

The Substantiation of the Technological Solution for the Environmental Rehabilitation of Technogenic Formations

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Keywords: wastes from tin ore processing, recultivation, ecosphere, industrial pollution, environmental objects

Abstract. In the Far Eastern Federal District (FEFD) of Russia, as a result of the restructuring of the economy, many mining facilities in the past century were bankrupt. Large volumes of toxic waste were uncontrolled. Hydrotechnical services were eliminated and the tailings were drained. Their preservation and recultivation was not carried out. As a result, the plume of products from the dusting surface of drained tailings constantly covers landscapes and settlements, especially in the spring-summer-autumn season. A significant part of the territory of the mining enterprise has a crisis ecological situation, which has led to the emergence of environmentally-related diseases of the local population.

The purpose of the research was to substantiate the technological solution for the rehabilitation of technogenic formations contaminated with heavy metal and arsenic compounds, using the potential of biological systems, to reduce their negative impact on the ecosphere. They are considered by us as environmental damage to the past economic activities of the mining enterprise.

To assess the risk of waste impact on the ecosphere, the following methods and techniques are used: geobotanical, silvicultural, geomorphological, modern instrumental and traditional physicochemical, chemical methods and cartographic modeling, statistical data processing, as well as scientific forecasting and systematization. Expeditionary field studies within the boundaries of the influence of the mining enterprise, conducted during 2008-2017, were carried out according to a single methodology. The samples were prepared for the analysis in the same way and were analyzed at the Khabarovsk Innovation and Analytical Center ITIG FEB RAS on a modern ICP device. The processes of soil formation and natural overgrowing in technogenic landscapes by generally accepted methods have been studied. The chemical analysis was carried out according to the methods described in the «Guidelines for the Control of Atmospheric Pollution RD.52.04.286-89».

On the basis of the conducted research, conclusions were drawn about the insufficient knowledge of the problem of recultivation of the surface of tailings within the influence of «Dalnegorsky GOK» containing toxic waste. The formulated bioengineering principles for creating a safe technology for the ecological rehabilitation of technogenic formations will significantly reduce the anthropogenic impact on the environment to an acceptable level

of inevitable impact generated by the fact of artificial withdrawal of part of the lithosphere for mining purposes.

The efficiency of using phototrophic bacteria for solving the problem of eliminating accumulated environmental damage is shown.

In the future, it is planned to continue research in this area for the transfer of land to the forest fund of the Dalnegorsk district forest area after reclamation work using the potential of biological systems.