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Heavy Metals Phytoextraction from the Polluted Soils of Zakamensk (Russia)

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Mining and ore-dressing are one of the most serious causes of environment pollution. Last century in days of active industrialization in Russia a considerable quantity of mineral deposits has been developed. It was not given sufficient attention for ecological safety at that time. After an economic crisis connected with disorder of the USSR and a planned economy, a number of the enterprises became bankrupts and have stopped the activity. As a result the broken landscapes have not been recultivated everywhere, there were numerous wastes.

The negative consequences were especially strongly manifested in areas with severe climatic conditions where environmental self-renewal occurred is slowed rather down. The degree of a waste toxicity also acted as the important factor.

One of such situations has arisen in Zakamensk – an administrative center of Zakamensky area of Buryat Republic (Russia). Environmental problems of the town have arisen in connection with activity of town-forming enterprise - Dzhidinsky tungsten-molybdenum industrial complex. The enterprise has been organized in 1934 and functioned within 63 years till 1997. During enterprise operating time 3 deposits have been exploited and is created 2 large (more than 40 million tons) tails depository of technogenic sands (TS), located in immediate proximity (less than 1-2 km) from a town residential zone.Sand of tails are rather toxic, the average maintenance of heavy metals in them is (mg/kg): Cd – 42, Pb – 7500, Zn – 3160, Cu – 620, Ni – 34, Co – 44, Mn – 121, Cr – 70, Hg – 0,01, As – 13, Mo – 90.

Due to the lack of knowledges on the toxicity of TS in the past century, they were actively used in the road and house construction, during the erection of dams. After scientific studies they were recommended for using as fertilizers.

Besides anthropogenic sands movement, there was intensive dispersion of sand by means of water and wind erosion. As a result of natural migration sands got to the subordinated elements of the landscape - Modonkul river flood plain, were transferred by its waters and redeposited in an estuary, forming a cone of carrying out with capacity of up to 2 meters or more.

The presence of large number of private houses with garden plots, in which the population grew potatoes, vegetables and fruit-berry trees cultures for food purposes, is the feature of many Siberian towns, including Zakamensk.

The biogeochemical assessment of the town territory current status has shown a high level of contamination of soils and plants by heavy metals that poses a threat to the health of townsmen.

In this connection search of effective ways of clearing up of the polluted soils by phytoextraction and selection of plants, capable to extract high quantities of heavy metals from soil in concrete ecological conditions, is actual. For this purpose we had been made experiments with 8 species of plants. Modeling of various conditions of pollution carried out by addition of following quantities of TS (%): 0; 25; 33; 50; 67; 75 and 100.

In the report results of the experiments and the recommendations on using of plants as extractors on soils polluted by technogenic sand will be presented.