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У збірнику матеріалів конференції наведені матеріали наукових досліджень у сфері використання води на підприємствах харчової галузі, оцінки її якості та можливого впливу на організм людини.

Матеріали призначені для наукових, інженерно-технічних робітників, аспірантів, студентів, спеціалістів цехів та заводів, які працюють в харчовій промисловості та водних господарствах.

Матеріали, занесені до збірника, друкуються за авторськими оригіналами.

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ПЕРСПЕКТИВНІ ТЕХНОЛОГІЇ, СУЧАСНІ РЕАГЕНТИ І МАТЕРІАЛИ ДЛЯ ОЧИЩЕННЯ ПРИРОДНИХ І СТІЧНИХ ВОД

EFFECT OF FILTRATE FROM THE MSW LANDFILLS ON THE QUALITY OF DECENTRALIZED DRINKING WATER SUPPLY SOURCES

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Most publications on the activities of the municipal solid waste (MSW) landfills are dedicated to addressing the issue of waste management. The current policy in this area is aimed at reducing the amount of waste that is subject to dumping, and their maximum using as a secondary raw material. However, this does not solve the problem of the negative impact on the state of the environment of existing landfills.

Despite the large number of publications, the issue of reducing the negative impact of landfills on the health and life of people in special editions is almost ignored. Therefore, the purpose of this study is to analyze the state and determination of the water resources safety level for the water supply of settlements located near the landfills.

The MSW landfill in the area of Dalnytski quarries (MSW-1 landfill), located 9 km west of Odessa, is the main landfill site for solid waste in the city. The nearest settlements - Dalnik, Prilimanske and Nova Dolina - are located to the north, east and south, respectively, at a distance of 2-3 km. The total area of a municipal landfill is 96.2 hectares, including on lands of agricultural purpose of Bilyaivsky district (35.8 hectares) and on lands of Ovidiopol'sky district (60.4 hectares).

The city dump is organized on the site of the former Dalnytski quarries, where limestone was developed for rubbish. The quarry was a pit depth of 4-5 m in the northern and northwestern part, up to 12-15 in the central and western parts of the quarry. At present, the south-eastern, western southwestern part of the quarry is filled with household waste, covered with an earthen dam from a river up to 10 m high, the central part of the quarry is buried by MSW. The surface of the waste land of the landfill is not reclaimed and represents a hilly terrain, which is pitted with weed.

The MSW-1 landfill in the city of Odessa is one of the typical Ukrainian landfills, which are usually operated with the minimum implementation of environmental measures. All municipal waste from the city of Odessa without pre-sorting is stored at the landfill, which is a potential source of intense air pollution, groundwater (and in general a threat to the epidemic state) and needs improvement of the waste storage process.

The filtrate formed in the body of the landfill poses a special danger to the environment, because it is a toxic solution with mineralization to several dozens of grams per liter, the content of ammonium ions, chlorine and other macrocomponents to several grams per liter, high concentrations of heavy metals (zinc, lead, nickel, chromium, cadmium, etc.) and organic compounds.

The composition and amount of the formed filtrate depend on the stage of the life cycle of the landfill and may be different for different landfills of solid waste. The maximum volumes of filtrate are formed on an absolutely filled ground before reclamation [1].

The establishment of the development stage of a specific testing landfill allows to predicting the specific features of the pollutants migration, the extent of environmental pollution and the impact on human health.

During the research, the stages of the full life cycle of the landfill of solid waste were analyzed, the hydrogeological conditions of the territory of the filtrate formation and distribution were determined, the quality of the filtrate and the adjacent surface water objects and groundwater were estimated.

It is accepted to allocate three stages of the landfill's existence, which differ in the complex of transient physical processes and chemical reactions, the level and direction of action on the surrounding landscapes [2].

The first stage is the beginning of the landfill formation: the aerobic processes with the participation of numerous groups of bacteria develop in it during the free access to air. At the same time, organic matter decomposes with the formation of a spectrum of organic acids and water. This is accompanied by a sharp decrease in pH to 4-5, and sometimes lower. At the same time, there is the oxidation of metals with the formation of oxides and hydroxides. Inorganic compounds, including metals, in the acidic medium have high mobility and are easily converted into solutions. Due to the release of acids and a sharp decrease in pH, this stage is called acidic.

The second stage is accompanied by the creation of an anthropogenic aquifer and the movement of the aerobic zone into the upper and peripheral part of the landfill. In the central part, where the pH is set to 7-7,5, anaerobic processes take place. Other organic compounds arise, including aliphatic and aromatic carbohydrates. The microbial composition changes completely. Necessary for life and oxidative processes, oxygen is removed from water, nitrates, sulfates, iron oxides and manganese. As a result, a reduction zone with a high content of nitrites, ammonia and hydrogen sulfide is formed in a layer consisting of waste and subsoil soil.

The third (last) stage is the stage of mineralization of organic substances in a non-oxygen medium. It is accompanied by the intensive creation and allocation of CH₄ (methane stage). Rising to the top of the landfill and entering the aeration zone, methane is partially oxidized, turning into CO₂, and the gas, consisting of CH₄ and CO₂, is released to the surface layer of the atmosphere. Their ratio depends on the capacity of the created aquifer and the overlapping aerobic zone. With high power of the aquifer and low aerobic power, methane prevails, with carbon-dioxide predominating in reverse relation [3].

The territory of the city dump is located in the boundaries of the Black Sea lowlands, in orographic terms it is a steppe plain, sloping to the south and south-east, and cutting by beams and few rivers. The main aquifer operating in Odessa is the aquifer horizon of the mean Sarmatian Neogene Tier. The aquifers below its do not have the practical importance for water supply to the population due to high

mineralization. The aquifers that are located above the section from the Sarmatian horizon and are developed in the boundaries of the study include the aquifer of the modern lake-alluvial deposits, the aquifer of the Pontic deposits and the aquifer of the Meiotic deposits.

In the settlements that are the closest to the landfills, the centralized water supply is predominantly operated, but a significant number of wells in the villages supplies water to the population from the aquifer of the Pontic deposits. It is worth noting that this aquifer lies first on the surface in the boundaries of the investigated areas. Water-bearing rocks are cavernous and cracked limestones. Nutrition of the aquifer is due to infiltration of atmospheric precipitation. The nutrition area of the aquifer coincides with the area of its distribution. The borehole depth is 8.3-10.8 m, the aquifer is weakly condensed, and the pressure height is 0.8-1.0 m. The water quality of this aquifer is brackish, sulphate-chloride-magnesium.

The analysis of laboratory tests of the filtrate samples, selected in the area of the landfill and the river Dalnyk, indicates the excess of the maximum allowable concentration in two to three times for the dry residue, chlorides, sulfates, the excess of the MAC for nitrates and nitrites, heavy metals. According to bacteriological parameters, the filtrate is characterized by the lactose-positive *E. coli* index, the content of which is 24000 in all samples of water, and the *E. coli* index, that is from 6200 to 24000.

Environmental safety of the use of local water resources for drinking water supply for the settlements located along with MSW landfills is determined by their natural security. In the case of the continuity violation of the aquifers and water-resistant horizons as a result of erosion, erosion, crackmanship, and other processes that make it possible to establish a hydrodynamic relationship between the man-made solution formed in the body of the landfill and aquifers, the use of aquifers for drinking water in the adjacent to landfill area is dangerous. In any case, it is environmentally hazardous to use water for drinking water first from the surface of aquifers, especially in the case of high standing of their levels. In areas characterized by the development of sustained aquifers protected by solid watercourses, subject to compliance with technical requirements for water intake wells, the use of underground aquifers for drinking supplies is completely safe regardless of the danger class of the object located on the surface.

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Наукове видання

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