

Study of geological details towards feasibility of uranium project: Indian case studies

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Appropriate technical evaluation of geological details at early stage of exploration is the key to minimising the lead-time between discovery and production. This has a major influence on economic viability of the deposits.

Indian uranium deposits are of medium-tonnage and low-grade occurring in dissimilar geological provinces. Detailed studies of geological characteristics of these deposits are very vital to the proper selection of technology and subsequent successful operation. The method of mining (underground / open pit / in-situ recovery) is influenced by the ore body depth, size, grade, configuration, hostrock and adjoining strata characteristics, hydrological condition etc. The ore processing technology is also subjective to mineralogical characteristics of the ore. In order to draw the flowsheet, determine process parameters and selection of reagents, a comprehensive study on identification of minerals and their probable metallurgical characteristics, general physical relationship between various minerals, mineral liberation size etc is of great significance. The technology for disposal of tailings is also influenced by geological / geo-hydrological characteristics.

The key to successful operation of Indian uranium deposits lies in outlining a pre-development strategy as the exploration advances to different stages. This phase called "exploratory mining" - which starts with detailed exploration and ends with approval of the project is very critical for early commissioning of the project. The activities during this period include collection of representative drill core samples during exploration, laboratory studies, geo-technical studies and determination of geo-mechanical properties of ore and waste rock etc. Later, the ore lenses are accessed through limited entry(ies). Developments along the ore body helps in better understanding of the configuration of the lenses. Studies for strata control in case of underground mining are carried out towards deciding the mining (stopping) method. Large ore samples generated during the process helps in detailed pilot plant studies and operation of the plant on continuous mode while fine-tuning all process related steps. The period of exploratory mining is further utilised in locating and planning infrastructure needs, preparation of different reports for regulatory clearances and generating public opinion in favour of uranium mining.

All Indian uranium deposits have gone through glorious phase of exploratory mining generating large volume of data which are of immense value to the operators during the life of the mines and plants.

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