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Forest fires in the territory contaminated as a result of the Chernobyl accident: radioactive aerosol resuspension and exposure of fire-fighters

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Abstract

Studies were carried out to investigate the processes of resuspension and redistribution of radionuclides by fire in the territories contaminated as a result of the Chernobyl accident. In this set of experiments, the dispersed radioactive aerosol composition, the values of airborne radioactive aerosol concentrations, the resuspension factor, the resuspension rate, the deposition flux and the deposition velocity have been obtained for the different phases of a fire and at various distances from the fire. In the active phase of a fire, the airborne concentrations of radionuclides increase by several orders of magnitude relative to the background value. The resuspension factor for the active phase of a fire was assessed as 10^{-7} – 10^{-8} m⁻¹, while the value of the resuspension rate had a 10^{-10} s⁻¹ order of magnitude at a deposition velocity of 1–2 cms⁻¹. The additional terrestrial contamination due to a forest fire can be estimated as a value in the range 10^{-4} – 10^{-5} of its background value. As recommended by ICRP, the human respiratory tract model was applied for calculation of the Effective Equivalent Dose (EED) to firemen. The dose coefficient for radioactive aerosol inhalation was estimated at 1.5×10^{-8} Sv (Bqm⁻³ h)⁻¹.

Author Keywords: Radioactive aerosols; Forest fires; Resuspension; Deposition; Inhalation; Dose; Standardized Gaussian model

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