove.

- Metal furniture is more heat-resistant than plastic or wood, but it can still sustain damage from high temperatures. Heat may cause frames to deform, particularly in lightweight materials like aluminum. Heat discoloration often appears as bluing, blackening, or whitening. Accelerated rust or corrosion due to exposure to heat, soot, and firefighting water. Welded joints or screws may weaken, loosen, or fail due to thermal stress.
- Wooden lawn furniture is highly combustible and often sustains significant damage. Blackened or charred surfaces, particularly on exposed edges. Deep cracks or fissures caused by heat stress, where dark streaks or stains from soot and smoke, especially in porous wood. Heat can cause wood to shrink, warp, or develop splits, and fasteners (nails, screws) may loosen due to structural changes.
- Fabric cushions and upholstered furniture are particularly vulnerable to fire, heat, and smoke. Holes, frayed edges, or complete combustion of fabric materials. Scorch marks where flames or embers landed. Fabric absorbs smoke odors, which can persist even after cleaning. Visible soot stains on fabric surfaces.
- Glass components, such as tabletops, can crack or shatter due to heat stress or falling debris. Heat can cause glass to crack or completely shatter. Look for spiderweb-like cracks or sharp, broken edges.

8. **<u>Exterior of the Structure</u>:**

When inspecting exterior siding, windows, doors and decks, various types of damage can be observed depending on the intensity of the fire, the type of siding material, and the fire's proximity to the structure. Each siding material reacts differently to heat, flames, and smoke.

- Wood siding is highly combustible and prone to significant damage in a wildfire, such as blackened, charred, or completely burned areas. Deep cracks or fissures in the wood due to prolonged heat exposure, where dark smoke stains or streaks on the surface, particularly around edges or seams may be present. Warping or bowing of planks are due to uneven heat exposure and gaps between siding boards

caused the wood to shrink. Lingering smoke odors in the wood can also pass into the vapor barrier and insulation in wall cavities. Check for structural integrity; even if the wood appears intact, it may be brittle and weakened.

- Vinyl siding melts at relatively low temperatures, making it highly vulnerable to wildfire damage. Sections of siding may appear melted, deformed, or sagging. Severe cases may result in holes or gaps where the siding has burned through. Discoloration can include yellowing, browning, or blackening of vinyl due to heat exposure. Uneven discoloration often indicates varying heat intensity across the surface. Check for heat damage to underlying materials, as melted siding may expose the structure beneath.
- Stucco siding is fire-resistant but can suffer damage under intense heat or due to indirect effects. Cracks, especially around windows, doors, or where the stucco meets other materials can result in chipping or flaking of the surface. Discoloration can include smoke stains or soot deposits, particularly on textured surfaces, including from the use of fire-retardants. Heat can scorch the surface resulting in yellowing, which is an indication of stucco damage, where heat can damage the lath or framework beneath the stucco, leading to instability or loose sections.
- Brick and stone are highly fire-resistant but can sustain damage under extreme conditions. Cracks in the mortar or stone due to thermal stress and flaking or chipping of the surface layer (spalling). Black streaks or discoloration can be seen on the surface. Weak or crumbling mortar joints can be a result of prolonged exposure to heat.
- Fenestration involves all elements of windows, doors, and other openings in the exterior envelope. They are particularly vulnerable to damage from heat, flames, smoke, and firefighting efforts. Wildfire damage to fenestration can compromise the building's structural integrity, energy efficiency, and security. Many fenestration components are covered under "Interior of the Structure."

9. **Roofing**:

When inspecting a building for signs of wildfire damage, the roof is one of the most vulnerable components. It often bears the brunt of heat, flames, falling debris, and smoke. The extent and type of damage depend on the roofing material (e.g., shingles, tiles, metal) and the fire's intensity.

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- As a safety precaution, all roofing (pitched or flat) should be inspected by roofing professionals.
- General signs of roofing damage include: (1) heat and flame damage, where scorch marks, charring, or blackened areas on roofing materials may be present; (2) sections of the roof may be partially or completely burned through; (3) smoke and soot residue include dark streaks, stains, or a layer of soot on the roof surface and lingering smoke odors, especially in porous materials like wood shingles and shakes, roofing paper and sheathing; (4) structural weakness includes warping or sagging of the roof structure caused by heat weakening the underlying framework, and spongy or soft areas when walking on the roof, indicating internal damage.
- Asphalt shingles and flat asphalt materials can experience heat exposure resulting in shingles to warp, curl, or bubble, and shingles may become brittle and crack due to thermal stress. High heat can strip shingles of their protective granules, leaving bare patches.
- Wood shakes or shingles can char or burn where they blacken or completely burn around edges and seams. Heat can cause wood to crack or split, compromising its waterproofing ability, where the underlayment can become wet or smoke damaged.
- Metal roofing experiencing heat exposure can cause metal roofing to discolor (e.g., bluing, blackening, or whitening). The "canning" effect can cause permanent damage to metal roofing. Screws, nails, or other fasteners may loosen or corrode due to heat or firefighting water.
- Flashing damage can include warped, melted, or discolored flashing around chimneys, vents, or skylights. Loosened or missing flashing can result from thermal stressors or debris impact.
- Vents and skylights can crack, shatter, or discolor, where they can also melt and warp, especially when they are made of plastic or lightweight metal.
- Gutters and downspouts can fill with wildfire debris (e.g., leaves, branches, ash and char). Plastic, vinyl, and light-weight metal gutters may warp or melt due to heat exposure, and they may discolor or sag because of thermal stress. Loose or missing fasteners can be caused by heat expansion, wind vibration, or firefighting activities.
- Eaves and overhangs can be heat damaged where holes or gaps in overhangs were caused by direct flame contact. Blackened, scorched and blistered eaves and soffits occur especially in wood materials and painted surfaces.

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10. **<u>Exterior and Interior Windows and Doors</u>:**

When inspecting the exterior of windows and doors, inspecting the interior at the same time is also important. Windows and doors become heat conductors, where thermal damage (thermal expansion, blistering, distortion, and a separation of materials) may be noticeable or not, such as hidden damage to interior parts. The damage on the wildfire side of a building may be substantially different on other sides because of thermal transfer of heat energy coupled with forced winds. The same applies to a second or third floor window or door as compared to the first floor. The following applies to fixed and sliding doors, and windows that were closed or opened at the time of the wildfire.

- **Window and sliding glass door safety hazards** are caused by cracked and shattered glass, because high temperatures resulted in thermal stress. When possible, inspectors and not homeowners should inspect door and window glass and document damaged materials. When unsafe door and window conditions are identified professionals should be hired to remove and replace them. Meanwhile, the homeowner should stay away from these situations where serious injury can occur from touching windows and door glass, where small amounts of vibration and changes in outdoor humidity and temperature can cause them to shatter or explode.
- **Window glass** (glazing) experiencing uneven heating (e.g., flames on one side of the building are cooler than the air temperature on other sides) exacerbates cracking of glass panes. Even windowpanes that are double or triple, where they are designed to be energy efficient, the smoke residue, staining, and particulate may be seen inside or between panes of glass because of forced wind and heat temperatures expanded caulking and seals. Fire retardants may leave behind chalky or streaked residues and etching from smoke residue can damage glass.
- **Window stained glass** includes wood and metal framework, lead support bars and solder, along with clear, frosted and colored glass. All parts of the stained glass window should be inspected where repairs are made. Afterwards, a water test should be completed to ensure there are no water leaks.
- **Window frames, casing, sash, grilles (grids) and rails, made of metal (aluminum, steel) and vinyl** can experience a condition called "heat warping," which is a result of high temperatures causing metal and vinyl to warp, buckle, or weaken.

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- **Window drainage** includes weep holes and drainage track that can warp and fill with ash and other wildfire debris. Clogged weep holes and drainage track can result in water back-filling into the drainage system and causing water damage.
- **Window frames, casing and grilles made of metal** can experience oxidation or discoloration (e.g., bluing, blackening) from heat exposure. Corrosion can occur on metal from exposure to fire retardants or firefighting water accelerates rust, or exposure of metal to smoke residue containing harmful chemicals. Metal mechanisms that open, close, and lock windows can experience corrosion. Metal soldering joints can weaken including supporting screws and sealants.
- **Window frames, casing, and grilles made of vinyl and plastic** can melt, warp, become out of square, disintegrate and discolor. Heat damage such as warping can occur inside vinyl window frame parts, because the core temperature as compared to the surface temperature was different during the wildfire.
- **Window frames, casing, and grilles made of wood and wood laminates** can experience charring, blistering, cracking, splitting, warpage, discoloration, a reduction in structural integrity, and damage to protective coatings.
- **Window and door weatherstripping** can experience degradation of rubber seals, leaving gaps around windows and doors. Warped or brittle weatherstripping no longer provides an airtight seal.
- **Exterior door panels** can be charred or burnt or bent and bowed from having direct flame or high-heat exposure. Less heat exposure can cause wood, vinyl, and metal doors and frames to warp, making them difficult to open and close.
- **Exterior door frames and panels** having exposure to heat can cause wood to char, crack, or warp; metal to warp and discolor, and vinyl or composition to melt, discolor, and become brittle.

11. Interior Damage or Contamination:

When inspecting the interior of a heat damaged or wildfire smoke impacted structure, damage may range from superficial smoke, ash, soot, and char stains to structure being compromised caused by intense wildfire wind, heat, flames, or water from firefighting efforts. Each area of the interior can reveal specific signs of wildfire damage or smoke and odor impaction that need to be inspected and documented individually, followed by cleaning, repair, or replacement. The recommended procedures for smoke particulate and smoke film removal includes at a minimum: HEPA vacuuming followed by detergent washing of ceilings, walls, windows, doors, light fixtures, cabinets (inside and out), flooring, and contents.

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- **Flame damage (heat damage) interior** includes burning affecting structural components, such as framing, windows, doors and casements, attic, wall and crawlspace insulation, hardware, ventilation systems, flooring, cabinets, and interior finishes. Flame damaged building components (framing) should be inspected by a licensed general contractor or structural engineer before touching and removing flame damaged materials.
- **Thermal damage (heat and smoke damage) interior cavities** may be hidden behind siding, such as damage to the back side of wood ship-lap siding, stucco or brick facia, vapor retarders, insulation, framing, and the backside of the interior facing plaster or drywall. Signs of thermal damage include heat discoloration, cracking, chipping, peeling, swelling, missing siding, smoke odor, heat damage around windows and doors. Another indicator for stucco is heat damage or smoke discoloration at the weep screed.
- **Smoke damage (smoke odor impaction) interior** can also affect structural components, including framing, windows, doors and casements, attic, wall and crawlspace insulation, hardware, ventilation systems, flooring, cabinets, and interior finishes. Smoke can easily penetrate into semi-porous and porous materials.
- **Drywall, paint, and wallpaper** in a flame damaged building requires heat damaged drywall to be removed, which means the paint and wallpaper will also have been removed. When only part of a building is flame damaged, in some situations, it may be possible to save non-heat damaged drywall, however, wallpaper may require replacement and painted surfaces will be smoke-washed cleaned, where an industry recommended sealer is applied followed by repainting.
- **Smoke residue in a non-flame damaged building** should be able to be smoke-washed and deodorized. The professional process involves first HEPA vacuuming, and second detergent chemical washing of ceilings, walls, windows, doors, fixtures, cabinets, and flooring. On completion, where a lingering smoke odor remains indoors, or occupants continue to experience health effects associated with odors known as volatile organic compounds (VOCs), further investigation as to identifying the source of the smoke odor is necessary.
- **Carpet and pad exposed inside a flame damaged building** should have its carpet and pad removed and replaced. Carpet and pad exposed to heavy smoke impaction, it should be removed and replaced. Carpet and pad in a lightly smoke impacted building, making an attempt to have it professionally cleaned and deodorized may be the correct answer, but the success cannot be determined until

it is tried. When lingering smoke odors remain after carpet cleaning, the source may be the carpet and pad that is acting like a sink in retaining odors.

- **Insulation is known to easily absorb and retain smoke particulate and odors** from both buildings experiencing flaming and wildfire driven smoke. Insulation that is in a flame damaged building, that insulation should be removed from ceilings, walls, and subflooring. Insulation exposed to wildfire winds and smoke (e.g., attics and crawlspaces) should be removed followed by cleaning the space before installing new insulation.
- **Depending on its location, the HVAC system and ducting** in a flame damaged building may need replacement or require restoration. In wildfire smoke impacted buildings, the HVAC system and ducting should be cleaned where new filters are installed. Recognizing buildings in the neighborhood were burnt and left regulated waste and hazardous materials behind, replacing ducting may be the right answer.
- **Smoke odor deodorization is required** in all flame damaged building and moderate to heavy wildfire smoke impacted buildings. The type of deodorization equipment and chemicals to be applied depends on the professional who is competent in evaluating the source and type of smoke odors and the means and methods of removing them. After a thorough interior detergent wet cleaning, most smoke odor sources should have been removed.

12. Contents Inspection and Cleaning:

Inspecting contents in a wildfire-damaged building involves assessing items like furniture, electronics, textiles, musical instruments, antiques, collectibles, books and documents, clothing, linens, and other personal belongings for damage caused by heat, flame, smoke, char, ash, soot, and firefighting efforts. Many items may be salvageable with proper cleaning and deodorization, while others may require disposal due to irreparable damage. In another case, some contents are not cost-effective to clean and restore because their replacement is less expensive, they are used, old, or have limited value, where there is no need to replace them.

- The property owner should create several "Categories of Contents" such as:
  - "**Immediate Need Items**," include items that must be cleaned and deodorized as quickly as possible. These are salvageable items for the homeowner to have while they remain out of their home until it is restored.
  - "**Total Loss Items**," which are heat damaged, or they are not cost-effective to clean, deodorize and restore.

- "**Sentimental and Historical Items**," that include family heirlooms, photos, wedding album.
- "**Important Documents**," such as insurance and legal records, birth certificates.
- "**Fabrics**," such as Oriental rugs, leather, fur, suits, dresses and other clothing.
- "**Furniture**," that are the easiest to the more difficult to clean such as:
    1. Easier To Clean – metal tables and chairs, solid wood, and glass tabletops.
    2. More Difficult to Clean – semi-porous items made of particleboard, or they are made with several different types of materials.
    3. Difficult to Clean and Deodorize – upholstered furniture and bed mattresses.
    4. Appliances – items having mechanical and electronic parts and rubber seals and gaskets where cleaning requires taking apart the appliance, flushing electronics, circuitry and components with specialized smoke washing and corrosion control chemicals.
- "**Specialty Items**," items having a high-cost of replacement or they can't be replaced," such as artwork, musical instruments, antiques, collectibles, and wine collections. These items should be inspected by knowledgeable and competently trained restorers and conservators where they assess damage and complete cleaning in a temperature and humidity controlled workspace.

13. Other Contents Cleaning Considerations:

One would like to believe all contents that are not heat damaged can be cleaned, deodorized, and restored. However, when contents are exposed to environmental contaminates such as asbestos, heavy metals such as lead and mercury, and toxic substances such as carcinogens, formaldehyde, hydrogen cyanide, dioxins and furans, the cost to clean, decontaminate and clearance test some items may outweigh their replacement cost.

- The general contents cleaning process for salvageable hard content items include removing surface particulate (e.g., smoke, char, ash, soot) using a HEPA vacuum, followed by detergent surface cleaning using detergents like Dawn Ultra, rinsing a microfiber towel in deionized water, then air drying.
- The general contents cleaning process for clothing and linens is to HEPA vacuum them outdoors in smoke-free air, followed by washing and drying them in a clean smoke free indoor space or have them professionally laundered.

- For draperies, rugs, and upholstery smoke-wash cleaning and deodorization, it is best to have them cleaned by a professional cleaning company.

14. Environmental Inspection and Testing (Sampling and Analysis):

- **Exterior:**
  - When your neighbor's home is burnt to the ground, the ash and other materials brough to your property by the wildfire can contain hazardous and toxic substances. When burnt debris from your neighbor is on your property, consult with local officials to have the debris tested.
- **Interior:**
  - The interior of your home or business is your responsibility, where you or your insurance company will pay to have wildfire ash and other particulate sampled and analyzed.
  - Is it a law or regulation to complete indoor sampling, probably not. However, if you do not have sampling completed, you could be putting your family and cleanup workers at risk of exposure. For example:
    - When your home is at or around the burn area, where neighboring buildings were consumed, it is reasonable to assume the wildfire driven ash and other particulate indoors contains some of your neighbor's waste, and not just the waste of burning trees, shrubbery, etc.
  - It is recommended to have a competently trained and experienced company specializing in wildfire sampling and interpreting laboratory data, to complete surface debris particulate analysis involving:
    - At a minimum (1) asbestos testing, and (2) char and ash sampling.
    - A more aggressive study of heavy metals that can affect human health, and organic compounds involving volatile organic compounds (VOCs) and semi-organic volatile compounds (SVOCs) can be related to the presence of smoke odor and may cause health effects.
    - When sides of the building are heat damaged, including windows and doors, high temperature wind-driven thermal pressures can drive toxic smoke into wall cavities, attics, and crawlspaces, where heavy metal, VOCs and SVOCs may need to be part of a study.

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About the Author:

Patrick Moffett has over 30 years of experience inspecting and assessing wildfire damaged and contaminated properties for building owners and insurance companies. He is a retired registered California Registered Environmental Assessor (REA), where currently, he is a registered industrial hygienist, licensed general contractor, and a certified master restorer in fire damage restoration. Patrick is also a standards writer, educator, expert witness, and a certified appraiser and umpire involving fire and wildfire damaged properties.