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Legal Problems of Ensuring the Quality of Underground Drinking Water in Ukraine

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Abstract
The paper is devoted to the analysis of the state of legal protection of the quality of drinking groundwater in Ukraine and the current trends in the development of national legislation in this area, taking into account the Directives of the European Union, which regulate water relations in this field. Drinking water is one of the most important human needs, as evidenced by numerous scientific studies, including legal ones, which formulate scientific approaches to understanding the right to drinking water as one of the basic human rights and ensuring its safety. On the basis of many factors, the problems of the lack of drinking water of the appropriate quality are revealed, in connection with which the demand for fresh underground water is rapidly increasing, and as a result, the anthropogenic load on the underground hydrosphere and the risk of pollution and depletion of these waters are increasing. Therefore, the underground waters of Ukraine are gaining more and more importance, and the legal problems of their protection and ensuring their quality are urgent. The work consists of three parts, which analyze the legal principles of ensuring the quality of drinking groundwater of Ukraine, the concept of drinking groundwater as an object of legal relations for protection and use, as well as the peculiarities of legal protection of the safety and quality of drinking groundwater of Ukraine. Current issues of groundwater protection, problems of legislative regulation of state accounting, state monitoring and state control of the quality of drinking groundwater on the territory of Ukraine are considered. The main problems of legal assurance of the quality of drinking groundwater and the ways to solve them have been determined. Particular attention is paid to the improvement of drinking groundwater quality

standards and their legislative enshrining. Proposals for improving the legal provision of drinking groundwater quality of Ukraine have been developed and substantiated, including taking into account the experience of the European Union. The article identifies the prospects for further scientific research in this area, in particular: determining the specifics of the legal regime for underground drinking water in Ukraine, studying the legal issues regarding implementation and protection of the right to drinking water (including underground water) of adequate quality, quantity and safety for human life and health and ensuring equal access to it at the national and international levels. The methodological basis of the study is a set of general philosophical, general scientific, special scientific and legal methods which allowed for a comprehensive analysis of the legal framework for the quality and protection of underground drinking water in Ukraine. The authors use descriptive and analytical methods of cognition as well as methods of legal norms interpretation. The problems of legal regulation are analyzed based on the study of international and national legal acts.

Keywords: *drinking water; underground water; quality of underground drinking water; state accounting; state monitoring; state control of quality of underground drinking water; regulation of quality of underground drinking water in Ukraine.*

Правові проблеми забезпечення якості питних підземних вод України

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Анотація
Стаття присвячена аналізу стану правового забезпечення якості питних підземних вод України та сучасним тенденціям розвитку національного законодавства у зазначеній сфері з урахуванням Директив Європейського Союзу, що регулюють питання водних відносин у цій галузі. Питна вода є однією з найважливіших потреб людини, про що свідчать численні нау-

кові напрацювання, в тому числі й правові, в яких формулюються наукові підходи до розуміння права на питну воду як одного з основних прав людини та забезпечення її безпеки. На підставі багатьох факторів розкриваються проблеми нестачі питної води відповідної якості, у зв'язку з чим стрімко збільшується попит на прісні підземні води, і як наслідок – зростає антропогенне навантаження на підземну гідросферу та ризик забруднення й виснаження цих вод. Тому підземні води України набувають дедалі більшого значення, а правові проблеми їх охорони та забезпечення їх якості – актуальності. Робота складається з трьох частин, в яких аналізуються правові засади забезпечення якості питних підземних вод України, поняття питних підземних вод як об'єкта правовідносин з охорони та використання, а також особливості правового забезпечення безпеки та якості питних підземних вод України. Розглянуто актуальні питання охорони підземних вод, проблеми законодавчого регулювання державного обліку, державного моніторингу та державного контролю якості питної підземної води на території України. Визначено основні проблеми правового забезпечення якості питних підземних вод та шляхи їх вирішення. Окрему увагу приділено вдосконаленню нормативів якості питних підземних вод та їх законодавчому закріпленню. Розроблено та обґрунтовано пропозиції щодо вдосконалення правового забезпечення якості питних підземних вод України, в тому числі з урахуванням досвіду Європейського Союзу. Виокремлено перспективи подальших наукових досліджень у зазначеній сфері, зокрема: визначення особливостей правового режиму питних підземних вод України, дослідження правових проблем реалізації та захисту права на питну воду (у тому числі й питну підземну) належної якості, кількості та безпечної для життя і здоров'я людини, а також забезпечення рівноправного доступу до неї на національному та міжнародному рівнях. Методологічну основу дослідження становить комплекс загальнофілософських, загальнонаукових, спеціально-наукових і правових методів, які дозволили здійснити всебічний аналіз стану правового забезпечення якості питних підземних вод України та їх охорони. Використано описові та аналітичні методи пізнання, а також методи інтерпретації правових норм. Проаналізовано проблеми правового регулювання на основі вивчення міжнародних і національних правових актів.

Ключові слова: *питна вода; підземні води; якість питних підземних вод; державний облік; державний моніторинг; державний контроль якості питних підземних вод; нормування якості питних підземних вод України.*

Introduction

The problem with the lack of drinking water of appropriate quality appears due to pollution and depletion of most surface water bodies and the demand for fresh underground water has increased rapidly. As a result, the anthropogenic load on the underground hydrosphere and the risk of pollution and depletion of these waters have increased.

It is well known that underground water is one of the main sources of drinking water. According to Art. 61 of the Water Code of Ukraine and the Rules for the Protection of Underground Waters (clause 2 III Use of Underground water and State Accounting of Underground Waters), underground water of drinking quality must be used primarily to meet the needs of drinking, household water supply of the population, food industry and animal husbandry [1]. State sanitary norms and rules (DSanPiN 2.2.4-171-10) also provide for giving preference to water from underground sources of drinking water supply for the population as it is more protected from biological, chemical and radiation pollution (3.1) [2]. Although underground water resources in the country are limited, but in one or another quantity they are spread over the entire territory of Ukraine and in most regions, it is expedient to develop underground drinking water supply (National reports on some waters and the state of drinking water supply in Ukraine [3-5], Regional report on the state of the natural environment in the Kharkiv region as of 2021 [6]).

The underground water quality does not meet the regulatory requirements for water supply sources in many regions of Ukraine. A significant part of underground water bodies are located in the areas near large industrial and agricultural complexes experiencing significant anthropogenic influence, which is manifested in a major reduction of fresh water reserves and deterioration of its quality leading to the spread of many diseases. The EU Nitrate Directive 91/676/EEC on the protection of waters against pollution caused by nitrates from agricultural sources covers the issue of protection against nitrate pollution of hydrosphere objects, including sources of drinking water supply in rural areas, monitoring of nitrate water pollution, etc [7]. The national legislation on the use of pesticides and agrochemicals is regulated by the Law of Ukraine "On Pesticides and Agrochemicals" [8].

The high content of nitrates in natural waters leads to water deterioration and decrease in biodiversity inside reservoirs, which negatively affects human health. Drainage of swamps leads to negative consequences, in particular, to a decrease in the level of underground water, which is the reason for the disappearance of water in wells and natural springs. Climate change also has a negative impact on underground water. It should be noted that this kind of changes happen quite quickly, therefore, the legislative framework for regulating the relevant relations does not have time to be formed. This applies not only to Ukraine, but also to other countries. Currently, there is a need to implement a unified approach to the drinking water quality. After all, this may involve one underground horizon locating in different countries, where different requirements for

the quality of drinking water are applied. In particular, the list of drinking water quality indicators in different countries is different and periodically changes.

The operational reserves assessment of underground water has fairly established methods throughout the world that aims to forecast quantitative and qualitative characteristics for a certain amortization work period of water intake facilities. There are issues of providing sanitary zones due to the fact that water intakes of small capacity prevail and they have been growing in number. There is a need to protect and reduce the cost of assessment works for small consumers. These issues are especially exacerbated because of war in Ukraine as providing water to the country's population is complicated by the high risk of contamination of surface water bodies and, accordingly, there is an urgent need for more protected underground water.

It should be noted that the common idea that underground water is always ecologically clean does not correspond to reality. On the contrary, the current ecological state of underground water can be characterized as stressed to varying degrees. The technogenic impact and penetration of pollution in the underground hydrosphere extends to the entire zone of active water exchange corresponding to the first approximation to the zone of fresh water distribution [9]. In addition to the progressive penetration of surface pollution, the drinking water quality can also decrease as a result of drawing unconditioned natural water into catchment structures, for example – hard, iron, fluoride, etc. [10]. Thus, examples can be given of the decline in the quality of even a well-protected aquifer complex of Cenomanian-Lower Cretaceous sediments, which, for most of the Kharkiv region, is a strategic reserve of fresh drinking water [11; 12].

Unfortunately, non-compliance with the requirements regarding the proper water quality in water bodies, in particular underground water, does not allow citizens to exercise the right to public water use without harm to their lives and health [13].

Legal questions arise at the legislative level regarding the rational placement of wells, the economic use of new aquifers, etc. In particular, the draft Law of Ukraine No. 9020 dated February 16, 2023 provides for amendments to some legislative acts regarding the licensing of drilling wells for the extraction of underground water and their liquidation and/or tamping [14].

Thus, in connection with the growing needs for drinking water, the underground waters of Ukraine are gaining more and more importance and the legal problems of their protection and quality assurance are urgent.

Literature review

Researches on the problems of ensuring the human right to drinking water was conducted, in particular, by such legal scholars as: N. Obijuh [15-18], K. Janishevskaya & A. Skoryk [19], S. Jacenko [20], A. Yevstigneyev [21; 22]; the issue of ensuring the quality and safety of drinking water was investigated by: O. Prjadko [23], V. Vitiv [24], A. Mkrtychjan [25], K. Riabets [26], M.J Stadnyk [27], V. Schestopalov [28]; legal provision of water protection was studied, in particular, by A. Sokolova [29-31]; special attention at the national and international level has been paid to underground drinking water and its protection by such research scientists as: O. Serdjuk [32; 33], V. Kharkevich & S. Kryzhevych [34], A. Kosygina [35], V. Shestopalov, V. Lyalko, V. Gudzenko & M. Drobnohod [36], M. Cherkashyna [37; 38], I. Iefremova, I. Lomakina & N. Obiiukh [39]; the issue of accessing underground drinking water was investigated through the prism of human rights by J. Grönwall & K. Danert [40]; peculiarities of ecological legal concepts ("pollution", "polluting substances", etc.) of Ukrainian and European water legislation, approximation of the Ukrainian environmental legal institute of water quality to the legislation of the European Union were considered in the works of V. Uberman, L. Vaskovets [41; 42]; water quality problems, in particular, underground water were studied by scientists M. Zeleňáková, K. Kubiak-Wójcicka & A.M. Negm [43]; management of groundwater considering its depletion and quality deterioration, in particular, due to climate change, is studied by E. L. Garner [44].

In many regions of the world, underground water resources and the social, economic and ecological systems that depend on them are threatened by over-abstraction and pollution. In this regard, the issues of limited reserves and quality of underground water affecting the sustainability of water supply systems are studied at the international level [45]; fundamental legal principles regarding the quantity and quality of underground water in the USA, Australia and the European Union are considered [46]; much attention is paid to the legal regulation of transboundary underground water [47]. Taking into account that dependence on underground water and its central role for realizing the human right to "safe" drinking water has increased manifold, the authors discuss the state's obligations to respect, protect and fulfill the right to water and suggest that self-sufficiency is the initial norm to exercise this right. Ignoring self-sufficiency, which occurs primarily from underground water, the state not only loses a great opportunity, but also endangers the water security of future generations [40; 48]. Achieving a clear understanding of local underground water indicators and human impact on underground water resources at various

scales is of primary importance for the comprehensive implementation of sustainable development goals [49].

The following example of a rational approach regarding the use of water resources can be given. There are three water supply networks in Stockholm – potable, technical and rainwater. Groundwater flows into the first one. Rainwater is purified and used, for example, for irrigation. In Ukraine, it simply flows into the nearest polluted rivers. The construction of new networks requires costs, but it is time to understand that water is a very expensive resource and high-quality drinking water is especially expensive since it is a leading factor in the formation of human health. According to WHO, up to 80% of human diseases are associated with drinking water contamination [48]. To improve the quality of drinking water in European countries, coastal water intakes are made (using a natural filter), and multi-stage drinking and waste water purification technologies are used.

It should be noted that the studies of underground water quality and the impact of its pollution on the environment are carried out by specialists of other sciences, in particular, hydrogeologists [9; 50-52]. Calculations of quantitative characteristics and forecasts of qualitative indicators made by V. Shestopalov, Je. Jakovlev, V. Jakovlev is the basis for underground water exploitation standards and is indirectly the basis for legal acts.

Thus, in the current conditions, the legal problems of ensuring the quality of underground drinking water on the territory of Ukraine do not lose its relevance and require additional consideration in order to provide proposals for the solution.

The aim of the Article is to analyze the state of legal regulation for underground water protection and the problems of legal assurance of the quality of underground drinking water on the territory of Ukraine. It also provides for the development and justification of proposals for improving legal support in the researched area, including the experience of the European Union.

Materials and Methods

The methodological framework of the research is a set of general philosophical, general scientific, special scientific and legal methods, which made it possible to carry out a comprehensive analysis of the legal provision regarding the quality of underground drinking water and its protection in Ukraine. The authors use descriptive and analytical methods of knowledge, as well as methods of interpreting legal norms. Problems of legal regulation are analyzed based on the study of international and national legal acts.

Thus, the following methods were used in the research process: dialectical, formal logical, analysis and synthesis, systemic structural, formal legal, comparative legal, interpretation of legal norms, prognostic, legal modeling, logical legal.

The dialectical method of cognition made it possible to analyze the development and current state of legal relations on the protection of underground drinking water in Ukraine and to ensure its quality as well as to argue the ineffectiveness of legal norms in this area. The formal logical method made it possible to analyze the legal norms of international and national legislation in the field of protection and quality assurance of underground drinking water, which determine the concept of underground drinking water and its special legal regime. The method of analysis and synthesis was used during the study of legal relations implementation regarding the protection and quality assurance of underground drinking water of Ukraine. Based on the system structural method, legal relations related to the protection and quality assurance of underground drinking water are considered as an integral part of relations in the sphere of protection of drinking water and legal assurance of its quality. The general principles of environmental law and terminology should be applied in this method. The comparative legal method was used for the comparative analysis on the legal regulation of the provisions of the Water Code of Ukraine, the Water Strategy of Ukraine for the period until 2050, the Rules for the Protection of Underground water, including the provisions of the environmental legislation of the European Union. An assessment of the legal regulation regarding the protection of underground drinking water and legal assurance of its quality was also carried out, and the general trends of harmonization of national laws with EU law were outlined. Using this method of legal norms interpretation, the meaning of certain regulatory terms as well as the scope of their application were revealed; the vagueness of certain wordings and the gaps in the the studied legal relations were also outlined. The formal legal method was used during the study of the national legislation specifics in the researched field of legal relations and the disclosure of these specifics in the relevant legal norms. The method of legal modeling was used by authors regarding reforming the current legislation of Ukraine and it helped to form the authors' own vision on the validity of legal norms and express their own position on relevant problematic issues. The use of the prognostic method of cognition made it possible to analyze the consequences of adopting proposals for improving the current environmental (in particular, water and weather) legislation of Ukraine, as well as making appropriate changes and additions to it in order to eliminate duplication, unclear wording and gaps. Based on our own scientific analysis of the researched relationships, trends in

their development and the current state of legal regulation, conclusions are formulated regarding the legal regulation of protection and quality assurance of underground drinking water using the logical legal method according to the purpose of the study.

Results and Discussion

Legal principles of ensuring the quality of underground drinking water in Ukraine

Ukrainian environmental policy is aimed at achieving strategic goals, including a state of the natural environment that is safe for human health. Among the tasks for its achievement is the Law of Ukraine "On the Key Principles (Strategy) of the State Environmental Policy of Ukraine for the Period till 2030" as it establishes, in particular, the preferential provision of compliance with sanitary and hygienic requirements for the quality of water used for drinking water supply until 2030 [53].

According to the Decision of the National Security and Defense Council of Ukraine "On challenges and threats to the national security of Ukraine in the environmental sphere and priority measures for their neutralization" dated March 23, 2021 No. n0018525-21 [54] the National Action Plan for Environmental Protection was developed on the period until 2025 that provides for: improvement of water quality, complete gradual cessation of the discharge of untreated and insufficiently treated wastewater into water bodies and ensuring compliance of the degree of wastewater treatment with established regulations and standards, as well as prevention of underground water pollution (clauses 109-112); permanent maintenance of the State Register of artesian wells (clause 31) [55].

The legislation of Ukraine in the field of water relations is characterized by the presence of a codified normative legal act, namely the Water Code of Ukraine, according to which the task of national water legislation, in particular, is to regulate legal relations ensuring the preservation, scientifically based, rational use of water for the needs of the population, water protection from pollution, clogging and depletion, improvement of the condition of water bodies, as well as protection of the rights of enterprises, institutions, organizations and citizens to use water (Art. 2) [1]. Also in 2023, the Law of Ukraine "On Water Drainage and Wastewater Treatment" was adopted, which defines the legal, economic and organizational principles of the functioning of the water drainage system, aimed at creating favorable conditions for human life and protecting the natural environment from the negative impact of wastewater [56]. The goal of the Concept of Water Management Development of Ukraine, in particular, is to improve the quality of water [57].

The research emphasizes that the above mentioned reflects the directions of the national environmental policy also in the field of legal relations on the use, protection and quality assurance of underground drinking water. The formation and development of these relations are fixed in both national and international environmental law, but they have different meanings. Thus, in the norms of international law, underground water is considered as a component of the ecosystem and is protected together with other components of the natural environment [58]. Regarding the protection of underground water in Ukraine, the relevant Rules [59] are in force, the requirements of which ensure their protection against "pollution, clogging, exhaustion, depletion and other actions that can worsen the conditions of water intake, the implementation of measures for the protection of the natural environment, in particular the subsoil, when implementing any types of anthropogenic activity that can negatively affect the quality and quantity of groundwater, reduce their ability to recover naturally, disrupt the hydrogeological regime of underground water, harm people's health".

Based on the Association Agreement between Ukraine and the European Union [60], the provisions of the Directives regulating water relations are introduced into national legislation. In particular, Directive 2000/60/EC of the European Parliament and the Council "On establishing the framework for Community activities in the field of water policy" dated October 23, 2000 (Water Framework Directive) [58]; Directive 2006/118/EC of the European Parliament and of the Council of the European Union on the protection of underground water against pollution and depletion, Strasbourg, December 12, 2006 [61].

Taking into account Directive 2020/2184 of the European Parliament and the Council of the European Union dated December 16, 2020 on the water quality intended for human consumption (new version) [62][1], it is possible to state that the national legislation is approaching the current standards of the water policy of the European Union. Thus, on February 15, 2022, the Verkhovna Rada adopted the Law of Ukraine "On the National Targeted Social Program "Drinking Water of Ukraine" for 2022-2026" [63]. The law provides for the sustainable development and reconstruction of the centralized water supply and drainage systems in a town, as well as the provision of sufficient drinking water quality to the residents of communities.

The Cabinet of Ministers of Ukraine approved the Water Strategy of Ukraine for the period until 2050 and the operational plan for its implementation

[1] The Directive does not apply to natural mineral waters (Directive 2009/54/EC) and waters that are medicinal products (within the meaning of Directive 2001/83/EC) In addition, sea vessels that desalinize water, carry passengers and act as water suppliers, subject only to Articles 1-6 and Articles 9, 10, 13 and 14 of this Directive and the relevant annexes to it.

[64]. This is an extremely important document for Ukraine on the way to fulfilling its international obligations in the field of "water" security of the country, the Association Agreement between Ukraine and the EU, and the UN General Assembly Resolution: Global Sustainable Development Goals by 2030. However, the opinion of M. Khvesyk, L. Levkovska, and V. Mandzyk should be supported: "... the algorithms for using many of the proposed mechanisms and approaches are not yet sufficiently institutionalized today, so they cannot be quickly implemented in water management and water protection practice. Mechanisms for periodic review of the main principles and objectives of the strategy should also be given regarding the possible new global and local challenges and conditions" [65].

Legal regulation of relations on the use and protection of underground water is carried out by the norms of various branches of legislation, first of all, by strategic planning documents. Thus, the Water Strategy of Ukraine for the period up to 2050 defines the problems of accounting, state control, protection and use, including groundwater. The goal is to ensure equal access to high-quality drinking water that is safe for human health. But taking into account the decrease in the volumes of fresh water resources of sufficient quality available for use, this document should have included measures to separate technical, household and purely drinking water supply.

Legal assurance of drinking water quality is carried out in Ukraine on the basis of State sanitary norms and rules (DSanPiN 2.2.4-171-10 Hygienic requirements for drinking water intended for human consumption) [2], DSTU 4808:2007 Sources of centralized drinking water supply. Hygienic and ecological requirements for water quality and selection rules dated May 7, 2007 No. 144 [66; 67], DSTU 7525:2014 Drinking water. Requirements and methods of quality control [68]. On April 22, 2022 the Order of the Ministry of Health of Ukraine No. 683 "On the approval of State sanitary norms and rules “Safety indicators and separate indicators of the quality of drinking water in conditions of martial law and emergency situations of a different nature”" was adopted [69].

The authors agrees with V.N. Pribylova, who states that the regulation systems of drinking water quality in different countries with different conditions of water supply and national characteristics of natural and socio-economic factors require analysis in order to adapt general approaches to local and regional conditions, in particular, Ukraine [70].

The concept of underground drinking water as an object of legal relations for protection and use

Article 1 of the Water Code of Ukraine contains the definition of the *water object* as a natural or artificially created element of the environment in

which water is concentrated (sea, estuary, river, stream, lake, reservoir, pond, channel (except for a channel on irrigation and drainage systems), as well as an aquifer horizon); *underground water* refers to water existing below the Earth surface in layers of rocks on the upper part of the Earth crust in all physical states; water quality refers to the characteristics of the composition and properties of water, which determines its suitability for specific purposes of use [1].

The feature of underground water as an object of legal regulation is that it is considered by the current legislation as an element of subsoil, water, etc. Therefore, the difficulty in legal regulation of their use and protection lies in the need to apply norms of several subbranches of environmental law. Underground water as minerals has a dual legal regime: according to the Water Code of Ukraine, it is included in the State Water Fund, and according to the Water Code of Ukraine on Subsoil, it is included in minerals of national importance [40]. This position is also taken by the Supreme Court of Ukraine [71].

Legal regulation of the use and protection of underground water occurs in water, land and subsoil legislation having inter-subsector nature of the legal regulation of these legal relations. It should also be noted that the imperfection of legal regulation can exacerbate the problem of implementing legal norms in the specified sphere of relations and lead to collisions and contradictions. Therefore, research concerning the interaction of legal norms of the specified subbranches of environmental law in the process of legal regulation of the use and protection of underground drinking water is relevant.

The legislation on subsoil contains norms regulating relations in the field of geological study, use and protection of underground water. It should be noted that the boundaries and status of underground water deposits are quite conditional. There are three zones of sanitary protection and the intermediate one, namely the second zone, is defined for these boundaries. Deposits of other minerals have clear spatial boundaries. According to the list of minerals of national importance, approved by the Resolution of the Cabinet of Ministers of Ukraine [72], fresh underground waters belong to the group of minerals of national importance and belong to the subsurface. The classification of reserves and mineral resources of the State Subsoil Fund was approved by the Resolution of the Cabinet of Ministers of Ukraine [73].

The instruction on the application of the classification of mineral reserves and resources of the state subsoil fund to mineral underground water deposits establishes groups of mineral underground water and categories of

deposits (in particular, Category I – deposits of unique mineral groundwater, Category II – deposits of rare mineral underground water) [74].

National classifier DK 008:2007 "Classifier of useful of minerals" is a component of the national classifiers complex. It provides organized and unified information on solid, liquid and gaseous minerals that are used or may be used in the future, with their codes. The Classifier refers underground waters (drinking, mineral, industrial, thermal, technical) as minerals. It defines the concepts of: "underground water" is water existing below the level of the Earth's surface in layers of rocks on the upper part of the Earth's crust in all physical states (3.1); "underground drinking water" meaning underground water intended to meet the drinking and household needs of the population, as well as the food industry and animal husbandry. Qualitative characteristics of underground drinking water in its natural state or after special water treatment must meet the requirements established by relevant national standards, environmental safety standards for water use and sanitary standards (clause 3.1.1) [75].

The Law of Ukraine "On Environmental Protection" (Art. 38) stipulates that the use of natural resources in Ukraine is carried out in the order of general and special use of natural resources [76]. The use of water resources can be of two types – general and special (Art. 46 of the Water Code of Ukraine) [1].

While implementating special water use to meet the drinking and domestic needs of the population according to centralized water supply of enterprises, institutions and organizations in charge of drinking and household water supply pipes water dranaige is made directly from water bodies regarding the approved water intake projects structures, water quality standards and permits for special water use. These enterprises, institutions and organizations are obliged to constantly monitor water quality in water bodies, maintain the sanitary protection zone of the water intake in proper condition and notify the relevant state bodies of executive power and local self-government bodies about deviations from the established standards and regulations of water quality. Water users must install a local network of observation wells at centralized underground water intakes within their deposits and in adjacent territories (Art. 59 of the Water Code of Ukraine) [1].

When using water for drinking and household needs bydecentralized water supply, legal entities and individuals take it directly from surface or underground water bodies in the order of general and special water use (Art. 60 of the Water Code of Ukraine) [1].

The current legislation stipulates the obligation of the business entity to obtain a permit for special water use and a special permit to use a subsoil area. The use of underground water not only for meeting economic and

domestic needs, but also for production requires obtaining the appropriate permit [77]. At the same time, a special permit for the use of subsoil gives the right to extract underground water, and a permit for special water use – the right to use it (clause 6.5) [78].

The procedure for granting a special permit for subsoil use is regulated by Art. 16, 16^1-16^6 of the Civil Code on the Subsoil. The State register of special permits for the use of subsoil is maintained [79]. The right to use the subsoil is approved by the act on the granting mining concessions, the receipt of which is regulated by the Procedure for the granting of mining concessions, approved by the Resolution of the Cabinet of Ministers of Ukraine dated January 27, 1995 No. 59 [80].

The analysis of the norms of the subsoil legislation allows to conclude that the extraction of underground water can be attributed to the extraction of minerals, for the implementation of which it is necessary to obtain a special permit for the use of subsoil, and in the case of extraction of mineral water, also a mining diversion (Articles 17, 23 of the Water Code of Ukraine on Subsoil) [81].

The legislation also provides for the need to issue a permit for special water use in accordance with the Procedure for Issuing Permits for Special Water Use, approved by Resolution No. 321 of the Cabinet of Ministers of Ukraine dated March 13, 2002 [82].

The draft Law of Ukraine dated May 20, 2016 No. 4347 On Amendments to the Water Code of Ukraine on Subsoils (regarding the optionality of studying subsoil in certain cases of groundwater extraction) deserves attention [83]. This document substantiates the expediency of introducing a legal norm on the possibility of extracting underground water without carrying out a geological study in the amount of up to 300 m^3/day. Clause 6 of this note indicates that the adoption of such a draft law "will contribute to a significant increase in the interest of business representatives... especially in areas that need irrigation...". Extracting this amount of water with an underground supply module of up to 0.5 l/s*km^2 attracts underground water resources on an area of more than 3.4 km^2, which exceeds the area of a large village. Extraction of underground water in the specified amount can lead to a decrease in underground water levels and dehydration of wells. Instead, the performed geological study includes a forecast of such a likely impact on the environment. Therefore, the authors of the paper express the opinion that the quantity of 300 m^3/day is insufficiently justified and suggest to revise this quantity with the involvement of specialists.

The Law of Ukraine "On potable water and potable water supply" defines the legal, economic and organizational provisions for the functioning of the

drinking water supply system aimed at ensuring the guaranteed supply of the population with high-quality and safe water for human health, and provides a definition of drinking water [84] (this definition is also contained in State sanitary standards and rules "Hygienic requirements for drinking water intended for human consumption" (DSanPiN 2.2.4-171-10 [2]). Namely, drinking water is water intended for human consumption (tap water, packaged water, water from pump rooms, bottling water, water from mine wells and catchments), for use by consumers to meet physiological, sanitary and hygienic, household and economic needs, as well as for the production of goods that require its use and if its composition meets the hygienic requirements according to organoleptic, microbiological, parasitological, chemical, physical and radiation indicators. Drinking water is not considered a food product in the drinking water supply system and in drinking water quality compliance points (Art. 1) [84].

A source of drinking water supply is a water object, which water is used for drinking water supply after appropriate treatment or without it according to the mentioned Law of Ukraine (Art. 1). Sources of drinking water supply must have passports issued in accordance with the procedure established by law. The list of water quality indicators in the passport of the drinking water source supply must correspond to the list determined by state sanitary norms and rules (Art. 16) [84]. According to DerzhSaNPiN 2.2.4-171-10, the production of drinking water is carried out regarding the regulatory and technical document and in accordance with the technological regulation or another document describing the technological process of drinking water production that has passed the state sanitary-epidemiological examination and received a positive conclusion [2]. Control of compliance with the regulations is carried out by the company itself. Since the source of water supply can be under the influence of various sources of pollution, it is advisable to accompany the control of water production regulations with the control of water quality in pure water reservoirs (PRW) according to the integral indicator – the toxicity index.

Underground drinking water is defined as underground water intended for meeting the drinking and household needs of the population, as well as the food industry and animal husbandry; quality characteristics of potable underground water in its natural state or after special water treatment must meet the requirements established by the relevant state standards, environmental safety standards for water use and sanitary standards (1.5.2). The quality of underground water in the course of its operation may remain unchanged or change over time both under steady and unsteady filtration regimes. Potential changes in water quality are caused by the hydrodynamic and hydrochemical conditions of formation of operational

reserves of the deposit, the presence of sources of pollution, conditions and volumes of underground water extraction (1.13). The selection and assessment of the source suitability for drinking water supply should be carried out in accordance with the current state standards, norms of ecological safety of water use and sanitary standards (2.1) [85].

Legal provision of safety and quality of underground drinking water of Ukraine: problematic issues and solutions

The right to a natural environment that is safe for life and health is of key importance among the environmental rights of Ukrainian citizens enshrined in the Law of Ukraine "On Environmental Protection" (Art. 9) [76]. It is one of the main fundamental human rights, which is fixed in the Constitution of Ukraine (Art. 50) as noted by N.R. Malysheva and M.I. Jerofejev. An environment that is safe for human life and health is such a state of the natural environment that ensures the prevention of the ecological deterioration and the danger to the daily lives of the ppulation. The criteria for a safe state of the environment are determined by ecological standards and regulations, also technical, sanitary and hygienic, construction and other norms and rules containing requirements for environmental protection [86, p. 55]. Regarding water bodies in Ukraine, the Water Code establishes standards for the ecological safety of water use (Art. 36 of the Water Code of Ukraine).

Water is used to meet the drinking and household needs of the population and its quality characteristics correspond to the established standards of environmental safety of water use and sanitary standards. Water users have the right to demand from the water owner (water supplier) information about compliance of the drinking water quality with the norms (Art. 58 of the Water Code of Ukraine). In the case of non-compliance of the quality characteristics of these waters with the established standards of ecological safety of water use and sanitary standards, their use shall be terminated by decision of the central body of executive power ensuring the formation of state policy in the field of health protection (according to the Law of Ukraine "On the Public Health System") [87].

Art. 26 of the Law of Ukraine contains medical and sanitary requirements regarding the safety of water bodies and drinking water for human health and life. In particular, water bodies used for drinking and household water supply, as well as for medical, health and recreational purposes, including water bodies located within settlements, should not be sources of biological, chemical and physical factors of harmful influence on a person (Art. 26(1)). The safety criteria of water bodies for humans, including maximum permissible concentrations in water of chemical, biological substances,

pathogenic and conditionally pathogenic microorganisms, and the level of radiation background are established by sanitary legislation and determined by state medical and sanitary rules and regulations (Art. 26(2)) [87].

Art. 9 of the Law of Ukraine "On potable water and potable water supply" stipulates that every user of drinking water is guaranteed by the state right of free access to information about the quality of drinking water [84]. For this purpose, the central body of executive power implementing state policy in the field of housing and communal services prepares and publishes annually the National Report on the quality of drinking water and the state of drinking water supply in Ukraine [88], provides the interested bodies of the state authorities, public associations, enterprises, institutions, organizations and citizens with information about cases and causes of drinking water pollution, the procedure for calculating tariffs for centralized water supply services according to the procedure established by the Cabinet of Ministers of Ukraine. In case the quality of drinking water does not meet the requirements of state sanitary standards and regulations by individual indicators, local self-government bodies inform consumers through the media about non-compliance with the quality indicators of drinking water and take measures related to averting threats to human health.

Ecological norms for the quality of drinking water should prevent the adverse impact of the water factor on the quality of human life and health. The *ecological standard regarding the water quality of surface and underground water bodies* (clause 2 of Art. 35 of the Water Code of Ukraine) is established among the standards in the field of water use, protection and reproduction of water resources. It contains scientifically based values on concentrations of pollutants and indicators of water quality (general physical, biological, chemical, radiation), assess the ecological and chemical conditions of the surface waters and underground waters to determine water protection measures. The Ministry of Environmental Protection and Natural Resources of Ukraine (Ministry of the Environment) develops and approves the specified standard (Art. 37 of the Water Code of Ukraine, clause 117 of the Resolution of the Cabinet of Ministers of Ukraine No. 614 dated June 25, 2020 "Some issues of the Ministry of Environmental Protection and Natural Resources" [1; 89]). The rules for the protection of underground waters also determines *ecological water quality standards for groundwater bodies* (clause 4 of the general provisions) [59]. The List of pollutants for determining the chemical state of surface and underground water bodies and the ecological potential of artificial or significantly altered surface water bodies was approved by the Order of the Ministry of Natural Resources of Ukraine dated February 6, 2017 No. 45 [90].

The Water Code of Ukraine determines the state of groundwater by the categories "good" and "bad" based on the degree of their purity or pollution (Art. 212). According to the authors, it is possible to apply it to underground water in general. But fresh drinking water is the primary source of drinking water supply, therefore Art. 21^2 is proposed to be supplemented with a paragraph on underground drinking water quality with an indication of its classification not by the quality categories "good" or "bad", but by four classes according to the state standard DSTU 4808: 2007 "Sources of centralized drinking water supply. Hygienic and ecological requirements for water quality and selection rules" [67].

The Law of Ukraine "On potable water and potable water supply" provides, in particular, for the environmental water quality standards of drinking water supply sources (Art. 29) [84].

The procedure, approved by the Resolution of the Cabinet of Ministers of Ukraine, determines the requirements for the development and approval of drinking water supply standards in the case of normal functioning of drinking water supply systems, in case of their violation, and in emergency situations of technogenic or natural character [91].

Prof. V.V. Jakovlev draws attention to the inconsistency of national quality standards with the peculiarities of the chemical composition of underground waters of Ukraine, in particular, the content of silicon. Also, in his doctoral dissertation, he raises the question of the need to establish lower values of the contents of all biophilic elements in drinking water [92]. At present, drinking water quality standards have established lower content values only for 9 such biophilic elements, but there are 29 of them in total [93]. The fact is that "artificial" water is obtained during water treatment, especially if using the reverse osmosis method, when removing all dissolved components from the water, including those necessary for living organisms.

Scientists S.M. Urasova and S.O. Kuryanova have comments on the DSTU standard 4808:2007. In accordance with European standards, the quality of water is considered to meet the requirements for water bodies for drinking purposes, if during the considered time period 90 % of the samples do not exceed the established standards. This requirement is stricter than the requirement of domestic norms: if the average value of the indicator coincides with the norm (permissible according to domestic norms), the number of MPC exceedances will be approximately 50 %, according to European norms no more than 10 % is permissible. In order to bring the requirements of domestic standards into compliance with European standards, it is sufficient to use not the average values of the indicators, but values with a margin of 10 %. Then, if the value of the indicator coincides with the norm, there will

be no more than 10% of the maximum limit exceeded for the considered period [94]. Therefore, the assessment of the water quality class according to DSTU 4808:2007 will reflect the actual state of the water body, if: instead of the average (and worst) values of the indicators, the value of the component concentration with a margin of 10 % is used.

Clause 3.9 DerzhSaNPiN 2.2.4-171-10 establishes that in case of contamination of drinking water with unknown toxic compounds and chemical substances, for the determination of which there are no research methods, it is recommended to use an auxiliary integral (express) indicator of the quality of drinking water – the index of toxicity of drinking water, calculated according to the results of biological tests (biotesting) [2].

Attention should be paid to the insufficient level of recommendations for drinking water quality control in emergency conditions. Therefore, in connection with the technical and organizational complexity of controlling all possible pollutants in crisis periods of natural disasters, large-scale ecological disasters, military operations, it is proposed to include water biotesting in the mandatory list of controlled indicators.

According to DSTU 4808:2008 "Sources of centralized drinking water supply. Hygienic and ecological requirements for water quality and selection rules" dated July 05, 2007 No. 144 the quality of underground water is divided into classes according to a semi-quantitative criterion, which has specific ecological and hygienic significance, and is a clear basis for the application of different levels (by complexity and the degree of intervention in the water composition) [67]. The latter is also related to economic parameters, that is, to the cost of water treatment and the cost of the prepared water. Given the limited resources of natural high-quality underground drinking water, a differential approach to setting fees for this resource depending on the quality class is appropriate. At the same time, the quality class must be determined during the geological and economic assessment of reserves (if a special permit for the use of subsoil is required) or during the preparation of documents for special water use (if a permit for the use of subsoil is not required). For this, the necessary changes and additions should be made to the regulatory documents of the State Commission of Ukraine on Mineral Reserves in the part of preparing materials for the geological and economic assessment of drinking and technical water deposits.

It is appropriate to point out the quantitative predominance of the water volume for economic and domestic purposes over the water volume for purely drinking purposes from the point of view of saving resources of high-quality drinking water. Therefore, it is considered necessary to provide

a centralized water supply with standards of quality of economic and domestic water, which must be bacteriologically safe. In fact, none of centralized systems of domestic and drinking water supply in Ukraine has water quality that meet the standard, regardless of the use of one or another water treatment. If even such water treatment will ensure the standard quality of drinking water at the stations, then this quality will be reduced in the water supply systems for homes. The experience of Western countries is based on legal economic factors and proves that this problem should be solved precisely by separating household and drinking water supply. In some large cities (for example, Paris) a separate water pipeline is installed, in a number of cities (in Ukraine, this is Kyiv, Odesa, Dnipro, Kharkiv, etc.) drinking water is sold in pump rooms, special kiosks, and transported by special tanker trucks to places of dense population.

Taking into account such development of real water supply to the population, legal regulation in this area should be improved accordingly. Therefore, when separating domestic and purely drinking water supply, there is an urgent need to develop water quality standards for domestic centralized water supply.

According to Art. 95 of the Water Code of Ukraine, all waters (water bodies) are subject to protection from pollution, clogging, depletion and other actions that may worsen the conditions of water supply, harm human health and the surrounding natural environment as a result of changes in the physical and chemical properties of water, reduction its ability to natural purification, violation of the hydrological and hydrogeological regime of waters. The activities of individuals and legal entities that cause damage to water (water bodies) may be terminated by a court decision.

Enterprises, institutions and organizations whose activities can negatively affect the state of underground water, especially those that operate storage tanks for industrial, domestic and agricultural effluents or waste, must take measures to prevent underground water pollution, as well as equip local networks of observation wells to monitor the quality of these waters (Art. 105 of the Water Code of Ukraine) [1].

The rules on the protection of underground water establish requirements and a list of measures for the protection of underground water, which are aimed at preventing and eliminating the consequences of their pollution, clogging, exhaustion and depletion, at preserving the qualitative and quantitative state of underground water, preventing a decrease in their ability to recover naturally, violation of the hydrogeological regime of waters (clause 4 of General Provisions) [59]. They must also comply with other current normative acts in the field under consideration [95-97].

According to Art. 87 of the Water Code of Ukraine in order to create a favorable regime for water bodies, prevent their pollution, clogging and depletion, destruction of aquatic plants and animals, as well as reduction of flow fluctuations along rivers, seas and around lakes, reservoirs and other bodies of water, water protection zones are established.

The rules of underground water protection (clause 1 IV Sanitary protection zones) establish sanitary protection zones (which are part of water protection zones) for centralized water supply, sanitary protection districts for medical and recreational needs.

According to V.V. Jakovlev it is expedient to create zones of sanitary protection, in particular, for catchments of natural springs, which are the sources of centralized and non-centralized water supply in a number of villages and towns of Ukraine [92]. Since water extracted from wells and shallow wells is almost everywhere contaminated [9], it is expedient and extremely necessary for local self-government bodies to periodically monitor the quality of water in wells and shallow wells on private plots of land (estates), in sources of collective use without pipelines and in street wells. According to Art. 60 of the Water Code of Ukraine "Periodic control for the quality of water used for non-centralized water supply of the population is carried out by enterprises, institutions, organizations accredited by the National Accreditation Agency of Ukraine (conformity assessment bodies), at the expense of water users". In order to accustom the population to the corresponding target costs, it is proposed to establish a temporary procedure for payment of the specified water quality control from the above-mentioned non-centralized sources of water supply at the expense of the state. This will increase the awareness of the population about the quality of water in wells and shallow wells leading to the continuation of personal payment for water quality control, or to the refusal to use low-quality water for drinking purposes. Both the first and second options are positive.

Control over the use and protection of water and the reproduction of water resources consists in ensuring compliance by all legal entities and individuals with the requirements of water legislation (Art. 18 of the Water Code of Ukraine). The national environmental legislation provides for the implementation of state and public control over the use and protection of water and the reproduction of water resources, which scientists paid attention to while studying the specifics of its implementation [13]. The procedure for state control over the use and protection of water and the reproduction of water resources is determined by this Code and other acts of legislation (Art. 19, Art. 20 of the Water Code of Ukraine).

Natural aquifers (layers of clay rocks, marls, thick chalk strata, etc.) are not completely impermeable. Therefore, these barriers provide protection from contamination from the surface (and from all technogenic objects of contamination) for a certain time, which in many cases has already passed. That is, depending on the amount of technogenic load, the distance from the polluting objects of natural water bodies, the intensity of extraction, the increase in the depth of pollution in the process of water exchange is a function of time. Therefore, it is not possible to completely exclude or significantly reduce the level of the latter, especially in areas located within industrial or cottage buildings. Therefore, in order to preserve and forecast the quality of drinking water for the future, it is necessary to ensure systematic and effective control of the ecological state of underground water throughout the country to the entire depth of the zone of active water exchange (zone of fresh underground water circulation), fixed at the legislative level. At the existing water intakes, a system of observation (monitoring) of the quality of underground water on the way to the catchment facilities should be established, for which observation wells should be installed. For these purposes, significant funds are not required, and the existing research and production potential can be used to implement the measures.

In connection with the possible threat of intentional water pollution of transboundary watercourses, it is necessary to make additions to the resolution of the Cabinet of Ministers of Ukraine "On the approval of the rules for the protection of surface waters from pollution by return waters" dated March 25, 1999 No. 465 [98]. Underground water reserves are hydraulically and filterally connected to surface waters. It should be noted that most of the rivers in Ukraine are transboundary, their flow is formed within the borders of Russia and Belarus. According to Clause 25, water quality control in transboundary water bodies is carried out in accordance with international agreements. It is not clear how this control will be carried out in the context of military operations. It is proposed to supplement paragraph 25 of the Resolution with a provision to provide for the change of water quality control under an international agreement to unilateral control for the period when the bilateral agreement ceases to be in effect.

The opinion of N.M. Obijuh should be supported regarding that the legislation of Ukraine does not provide specifics for the implementation of state environmental control over the use and protection of underground water. Therefore, state control in this area does not actually take place. In this regard, the author reasonedly proposes the creation and legislative consolidation of the activities of a special competent body, authorized to

exercise state control over the use and protection of groundwater, as part of the State Geology and Subsoil Service of Ukraine [17].

The task of state water accounting is to establish information (by forming a database) about the quantity and quality of water, as well as data about water use, on the basis of which water is distributed among water users and measures are developed for the rational use and protection of water and the reproduction of water resources (Art. 24 of the Water Code of Ukraine). State accounting of water use is conducted in accordance with the approved Procedure [99] in order to systematize data on the intake and water use, the discharge of return water and pollutants, the availability of circulating water supply systems and their capacity, as well as on the current wastewater treatment systems and their efficiency (Art. 25 of the Water Code of Ukraine).

State accounting of underground water is carried out by the central body of executive power, which implements state policy in the field of geological study and rational use of subsoil (the State Service of Geology and Subsoil of Ukraine), by observing the quantitative and qualitative characteristics of underground water according to the program approved by the central body of executive power ensuring the formation of state policy in the field of environmental protection (Art. 27 of the Water Code of Ukraine). Currently, water accounting is conducted according to quantitative indicators, as for qualitative indicators, the 7-GR reporting forms, although they contain data on qualitative indicators of underground water, but this information is not processed at the proper level.

Considering a shortage of high-quality drinking water resources, the task is to account not only the total resources of fresh underground water, but also to allocate that share of resources of the highest quality drinking water, as it was done by V.V. Jakovlev in his doctoral dissertation [92], where the resources of well-protected high-quality drinking water were identified in the chalky aquifers of the Dnipro-Donetsk artesian basin and soft underground waters with low mineralization within the sandy river terraces were defined based on objective data.

State water monitoring is carried out in order to ensure the collection, processing, preservation and analysis of information on the state of water, forecasting its changes and the development of scientifically based recommendations for making management decisions in the field of water use, protection and reproduction of water resources. The components of state water monitoring are the monitoring of biological, hydromorphological, chemical and physico-chemical indicators (Art. 21 of the Water Code of Ukraine). State water monitoring is carried out in accordance with

the procedure determined by the Cabinet of Ministers of Ukraine [100]. Underground water monitoring is a type of subsoil use monitoring that is carried out within the competence of the State Geology and Subsoil Service of Ukraine. However, the research of N.M. Obijuh is supported by authors as she proposes the absence of a regulatory act that would regulate the procedure for monitoring underground water and that fact indicates the ineffectiveness of state monitoring of underground water, including drinking water [17]. Unfortunately, nothing has changed in this situation since the proposal was made by the scientist.

The issue of monitoring the underground hydrosphere in our country is very acute, since underground water as a component of the hydrosphere suffers from progressive pollution. One of the aspects of the problem is the widespread rapid contamination of underground water with nitrogen compounds and the reasons are the almost complete absence of drainage systems in rural areas and the increasing use of nitrogen fertilizers in agriculture. It is significant that nitrate pollution of underground water is more dangerous than for surface water, since the processes of natural self-cleaning in the underground hydrosphere are very slow compared to surface water bodies. According to the data of the public organization "Ekodiya", the State Geological Survey has completely stopped monitoring the quality of underground water [101]. The state has missed all deadlines for the implementation of the EU Nitrate Directive, which is necessary to prevent the pollution of water resources. According to Art. 5 clause 6 of the Directive, "Member States shall develop and implement appropriate monitoring programs in order to assess the effectiveness of the action programs developed in accordance with this article. Member States applying Art. 5 on their national territory, must monitor the nitrate content in water (surface and underground water) at selected measurement points, which makes it possible to determine the degree of water pollution by nitrates from agricultural sources" [7]. On the other hand, according to Ekodiya, "the number of surveys of mine wells (this is the highest level of underground water, which suffers the most from the impact of economic activity) decreased by almost half after 2019 and continues to gradually decrease every year", added M. Dyachuk, referring to the National Report on drinking water quality for 2021 [101].

The problem of underground water quality is currently relevant, because wells and shallow wells are the main source of drinking water in the Ukrainian countryside. Therefore, on the example of just this one aspect of the problem of underground water quality, it can be seen that underground water monitoring should be restored first of all at the state level, which is a necessary basis for the restoration of regional and facility monitoring.

The largest compilation of methodological documents related to underground water monitoring was created at the Ukrainian State Geological and Survey Institute, which has many years of practice in processing materials for such monitoring and issuing annual Bulletins on the state of underground water in Ukraine. Bulletins were issued by the SRDE "Geoinform Ukraine" [102]. At the moment, the geological service has stopped monitoring the special network of regime wells, and therefore there is no data for bulletins (where there were forecasts of underground water levels). The Special Geoinform Unit will resume issuing bulletins and observations should resume as well.

A huge problem is also represented by thousands of emergency water intake wells, which are ways of underground water pollution. In order to intensify the process of liquidation of numerous emergency wells that are on the balance sheet or written off, but not plugged, it is necessary to attract funds from various enterprises and departments, with the coordinating role of the Ministry of Environment of Ukraine. Therefore, it is appropriate to propose a separate order of the Ministry of Environment of Ukraine to organize an immediate accounting of such wells, and to ensure control of their planned sanitary and technical tamponade.

Conclusions

Taking into account the analysis of the legal regulation regarding the protection and quality assurance of underground drinking water, it is necessary to emphasize the need to improve, first of all, environmental (including water, natural) legislation. Thus, the authors propose to make changes and additions to the legislation dedicated to the regulation of the specified water relations in order to eliminate duplication, unclear wording and gaps:

The Art. 21^2 of the Water Code of Ukraine should be supplemented with a paragraph on underground drinking water quality with an instruction to classify it not by the categories "good" or "bad" quality, but in 4 classes according to the state standard DSTU 4808.2007. Sources of centralized drinking water supply. Hygienic and ecological requirements for water quality and selection rules.

Water biotesting should be included in the mandatory list of controlled indicators due to the technical and organizational complexity of controlling all possible pollutants during crisis periods of natural disasters, large-scale environmental disasters and military operations.

Taking into account the developed underground water quality criteria (DSTU 4808.2007) and the limited resources of natural, high-quality drinking underground water within Ukraine, the authors introduce: 1) a differential approach to setting fees for this resource depending on the

quality class; 2) separation of standards for household and purely drinking water supply to the population at the legislative level. At the same time, the quality class must be determined during the geological and economic assessment of reserves (if a special permit for the use of subsoil is required) or while preparating documents for special water use (if a permit for the use of subsoil is not required). The necessary changes and additions should be made to the regulatory documents of the State Commission of Ukraine on Mineral Reserves in the part of preparing materials for the geological and economic assessment of drinking and technical water deposits.

Drinking water quality standards should be improved in terms of expanding the list of dissolved biophilic microcomponents.

New sanitary protection zones should be created for the catchments of natural springs, which are the sources of centralized and non-centralized water supply in a number of villages and towns of Ukraine. Local self-government bodies should organize periodic quality control of water extracted from individual wells and shallow wells on private plots of land (estates), from sources of collective use without pipelines, and from street wells.

Systematic and effective control of the ecological state and water quality should be implemented at the legislative level throughout the territory of Ukraine and throughout the depth of the zone of active water exchange (zone of fresh underground water circulation).

The Ministry of Environmental Protection and Natural Resources of Ukraine was ordered by a separate order to organize the accounting of emergency wells (which are channels of contamination of drinking groundwater), and to control their planned sanitary and technical tamponage.

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