Evaluating Post-Fire Environmental Testing Guidance for Standing Homes: Gaps, Risks, and Recommendations

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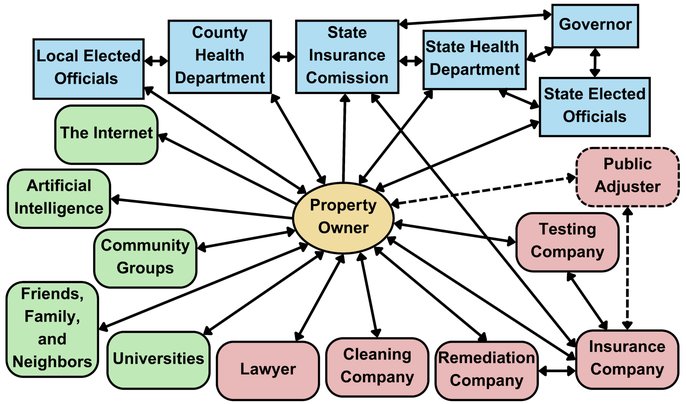
INTRODUCTION AND APPROACH

Wildfires that enter communities often leave behind structurally intact, chemically contaminated homes. These homes can pose immediate and long-term health risks to building inhabitants. Inorganic and organic contaminants can persist indoors long after the outdoor environment has been remediated[4]. Despite decades of wildfires in the United States, no evidence-based post-fire testing and remediation guidance was found. Practices we witnessed after the 2025 Los Angeles, California fires varied widely in methods, terminology, target contaminants, allowable exposure concentrations, and remediation actions. Here, we examine the stakeholders involved in post-fire testing and remediation guidance, property owner environmental testing reports provided through IRB protocol IRB-2025-387, current state of testing approaches for fire-impacted standing home, provide recommendations to improve public health protections, and identify knowledge gaps. This work is ongoing.

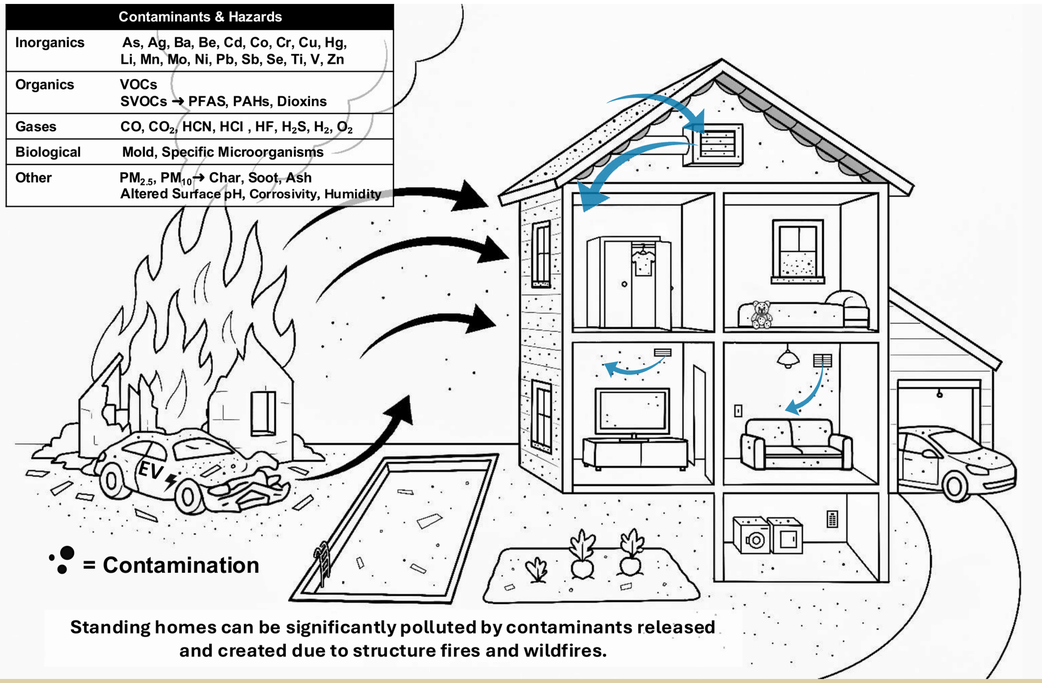
AFTER THE FIRE

Homeowners are often overwhelmed and encouraged to rely on their insurance company for all post-fire testing and restoration support.



After the Los Angles Fires on February 11, 2025, the local public health department warned that **asbestos and lead were** post-fire residential hazards[1].

Contaminants & Hazards	
Inorganics	As, Ag, Ba, Be, Cd, Co, Cr, Cu, Hg, Li, Mn, Mo, Ni, Pb, Sb, Se, Ti, V, Zn
Organics	VOCs SVOCs → PFAS, PAHs, Dioxins
Gases	CO, CO_2, HCN, HCl , HF, H_2S, H_2, O_2
Biological	Mold, Specific Microorganisms
Other	$PM_{2.5}$, PM_{10}→ Char, Soot, Ash Altered Surface pH, Corrosivity, Humidity



Standing homes can be significantly polluted by contaminants released and created due to structure fires and wildfires.

POLLUTION HEALTH RISKS

Structures, vehicles, and hazardous materials can release chemicals into the air. New chemicals are created during and after release.

- **Pollutants released:** Vapors and aerosols that include solid and liquid particulates.
- **Reservoirs of contamination:** Wall, ceiling, and flooring, HVAC system, wall and ceiling cavities, attic, crawlspace, insulation, and personal items.
- **Gases and vapors can permeate some materials:** Mattresses, fabric furniture, carpets, rugs, toys, clothing, etc. (There is currently no evidence-based consensus on what to do with these items).

ONGOING AND FUTURE WORK

Property owners have asked us **100+ questions**. Some are…

- What should be tested for inside and outside my home?
- Should I remediate the home myself? What PPE is needed?
- Should I throw away or clean my clothing, fabric items, or furniture?
- Should garden produce be composted?
- Who does and how should post-remediation testing be conducted?
- Should I give my contaminated personal items to universities to test?

We continue to receive and analyze the home environmental testing reports, meet one-on-one with property owners, and will share additional information and guidance.

CHEMICALS OF CONCERN

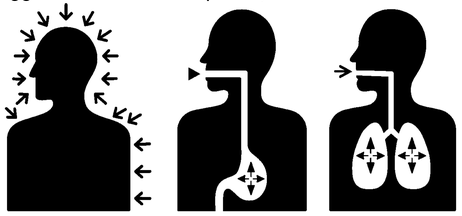
Lead: There are U.S. regulated limits (5 µg/ft² for interior floors; 40 µg/ft² for windowsills). An exceedance should prompt abatement, a set of highly specialized measures to address lead-based hazards[2].

Asbestos: Protective clothing is required where levels exceed 0.1 fiber/cm³ of air; problematic residential levels would be lower. State action levels and recommendations vary[3] and include abatement.

Other Contaminants: Harm to human health can be caused by other contaminants. Combustion byproducts (CBP) [soot, ash, and char] have no health-based exposure threshold, or proven relationship with lead or asbestos. More contaminants include other metals, gases (HCl, HCN, H_2S, CO, CO_2, etc.), volatile organic compounds (VOC), semi-volatile organic compounds (SVOC) like polycyclic aromatic hydrocarbons (PAH), dioxins, furans, and perfluoroalkyl substances (PFAS/PFOS), particulate matter (PM) in air, and microorganisms.

EXPOSURES, STANDARDS, AND ACTIONS

Acute and chronic exposures can involve dermal, inhalation, and ingestion pathways. Only asbestos and lead regulatory indoor limits were found. Other contaminants have regulatory limits only for workers, suggested limits for the public, or no limits at all.



REFERENCES

1) L.A. County DPH. (2025, Feb. 11). *Public Health Advisory Noted for Those Residing Near Burned Structures in Palisades and Eaton Areas*. L.A., CA.
2) *40 C.F.R. § 745.223*. *Code of Federal Regulations*. Washington, D.C. Accessed July 23, 2025.
3) OSHA. (1970). *Occupational safety and health standards: Asbestos (OSHA Standard No. 1926.1101)*. U.S. Department of Labor. Washington, D.C.
4) Reid et al. (2024). Physical Health Symptoms and Perceptions of Air Quality among Residents of Smoke-Damaged Homes from a Wildland Urban Interface Fire. *ACS ES&T Air*, *2*(1), 13–23.

ACKNOWLEDGEMENTS

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