

Environmental Levels (Air and Soil) of Other Organohalogenes and Dioxins P301

Dioxin and Furan Concentrations in Snow of Moscow Region, Russia

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Introduction

The works on drinking and natural water control over PCDD/Fs content were initiated in Moscow few years ago. Snow was sampled near sources of drinking water. Sometimes, there were occasions when PCDD/Fs have been observed in flood water. It may be assumed to be caused by PCDD/Fs accumulation in snow during winter. Investigation of "clean" regions in the range of 50 km from Moscow beltway was carried out in 1998. The sampling has been performed in Odintsovo region to the west of Moscow along the shores of Moskva-river, Istra, Molodnya, Medvenka (N1 - 7); in Shchelkovo' region to the east of Moscow near Klyazma-river (N8 -9); in Dmitrov' region to the north of Moscow along the shores of Yakhroma-river and the Moscow canal (N10 -14). Similar experiments were conducted in 1999. Snow samples (N15-19) were taken in Odintsovo region. The object of the present investigation was determination of background concentrations of PCDD/Fs in the snow cover nearby water sources. Quantitative and qualitative evaluations of the PCDD/Fs content in snow and natural water nearby water sources during flood water was attempted as well.

Experiment

The map of the sites of snow sampling is presented in Fig.1. The snow samples N1- 7 were taken on the 4 th of March,N8- 14 - on the 6th of March 1998,N15-19 - on the 18th of March 1999 at the time of maximum snow accumulation. Snow cores were sampled down to soil surface and placed into plastic containers. Taken samples have been melted at the room temperature. After snow melting each snow sample gave minimum 20 liters of water, then it was carried to glass bottle.The samples were spiked with the mixture of labeled standards in acetone (Cambridge Isotope Laboratories, USA) , then PCDD/Fs were extracted by hexan. Glass columns with acid and basic silica gel and basic alumina oxide were used for extracts cleaning. The methods of cleaning and detection (HRGC/ LRMS) were described in details earlier 1). Identification and quantitative analysis was performed on Hewlett-Packard GC/MS 5890/5971A using Ultra-2 capillary column by Hewlett- Packard.

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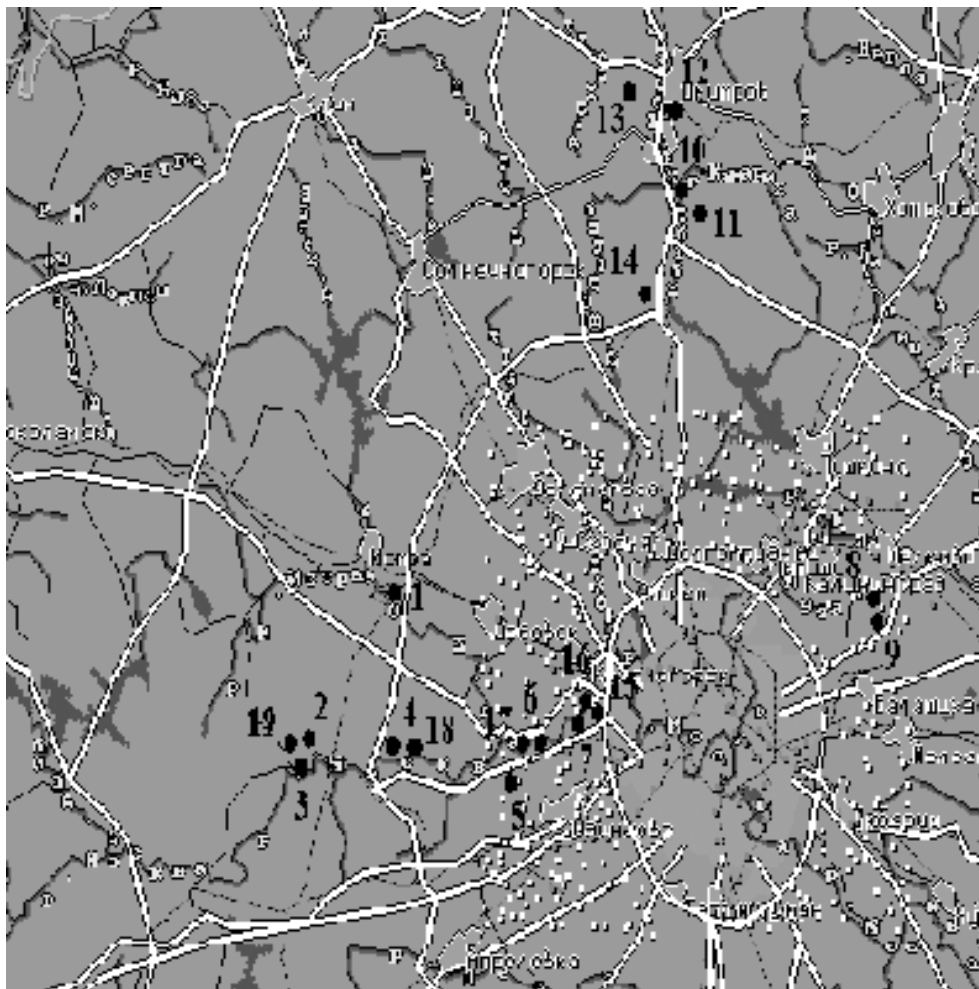


Fig1. Snow Sampling Sites of the Moscow Region

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Results and Discussion

Fig.2 presents results of analysis of snow samples expressed in TEQs. The range of total equivalent contamination in the samples N1-7 was from 0.228 to 7.418 pg/l; in the samples N 8-14 - from 0.307 to 2.792 pg/l; in the samples N 15-19 - from 5,0 to 15,6 pg/l. Maximal concentrations of PCDD/Fs were observed in the sample N7(1998) and in the sample N15 (1999) taken in densely populated place.

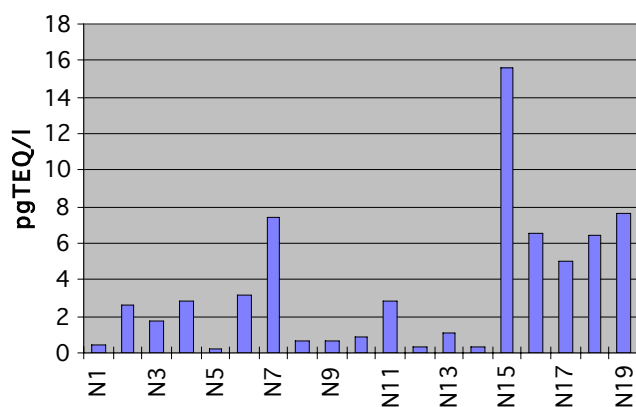
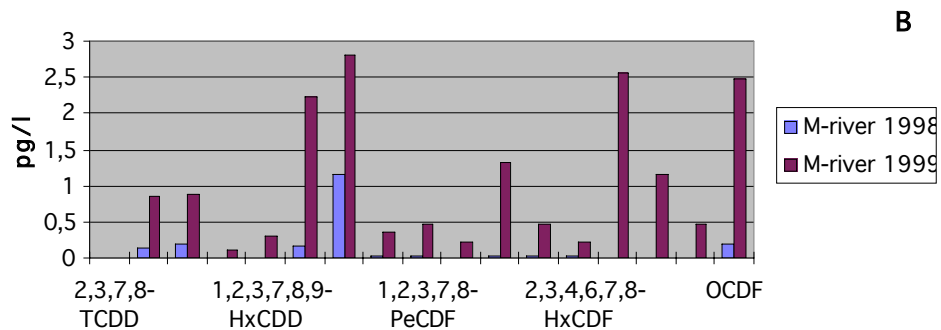
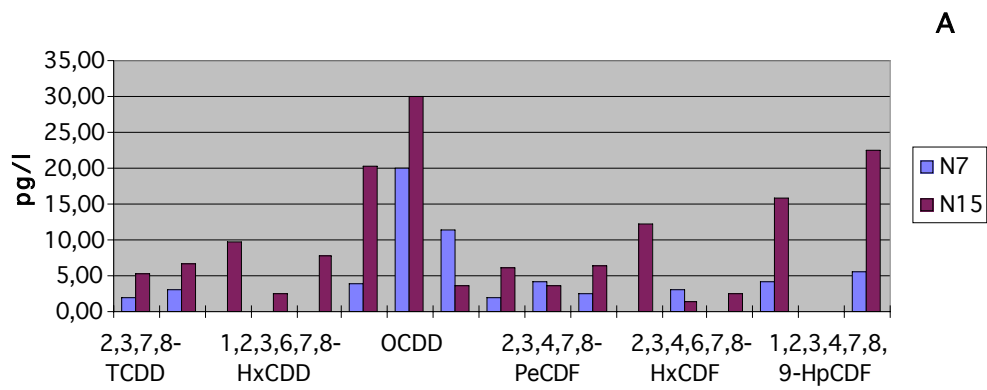


Fig2. Sum of TEQs in Snow Samples

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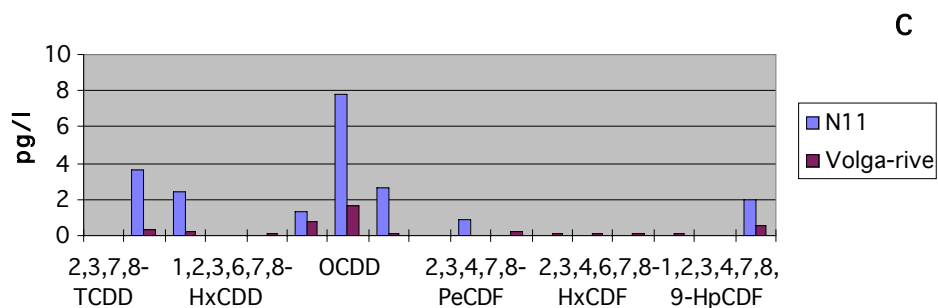


Fig.3 Profiles of PCDD/F Congeners Concentrations in the snow samples N7,15 (A), in the flood water from Moskva-river(B), in the snow sample N11 and in the flood water from Volga-river(C).

Figures 3A,3B,3C present characteristic composition of PCDD/Fs congeners in the snow samples N7,15; in the flood water from Moskva-river and in the snow sample N11 and in the flood water from Volga-river, respectively. As Figs.3A,3B,3C show the same toxic isomers (penta-, hexa-, hepta-, octa- dioxins and tetra-, penta-, octa- furans) exist in water and snow samples. This allows suggestion about flood water's PCDD/Fs origination from the snow accumulated during winter period. PCDD/Fs transport to the snow may occur through atmospheric deposition resulted from flue gases discharges of various combustion sources such as power plants, waste incinerators, petrochemical industry, home heating, automobiles and other.

acknowledgments

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References

1. EPA. Method 8280: The Analysis of Polychlorinated Dibenzop-Dioxin and Polychlorinated Di benzofurans.

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