

УДК 504.45(470.322)

APPROBATION OF THE METHODOLOGY FOR A COMPREHENSIVE ASSESSMENT
OF THE CONDITION SOURCES OF DRINKING WATER USE
BY EXAMPLE LIPETSK REGION

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This study focuses on the validation of a comprehensive geological and environmental diagnostics methodology for assessing the condition of decentralized drinking water sources (DS) in order to improve safety and reduce environmental risks to the health of the population in the Lipetsk Region. The methodological scheme of the study includes 4 consecutive stages: 1) preparatory (sampling of drinking water in water use sources); 2) experimental (own chemical and analytical studies); 3) computational and analytical (assessment of water quality and potential risks to public health); 4) forecast and recommendation (zoning of residential areas of the region in terms of water quality and the level of environmental risks of water use). The monitoring studies covered 63 settlements in 18 municipal districts of the Lipetsk Region. During field expeditions from 2025 to the winter of 2026, 119 water samples were collected from DS, including wells (39 samples), springs (21 samples), wells (12 samples) and columns (47 samples). A comprehensive assessment of the quality of the selected water samples was carried out based on the results of organoleptic (intensity of taste and odor, color, transparency, and presence of sediment) and chemical (12 indicators) analyses using classical and instrumental methods, including 6 indicators that are priority for Lipetsk water (total hardness, iron, manganese, boron, ammonia, and nitrate nitrogen). Organoleptic analysis showed that most often the quality of drinking water taken from DS does not meet the standards in terms of taste and odor intensity – 15.13% and 15.97%, respectively, as well as in terms of water color – 5.88% and the presence of unacceptable sediment in the water – 8.4%. The conducted studies have shown that, in general, for all 18 districts of the Lipetsk Region, the average concentrations of priority drinking water indicators meet the sanitary and hygienic standards for DS. However, in some samples, maximum concentrations of pollutants were recorded that exceed the multiplicity of standards by several times, reducing the quality of drinking water and the level of safety of its use: total hardness (1.01–1.9 MPC), iron (1.06–5.41 MPC), manganese (1.06–1.34 MPC), boron (1.02–3.6 MPC), ammonium (1.02–2.32 MPC) and nitrate nitrogen (1.01–1.85 MPC). The calculation of the population risk showed that about 3 210 people, mostly rural residents of the Lipetsk Region, are at risk of health problems due to the consumption of water of inadequate quality. Based on the results of the study, recommendations were made to improve the safety of drinking water in the Lipetsk Region.

<https://doi.org/10.46991/PYSUC.2026.SI1.042>

Keywords: methodology testing, priority pollutants, decentralized water sources, drinking water quality, administrative territories, and health risk assessment.

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