

Characterization of Firefighter Exposures During Fire Overhaul

The University of Arizona conducted a study back in 2000 called "Characterization of Firefighter Exposures During Fire Overhaul". Acrolein, formaldehyde, glutaraldehyde, benzene, coal tar pitch volatiles, nitrogen dioxide, ethyl benzene, toluene, and xylene were some of the chemicals detected.

Previous studies have characterized firefighter exposures during fire suppression. However, minimal information is available regarding firefighter exposures during overhaul, when firefighters look for hidden fire inside attics, ceilings, and walls, often without respiratory protection. A comprehensive air monitoring study was conducted to characterize City of Phoenix firefighter exposures during the overhaul phase of 25 structure fires. Personal samples were collected for aldehydes; benzene; toluene; ethyl benzene; xylene; hydrochloric acid; polynuclear aromatic hydrocarbons (PNA); respirable dust; and hydrogen cyanide (HCN). Gas analyzers were employed to continuously monitor carbon monoxide (CO), HCN, nitrogen dioxide (NO₂), and sulfur dioxide (SO₂). Area samples were collected for asbestos, metals (Cd, Cr, Pb), and total dust. During overhaul the following exceeded published ceiling values: acrolein (American Conference of Governmental Industrial Hygienists [ACGIH] 0.1 ppm) at 1 fire; CO (National Institute for Occupational Safety and Health [NIOSH] 200 ppm) at 5 fires; formaldehyde (NIOSH 0.1 ppm) at 22 fires; and glutaraldehyde (ACGIH 0.05 ppm) at 5 fires. In addition, the following exceeded published short-term exposure limit values: benzene (NIOSH 1 ppm) at two fires, NO₂ (NIOSH 1 ppm) at two fires, and SO₂ (ACGIH 5 ppm) at five fires. On an additive effects basis, PNA concentrations exceeded the NIOSH recommended exposure limits (0.1 mg/M³) for coal tar pitch volatiles at two fires. Maximum concentrations of other sampled substances were below their respective permissible exposure limits. Initial 10-min average CO concentrations did not predict concentrations of other products of combustion. The results indicate that firefighters should use respiratory protection during overhaul. In addition, these findings suggest that CO should not be used as an indicator gas for other contaminants found in this atmosphere.

The study can be found at the following location:

<http://www.firescenesafety.com/downloads/CharacterizationofFirefighterExposuresDuringOverhaul.pdf>



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