Mercury in biochemical cycle of the Bratsk reservoir and Program of demercurization of chlor-alkali production in Baikal region, Russia

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Emission of the anthropogenic mercury to the Bratsk reservoir is for all related to the operation of mercury electrolysis shop of the enterprise "Usoliekhimprom" at the period 1970-1998. Studies, that we conducted at the last ten years (1998-2008) and annual monitoring research of the mercury accumulation at the various elements of reservoir's ecosystem allowed us to trace changes occurring in the biochemical cycle after diminishing the mercury burden, to define dependencies and regularities of the toxicant's migration in the aquatic environment and trophic chains of hydrobionts. The summary of the research is the following:

- We have defined that, against a background of the general reduction of mercury's content in water, the main source of mercury contamination are the bottom deposits. They contain large amounts of mercury, with it's concentration up to 2 $\mu g \cdot g^{-1}$ dry weight. The heterogeneity is often the main cause of mercury accumulation in hydrobionts.
- It is determined that even after the end of the mercury electrolyses at the enterprise "Usoliekhimprom", its wastewater still contains high level of mercury concentration, at the average 6 $\mu g \cdot L^{-1}$. The main part of suspension, contaminated with mercury is transferred by thin argillaceous suspended particles that have a large sorption potential. Suspension, contaminated with mercury accumulates mainly in zone of main sediment geochemical barrier, thus creating areas of focal sediments contamination. 2008, there were registered maximal levels of total Hg accumulation in plankton (0,722 $\mu g \cdot g^{-1}$ dry w.), benthos (0,476 $\mu g \cdot g^{-1}$ wet w.), aquatic plants (0,83 $\mu g \cdot g^{-1}$ dry w.), nonpredatory and predatory fishes (1,542 and 2,484 $\mu g \cdot g^{-1}$ wet w.).
- Mercury content in the total plankton in inverse proportion with the water level of Bratsk reservoir. As the biomass of plankton increases, the content of mercury in water decreases, that is caused by absorption and accumulation of mercury by planktonic organisms. With the increase of the plankton biomass the level of mercury concentration in total plankton becomes higher, and vice versa, with the prevalence of phytoplankton in tests, the content of mercury decreases. Depending on the specific structure, zooplankton accumulates 2-2,5 times more mercury than phytoplankton. The content of mercury in filtering zooplankton (Cladocera) s higher than in predators (Copepoda).
- Differences in mercury accumulation by various organs and tissues of various fish species is caused by differences in food items, physiological particularities of fish and hydro chemical environmental conditions. Mercury content analysis for muscles, larvae, blood and bolus, as well as the defining of food composition for fishes of different trophic directions could give a prior express-estimation of mercury contamination of water and of ways of mercury transfer in food chains.