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Geological 3-D modelling and resources estimation of the Budenovskoye uranium deposit (Kazakhstan)

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The Budenovskoye deposit is the biggest sandstone-hosted, roll front type uranium deposit in Kazakhstan and in the world. Uranium mineralization occurs in the unconsolidated lacustrine-alluvial sediments of Late Cretaceous Mynkuduk and Inkuduk horizons. The Budenovskoye deposit was split into four areas for development with the present Karatau ISL Mine operating No. 2 area and Akbastau ISL Mine No. 1,3 and 4 areas. Mines are owned by Kazatomprom and Uranium One in equal shares.

CSA Global was retained by Uranium One to update in accordance with NI 43-101 the Mineral Resource estimates for the Karatau and Akbastau Mines.

The modelling Reports shows a significant increase in total uranium resources tonnage at both mines when compared to the March 2012 NI 43-101 resource estimate: at Karartau measured and indicated resources increased by 586% while at Akbastau by 286%. It has also added a 55,766 tonnes U to the Karatau Inferred Mineral Resource category.The new estimates result from the application of 3-D modelling techniques to the extensive database of drilling information, new exploration activities.

The modelling of roll front type uranium deposits to be developed using ISL methods has its own specific requirements, which have been fully accounted. Mineral resources estimation was based on 0.04 m% grade x thickness cut-off. The relationships between geophysical logging data and laboratory analyses were identified in order to define resource estimation parameters based on gamma log, electrical logging methods and disequilibrium studies.

The interpretation of roll front type uranium deposits amenable to in-situ leaching consists of: modelling of mineralized-bearing horizons (Inkuduk and Mynkuduk); interpretation of mineralized bodies and interpretation of clay horizons in order to define mineralization that cannot be extracted from impermeable sediments by ISL methods.

Mineralized envelopes were divided into three morphological elements –rolls nose, wing, and residual parts as well as into mineralized horizons. The intervals where mostly reduced rocks are developed were attributed to the nose; the intervals where reduced and oxidised rocks are developed were attributed to the wings; and the intervals where there are mainly oxidised rocks developed were attributed to the residual part. The nose parts of rolls trace regional redox front zones.

The resources estimation methodology for ISL amenable sandstone type deposit is based on GT (grade x thickness) modeling as a main parameter. First a gridded model is generated where the vertical dimension for each block corresponds to the thickness of mineralised ore body. After that uranium productivity (grade x thickness) is calculated by multiplying the cell vertical size by uranium grade. Finally the productivity of each two-dimensional gridded model cell is compared with the corresponding column of cells in the classical three-dimensional block model.

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