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Exposure to radionuclides in smoke from vegetation fires.

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Abstract

Naturally occurring radionuclides of uranium, thorium, radium, lead and polonium were determined in bushes and trees and in the **smoke** from summer forest fires. Activity concentrations of radionuclides in **smoke** particles were much enriched when compared to original vegetation. Polonium-210 ((210)Po) in **smoke** was measured in concentrations much higher than all other radionuclides, reaching $7,255 \pm 285$ Bq kg⁽⁻¹⁾, mostly associated with the smaller size **smoke** particles (<1.0 μm). Depending on **smoke** particle concentration, (210)Po in surface air near forest fires displayed volume concentrations up to 70 m Bq m⁽⁻³⁾, while in **smoke**-free air (210)Po concentration was about 30 μ Bq m⁽⁻³⁾. The estimated absorbed radiation dose to an adult member of the public or a firefighter exposed for 24h to inhalation of **smoke** near forest fires could exceed 5 μSv per day, i.e, more than 2000 times above the radiation dose from background radioactivity in surface air, and also higher than the radiation dose from (210)Po inhalation in a chronic cigarette smoker. It is concluded that prolonged exposure to **smoke** allows for enhanced inhalation of radionuclides associated with **smoke** particles. Due to high radiotoxicity of alpha emitting radionuclides, and in particular of (210)Po, the protection of respiratory tract of fire fighters is strongly recommended.

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