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unofficial translation

Results of the analysis of industrial waste of "black sand" from Montenegro

Study Protocol No. 1/20 dated 4/1/2020

To make a decision on how to dispose of waste by the degree of their harmfulness, it is necessary to first determine to what class of hazard waste belong. The hazard class of waste is established depending on the content of highly toxic substances by the calculation method or according to the list of waste given in the State Classifier of Waste (DSTU-2195-99).

The legislation provides for 4 hazard classes of industrial process waste, where 1-st is extremely hazardous and 4-th class is low hazardous, with minimal hazard.

A technical passport is developed for waste in accordance with DSTU 2195-99 Interstate Standard.

In our case, waste is generated during the abrasive blasting of ships hulls and associated infrastructure (tanks, pipelines). The waste consists of abrasive residues and surface cleaning material. The composition of the waste was determined by morphological and chemical studies.

The analysis of the abrasive was carried out by extracting from the waste fraction 0.25-1.5 mm, which was about 60% of the mass. This fraction is represented externally by prismatic pellets, black with metallic luster, 6 units hardness (*Mohs scale*).

The specific gravity of the abrasive (*according to laboratory studies*) is 3.0-3.3 g / cm³, the bulk density is 1.4 g / cm³. By these characteristics, the abrasive is most likely represented by "Kuperschlag", which is made from copper-smelting slag production. The result of the analysis is in favor of this assumption: the quantitative content of mobile copper compounds is 440.0 mg / kg of weight (**exceeding** the MPC for soil **146.7** times).

Purification material: rust, scale, residues of paint and varnish materials, a small amount of asbestos and residues (up to 3%) of heavy petroleum products, as well as heavy metals (copper, zinc, lead).

The hazard class of the waste due to the lack of a clear definition of their composition was established by carrying out laboratory tests of the general "mixture" depending on the content of highly toxic substances.

The waste also contains excess content:

- zinc - 258.5 mg / kg (excess of soil MPC 11.2 times);
- lead - 22,9 mg / kg (soil MPC exceeding 3,8 times);

- petroleum hydrocarbons - 3%.

Heavy metals that exceed the maximum permissible concentration (MPC) in the soil are considered as toxic environmental pollutants. Once in the soil, heavy metals migrate, moving to one form or another. Exceeding the permissible concentration of heavy metals in the soil leads to the suppression and death of living organisms, has a pronounced mutagenic and carcinogenic effect.

According to the content of hazardous substances, the waste of the so-called "black sand" according to Interstate standard DSTU 2195-99 belong to the 2 hazard classes.

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