

## **Distribution of mercury in the ecosystem compartments of the Nura River, Central Kazakhstan**

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Mercury pollution of river Nura in Central Kazakhstan was caused by 47-year operation of PO “Karbide” (Temirtau) which consumed 2352 tons of Hg /1/. This paper summarizes the results obtained by AIPET during fieldworks 1997-2004 relating to the mercury pollution of river ecosystem.

The data on mercury content in riverbed sediments (in total 437 samples), deposits on river banks (140 integral samples), topsoil in the floodplain (1104 samples), water vegetation (12 integral samples) and fish (46 samples) were collected during fieldworks and laboratory analyses at 1997-1998. Seasonal variation of Hg concentration in surface water of the river (382 samples) was studied in 2001-2004. Additional sampling of fish was undertaken in 2002. These samples were partly analyzed at the same year (20 samples), however 90 samples were stored frozen until 2005 when they were finally analyzed. Atomic fluorescence spectrometer (Millennium Merlin, UK) and atomic absorbance analyzer (AGP-01, Russia) were used for determination of total mercury concentrations.

Figure 1 shows the change of average Hg concentrations in technogenic silts downstream at the distance from outlet point of contaminated wastewater. Estimated amounts of deposited Hg are: 10 tons in riverbed silts; 4 tons in backwater silts; 2 tons in silts of oxbow-lakes; 65 tons in silt depositions at river banks; and 53 tons in floodplain topsoil. Figure 2 gives average Hg content in the leaves of reed mace. This graph correlates with those presented in Fig. 1. Figure 3 shows the seasonal variation of total Hg concentration in surface water of river Nura. The water flow at the most contaminated location was: 4-6.11.2001 – 16 m<sup>3</sup>/s; 8-13.11.2002 – 70 m<sup>3</sup>/s; 22-23.08.2002 - 6 m<sup>3</sup>/s; and 4.04.2004 – 125 m<sup>3</sup>/s. Figure 4 shows the variation of Hg content in non-predator fish species (including lake perch). For comparison purposes the similar data (58 samples) obtained by Karaganda Hydromet in 2004 /2/ are also presented at this figure.

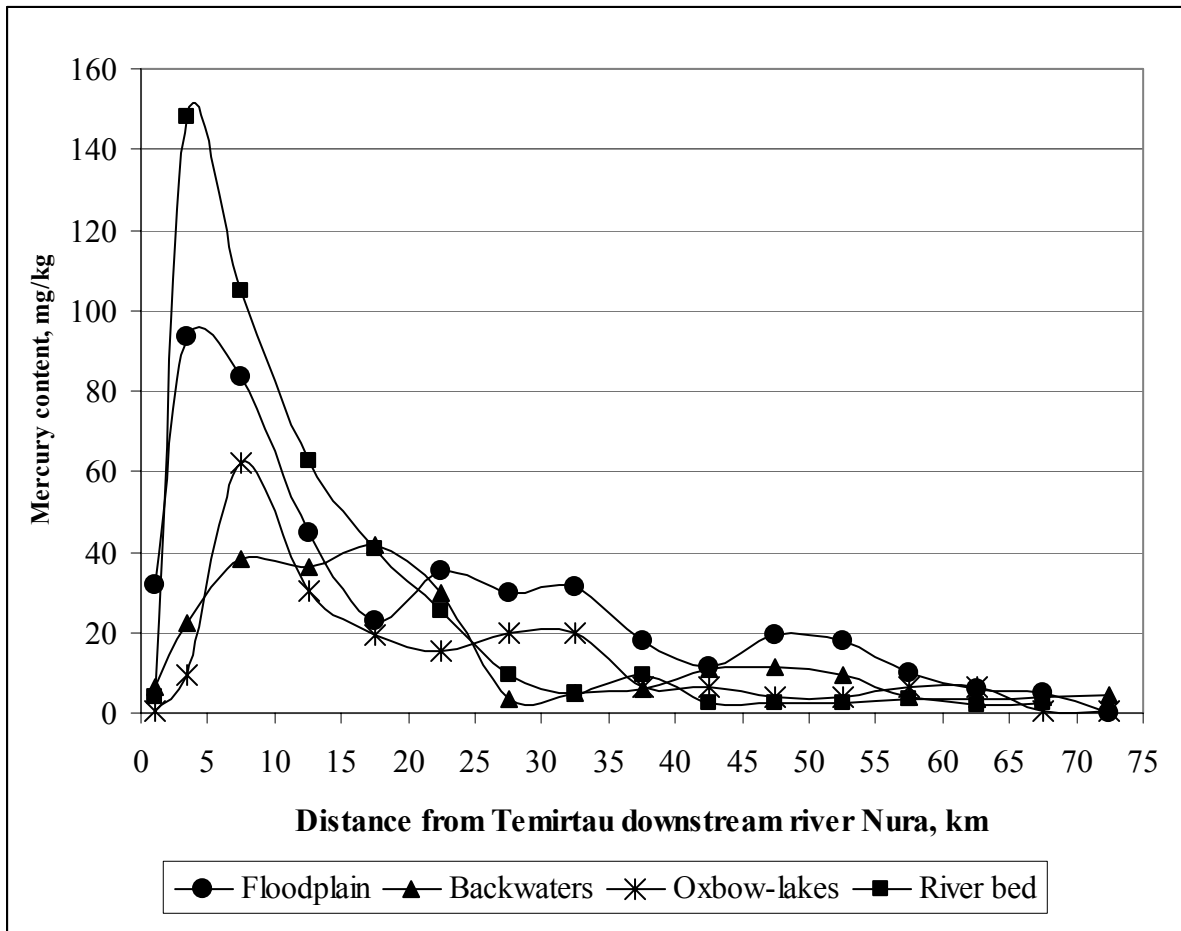


Figure 1. Mercury content in technogenic silts of riverbed, river banks, backwaters and oxbow-lakes of Nura River

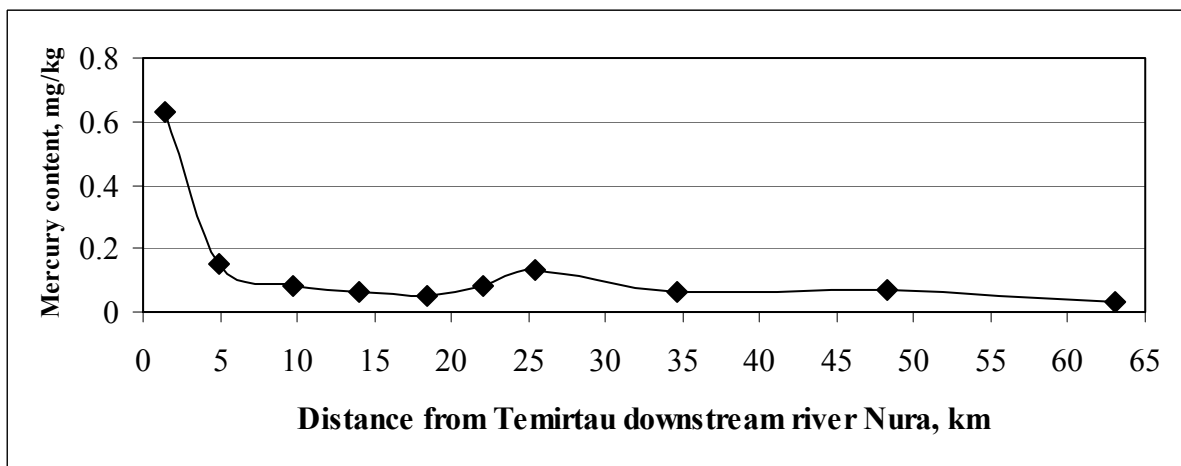


Figure 2. Mercury content in the leaves of reed mace (*Typha angustifolia*) in the Nura River floodplain

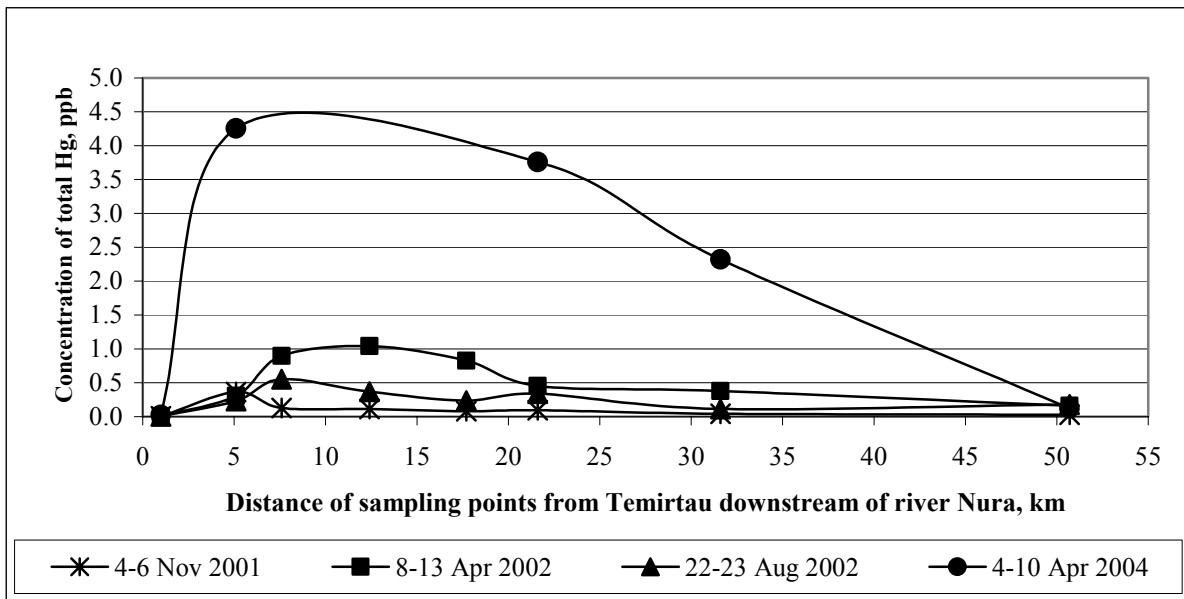


Figure 3. Concentration of total mercury in the water of river Nura at different seasons of 2001-2004

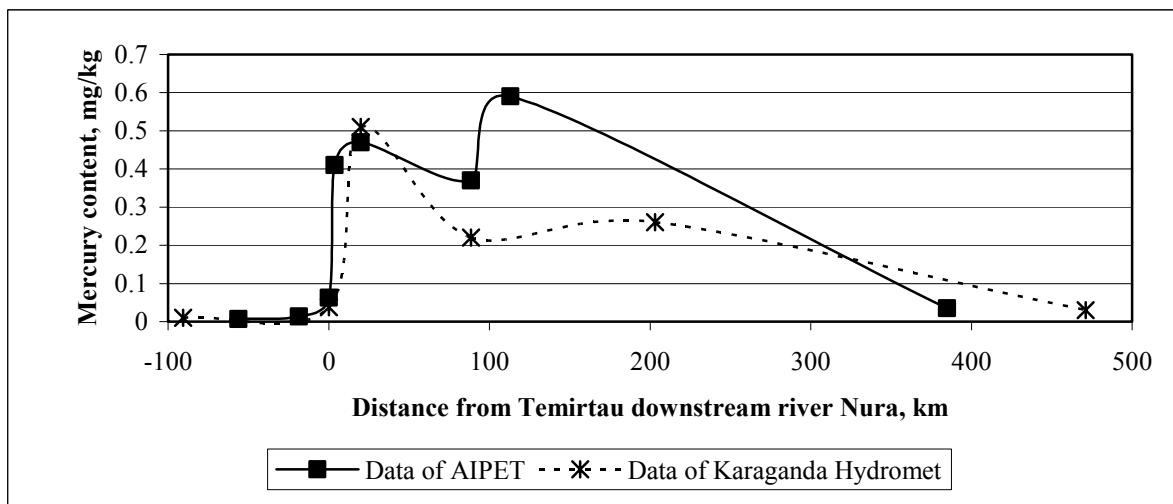


Figure 4. Concentration of total mercury in fish muscle of River Nura

#### Reference

1. M.Ilyushchenko, L.Yakovleva, S.Heaven, E.Lapshin. Mercury contamination of River Nura. Promyshlennost Kazakstana. № 3 (6), 2000, P. 56-59 (Ru).
2. V.M.Stratienko. River Nura Clean-Up Project. Component: Monitoring of River Nura. Final Report. DGP "Karaganda Centre of Hydrometeorology" Karaganda, 2004, V. 1. 138 p. (En).