

Exploration and geology of the Inkai Uranium Deposit

Sergey Ivanov, Cameco Corporation, Saskatoon, Canada

Inkai is located in the Chu-Sarysu basin in Kazakhstan which is comprised of a largely flatly lying sequence of continental unconsolidated fluvial clastic sedimentary rocks resting upon the deformed and weakly metamorphosed basement made of material eroded from the land. The basin is approximately 1,000 km by 250 km, stretching from the Tien-Shan mountains in the southeast to the Aral Sea depression in the northwest. Several relatively continuous, sinuous and uranium-bearing redox and roll fronts occur throughout the lithostratigraphic column.

Mineralization at Inkai occurs in the three Upper Cretaceous horizons: the Mynkuduk (resting on the basement), the Lower Inkuduk, and the Middle Inkuduk. The depth ranges from 300 to 525 m depending on the horizon and the area. In the western part of the deposit, the redox and roll fronts in the Middle Inkuduk horizon are about 10 km more propagated in the northwestern direction relative to those in the Mynkudyk horizon. In the northern and eastern parts, roll fronts in different horizons occurs over the same area forming up to six stacked mineralization levels. In a plan view, the width of the sinuous shaped mineralization envelope ranges from <50 m in the limbs to 1,400 m in the crests and troughs. In a cross-section, a variety of morphological types are observed: simple rolls, cascade rolls, two adjacent tongues, and their various combinations.

Inkai was discovered in 1978 by the Soviet uranium exploration and development organization as a result of the extensive exploration and evaluation program that was started in the Chu-Sarysu basin in the early 1970s and lasted until 1991. The program resulted in delineation and evaluation of mineralization for ISR amenability, which was sufficient for defining the uranium resources at Block 1 of Inkai deposit. JV Inkai obtained subsoil use rights and started the exploration/evaluation and development at Inkai in 2000. The exploration/evaluation work carried out by JV Inkai included delineation drilling in the northern flank, as well as hydrogeological studies, and laboratory and field ISR tests carried out at Blocks 2 and 3. Drilling grids progressively tightened from 3,200 m by 400 m to 200 m by 50 m spacing. All fences at 400 m or more apart were cored through the target horizons, while the infill fences 200 m or less apart used coreless drillholes. The results of both historic and JV Inkai evaluation work were used to produce resource estimation and mining plans supporting uranium production at Inkai.