

Improvement of the technology of treatment of uranium ores from the Streltsovsky group of deposits

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Production of uranium ores has been carried out in the Russian Federation from the Streltsovsky group of deposits by the Priargunsky Mining and Chemical plant OJSC since 1970. During the exploitation period, the ore bodies most rich with uranium were mined-out. At the present time, the uranium content is about 2 times lower compared to that of the ores produced in 1970-2000. Deterioration of the produced ores quality caused change of the approaches to selection of the treatment method.

A specific stage in the scheme of the uranium ores leaching in pachucas was development of the method that included separation of the initial ore pulp into two streams; treatment of the heading stream, that amounted 35-70% of the total volume, by sulphuric acid solutions with pH 2 to 4.2 with transformation of the iron, contained in the ore, to the liquid phase; mixture of that stream with the remaining part of the initial ore pulp; oxidation of the dissolved iron to the trivalent form by atmospheric oxygen, which is transferred to the leaching pachucas for concitation; admission of sulphuric acid and manganese dioxide to the joined pulp, and uranium leaching under the pH values in the leached pulp equal to 1.5-2.5 and the redox potential ≥ 450 mV. The developed method enabled decreasing consumption of sulphuric acid and oxidant.

The technical solutions providing significant decrease of expenses for ore treatment were the methods of parcelwise sorting and heap leaching of low-grade uranium ores. All the low-grade ore obtained for treatment passes the screen sizing operation, where it is divided into three streams: slurries with coarseness -5mm (uranium-enriched) are transferred to the main hydrometallurgic process of reach ores treatment; ore with coarseness -40+5 mm (with uranium content close to the one in the initial low-grade ore) is transmitted to the unit for heap leaching of low-grade ores; and the machine-class ores 200+80 mm and -80+40 mm runs to the separators. The enrichment products are the tailings having uranium content $0 \leq 0.13\%$ that are removed from the treatment, and the concentrate that is transferred to the hydrometallurgic process of reach ores treatment.

At various times in our enterprise were conducted the pilot works for the block-based in situ underground leaching of uranium ores. The pilot works were carried out within several specially prepared blocks with varying mine technical and mine geological conditions, and they have shown the principal possibility and practicability of the block-based underground leaching for some areas, mainly for re-exploitation of residual reserves after excavation of the principal volumes of the Uranium ores by traditional methods.

This way, the separately developed and implemented technical improvements formed a complex mining and chemical technology providing optimal composition of the classical methods of hydrometallurgy, heap leaching, underground leaching, and roentgen-radiometric enrichment that gives the possibility to reduce the cost of the uranium peroxide-oxide produced.

Author: Dr LITVINENKO, Valery (Russia)

Co-author: Dr MOROZOV, Aleksandr (Russia)

Presenter: Dr LITVINENKO, Valery (Russia)

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