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ASSESSMENT OF THE CONTENT OF HARMFUL CHEMICALS IN THE AIR

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Abstract

Relevance of the study. Maintaining occupational health is an important function of the state in implementing its social policy, which determines the potential and pace of the country's economic development. Urban health issues continue to be a priority and challenging area in the field of human ecology and environmental health. A modern wastewater disposal system is a vital component of a metropolis' infrastructure, protecting the environment from pollution. However, the operation of such complex technological structures is associated with a variety of risks that can disrupt not only the normal functioning of the city but also negatively impact human health and the environment. Domestic and international literature contains publications attesting to the attention of scientists to the problem of wastewater treatment, primarily from the perspective of water body sanitary protection. However, a modern understanding of the wastewater treatment process is inextricably linked to improving working conditions and assessing the incidence of illness among service personnel.

The presence of large quantities of harmful chemicals and biological factors in wastewater makes it crucial to ensure the hygienic safety of personnel servicing wastewater treatment facilities. Sewage pumping stations (SPS) are the first facility where workers may come into contact with wastewater and coarse waste from screens. However, there are no published studies assessing working conditions and worker morbidity at these facilities.

The aim of the study is to scientifically substantiate and develop a set of preventive measures aimed at optimizing working conditions, reducing morbidity and maintaining the health of workers at sewage pumping stations.

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Research Objectives:

• study the technological process and identify the main sources of formation of harmful production factors at sewage pumping stations;

• to provide a hygienic assessment of the physical (microclimate, noise, vibration, lighting, dust) and chemical factors of the production environment; to assess the degree of severity and neuro-emotional tension in workers of the main technological professions, and also to establish the role of the biological factor in the formation of working conditions at sewage pumping stations;

• conduct a comprehensive assessment of working conditions based on indicators of harmfulness and danger of factors of the production environment and the work process.

Research Results

The city's wastewater disposal system, at the sewage pumping station stage, consists of a mechanical treatment unit and high-power pumps. The use of modern urban wastewater treatment technologies at pumping stations creates specific health risks for maintenance personnel. An algorithm for comprehensive research has been developed to ensure the hygienic safety of sewage pumping stations during their operation, which includes: an assessment of the technological process and working conditions with a mandatory study of the biological factor, the incidence of diseases among workers, and the development of measures to improve working conditions. Due to the specific technological process at sewage pumping stations, specific working conditions arise with the following key factors: a chilled microclimate, industrial noise, process vibration, and high levels of airborne microbial contamination. The predominant bacterial groups were gram-positive rods, yeasts, and molds. The primary chemical pollutants in the work area were hydrogen sulfide, a mixture of natural mercaptans, ammonia, phenol, and formaldehyde. A comprehensive assessment of the working conditions of workers servicing sewage pumping stations allowed them to be classified, based on indicators of harmfulness and danger of the production environment factor, the severity and intensity of the work process, as class 3 (harmful working conditions) of the 2nd and 3rd degree.

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A comparative analysis of a set of medical and statistical indicators reveals a statistically significant increase in the incidence of illness among sewage pumping station workers compared to a control group of workers in similar occupations at the state unitary enterprise. The incidence of morbidity and days of incapacity for work in the group of sewage pumping station workers exceeded the rates in the control group by 10%.

A retrospective assessment of the problem under analysis reveals that the prevailing paradigm for protecting the health of the working population at the turn of the 20th and 21st centuries encompasses an integrated set of interrelated and complementary measures aimed at both improving working conditions and protecting the natural environment. However, the complex nature of the impact of adverse environmental and working conditions makes it impossible to clearly identify priority etiological factors or sources of environmental impact without specialized research. In the context of intense man-made environmental pollution and the adverse effects of industrial factors, environmental and hygienic risk zones are emerging in some regions of the country, accompanied by rising rates of somatic and occupational morbidity and mortality, coupled with a sharp decline in the birth rate.

Many studies have reflected various methodological approaches to assessing the combined effects of environmental factors and working conditions in regions. In this context, it should be noted that hygienic studies conducted at the regional level provide the most rational mechanism for managing the health of the country's population as a whole. A number of authors in their studies rightly believe that in order to improve the effectiveness of social and hygienic monitoring in analyzing and predicting the impact of the environment on public health, it is necessary to develop objective criteria for assessing both the natural and industrial environments in order to study pre-clinical changes and develop measures to enhance the body's adaptive capacity and prevent environmental pathologies.

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Conclusions:

The overall incidence of pathological lesions, based on occupational health examination data, was 2314.0% in the study group and 1746.4% in the control group. A statistically significant increase in the frequency of compulsory medical insurance services among KNS workers was found compared to the control group. In the study group, these rates were 4763.2%, compared to 3867.5% in the control group.

The increase in overall morbidity rates and specific disease categories corresponds to the hygienic characteristics of the work and professional activities of sewage pumping station workers. The most effective and hygienically safe method for improving working conditions at sewage pumping stations is the use of systems with combined ozone-inducing and microbicidal properties. Monitoring ozone levels in the air of the work area is a prerequisite for the safe operation of ozone-producing devices.

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