

WILDLAND FIRE RESPIRATORY RISKS

Wildland firefighters are exposed to many of the same naturally occurring respiratory hazards as structural firefighters: the myriad byproducts of wood pyrolysis and combustion, including carbon monoxide (CO), acrolein, polycyclic aromatic hydrocarbons, aldehydes and ketones and acid gases.

The main problem is wildland firefighters do not use an effective form of respiratory protection. For many wildland firefighters, a cotton bandana remains the state of the art in respiratory protection, and the protection afforded is minimal.

The greatest inhalation hazard is CO because it is present in the largest concentration. Peak exposures of CO as high as 179 parts per million (ppm) have been measured in some controlled burns, whereas the Occupational Safety and Health Administration permissible exposure limit for CO is only 35 ppm for an eight-hour exposure. The 15-minute short term exposure limit is 150 ppm. Another problem is most air purifying respirators (APRs), especially bandanas, cannot protect against the extremely fine (and most hazardous) particles present in smoke aerosols from the wildland fire environment.

WILDLAND RESPIRATOR

Wildland firefighters need a small, lightweight device that is easy to don and doff, and can be carried in a cargo pants pocket or a small pouch. TDA and Avon Protection are developing a scarf-type respiratory protection system capable of removing airborne hazards present in the wildland firefighting operating environment. The system is composed of a filter module that will remove very fine particulates, and a carbon sorbent optimized to remove Wildland chemical vapors. Our team is investigating designs, like the back-mounted unit in the drawing and photographs, which would move filtration components away from the Wildland firefighter's face, improving evaporative cooling.

WILDLAND RESPIRATOR FEEDBACK

TDA and Avon Protection have produced prototype Wildland Scarf Respirators and are seeking experienced Wildland Firefighters to provide feedback on existing and future designs. TDA Research is in Golden, CO. If you are a wildland firefighter based in Colorado and would like to review the Wildland Respirator, please email Girish Srinivas at GSrinivas@TDA.com.

