

## **Classification and genesis of sandstone-type uranium ore bodies in middle Siwalik rocks, eastern Sulaiman Range and Bannu basin, Pakistan**

**M. Amin Shah, Azizullah, Sher Muhammad and Taimur Shahzad**  
DEUP-II-Kohat, Pakistan Atomic Energy Commission, Kohat

The sandstone-type uranium ore bodies have been discovered in middle Siwalik rocks in Sulaiman Range and Bannu Basin. These ore bodies were probably developed from single origin, later tectonic developments created different environments, shaping their present mode of occurrence and genesis. It is assumed that initially, braided paleo-Indus river eroded the uraniumiferous material from primary rocks in the north and west and deposited the material in foredeep basin and developed conventional paleo-channel type uranium ore bodies. Later reworking shaped the present forms of the ore bodies.

During the first stage, conventional paleo-channel ore bodies developed in braided river system. These ore bodies are affected least by orogeny and buried beneath sedimentary cover. Since no contact of the ore body and air has occurred, hence no leaching phenomenon has been activated. During the second stage, paleo-channel related ore bodies, passing through tectonic episode, got tilted, and rose above the surface of erosion. The above surface part of the ore body has been oxidized and enriched the already existing ore body below the water table. This body is termed as complex paleo-channel cum ground water leached type of sandstone deposits bounded by clay bed on lower side. During the third stage, these re-enriched ore bodies were further uplifted, and the above-surface part of the ore body was oxidized which further re-enriched the existing ore body below the water table, resulting in development of horizontal as well as inclined ore bodies. In the fourth Stage, uranium ore bodies developed as a result of complete leaching of pre existing paleo-channel ore body. These were then re-precipitated horizontally below the surface exposure of anomaly in reduced zone below the water table.

World wide, on the basis of mode of occurrence, three types of ore bodies, i.e. tabular horizontal, tabular inclined, and roll front, are identified in sandstone, while in Pakistan tabular horizontal, horizontal-inclined and tabular inclined are identified. On the basis of origin, these ore bodies are classed as sedimentary precipitated uranium ore bodies, and on the basis of genesis the ore bodies are classed as paleo-channel and reworked ore bodies.