Review

on dissertation by Rysmagambetova Aina Akanovna on the subject -"Assessment of the boron pollution dynamics of the groundwater and surface water of the Ilek River valley" provided to the defense for the degree of Philosophy Doctor (PhD) in the specialty «6D060800 - Ecology".

A technogenic pollution of groundwater in Kazakhstan is observed in the western and northwestern regions. In Aktobe region in groundwater of the Ilek River valley the iron, manganese, hexavalent chromium and boron pollutions are the most widespread. The boron pollution is recognized as historical because it is associated with the former Alga Chemical Factory activity.

Since boron is transported by the Ilek River flow and accumulated in the silts of the Aktobe reservoir, which is a recreational resource and a source of drinking water supply for the city of Aktobe, the task of study of the pollution dynamics of underground and surface waters of the Ilek River valley is very urgent. The relevance of the topic is not doubt not only from the position of the increasing threat of pollution of the reservoir, but also from the standpoint of clarifying the role of the main sources of groundwater pollution at the present stage, as well as identifying the possibilities to dilute the boron polluted groundwater, discharging into the river, by the Ilek River water.

The content of the dissertation is devoted to solving these important problems, the logical conclusion of which is the conclusion that the previously developed technical and technological projects lost the relevance. They were directed to intercept the flow of contaminated groundwater from the main sources of pollution — the old and new sludge collectors, the consequences of accidents at sludge pipelines, contaminated soil of a former Chemical Factory and surrounding areas. None of the developed environmental projects was implemented due to the high cost of their realization,. Now the interception of polluted streams is impossible, the deadlines have been missed - the plume of pollution has more than doubled, and the Aktobe reservoir has now become a new source of pollution of the Ilek River below the dam - and this is the suburban area of Aktobe.

A favorable impression is made by the variety of research techniques and methods that are used to maximize the possible extraction of information from the amount of available information about the quality of groundwater in the Alga district of Aktobe region. Assigning the secrecy stamp on the groundwater monitoring information makes clear the links to the report for 2010-2012.

The problem of updating information is solved by an original combination of the analysis of graphic applications in the form of hydrogeological maps with the contours of the source of groundwater contamination that discharging into the Ilek River, groundwater surface maps, hydrodynamic calculations of the velocity of movement and volumes of groundwater, discharging into the river. The validity of these calculations and forecasts is confirmed by KazHydroMet monitoring data of the Ilek River. It was these calculations that explained the reason for the sharp

jump in boron concentrations in the observation post Alga-2 (Bestamak settlement).

The use of a multidimensional statistical model of component analysis for different years and different seasons allowed tracing the dynamics of pollution processes. The recorded transition of the hydro-geochemical state of the territory from acidic to alkaline is evidence about the development of the processes of self-cleaning of the territory and the upper layer of sludge due to snowmelt water and precipitation.

Numerical experiments based on the model of the flat task of turbulent diffusion in the formulation by A.V. Karaushev for different conditions of discharging groundwater into the river, different values of background concentrations and different flow conditions of the Ilek River gave a number of interesting results on the characterization of the river's ecological capacity. Since the ability to dilute different concentrations of boron in the discharging groundwater into the river to the maximum permissible concentration for boron in the Ilek River was considered, the most important conclusion was the prevailing effect of background pollution, because the mass of the pollution was diluted at distances of 300-1000 m from the groundwater discharging zone.

A logical and generalizing conclusion from the results of the dissertation is the proposal for the periodic cleaning of the Aktobe reservoir from accumulated silt on which boron is deposited, with the obligatory replacement of the bottom outlet of the dam to the overflow method, which will prevent pollution of the Ilek River below the dam.

There are the following remarks on the work:

1) It is known that the hydrological post on the Ilek River is located in Aktobe downstream the dam, and therefore it represents the characteristics of the regulated flow. The Alga district is located upstream the dam, that is, in the zone of unregulated flow. How, in this case, have you justified the Ilek River runoff characteristics with probabilities 50, 75, 95% in the research area?

It is also known that the A.Karaushev model is built to analyze turbulent dilution of wastewater discharged from a pipe, that is, from a concentrated source. Groundwater is discharged into the river throughout about tens meters along the riverbank. From the dissertation text, it is not clear how the boundary conditions for the model were selected?

The above remarks are not principal and do not reduce the general idea of a high scientific level and about important applied value of a dissertation research. As a result, the dissertation work of Rysmagambetova Aina Akanovna on the subject "Assessment of the boron pollution dynamics of the groundwater and surface water of Ilek River valley" was performed at a fairly high scientific level, meets all the requirements of the "Rules of awarding scientific degrees", and its author Rysmagambetova Aina Akanovna deserves the award of the required degree of Doctor of Philosophy (PhD) in the specialty "6D060800-Ecology (geographical sciences)".

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26.02.2020 г.