

3. Lack of infra-structural planning
4. Lack of rationalisation by product work load
5. Improper maintenance policy

(2) Organisational Problems

1. Inappropriate manpower planning
2. Absenteeism of workforce
3. Improper incentives for work force
4. Inadequate training facilities for personnel

Today not much seems to have been done for medium and small scale mining sectors, particularly for mining minerals other than the above mentioned. The future scenario of R&D should, therefore, focus on (a) development of scientific mining for non-coal medium and small scale mining sectors, (b) environmentally viable mining technology for overall sustainable development, (c) improvement in production and productivity, (d) man-machine optimisation, (e) mineral investment policy and planning, and (f) optimum utilisation of non-conventional mineral resources used for purposes other than usual.

### **Support of Underground Excavations and Tunnels**

#### *Stowing and Back Filling in Mines*

Until now, more than 90 projects on design/modifications of hydraulic stowing plants in the coal sector have been completed; besides, a large number of samples of materials have been investigated to find the feasibility of stowing as alternative to sand. As a result, well developed expertise has been established. Recently (October 1992) a national workshop was organised to focus attention on the need of back filling/stowing in India. Some significant contributions in this area are:

- Evaluation of the performance characteristics of Indian river sands under different hydraulic gradient conditions.
- Suitability of materials. For example, coal ash, washery rejects, crushed overburden rocks, mill tailings and slags from steel and aluminium plants, alternative to sand for hydraulic stowing.
- Improving the operating efficiency of the existing stowing plants.
- Development/modifications in the stowing equipment for enhancing the stowing rates of low-head stowing plants.
- Development of numerical models for operation of hydraulic stowing plants.
- Studies into the wear pattern of stowing pipes.

The mineral processing industry today is facing problems in mineral processing technology as the ores and minerals mined today are of much low grade than that was treated a decade earlier. The low grade ores and minerals are finally interlocked with the gangue minerals and the liberation size of the values is of finer sizes, thus making the process of physical separation a highly complicated issue.