

FEEDBACK

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

The topic of the dissertation by Rysmagambetova A.A., which directed to identifying the specifics of the dynamics of pollution of underground and surface waters of the Ilel River Valley, is relevant both from theoretical and practical points of view. Relevance from a theoretical point of view is determined by the demonstration of the possibilities of using a whole set of modern methods for studying the dynamics of processes of pollution of underground and surface waters. Relevance from a practical point of view is due to a critical analysis of the practical futility of most of the environmental protection projects developed so far due to missed deadlines for their practical implementation, when pollution of the Ilel river could still be prevented in the Alga region before flowing into the Aktobe reservoir.

The main theoretical results are presented in the third and fourth sections of the dissertation. Section 3 provides a solution to a series of tasks for processing a model of multidimensional statistics — component analysis — of the initial data on the chemical composition of groundwater in the territory of a former research site equipped with a sufficiently dense network of observation wells to track the effects of the main sources of groundwater pollution with boron. However, after monitoring monitoring ceased in 2005, the number of observation wells began to decrease steadily to a minimum in 2012, when only wells near water intakes were observed. Method of a joint interpretation of the main components of a series of tasks for the period 1988-2012 made it possible to obtain a very important hydrogeochemical result: a change in the hydrogeochemical situation of the territory from acidic to alkaline was recorded, indicating a transition from the filtration mode of industrial acidic waters to stationary filtration of contaminated groundwater as a result of washing with snowmelt water and sediments of soil and the upper layer of sludge collectors.

A similar approach to a diversified approach shown, when studying the dynamics of groundwater pollution — analysis of cartographic information (hydrogeological maps with contours of different concentrations in the pollution center, map of hydroisohypses), calculations of the volume of wedges out in the Ilel river and the boron mass carried out by them, building a regression model self-cleaning of the old sludge collector, the use of Kazhydromet monitoring data on the sites in the study area for a comparative analysis contains the boron in groundwater and surface water. The generalized result is the conclusion that a new sludge collector is connected to the pollution processes, which was presented by local hydrogeologists as an almost perfect structure. Very interesting and important here is the combination of calculating the speed of the flow when the pollution front enters the valley and approaching it to the bank of the Ilel River. This calculation made it possible to explain the jump in the growth of boron concentrations in the Alga-2 site in the period 2016-2018.

Section 4 considers a series of numerical experimental calculations of dilution in r. Ilel of contaminated groundwater contaminated by boron based on a model of turbulent diffusion that is rarely used in hydrogeology and hydrology. These calculations demonstrate a clear mutual coordination and logical sequence of solving the tasks set in the thesis. In addition, here, as a generalization of the results of many experimental

calculations, an important result was obtained - the prevailing role of background pollution of the Ilek river was established in the processes of turbulent dilution of wedge contaminated groundwater contaminated with boron based on numerical experiments on the model of a flat problem in the formulation of A. Karaushev

Section 5 solves practical issues based on the theoretical results of sections 3 and 4 and a critical analysis of the viability of previously proposed environmental measures. The feasibility of extracting the sludge of the Aktobe reservoir and their subsequent use as fertilizers are proved as a generalizing practical result. Due to the loss of relevance of all previously developed technological and technical solutions for intercepting and treating polluted groundwater flows and transforming the Aktobe reservoir into a new source of pollution of the Ilek river is below the dam. The recommended replacement of the bottom method of the outlet from the Aktobe reservoir with the overflow method will prevent the discharge of sludge contaminated with boron involved in the turbulent flow generated by the bottom outlet.

There are the following remarks and wishes:

- In the work does not describe the procedure for choosing the value of the frequency of the Ilek river discharge on its unregulated section - on the territory of the Alga region.

- It is advisable to continue the experimental calculations using the turbulent diffusion model in order to obtain a regression relationship between the concentrations of wedging out groundwater and background concentrations.

The above remarks and wishes do not completely reduce the overall impression of the work, which can be noted as a recognition of the high scientific level of achieving the goal and objectives and a sound practical solution to the problem of pollution of the Aktobe reservoir and preventing pollution of the Ilek river below the dam – in the zone of Aktobe and surroundings area.

As a result, we can conclude that the dissertation work of Ays Akanovna Rysmagambetova 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 for awarding scientific degrees", and its author Rysmagambetova Aina Akanovna deserves the award of the degree of Doctor of Philosophy (PhD) in the specialty 6D060800-Ecology (geographical sciences).

Associate Professor
Satbayev university,
Candidate of technical sciences

Signature of Auelkhan Ye.S.

CONFIRM:

Auelkhan Ye.S.

