REVIEW

of local scientific supervisor, Doctor of Geography Sciences, Professor Pavlichenko Liudmila Mikhailovna,
for the PhD thesis of **Rysmagambetova Aina Akanovna** titled **«Assessment of the boron pollution dynamics of the groundwater and surface water of Ilek river valley»**, provided for the degree of Philosophy Doctor Ph.D. in specialty «6D060800-Ecology»

The problem of pollution of the Ilek River with boron, as well as hexavalent chromium, was included in 2005 among the priority environmental problems in the Aktobe region. Although a feasibility study was developed in 2008-2009 for the purification of groundwater in the Ilek river valley, approved in 2010 by an independent state expert review (the examination procedure lasted a year and a half), the cleaning work did not begin. However, in this not very favorable case, there was a positive moment: sample results of groundwater testing conducted in 2008 did not analyzed and not taken into account in the feasibility study (It was held by "Center for Health and Environmental Engineering" LLP). Technical solutions in the feasibility study are based on monitoring materials from 2005 – the last year of observations, when an increase in the concentration of boron in groundwater near the old sludge collector was recorded, caused by filtering to bypass the unfinished "wall in the ground". The problem of pollution of the Aktobe reservoir with boron is constantly aggravated, since none of the decisions taken has been fully implemented.

Initiative field studies and results of determining sample samples of the PhD applicant A.A. Rysmagambetova, conducted in July 2017, showed an excess of the maximum permissible concentration (MPC) of boron both in the zone of the old sludge collector (7.5 mg/dm^3 - 15 maximum concentration limits) and in the Aktobe reservoir (1.2 mg/dm^3 - 2.4 maximum concentration limits). In addition, on the territory of Aktobe, i.e. a slight excess was noted below the dam (0.6 mg/dm^3 - 1.2 MPC), although it was always believed that silts in the Aktobe reservoir deposited boron almost completely, i.e. within the city, the concentration of boron should be lower than the MPC. Based on the current situation, studies analyzing the change in the interaction of polluted groundwater in the Ilek river valley with surface runoff, that is, research on the topic of the dissertation, will be very relevant.

The purpose: to identify the specific processes and the path of movement of groundwater contaminated with boron in the Ilek river valley.

To achieve this goal it was necessary to solve the following main tasks:

1) Assessment of the current environmental situation in the region;

2) Analysis of the findings of previous studies on the nature of groundwater and Ilek river pollution processes with boron;

3) Assessment of the dynamics of the hydro geochemical situation according to regime observations based on a multidimensional statistical model (component analysis);

4) Constructing a model of a planar problem for numerical experiments to analyze the nature of turbulent dilution of various options for boron content in wedged out underground waters and different wedging patterns

5) A critical analysis of existing methods and proposals for developing a system of measures to reduce the level of pollution of the Aktobe reservoir and the Ilek river below the dam.

In the dissertation, the author studies available published and stock sources on the problem of boron pollution of the Ilek river on the environmental consequences of exposure to humans and biota of boron pollution by calculating the risks of population disease. It held when eating fish and meat products obtained using contaminated groundwater. Also, through a comprehensive analysis regime data to identify the main sources of boron pollution of underground and surface water, conflicting points of view on the causes of pollution. This demonstrates *the ability to correlate their results with a wider picture of reality.*

To find answers to the tasks, the dissertation needed not only the ability to control the drone to take pictures of the territory, to take and analyze water samples, but also to master completely new models for it – a multidimensional statistics model, principle component analysis and turbulent dilution of polluted water (simulation of wastewater in a flat model tasks). She mastered these models seriously and thoroughly, trying, first, to find out the specific capabilities of the models, how to prepare the initial information, calculate the parameters and the essence of the processes that can be studied with their help. Thus, she had to solve the dissertation problems from the standpoint of hydrodynamics and statistics, i.e. the author uses *knowledge that goes beyond the scope of her original specialty.*

Substantiation of environmental methods and approaches in solving the complex theoretical problem of combining motion models of groundwater and surface water in a changing source of pollution.

The theoretical significance of the study lies in the substantiation of a set of environmental methods and approaches in solving the complex theoretical problem of combining motion models of groundwater and surface water under conditions of changing intensity of the pollution source.

Practical significance is determined by the ability to use the results to conduct advanced environmental, chemical, biological studies of the territory in order to improve the quality of water resources in Aktobe; as well as for the development of environmental measures to reduce pollution of the Aktobe reservoir.

The main results of the dissertation are presented in publications with co-authors. In addition, the thesis contains completely new interesting results that deserve publication. First, this is a completely new result in identifying the progress of the pollution front from the new sludge collector with the confirmation of the speed determined by the map by analyzing the dynamics of boron contents at the Alga 2 post.

PhD disseration of Rysmagambetova Aina Akanovna titled «Assessment of the boron pollution dynamics of the groundwater and surface water of Ilek river valley» in terms of relevance, scientific level, novelty, significance of the results and the total volume of research; it meets all the criteria for PhD dissertations. Its author, Rysmagambetova Aina Akanovna, deserves the Ph.D. degree in the specialty «6D060800-Ecology».

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