Accumulation of chlorinated dioxins and furans in human milk in zone of kraft pulp mill emission distribution

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Using chlorine in bleaching of pulp and paper is one of the pollution sources responsible for discharging highly toxic chlorinated polyaromatic compounds: polychlorodibenzo-dioxins and polychlorodibenzofurans. These toxic compounds have been found in re-production made of paper and cardboard products, in tanks not far from pulp and paper enterprises. Further increases in the production of pulp, paper and cardboard should be prevented by environmental standards to reduce discharges and emissions of poten-tially toxic compounds, including chlorinated dioxins and dibenzofurans.

High temperature processes of chemical recovery and waste utilization are widely used at modern pulp mills, recovery boilers and sludge incinerators being emission sources of chlorodioxins and chlorofurans, contributing to air pollution of populated zones.

The town of Baikalsk (Southern coast of lake Baikal, 51 ° north) was selected for the study. A bleached kraft pulp mill is located there producing 180 tons of pulp per year. Chlorine dioxide, chlorine gas (1:6) and sodium hypochlorite are used for many–stage bleaching. Sludge after biological and chemical treatments (50 – 60) t/day is burned in fluidized bed incinerators Babcock Hitachi. This method distributes halogen containing aromatic compounds into the atmosphere where they accumulate in human bioliquids. This fact determined the study's purpose to measure congeners of tetrachlordibenzo-para–dioxins and –furans in human milk collected from nursing mothers having lived in Baikalsk for a long time. Different milk samples were collected and compared to samples from another Siberian town, Kachug, where there was not any significant industry. This town lies rather far from both the pulp and paper mill at Baikalsk (54 ° north) and other sources of anthropogenic environmental impact.

Comparison of levels of various individual halogen containing organics, their total amounts, as well as dioxin toxic equivalents show no significant differences in their val-ues for human milk between Baikalsk and Kachug. These findings indicate background concentrations of chlorinated organics in human bioliquids in the East–Siberian region and show no accumulation of chlorodioxins and chlorofurans in inhabitants of Baikalsk, subjected to the tolerable influence of kraft pulp mill emissions. Utilization of sludge in fluidized bed incinerators does not contribute to emitting halogen containing compounds into the atmosphere in amounts leading to their accumulation in organisms.