

Composition and dynamics of volatile and semi-volatile organic contaminants in potable water transported via extended water distribution networks of a metropolis

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With the objective of identifying degree of water quality change at a long-time transportation of potable water on vast city networks, as well as in dead-lock zones, potable water quality of the surface water intake of Ufa city was analyzed with a use of different GC and HPLC techniques. Forty-six volatile and semi-volatile organic compounds were detected in potable water according to an obligatory water quality control program, and more than 250 organic compounds were identified under supplementary monitoring program. It was shown that halogenated by-products were formed during the first hours of contact between residual organic matter present in water and chlorinating agent, which was added at the city water treatment plant. Additional formation of trihalomethanes (up to 40%) was caused by the presence of residual chlorine during transportation of water via the distribution system. The content of haloacetic acids and semi-volatile halogenated organic compounds in potable water dropped down by 70-90% of the initial one after water exited from the plant. At the same time, these zones were characterized with enhanced concentration of squalene that was proposed as an indicator of intensity of biotransformation processes occurring in water (Figure1).

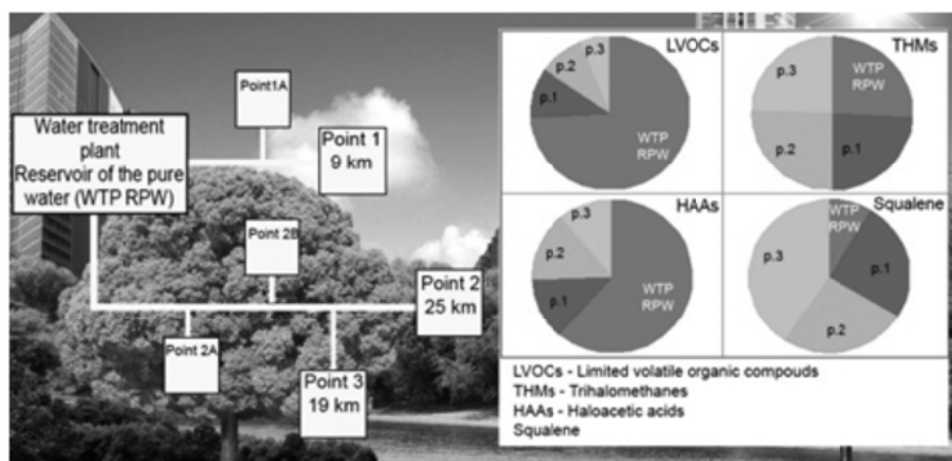


Figure 1. The scheme of the city water distribution networks and the content of the main classes of organic water pollutants.

Carcinogenic and non-carcinogenic risks reduction was demonstrated in case of transportation of potable water from the surface water intake to remote and dead-lock zones of the city water network. In case of the ground water intake the risks mentioned were shown to increase. The latter is constrained by increasing of content of metals and chlorination by-products.