After An Urban Community Fire, Assessing Contents as to their Salvageability, Restorability, and Damaged






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Introduction:

- On January 7, 2025, hurricane-forced winds impacted Los Angeles County by Santa Ana winds reaching up to 90 miles per hour. (Washington Post, LA Times) Once fire developed, it spread at an alarming rate, where some homeowners only had minutes to leave their house and evacuate the community. Except for grabbing a few possessions, the remaining contents were either left behind to be consumed by fire or homes became damaged by smoke containing toxic substances and heavy metals. (Caltech Science Exchange; Pasadena Now)
- Once homeowners were allowed to return, some individuals experienced respiratory, skin irritation, and neurological disorders. Health issues developed because of the continued burning of the community for days and weeks, resulting in poor air quality, and when individuals were inside smoke-laden houses, they experience increased health symptoms. Some people were breathing combustion byproducts such as micro-fine soot, char, and ash, or gases containing volatile organic chemicals (VOCs) such as benzene, toluene, xylene, formaldehyde, acrolein, others may have breathing inorganic acids such as hydrogen chloride and sulfur dioxide, dioxins and furans, and other people came in contact with heavy metals such as lead, arsenic, cadmium, mercury, barium, and vanadium.
- Protecting the health of people outweighs protecting contents and restoring homes. People who have pre-existing health issues or have increased health concerns when remaining indoors should seek medical advice.
- Professional restorers and environmental professionals should be consulted to inspect, assess, and test how the building should be remediated and restored, and identify contents that can be: (1) decontaminated and restored, (2) contents that may not be cost-effective to decontaminate, and restore, (3) contents that may not respond to cleaning, where heavy metals and hazardous substances caused damage or they could not be removed to a safe level.

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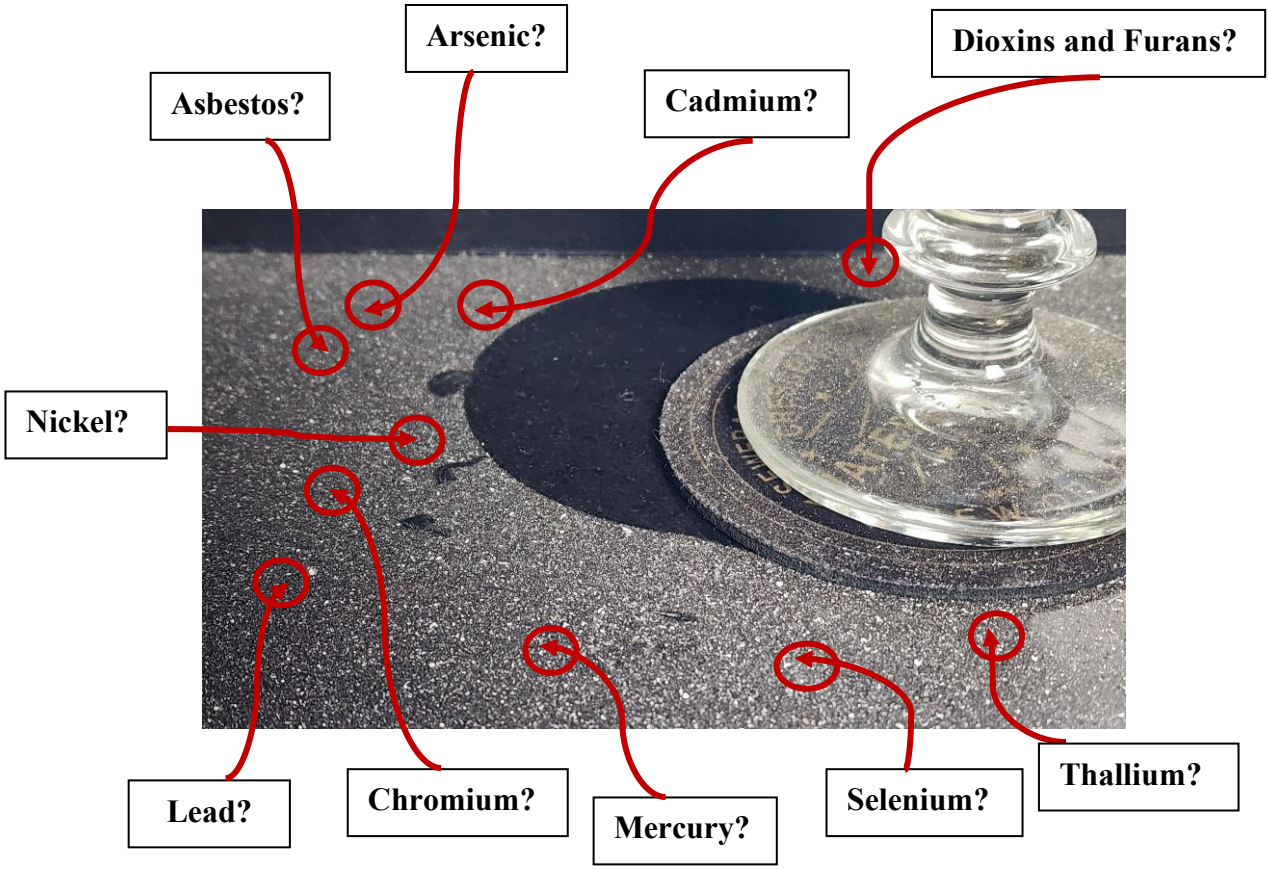
1) About Hazardous Material and Heavy Metals:

During a fire, heated and burnt building components, stored garage chemicals, furniture, and contents can contain a number of hazardous elements such as asbestos, lead, mercury, arsenic, and cadmium that can travel in wind and enter nearby homes. Before handling contents in a fire or from smoke-filled building, testing is either mandatory or should be completed to document if contents are damaged by regulated materials or heavy metal elements considered to be a safety and health hazard, where they may need to be destroyed when exposed to:

- Arsenic – Carcinogen; affects liver, skin, lungs
- Asbestos – Chronic lung disease and cancer causing
- Barium – Toxic to heart and nervous system in soluble form
- Cadmium – Carcinogenic; kidney and bone damage
- Chromium – Carcinogen; lung and skin irritation
- Dioxins and furans – Group 1 carcinogen; cancer causing, and immune system suppresser
- Lead – Neurotoxic, especially to children; affects blood, kidneys, CNS
- Mercury – Neurotoxic, vaporizes at room temp; highly persistent
- Nickel – Respiratory sensitizer, potential carcinogen
- Thallium – Extremely toxic; affects the nervous system
- VOCs, SVOCs and PAHs – Burning of wood, plastics, fabrics, paint, electronics



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- From the photo on the previous page, one can see signs of fire debris sitting on a table with a glass lamp. However, just by looking at the debris, we cannot see heavy metals and identify the types and amounts of contaminates.
- During an urban fire, smoke and heavy metals travel from the source of the fire in the airstream and enters homes downwind contaminating them and contents. Smoke is attracted to contents in many ways including capillary action, magnetic and electrostatic attraction, air currents, stack effect, and surface-to-air ratio. Smoke and heavy metals are also attracted to cooler surfaces in the home that are away from the fire, such as plumbing, metal fixtures, tubs, sinks, electrical, windows, and walls.
- When semi-porous and porous contents are affected by heavy metals, decontamination is often difficult to almost impossible to achieve. In other words, it may not be possible to bring certain contents back to a safe level for use around babies, small children, the elderly, and persons having health issues.

2) Non-Porous Contents Considered "Cleanable and Restorable:"

Hard non-porous contents are those that can be successfully cleaned, decontaminated and restored of smoke, VOCs, and heavy metals, examples include: .

- Sealed wood furniture and wood items that did not experience damage to finishes
- Metal desks, tables, filing cabinets, and metal items that did not experience corrosion, discoloration, or heat damage
- Glass surfaces and mirrors, as long as etching did not occur or heat caused cracking
- Ceramics, porcelains, and stoneware as long as pitting did not occur or heat caused cracking

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- Hard plastics as long as discoloration or melting did not occur
- Non-porous jewelry that did not discolor or become damaged from exposure
- Items that can be safely handwashed or dishwasher washed on all sides, such as dishware, silverware, glassware, stemware, plasticware, cooking utensils, pots, and pans
- Items that respond positively to deodorization
- Items that did not bind toxic heavy metal residues to them
- Items that can be tested to ensure they a safe to use

3) Semi-Porous Contents Considered "Non-Damaged" after Successful Cleaning and Restoration:

Where semi-porous contents are involved, there is a grey area (middle zone) whether they can be successfully cleaned and decontaminated of smoke, VOCs, and heavy metals or not. Semi-porous contents are those that are not fully porous such as carpets, rugs, underlayment, clothing, bedding and bed mattresses, paper and cardboard. (In furniture cleaning limitations involves smoke and heavy metals that entered porous surfaces.) Examples of semi-porous contents that may be successfully cleaned and restored includes:

- Leather couches, chairs, and bags
- Vinyl furniture
- Wood and laminate furniture and other items
- Hard surface items that may have lost their finish such as from wear and use
- Natural stone items

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- Plastics that are cost effective to clean
- Items that can be safely hand or dishwasher washed
- Items that can be dismantled and thoroughly cleaned
- Items that were not exposed to temperatures resulting in damage
- Items that did not experience corrosion
- Items that respond positively to deodorization
- Items that did not bind toxic heavy metal residues
- Items that need to be tested to ensure that they a safe for normal use

4) Porous Contents May Be Considered "Damaged" With or Without Cleaning:

Porous contents are those having microscopic openings, fibers, or cellular structures that allow combustion byproducts, VOCs, and heavy metals to enter, such as carpets and rugs, draperies, upholstered furniture, children's dolls, stuffed toys, and games, baby, children, and adult clothing, pillows, bedding, and bed mattresses, along with books, paper, and cardboard.

- Surface or immersion cleaning is expected to remove many combustion byproducts, VOCs, and heavy metals. However, after cleaning where smoke odors return, or some items cause a respiratory or skin reaction, they should be placed in the "damaged" category.
- When certain items are cost effective to clean, they should also be sampled and analyzed, confirming that heavy metals released by the fire are not present and can affect the health of persons.

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- Recognizing there is risk in keeping certain porous contents, where the cost to clean and restore them outweighs the replacement cost value, they should be placed in the "damaged" category.

5) Electronics and Electromechanical Appliances and Devices:

Shortly after exposure to smoke, ash, and heavy metals, electromechanical corrosion can begin to set in, where sometimes it takes weeks and months to occur.

- Smoke from an urban fire contains numerous acids such as hydrochloric, phosphoric, formic, sulfur dioxide and organic acids caused by the burning of carpet and pad, plastics, upholstery, automobiles, paint, wood, and roofing to name a few.
- Invisible amounts of chloride and sulfate ions form acidic films on electronic components such as metal contacts including circuit paths that attack copper traces, gold-plated contacts, tin solder, and component leads. In addition, galvanic corrosion between dissimilar metals is accelerated by ionic smoke residues.
- Appliance having interworking parts that have contact with smoke-ladened air, requires taking them apart to service, clean, and corrosion control to electrical and electronic components.
- Leaving residue behind may result in fire, explosion, and overtime, failure of electronics to operate, no matter if they are washing machines, refrigerators, freezers, or smaller items having electrical and electronic components such as TVs, computers, monitors, musical instruments, hairdryers, coffee makers, clocks, and toasters.

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6) Specialty Items:

Most contents can be cleaned and made free of combustion byproducts, VOCs, and heavy metals, but at what cost, and who is qualified to complete the work?

- Contents such as important and valuable legal documents, medical records, books and manuscripts, family photo albums, framed and unframed pictures, collectibles, antiques and items of historical significance, heirlooms, Oriental rugs, firearms, musical instruments, computers, jewelry, including paintings and other artwork should be evaluated on an item-by-item basis.
- A number of restorers and art conservators are available, but not all restorers and conservators are qualified and competent to clean all items. In one instance, a Yamaha grand piano restoration expert may turn down the cleaning and restoration of Yamaha acoustical pianos, guitars, violins, and percussion instruments.
- When combustion byproducts, VOCs, and heavy metals affect musical instruments, antiques and paintings for example, it requires specialized cleaning methods which are often more expensive, detailed, and intricate to complete.
- Many of the contents mentioned cannot be cleaned and restored in the home, where the restorer or conservator requires removing them to their place of business.
- Before handling and moving for cleaning, restoration, or conservation, an estimate of costs to clean, restore, or conserve should be provided along with stated expectations.

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<u>Conclusion</u>:

- Many hard non-porous contents can be cleaned of combustion byproducts, VOCs, and heavy metals, where there is less success in cleaning semi-porous contents, and in most cases, there is limited success in cleaning porous contents.
- Damaged contents are those that are heat damaged, where damage is visually apparent to the homeowner, restorer, and adjuster that they are no longer repairable or economically restorable.
- Damage also includes contents that are less physically or chemically altered, where a structural component, system or finish is not economically repairable to be brought back to a safe and functional condition. In documenting this condition, it may require experts to inspect and test.
- When combustion byproducts and heavy metals cause corrosion in electrical and electronic components, contents are damaged until they can be inspected, serviced or replaced.
- When lead or other heavy metals are brought into the home by the urban fire, highly porous contents are damaged until qualitative post remediation verification (QPRV) results confirm contents are no longer damaged.
- The cost to clean and restore certain contents may outweigh the replacement cost, where in those situations they should be replaced as damaged total loss items.
- Specialty items, such as important and valuable legal documents, medical records, books and manuscripts, collectibles, antiques, heirlooms, Oriental rugs, musical instruments, computers, paintings and other artwork should be evaluated on an item-by-item basis, which requires interviewing experts, including discussing their expected results and costs.

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