11 Science and Technology

11.1 The Science and Technology programme of the Ministry of Mines initiated in 1978, cover the disciplines of geology, exploration, mining, environment, bio-leaching, beneficiation, rock mechanics and ground control and non-ferrous metallurgy.

11.2 During the current year, 8 new project have been approved in the 37th SSAG meeting held on 27th May, 2008 along with one modified project titled 'Bio-leaching of lean sulphide chalcopyrite ore at Malajkhand mine of Hindustan Copper Limited, considered earlier in the 35th SSAG meeting.

11.3 A total Budget Outlay of Rs. 3 crores (Plan) and Rs. 2.80 crores (Non-Plan) has been provided in 2008-09 for S&T Programme.

The Jawaharlal Nehru Aluminium Research Development and Design Centre, (JNARDDC) Nagpur, Maharashtra

11.4 JNARDDC is a "Centre of Excellence" set up in 1989 as a joint venture of Ministry of Mines, Government of India and UNDP with a view to provide major R&D support system for the emerging modern Aluminium industry in India. It is an Autonomous Body in the Ministry of Mines, registered under Societies Registration Act, 1860 & Bombay Public Trust Act, 1950 and is located at Nagpur, Maharashtra. The objective of the Centre is to assimilate the technology available in the country and abroad for the production of alumina & aluminium including aluminium alloys as well as to develop technical know-how for the basic engineering process and downstream areas and to provide training to the personnel employed in the Indian aluminium industries. The centre also provides technological support for setting up Alumina refinery in the country and also caters to the R&D needs of Primary Producers.

11.5 The Centre has well-established facilities for the study of bauxite, alumina and aluminium. Its principal preoccupation is with all aspects of Bayer process for conversion from bauxite to alumina and electrolytic smelting for conversion from alumina to aluminium. Subsequently, aluminium is used in downstream processing for product making. Attempts are also being made for the reduction of energy consumption and environmental pollution by the effective utilisation of residue materials such as red mud & scrap etc.

11.6 The Centre also offers analytical and testing facilities to other non-ferrous industries, steel plants, small-scale industries, R&D Organisations and Academic Institutions particularly in the areas of chemical and mineralogical analysis, powder characterisation, thermal mapping, micro-structural studies, mechanical and non-destructive testing, failure analysis and technical information.

11.7 An income of Rs. 147.32 lakhs was generated in 2007-08. This is the highest internal revenue generated by the Centre so far. The Centre is likely to achieve the Internal Revenue target of Rs.175 Lakhs in the year 2008-09. During 2008-09, a budget support of Rs. 130 lakhs (Plan) and Rs. 130 lakhs (Non-Plan) has been provided. The Scientists of the Centre presented/published 14 technical papers in international & national seminars/journals in 2008-09.

Major Activities

11.8 The Centre has completed four projects till March, 2009. Presently two projects of Gujarat Mining Development Corporation (GMDC) & NALCO are under implementation and eleven projects have been recently considered by Industry / S&T Programme of Ministry of Mines and are likely to commence shortly.
The Centre successfully completed the project awarded by ANRAKAL, (United Arab Emirates, UAE) with respect to determination of technical parameters of Jerilla bauxite for Alumina Production. The Centre also carried out technological evaluation of bauxites from Gianni, West Africa in an assignment awarded by BHP Billiton Australia. Several projects are under negotiation with international companies like RUSAL-VAMI Russia, SECAT-USA etc.

11.9 JNARDDC has also got excellent response in the field of organizing Training Programmes. The Centre is successfully providing Training on “Aluminium Technology” for NALCO.

Date of meeting of GB, RAC etc:

11.10 Research Advisory Committee Meeting (RAC) for the year 2008-09 was held on 6.5.08 and 7.11.08. Governing Body Meeting was held on 22.5.08 and 25.11.08. Annual General Body Meeting was held on 22.5.08

National Institute of Rock Mechanics (NIRM)

11.11 The National Institute of Rock Mechanics (NIRM) is a premier centre for Research in applied and basic rock mechanics. Set up under the Ministry of Mines, Government of India, the Institute provides research and consultancy services for improving safety and productivity in the mining and civil engineering sectors. It is an ISO 9001 : 2000 certified research Institute. NIRM has been carrying out research work through both government-funded and industry-sponsored S&T and consultancy projects. The Institute has been extending its support to the industry in the following areas:

- Metalliferous mines / Hard Rock Mines
- Coal Mines
- Hydroelectric & Tunnelling Projects
- Other Civil Construction Projects

11.12 The following S&T projects were undertaken by NIRM.

- Underground Coal Mining, Singareni Coalfields.
- Establishment of Broad Band Seismic Station, Kolar.
- Study on Blasting Dust Management System in an Open cast Mine.
- Industry Sponsored Projects.
- Tapovan – Vishnugad Hydro-Electric Project, Uttarakhand.
- Determination of In-situ Stress by Hydrofracturing Method at the Proposed Underground LPG Cavern at Mangalore, Karnataka, RITES.
• Seismic Refraction Survey for Sleemanabad Carrier Canal Project near Katni in Madhya Pradesh.

• GPR and Resistivity Survey for Assessing the Stability of HMRB Oil Pipeline of IOCL in Raniganj Coalfields, West Bengal.

• Instrumentation, Monitoring and Data analysis at Powerhouse Complex, Tala Hydroelectric Project, Bhutan.

• Support Design for Tunnel at Nettempadu Lift Irrigation Scheme, stage –II, Andhra Pradesh.

• Measurement of Ground Vibration and Air Overpressure Produced from Quarry Blasting Beyond 500m from Yeleru Reservoir, Yeleswaram, East Godavari, Andhra Pradesh, Department of Mines and Geology, Govt. of Andhra Pradesh, Hyderabad.

• Ground Vibration and Air Overpressure Study Conducted During Test Blasts at an Alternate Site for Bangalore Metro Rail Corporation Ltd (BMRCL).

• Geological survey using GPR for investigating buried objects near an archeologically important monument adjacent to the proposed metro alignment for Bangalore Metro Rail Corporation Ltd.

• Assessment and Expert Opinion on Rock Strata Classification at Pattuvam and adjoining villages for Contract Package-3 of JBIC Assisted Kerala Water Supply Project, Kerala.

Performance at a Glance

11.13 NIRM Scientists published 12 technical papers during the year 2008-09 and 32 technical reports. The Institute has registered an external cash flow of Rs. 313.95 lakhs during the period April to March 2009. The Institute completed 32 industry sponsored projects and worked on 3 Science and Technology projects and 50 industry sponsored projects.

11.14 NIRM is likely to sign MoU to take up geotechnical investigations in DPR stage and construction stage in five hydro-electric projects falling in the state of Arunachal Pradesh, Uttarakhand and Maharashtra. The expected cash flow from these projects is around Rs.150 lakhs.

National Institute of Miners’ Health (NIMH), Nagpur, Maharashtra

11.15 National Institute of Miners’ Health (NIMH) was established for promotion of occupational health and hygiene in mining and mineral based industry and for development of trained manpower in these fields. It was registered as Society in the State of Karnataka. On closure of BGML, a camp office was established in Nagpur in 2002.

11.16 The institute has state of art infrastructure, equipments and highly trained manpower to conduct and carry out.

• Detailed initial and periodic medical examinations as per Mines Rules, 1955.

• Clinical investigations like routine hematological tests, blood biochemistry, audiometry, spirometry, electro-cardiography.

• Computerized vision screening.

• Exposure assessment of individual subjects for noise, dust and vibration using personal dosimeters.

• Risk assessment of work environment for dust, noise, vibration.

• Risk characterization of dust for free silica (using FTIR), heavy metals (using AAS) etc.

• HRD activities in mine related health and hygiene issues.
Budget (Plan & Non plan)

11.17 Government of India made a budgetary provision of Rs. 30 Lakhs for plan expenditure and Rs. 22 Lakhs for S & T project. For Non Plan grant, initial budgetary provision made by GOI was Rs. 50 Lakhs and later an additional amount of Rs. 15 Lakhs was approved for implementation of recommendations of 6th CPC.

Major Activities Undertaken (Projects)

11.18 NIMH has conducted field studies and submitted Environmental Monitoring studies in one mine of National Mineral Development Corporation Limited (NMDC) and 3 Limestone mines of ACC Ltd namely, Kaymore, Bamangarh and Maddukarai mines. A total of 146 respirable dust samples were collected and analysed to determine the dust concentration as well as free silica content in the mine air.

11.19 The Institute also analyzed data on dust, noise and whole body vibrations of miners in Western Coal Fields Limited (WCL) and prepared risk assessment report under S & T project titled “Intervention Studies in Coal, Bauxite & Zinc Mines” sponsored by the Ministry of Mines. The project report was reviewed in the Project Monitoring Committee meeting (PMC) held in November 2008.

11.20 Report of Epidemiological studies on a database of 1553 employees working in Nagpur area of Western Coal Fields Limited (WCL) was prepared. The study highlights the prevalence of diseases such as Diabetes mellitus, hypertension, various eye disorders, Muscular Skeletal Disorders (MSD) etc among the mining population. The report recommended intense health education for the employees as one of the options for prevention of diseases. On the basis of the Epidemiological studies, detailed medical examination of a sub-sample of 280 employees for audiometric, spirometry, hematology and biochemical variables has been completed. The remaining phases of the project will focus on the environmental and occupational health aspects in Aluminium and Zinc Mines.

11.21 Training programme on noise dust and vibration has been organised in the institute to impart training to participants of National Aluminium Company Limited.