

RRL Bhubaneswar has done considerable work on the bacterial leaching of pb, zn, and cu complex sulphide ore, difficult of float oxidised Cu-ore of Malanjkhand and also removal of silica from the limestone and bauxites. At present field trial leaching of Cu-ore at Malanjkhand in collaboration with HCL is going on.

Training and Education

Training and education is a key element essential for a result oriented technology transfer. In respect of a new technology, training would be necessary under three categories:

- (a) **Training for Planning :** The engineers associated with the planning of new technology should be thoroughly trained in all the related aspect of technology. In fact, their training should be quite an indepth appreciation of the merits and demerits of the technology and should be in a position to undertake critical evaluation of its suitability in a given geo-mining condition. This training should be started immediately after the selection of technology.
- (b) **Operational Training :** Key personnel, including junior level executives, supervisory staff and operators should be provided with on the job training backed by theory classes. The training programme should be of sufficiently long duration to acquaint these personnel with the various operational details.
- (c) **Training for Technology Management :** Training of technology managers, who would be responsible for its implementation, should be provided in the management institution, planning organisations and at the actual site where the method is in practice. Their training should be largely comprised of discussions with the planners, operators and managers dealing with the selected technology.

Other R&D Institutions in Mining Research

There are several other institutions also busy in R&D activities in a limited scale for mining and other rock excavations (besides the CMRS, Dhanbad) namely, Research Laboratory National Geophysical Research Institute (NGRI) and the newly formed National institute of Rock Mechanics (NIRM), Kolar; Teaching institutions : Indian School of Mines, Dhanbad, Mining Department of BHU, Varanasi and IIT, Kharagpur (West Bengal).

To be able to utilise even low grade ores cost-effectively is a challenge. CSIR laboratories, particularly National Metallurgical Laboratory (NML), Jamshedpur and Regional Research Laboratory (RRL), Bhubaneswar have been pioneers in conducting studies and developing methods and techniques for agglomeration and bonification of iow grade ores to make them suitable as industrial raw materials.

NML has now taken up a project to produce tungsten from Indian tungsten ores which are lean. The deposits are embedded in the hard graphite rock. Even though the extraction of tungsten from such ores may not be economic, the process to extract tungsten has to be developed for purely strategic reason and at the lowest possible cost.