

Title \*

## **Differential Mutagenicity and Lung Toxicity of Smoldering Versus Flaming Emissions from a Variety of Biomass Fuels**

Abstract \*

Wildfire smoke changes with combustion conditions and fuel types, however the specific role of wildfire conditions on health effects are uncertain. This study applied a novel combustion and smoke-collection system to examine emissions from multiple biomass fuel types (oak, peat, pine needles, pine, and eucalyptus) under flaming and smoldering combustion phases. The system sustains flaming or smoldering phase for up to 60 min and uses multi-stage, cryogenically cooled impingers to capture particulate matter (PM) and semi-volatile organic compounds. Biomass smoke PM was extracted and assessed for mutagenicity in Salmonella strains TA100 and TA98 +/-S9, as well as lung toxicity in mice via oropharyngeal aspiration. On an equal-mass basis, extractable organic matter from the peat, pine, and eucalyptus flaming PM had the highest mutagenic potencies while the lung toxic potencies of the peat and eucalyptus flaming PM were greater than the respective smoldering PM. After adjusting for the emitted PM mass (i.e., real-life smoke exposure situations), the mutagenicity and lung-toxicity emission factors were higher for the smoldering than flaming emissions, with the highest emission factors being exhibited by the pine needles for mutagenicity and eucalyptus for lung toxicity. These results demonstrate that (1) the different fuel types and combustion phases can dramatically alter the emissions characteristics, mutagenicity, and lung toxicity; (2) the present combustion system can be used for health-risk assessment from inhalation exposure to various types of wildfire smoke; and (3) smoldering emissions produce greater toxicity emission factors than do flaming emissions. [Abstract does not represent official USEPA policy.]

Permission to publish \*



Check this box to give us permission to publish your abstract on a flash drive/USB Stick for distribution to all delegates if it is accepted for presentation

Affiliations and Authors \*

Author Information

M Ian Gilmour (Presenting)

Affiliations

US EPA, durham, USA

Author Information

Todd Krantz

Affiliations

US EPA, durham, USA

Author Information

Charly King

Affiliations

US EPA, durham, USA

Author Information

Michael hays

Affiliations

US EPA, durham, USA

Author Information

Matthew Landis

Affiliations

us epa, durham, USA

Author Information

mark higuchi

Affiliations

US EPA, durham, USA

Author Information

david demarini

Affiliations

US EPA, durham, USA

Author Information

Yong Ho Kim

Affiliations

US EPA, durham, USA