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Prospects of block underground leaching application on Streltsovskoe field deposits

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The Streltsovskoe uranium ore field belongs to the category of unique deposit and represented by 26 deposits which lie on a large area. The average uranium grade was 0.212% in reserves approved by State Committee for Mineral Reserves. The main volumes of uranium ores are mined via descending horizontal slicing with hardening backfilling which accounts for more than 90 % of the uranium mined. The uranium grade decreased to a half times less in run-of-mine ore to 2013 because the richest ore reserves were mined for more than forty years work of the enterprise. The uranium grade reduction has led to decline the technical and economic performance of the enterprise, to a sharp cost rise of mining and hydrometallurgical processing, to fall-off of the running mines output by the final product. Uranium production growth is not possible by increasing the volume of mined ore due to the high-cost current mining system and technical condition of existing equipment.

Moreover, the proven ore reserves remaining at the depths are enough during 50 years of operation.

The development of new deposits could be delayed due to a hard geographical and mining operation conditions. The proposed complicated approach for the remaining ore reserves recovery including descending horizontal slicing for the high grade ore mining and block underground leaching of low-grade ore will ensure the profitable operation of the enterprise. From 1986 to 2006 the block underground leaching commercial tests were carried out under mining of ore bodies with various configuration, angle of dip, thickness and different host rock at the Priargunskiy enterprise.

The long-term scientific research results and commercial tests, as well as technical and economic calculations show that the most promising way to improve the mining operation is the use of physical and chemical geotechnology by means of direct underground uranium ore leaching into a production solution from the most part of the broken and shrinkaged ore inside an operational ore block, excluding thus ore hoisting and hydrometallurgical processing. However, the large-scale block underground leaching application was not implemented under mining of Streltsovskoe ore field reserves due to an unstable (from 34 % to 88%) uranium rate extraction from shrinkaged ore within testing blocks. The main reasons of the low uranium recovery in a some blocks were improper testing block development, shrinkaged ore mass repacking, flowing channels appearance within the blasted ore massive, colmatage, failure to comply the schedule of tests. Overall, it was due to lack of properly scientific study of technological schemes, operation conditions and parameters of leaching. At present the JSC “Priargunsky Industrial Mining and Chemical Union” (JSC “PIMCU”) together with the Leading Research and Development Institute for Industrial Technologies (OJSC “VNIPIpromtekhnologii”) and the Trans-Baikal State University make a complex scientific researches on the block underground uranium leaching technology. Now the pilot tests of uranium leaching from run-of-mine ore size in percolation columns are completed at the Central Research Laboratory of JSC “PIMCU”.

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