

Ecochemical assessment of Tkibuli hard coal

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Annotation

Despite the fact that combustion products of hard coal belong to the major sources of environmental pollution, its share in modern energy generation reaches 90%. The reason for this are larger deposits of solid fuel in comparison to gaseous and liquid fuels worldwide. As it is well known, the combustion products of hard coal are the powerful source of greenhouse gases and toxic elements, as well as generator of acid rains. Currently the annual production of Tkibuli mines is roughly 0.5 mln. tons. An increase of annual production to 1.0-1.5 mln. tons and construction of thermal power station are considered in the future. Taking into account the above mentioned the ecochemical evaluation of Tkibuli hard coal is topical issue.

The content of regulated substances, such as sulfur, arsenic, chlorine and fluorine was determined in the samples taken from different Tkibuli mines. The official methods recommended by International and Russian regulatory agencies were used for quantitation of the above mentioned components in the hard coal.

According to sulfur content Tkibuli hard coal belongs to ecologically acceptable solid fuel since its total content does not exceed 11.7 g/kg and is equal to 8.5 g/kg average (maximum permitted level is 30 g/kg). Maximum content of arsenic in samples studied reached 5.9 mg/kg, while average content was 2.4 mg/kg. This is far below the allowed limit (0.02%). The volatile form of arsenic equals to 67% of its total content. Nearly the same is the volatile form of chlorine (70%) what can be explained by formation of iron and aluminium chlorides while coal combustion. Contents of chlorides and fluorides are less than permissible limit (average 1.8 g/kg and 8 mg/kg). The humidity in the samples varied from 1.8 to 4.2%, while average ash content was 22.5% (it varied between 11.8-33.6%). Iron content in Tkibuli hard coal varies between 0.7-13.1 mg/kg and is equal to 5.0 mg/kg in average.

Thus, based on the results obtained in the present study one can conclude that Tkibuli hard coal represents ecologically acceptable fuel.