

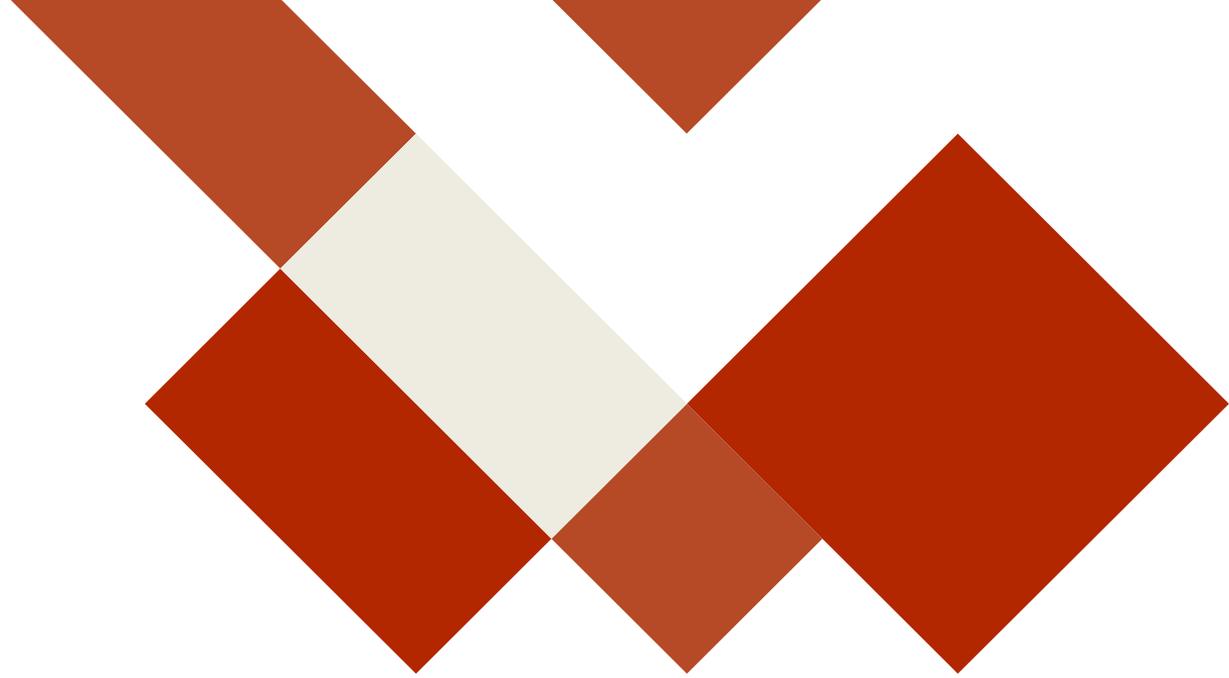


**M.A.R.S.
ENVIRONMENTAL**

**POST-FIRE
INSPECTIONS**

Agenda

- Introduction
- Wildland-Urban Interface Fires
- Post-Fire Inspections
- Comprehensive Post-Fire Inspections
- Limited Scope Inspections
- Critical Considerations for Post-Fire Inspections
- Post-Fire Remediation
- Follow-Up Process
- Questions



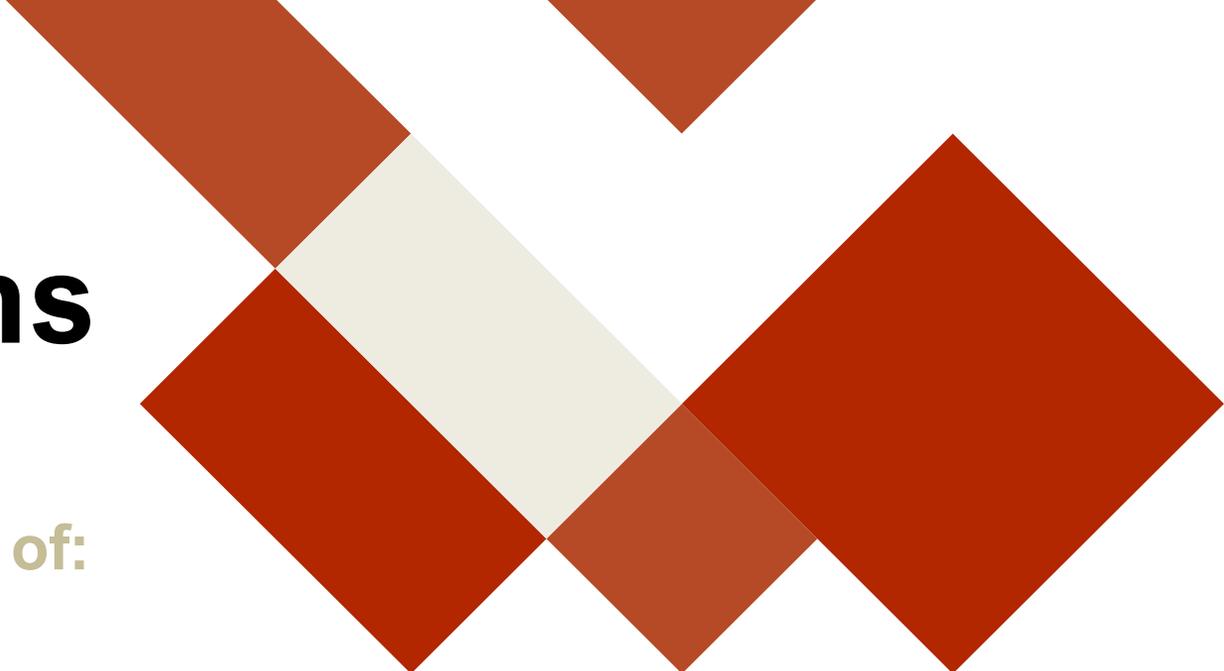
M.A.R.S. Environmental

- **Based in Broomfield, CO**
- **Formed in 2019 as Certified IAQ Professionals**
- **Rebranded to M.A.R.S. Environmental in January 2025**
- **Jeanine Humphrey, Owner of M.A.R.S. Environmental**
 - **Council-Certified Fire and Smoke Damage Technician**
 - **Lead Inspector on all fire inspections**
 - **Experience with wild-land urban interface fires such as the Marshall Fire**

Wildland-Urban Interface Fires

- **Wildland–Urban Interface (WUI) fires are mixed-fuel disasters that occur where communities and natural vegetation meet.**
- **Fuel sources include vegetation, building materials, vehicles, batteries, plastics, foams and more**
- **Create more toxic by-products than wildfires**
- **Typically produce extreme heat and spread quickly**
- **Various toxins are transported through smoke, easily penetrating and depositing in homes**
- **Many homes are engulfed in the smoke plume for several hours to days during a fire event**

Post-Fire Inspections



- **Post-Fire Inspections typically consist of:**
 - Visual Inspection
 - Sampling for Contamination
 - Determine Remediation Recommendations
- **Typically done in a comprehensive or limited scope**
 - Limited- fewer toxins are tested for, typically lower number of samples taken, may not include all areas of the home/property
 - Comprehensive- sampling for more toxins is conducted, more samples collected, all areas are inspected visually, samples may be collected from spaces such as wall cavities

Comprehensive Post-Fire Inspections

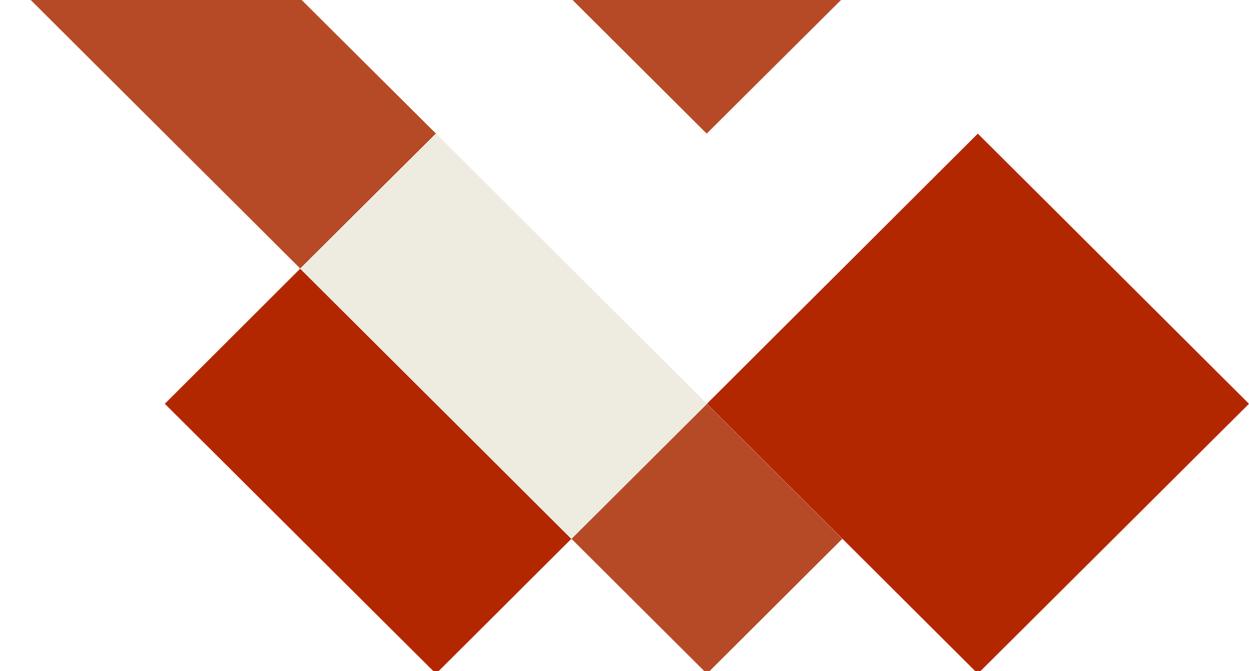
At M.A.R.S. Environmental, we perform comprehensive post-fire inspections

- Thorough visual inspection of the home
- Sampling for many common contaminants found in WUI fires
- Full inspection report that includes observations, sampling results and discussion, remediation recommendations
- Continued support to ensure clients are returning to a home that is as safe as possible

Sampling plan may include:

- Combustion by-product
- Cyanide Bulk and Air
- Lithium
- Fire Metals
 - CAM 17 Heavy Metals
 - Beryllium Wipe & Air
 - Hexavalent Chromium VI Wipe & Air
- VOCs
- Formaldehyde/Aldehydes
- Chloride Anions
- Dioxin/Furans
- PAH (Polycyclic Aromatic Hydrocarbons)

- **It is important to remember that each fire event is unique**
- **Wildland-Urban Interface Fires (Like the Eaton and Palisades Fires) burn different materials than structure fires and wildfires**
- **Things like solar panels, electric cars, older homes, and commercial buildings produce several different toxic chemicals when burned, such as**
 - **Lithium**
 - **Cyanide**
 - **Soot (a known carcinogen)**
 - **Formaldehyde**
 - **Dioxins/Furans**
 - **Various Heavy Metals**



**Why
Comprehensive
Testing is
Important**

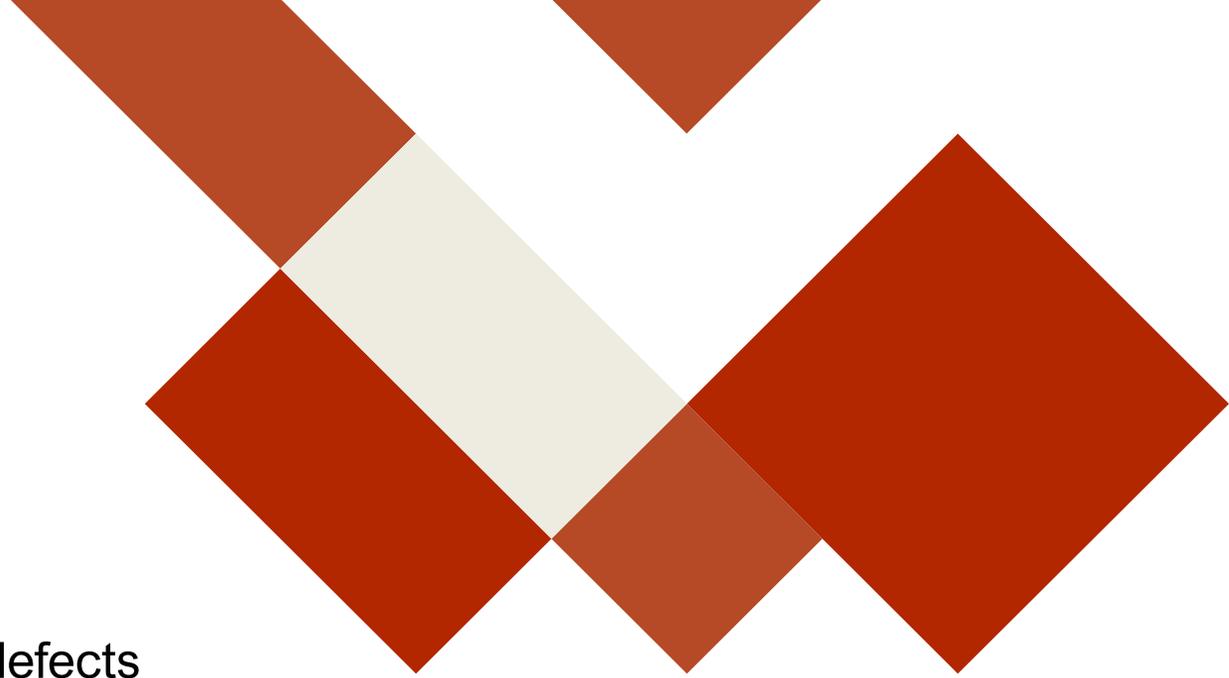
Limited Scope Inspections

- **Many Industrial Hygienists use limited scope inspections following Wildland-Urban Interface Fires**
- **These inspections test for a limited amount of toxins and often a limited number of samples**
- **The scope of contamination present in the home is often not determined through these inspections**
- **By not getting a full scope of contamination, it is impossible to determine the proper remediation necessary to reduce health risks to occupants**



Limited Inspections Often Do Not Detect

- **Dioxin/Furans**
 - Extremely toxic, even at low levels
 - Can cause cancer, endocrine disruption, birth defects
- **Lithium**
 - Found in homes following WUI fires from combustion of electric cars, solar panels, etc
- **VOCs**
 - Many different VOCs are found in homes following WUI fires
 - Several are known human carcinogens
- **Formaldehyde**
 - Known human carcinogen
 - Remains in homes through sorption into porous materials and can continue to off-gas for long periods of time
- **Cyanide**
 - Can be present in homes following a WUI fire in salt form or gaseous form
 - Residual cyanide can form into HCN, a known chemical asphyxiant



Critical Considerations for Post-fire Inspections

When evaluating post-fire contamination, certain groups require heightened protection because they are more vulnerable to toxins commonly present after WUI fires. These include:

Infants & Toddlers

- Spend more time on floors and soft surfaces where particulates settle
- Greater breathing rate relative to body size
- Particularly vulnerable to formaldehyde, ultrafine particles, and nitrile/cyanide residues

Children

- Higher hand-to-mouth behavior leading to greater dust ingestion
- Developing respiratory, neurological, and immune systems
- Smaller body mass → higher dose per exposure
- Increased sensitivity to VOCs, aldehydes, cyanide residues, metals, and soot

Immunocompromised Individuals

- Reduced ability to detoxify or clear contaminants
- Greater risk of respiratory effects from soot and ash exposure.
- Adversely affected by low-level chemical exposures that may not impact healthy adults

Elderly & People With Chronic Illnesses

- Pre-existing respiratory or cardiovascular conditions increase risk
- More sensitive to particulates, HCN, VOCs, and oxidizing chemicals in smoke

Post-Fire Remediation

- Remediation in a home following a WUI fire is critical to not only return the home to pre-fire conditions but also to reduce health risks associated with toxins found in the home.
- Post-fire contamination in WUI events is rarely isolated to a single room or surface. Smoke, soot, and chemical vapors migrate throughout the structure, meaning effective remediation must address the entire home rather than localized areas.
- Localized cleaning ignores the widespread, invisible particulate and chemical migration that characterizes WUI smoke, leading to persistent odors, health symptoms, and delayed safe re-occupancy.
- Remediation involves numerous considerations and a wide range of effective options. Some homes require more aggressive remediation such as removing drywall.

Post-Fire Remediation

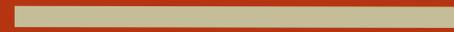


- **Lead/Asbestos Abatement**
 - Legally required for contamination above legal thresholds
- **Thorough Cleaning**
 - Should include HEPA Vacuuming and a wet clean.
 - All smoke impacted homes should have a thorough clean performed as part of remediation plan.
- **Encapsulation**
 - Sealing of all painted surfaces and around gaps in drywall (around outlets, light switches, can lights, etc)
 - Will aide in preventing off-gassing of contamination
- **Removal of building materials**
 - Generally, only necessary for severely impacted homes or materials that cannot be effectively cleaned
 - Some homes require limited building material removal, such as removal of drywall on walls where the fire reached the exterior of the home or removal of porous flooring materials that cannot be properly cleaned

The Follow-Up Process

- WUI fires generate a complex mixture of contaminants that persist long after the fire is extinguished. These long-term environmental impacts influence soil, water, air, and indoor environments for months to decades.
- The implementation of on-going preventative practices is essential to prevent re-contamination of the home.
 - **Daily HEPA Vacuuming**
 - Vacuum all flooring daily
 - **Routine Wet Surface Cleaning**
 - Cleaning all surfaces near entry ways daily
 - Cleaning all other surfaces weekly at minimum
 - **Minimizing indoor tracking**
 - Removing shoes or wearing shoe covers upon entry to the home
 - **HVAC**
 - Consider attachments or upgraded filters, dependent on manufactures recommendations
 - Frequent replacement of filters
 - **Continuous Air Filtration**
 - Operate carbon/HEPA air purifiers continuously throughout the home
 - Ensure that air purifiers are the appropriate for the square footage of the space

Questions/ Comments



Contact Us

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