



# Methods for Detecting Residual Combustion Products from Wild Fires

Joe Spurgeon, Ph.D.  
Bayshore Environmental  
IAQA Exposition  
Orlando, FL  
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## **Eight Houses Included in The Study**

- **2 Smoke-Exposed & Professionally Cleaned**
- **3 Smoke-Exposed & Cleaned by Home-owner**
- **1 Smoke-Exposed & Not Cleaned (Vacant)**
- **2 Unexposed Control Houses**
- **Sampling: 8 months after fire**

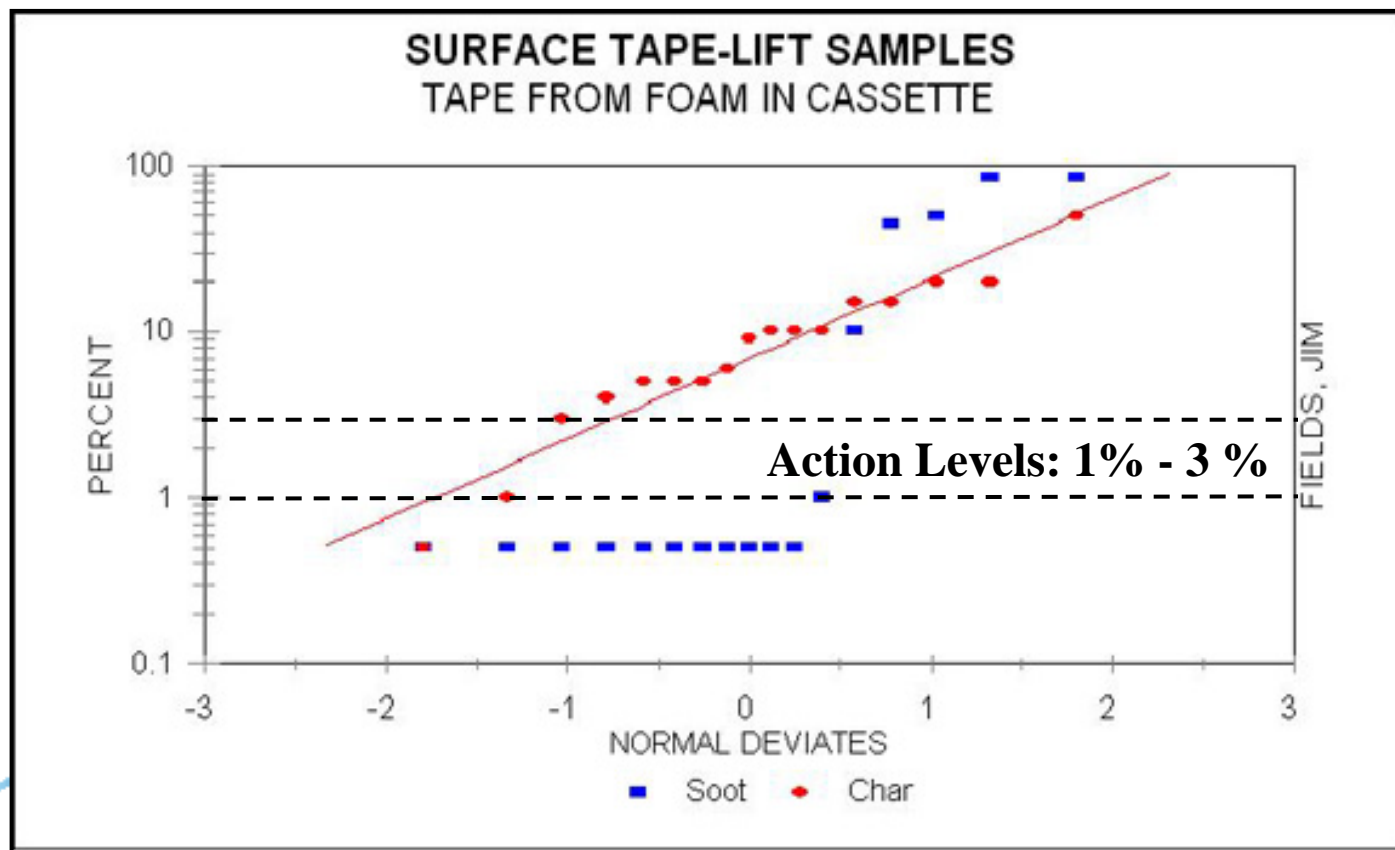


## Typical Sampling and Analysis

- **Surface Samples**
  - Tape Lift
  - Micro-vacuum
- **Sample Analysis**
  - Percent Ash, Char & Soot
    - Light Microscopy, TEM, SEM, EDXS

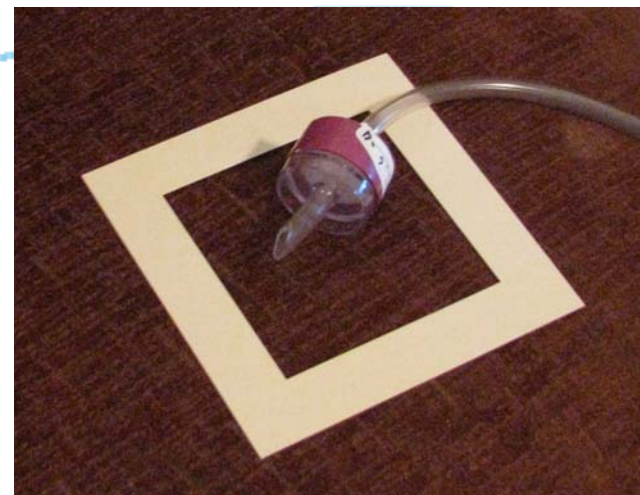


# Tape Lifts by Microscopy: Soot and Char in Smoke-Exposed Houses

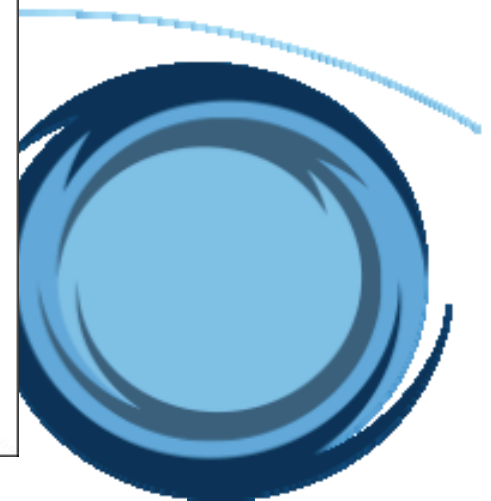
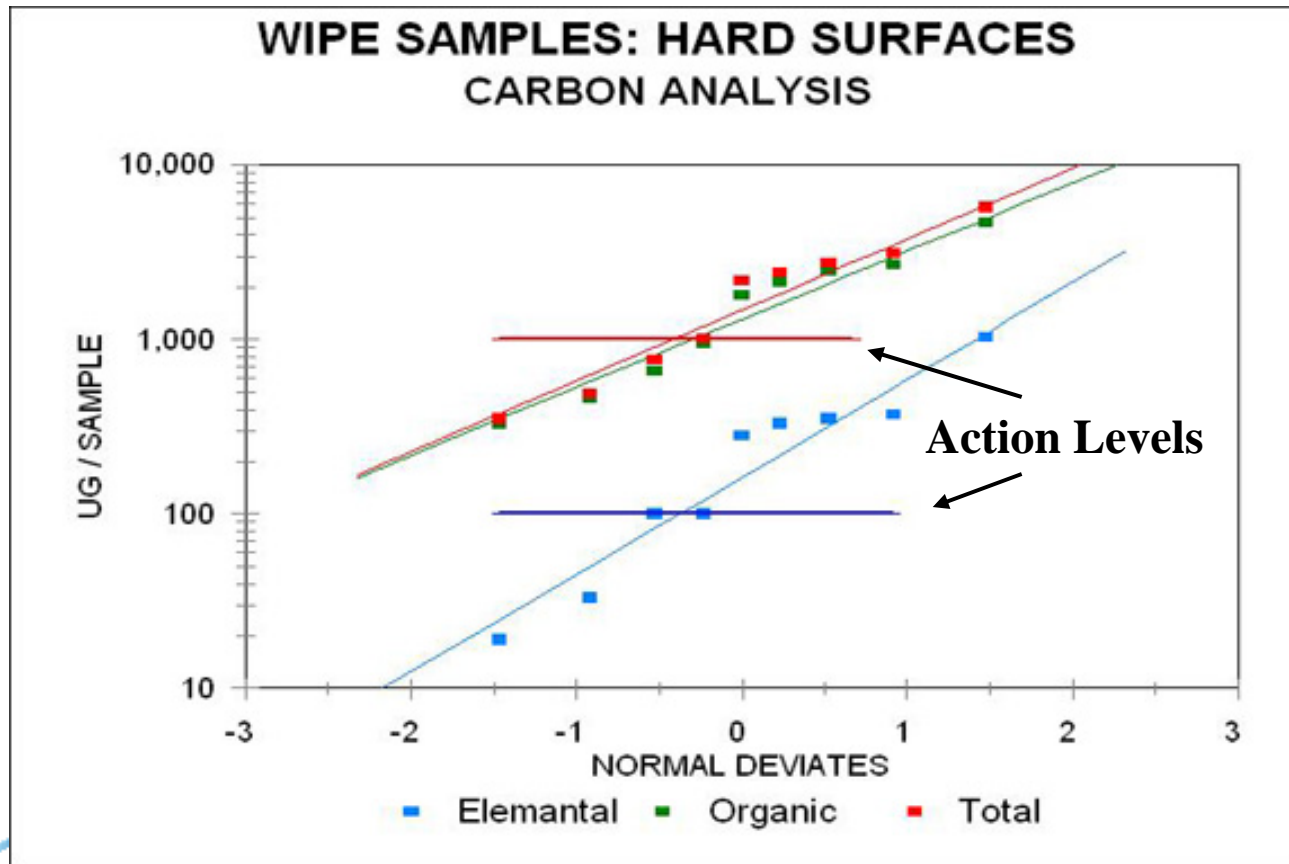


# Surface Carbon by the NIOSH 5040 Method

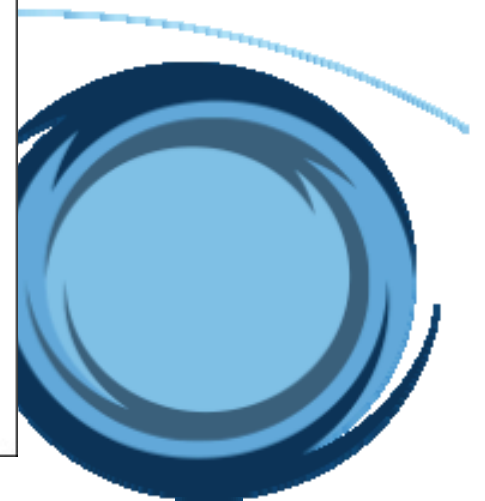
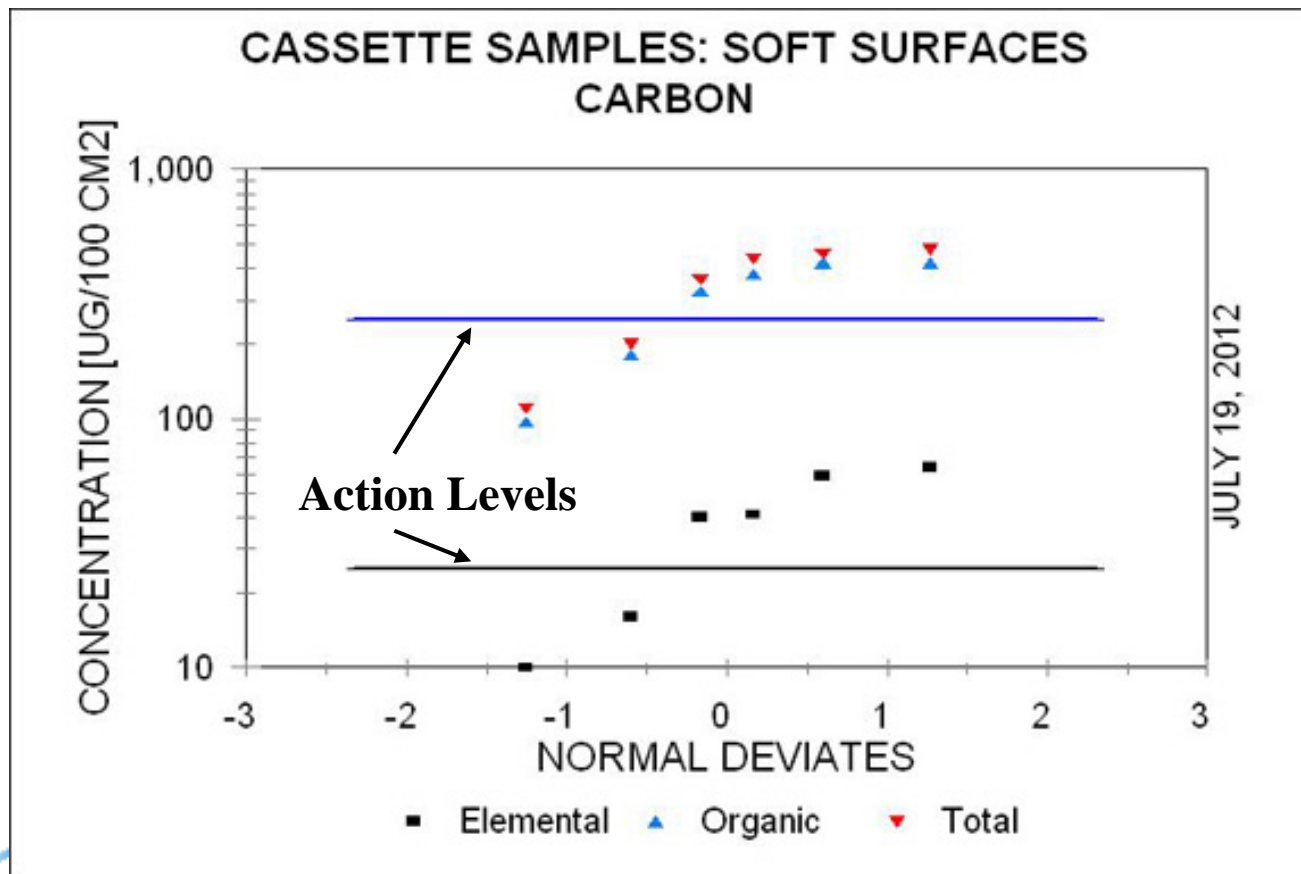
- **Method**
  - 37 mm glass-fiber Filter
  - Heat Treated (Binders)
  - Elemental, Organic & Total Carbon by wt.
- **Wipe Samples**
  - Hard Surfaces
- **Cassette Samples**
  - Soft Surfaces



# Smoke-Exposed and Control Houses



# Smoke-Exposed Houses (Only)





# Airborne Aldehydes as Indicators of Residual Contamination and Occupant Exposure

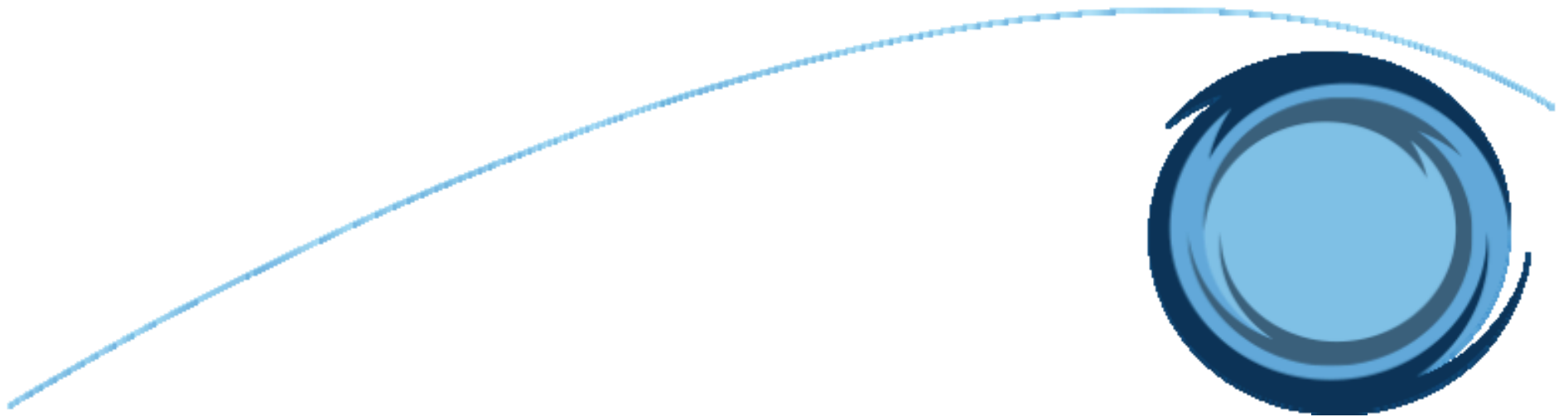
- **NIOSH 2016 Method**
  - **Treated Silica Gel Tube**
    - **SKC 226-119**
  - **200 cc/minute**
  - **60 Minutes**
  - **Scan – 11 Aldehydes**



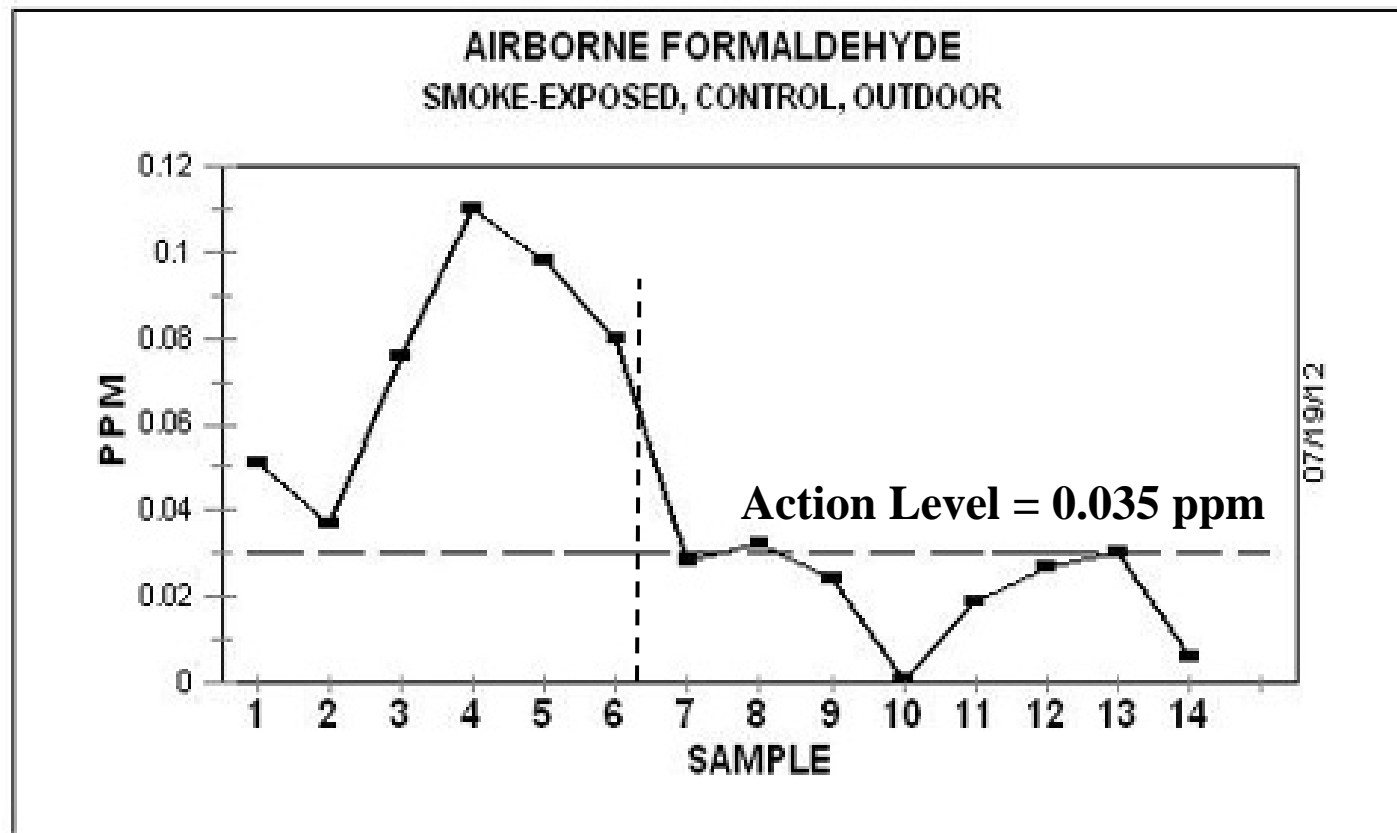


## **Airborne Aldehydes Associated with Residual Contamination**

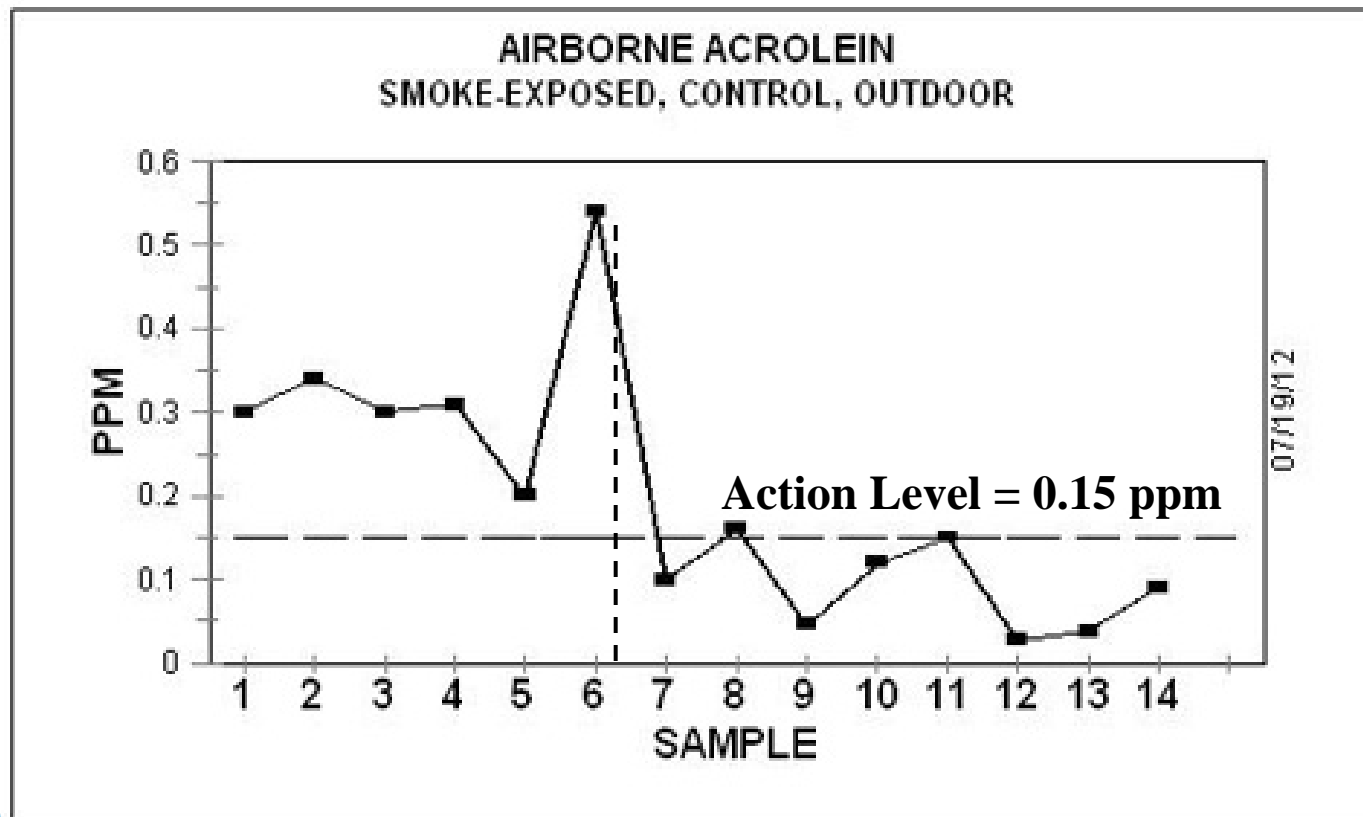
- **Formaldehyde**
- **Acrolein**
- **Benzaldehyde**
- **Acetaldehyde**
- **Hexanal**



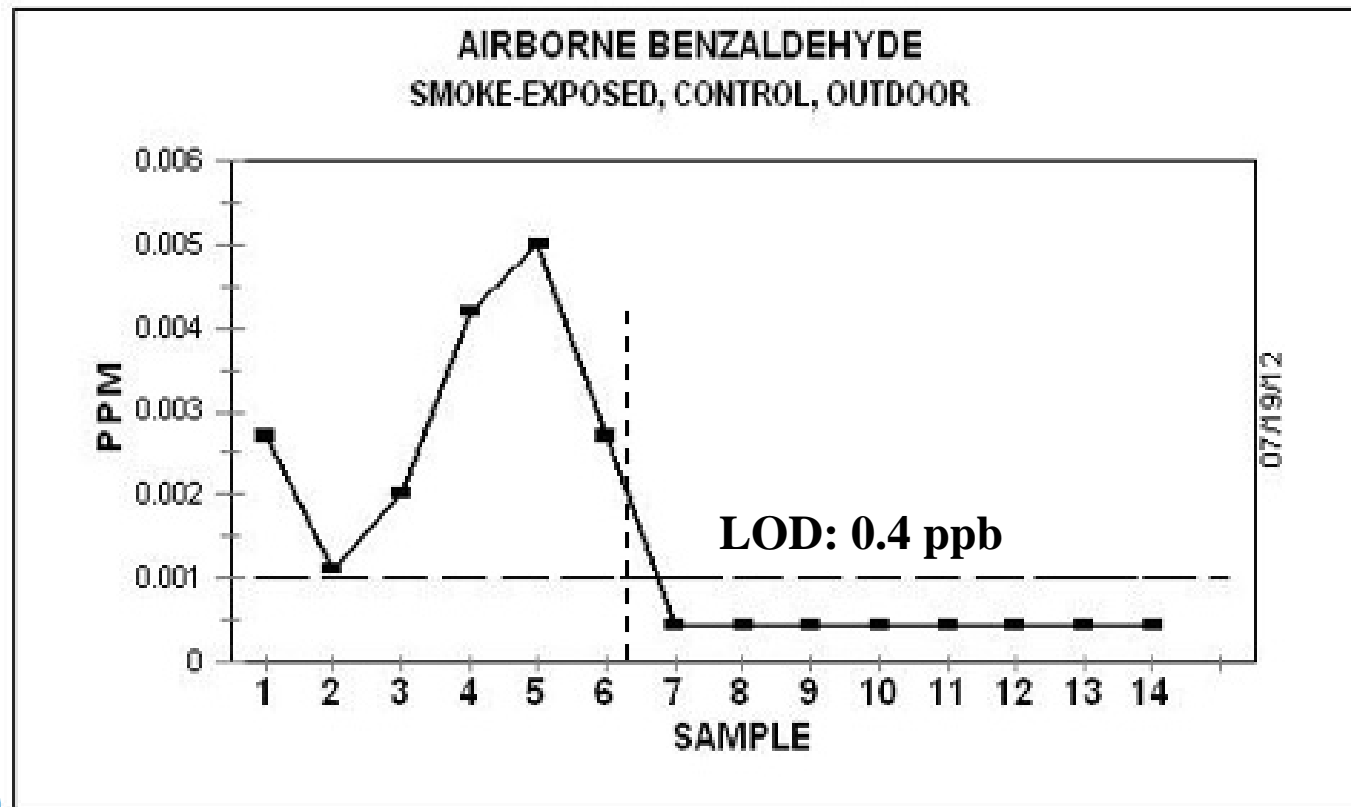
# Formaldehyde



# Acrolein



# Benzaldehyde: Unique Indicator?



# Aldehyde Concentrations in Smoke-Exposed Houses: 8 Months after Wild Fire

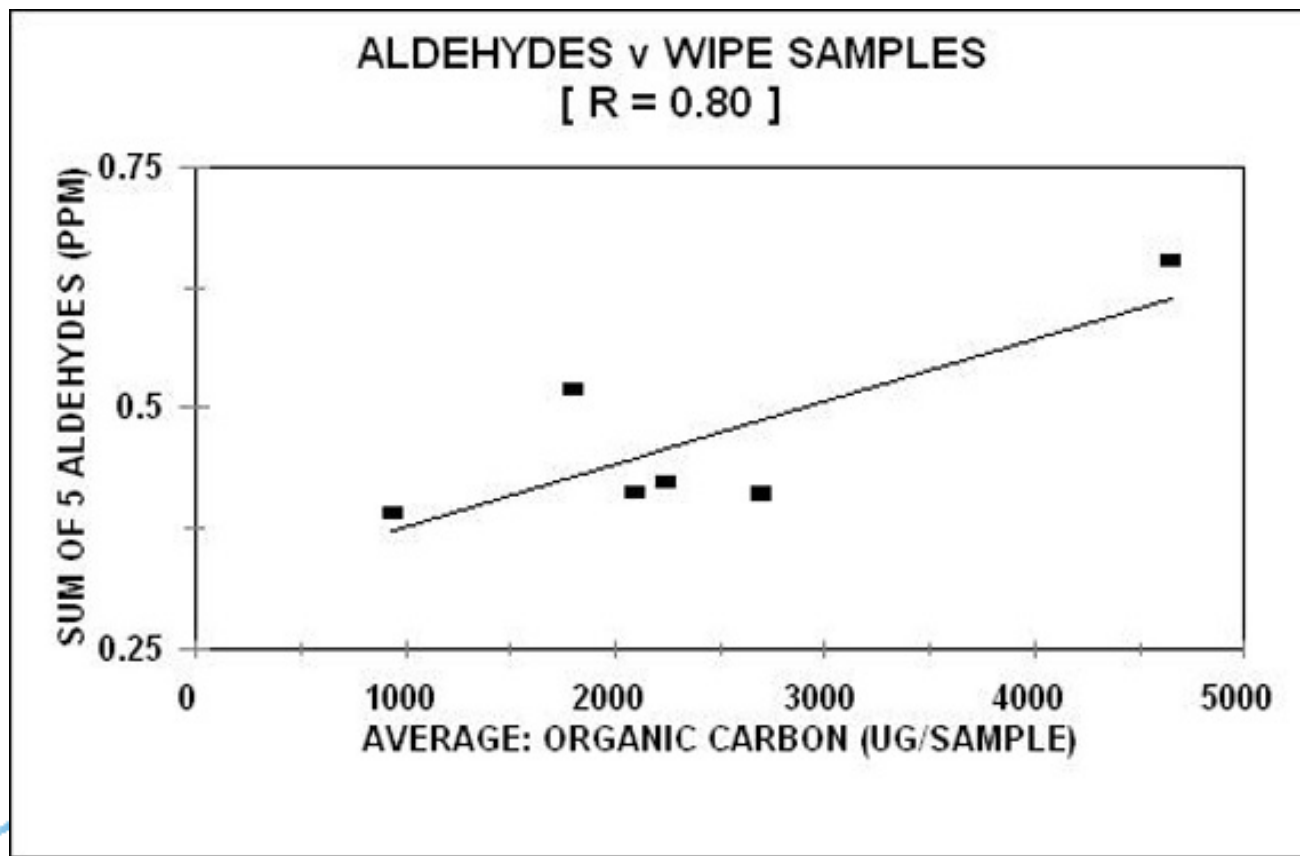
HOUSE	MRL*	1	2	3	4	5	6
Cleaning	NA	Pro	Pro	Own	Own	Own	None
Formaldehyde	40	50	38	78	115	100	80
Acrolein	3	200	300	300	310	340	540

\*CDC/ATSDR Acute Minimal Risk Level

Concentrations = ppb



# Organic Carbon on Hard Surfaces Indicator of Occupant Exposure?



**Formaldehyde**  
**Acrolein**  
**Benzaldehyde**  
**Acetaldehyde**  
**Hexanal**

