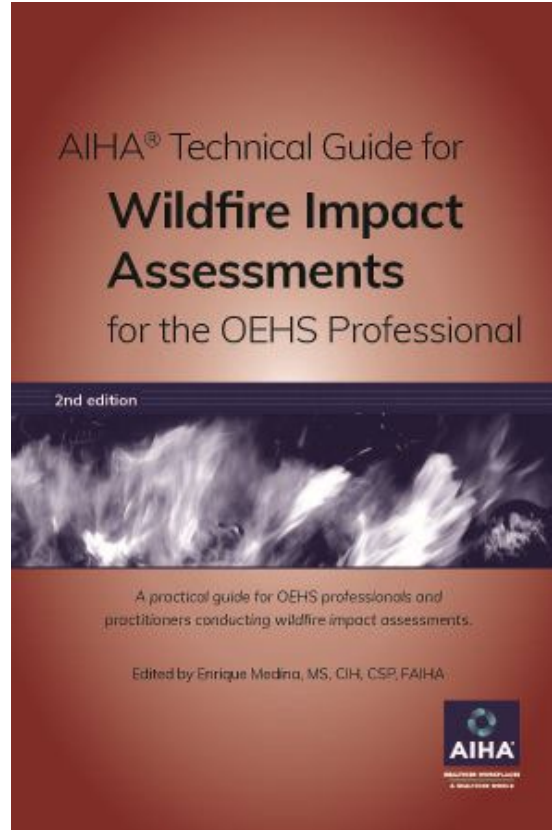


# What's New in the 2nd Edition of the AIHA Technical Guide for Wildfire Impact Assessments for the OEHS Professional

Enrique Medina, MS, CIH, CSP, FAIHA. Editor and Co-author

# 2025 Technical Guide for Wildfire Impact Assessments: The ARECC Approach

1. Overview of the Potential Impacts of Wildfires
2. Wildfire Impact Assessment
3. Sampling
4. Microscopic and Analytical Chemical Methods
5. Data Interpretation (and Appendix)
6. Restoration Project Specifications



# 2025 2<sup>nd</sup> edition of the “*Technical Guide for Wildfire Impact Assessments for the OEHS Professional*”



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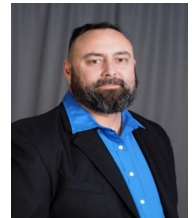
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- 17 authors and contributors.
- More than 300 years of combined experience.
- Nine Internal and External Independent Technical Peer Reviewers.



# New and Expanded Content

Forensic Investigations and Exposure Assessments

Time and Distance Effects: Fate and Transport

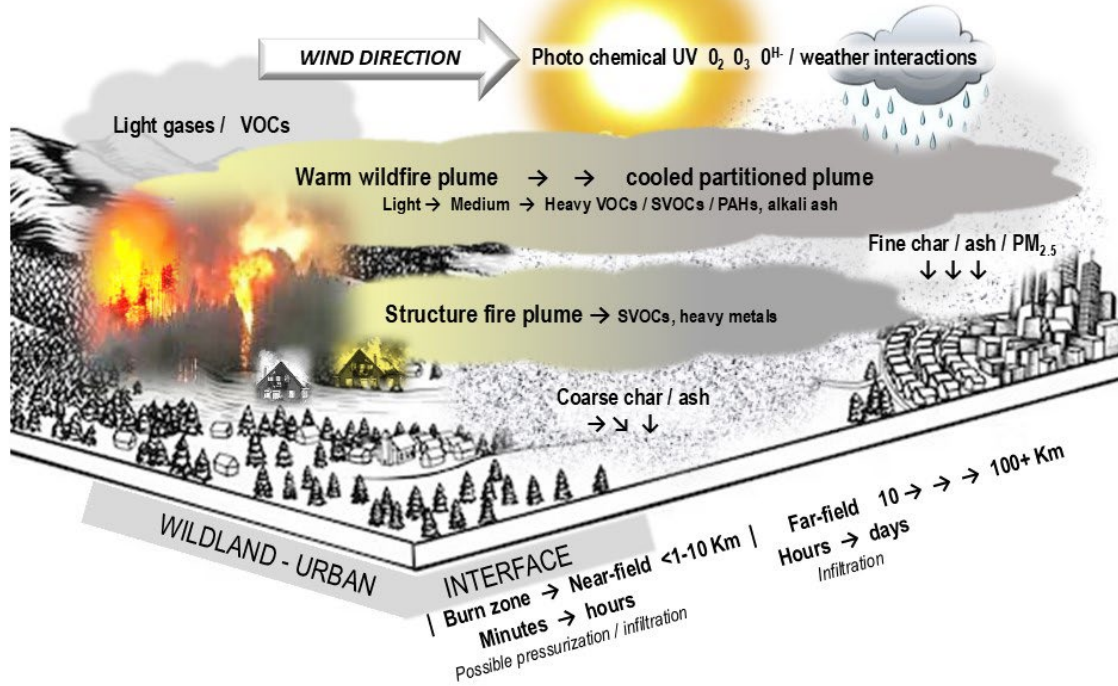
Visual Inspection and Sampling

Illustrated Minimum Optical Microscopy Capabilities

Data Interpretation using Probability Distributions

Restoration Project Specifications

# Conceptual Model of Time and Distance



# Wildfire Smoke Components

## Combustion Byproducts (CBP)

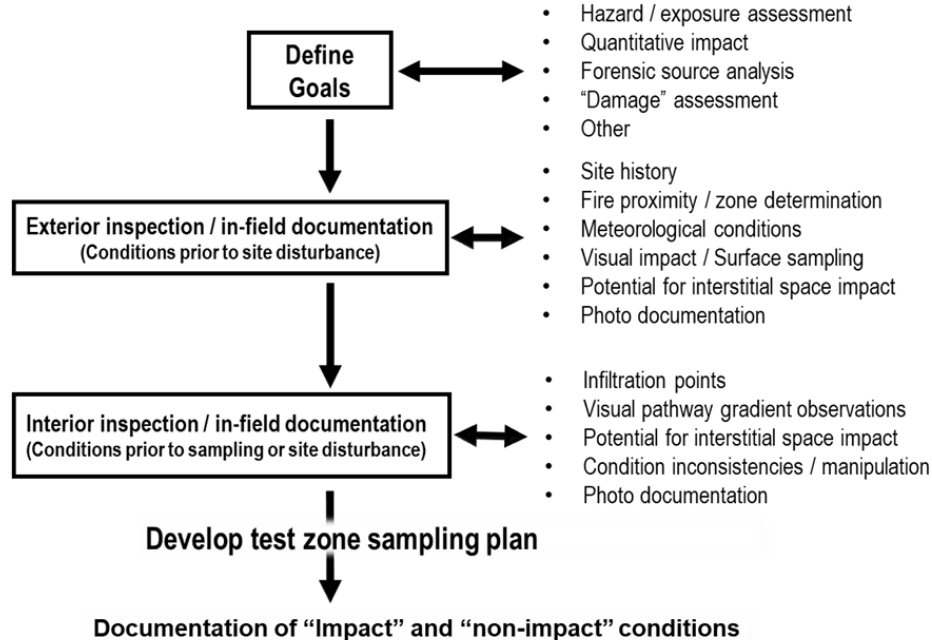
- Char: Organic residue of incomplete combustion of plants
- Ash: Inorganic residue of complete combustion
- Soot: Condensed products of pyrolysis of organic compounds
- Signature Particles: burnt soil, burnt pollen, minerals

## Other Potential Contaminants

- Volatile Organic Compounds
- Semi-VOCs
- Polycyclic Aromatic Hydrocarbons (PAHs)
- Metals
- pH

# Initial Inspection and In-field Testing

## FLOW DIAGRAM - INITIAL VISUAL INSPECTION



# Inspection Documentation

## INTERIOR FIRE INSPECTION - 1 (Main Living Spaces)

Page \_\_\_\_ of \_\_\_\_

Floor/Level →	Proj.#:	Client Project#:	Description:	Address:	Visual potential fire-related impact observations (rated from 0-3)													Bkg. Combustion Sources	Bkg. Dust
Room Description	Room Component	Orientation (N S E W)	Potential Impact Location	Fire Odor	Soot-like deposition	Ghosting	Fine Char / ash	Coarse Char / ash	Heat / Melting	Warping / Cracking	Corrosion	Mold / Moisture	Sample #	Description Fireplace, Cooking, Candles, Vehicular, Industrial, Other	Bkg. Fire Impact Level	Occupant related activities (0-3)			
ENTRY	Ceiling		Perimeter Center Fixture Other														Room / Zone →		
# of Windows:	Windows		Operable Fixed Ledge Track	Room / Zone →															
	Walls		Base Center Upper																
Photo #s:	Flooring		Carpet Tile Wood Laminate	Room / Zone →															
	Contents		Perimeter Center Closet		Furniture Cabinets Pictures Electric Softgds Utilities Other→														
LIVING ROOM	Ceiling		Perimeter Center Fixture Other														Room / Zone →		
# of Windows:	Windows / sliders		Operable Fixed Ledge Track	Room / Zone →															
	Walls		Base Center Upper Fireplace																
Photo #s:	Flooring		Carpet Tile Wood Laminate	Room / Zone →															
	Contents		Perimeter Center Closet		Furniture Cabinets Pictures Electric Softgds Utilities Other→														
FAMILY ROOM	Ceiling		Perimeter Center Fixture Other														Room / Zone →		
# of Windows:	Windows / sliders		Operable Fixed Ledge Track	Room / Zone →															
	Walls		Base Center Upper																
Photo #s:	Flooring		Carpet Tile Wood Laminate	Room / Zone →															
	Contents		Perimeter Center Closet		Furniture Cabinets Pictures Electric Softgds Utilities Other→														
KITCHEN	Ceiling		Perimeter Center Fixture Other														Room / Zone →		
# of Windows:	Windows / sliders		Operable Fixed Ledge Track	Room / Zone →															
	Walls		Base Center Upper																
Photo #s:	Flooring		Carpet Tile Wood Laminate	Room / Zone →															
	Contents		Perimeter Center Closet		Furniture Cabinets Pictures Electric Softgds Utilities Other→														

FIRE IMPACT LEVELS	Codes	Fire Impact Levels	Bkg. Dust Levels	Additional Comments
	Blank	Not addressed by inspection	Not addressed / relevant	
	0	Inspected - No visual or other / impact	Low / recently deaned	
	1	Light fire residue impact	Light - moderate	
	2	Moderate fire residue impact	Moderate	
	3	Heavy fire residue and/or heat impact	Heavy (rarely deaned)	

# Exterior Thermal Effects



- Proximity to burned structures
- Temperature and pressure differentials
- External and Internal Pressurization
- Interstitial Spaces
- Infiltration

# Initial In-field Testing



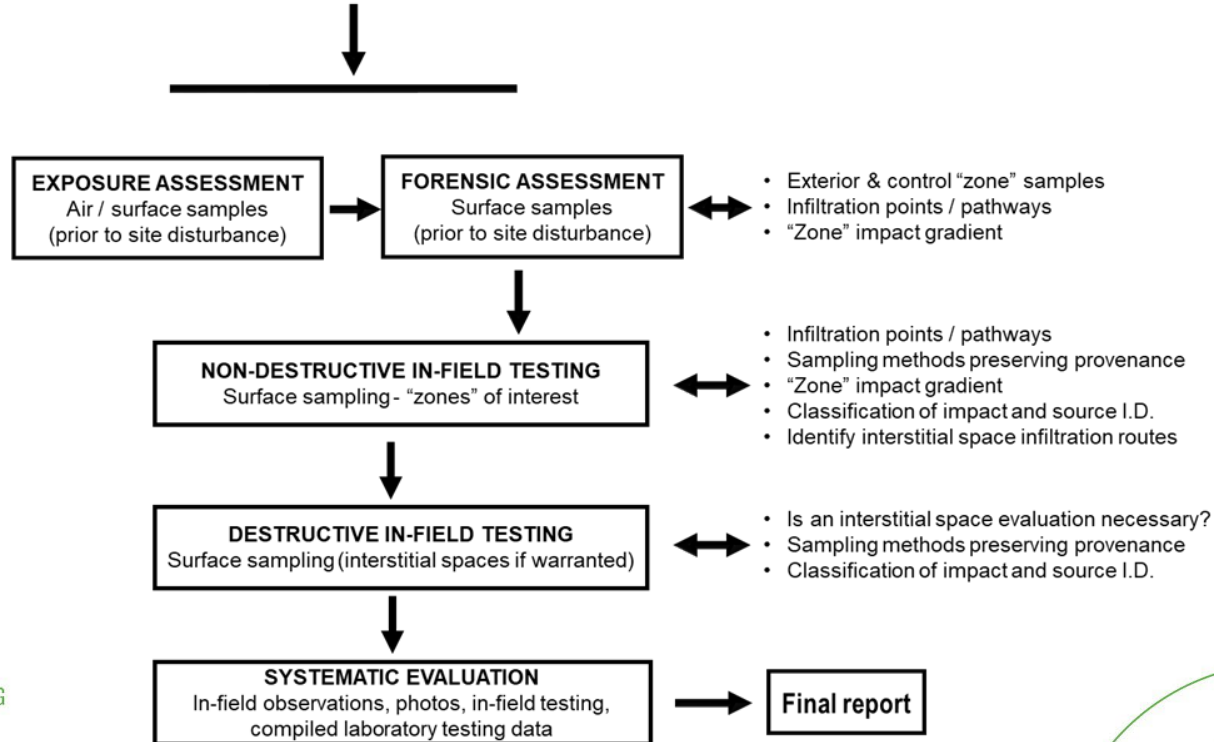
- Testing surfaces for CBP residue
- At Entry Points (doors, windows, attic vents)
- At interior spaces
- White Glove or Low lint paper wipes (Kimwipes)
- Dry Sponge
- Also used in Post-restoration Verification

# Preliminary Smoke Impact Levels

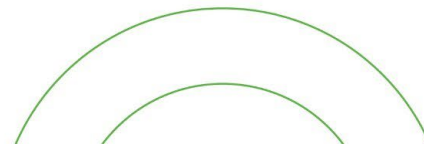
Evaluation Criteria	Level 1 (Background)	Level 2 (Light)	Level 3 (Moderate)	Level 4 ( Heavy)
Visible evidence of wildfire heat, smoke, or particulate residues	No visible evidence	Discrete; limited to points of entry (e.g., windowsills/tracks, door thresholds, proximate flooring, etc.);	Noticeable in multiple interior surfaces and spaces	Confirmed and widespread. Thermal impact to the exterior and/or interior surfaces may be present.
Perception of wildfire odors	No perception	Faint/Intermittent/ Discrete	Noticeable in designated areas	Noticeable and irritating perception throughout the affected area
Evaluation accounts for interior particles or odor sources unrelated to wildfires (i.e., fireplace, wood-burning stove, candles, etc.);	Yes	Yes	Yes	Yes
Structure located in a mixed-burn zone or near field to a WUI fire.	No	May or may not be	Yes	Yes
Evidence of mixed-burn or WUI fire effects (if applicable).	No	Limited in discrete areas	Noticeable in multiple areas	Generalized effects throughout the affected area.

# Sampling and Analysis

## FLOW DIAGRAM – SAMPLING / ANALYSIS PLAN



# Smoke Infiltration Points



# Sampling Indoor for Combustion Byproducts

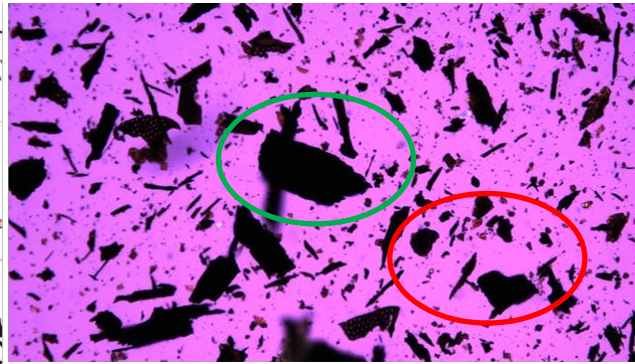
- Soot, Char & Ash (SCA) are the best surrogate indicators of wildfire smoke impact.
- Wildfires generate relatively low levels of soot compared to structure fires.
- Fresh wildfire ash produces elevated pH levels above 9
- Solid phase SVOCs partition and adsorb onto particulates.
- PAHs condense into soot.
- Infiltrated metals and adsorbed SVOCs settle on surfaces.

# Surface Sampling Techniques

- Tapelift – maintains the structure, composition and spatial integrity of the particles
- Wipes – Standardized sampling area. Best for metals, PAHs
- Micro-vacuuming – Cover large areas for bulk sampling
- Bulk – collect material for analysis.



# Optical Microscopy Capabilities



Transmitted light brightfield

Transmitted polarized light

Reflected light darkfield

The particles in the green oval are char particles. The particles in the red oval are iron oxide corrosion. These appear black and can only be differentiated as orange in the RLDF illumination mode.

# Air Monitoring

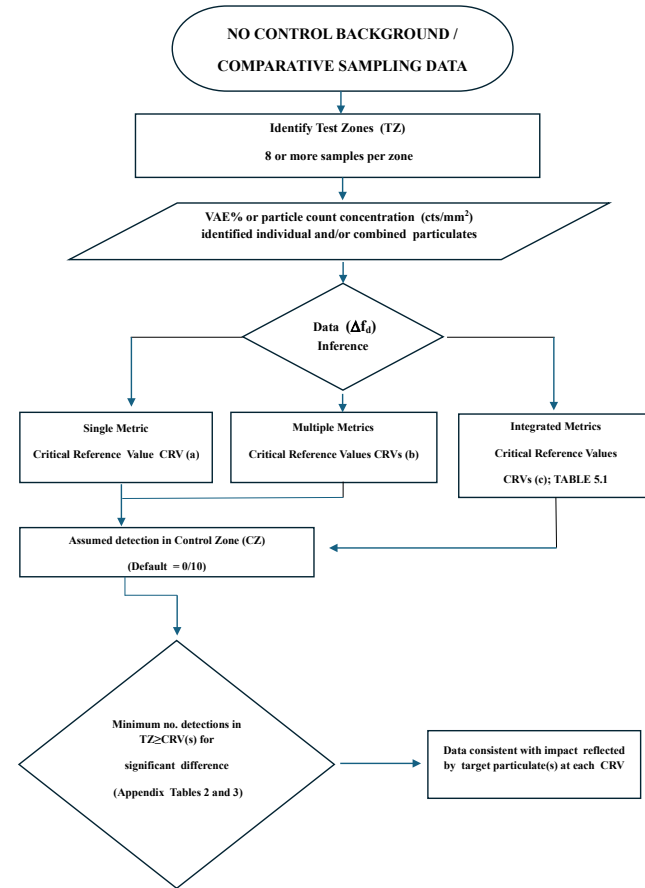
## Direct Reading Instruments

- Ultrafine Particulates
- Volatile Organic Compounds
- Initial Screening
- PPE selection
- Soon after the fire
- Subject to dilution, half-life, and background effects



# Data Interpretation

- Exposure assessments and forensic impact evaluations often require different statistical approaches.
- Distribution of settled particulate data following a fire often deviates from the “bell-shaped” normal distribution.
- Using Mean or Average values can lead to errors.
- Probability inference model evaluates differences in distribution and detection frequency rather than differences in mean values.



# Restoration Specifications

- The impact investigation report typically includes restoration specifications.
- Prescriptive Specifications: Detail the required procedures and the preferred methods for performing the work.
- Performance-based Specifications: Describe the desired outcomes of a project rather than the step-by-step methods used to achieve them.
- Post-Restoration Evaluation and Verification: incorporate pre-established clearance criteria into the restoration specifications to demonstrate and confirm cleaning effectiveness.

# Restoration Guidelines

- Restorer Qualifications
- Restoration Work Plan
- Work Area Isolation & Containment
- PPE
- Cleaning Methods
- Odor Treatment
- Contents Restoration
- Removal and Replacement of Contents and Personal Property Beyond Restoration
- Attics and HVAC Systems
- Post-Restoration Evaluation
- Post-Restoration Verification

# Attics and HVAC Restoration



# Post-Restoration Verification

- Verify the successful restoration and return of the structure, systems, or contents as close as possible to a pre-loss condition.
- Performed by an independent, third-party OEHS professional.
- For Restoration or Exposure Assessment
- Surface and bulk sampling for wildfire combustion residue, metals, PAHs
- Pre-established clearance criteria with pass/fail metrics.
- Resolution of all recognized health and safety hazards.

# Professional Judgment

## Confounders

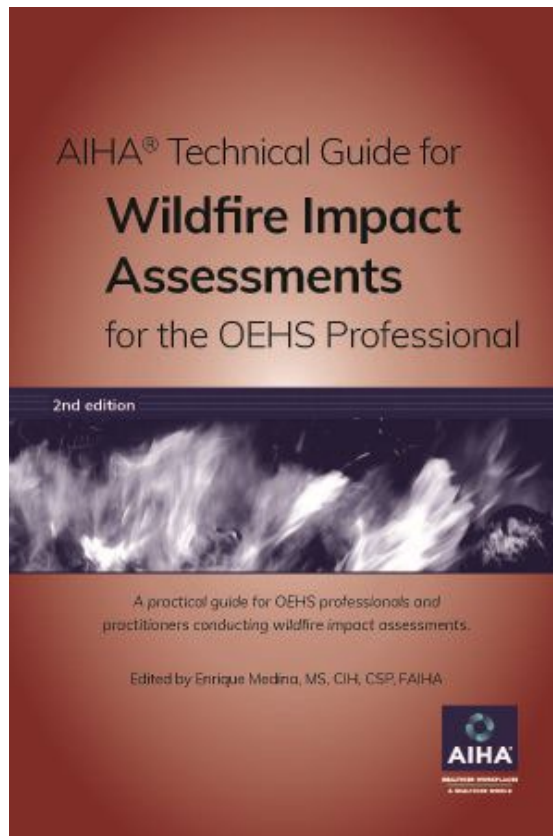
- Background sources unrelated to the wildfire event
- Combustion particles from occupant activities (fireplace, candles, BBQ)
- VOCs in household products
- Outdoor sources

## Uncertainties

- Natural distribution variability of sampled areas
- Sampling & Analytical Error
- Exposure Reference Values
- Wildland Fires
- WUI Fires
- Urban Firestorms

# AIHA Technical Guide for Wildfire Impact Assessments for the OEHS Professional 2<sup>nd</sup> Edition, 2025

California Smoke Claims and Remediation Task Force to develop standards for insurance coverage and clean-up of smoke-damaged homes.



# Questions & Comments?

# Thank You!

For your attention and time

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