18 Environmental Pollution in the Vicinity of an Aluminium Smelter in Siberia

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Abstract

Detailed studies of snow and soil contamination within the influence zone of the Irkutsk Aluminium Metallurgical Plant were carried out for the period of 1996–2015. The main types of atmospheric and soil pollution and the amounts and distribution area of the pollutants were described. The study revealed that within 1 km of the aluminium smelter, the maximum fluoride concentration in the snow meltwater reached 66 mg dm^{-3}. The relationship between technogenic soil and snowpack pollution was assessed, and their effect on some soil parameters was revealed. A standard determination of technogenic loads was carried out in relation to the significant and sensitive soil parameters. The maximum level of technogenic load was obtained by determining critical points on the "load vs. effect" curve. The values of the "dose–effect" relationship can be used to determine the maximum permissible concentration (MPC) and maximum impermissible concentration (MIC) of the potentially toxic elements in the soil. The amounts of the total forms of fluoride, aluminium and sodium were, respectively, 0.66 and 0.84 g kg^{-1}, 82 and 93 g kg^{-1}, and 24 and 26 g kg^{-1} for the upper (MPC) and lower (MIC) limits. This highlights how the soil environment is polluted with these substances emitted from the Irkutsk aluminium smelter.

Keywords

Aluminium smelter · Pollution · Atmosphere · Snow · Soil

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