

# Chapter 1

## Highlights of 2007-2008

### Mining Policy and Foreign Investment

1.1 The demand growth for metals and minerals, domestic as well as global is continuously pushing up both domestic and international prices. The margins available in the mining sector are widely expected to stabilize at healthy growth levels in the foreseeable future. The country's accelerated growth rate warrants a rapid development of the mining sector on which most of the basic industries in the manufacturing sector depend. With increasing competition on account of globalization and the level of technology employed, initiatives for growth in the mining sector have assumed critical significance. Though it has been the endeavour of the Ministry of Mines to encourage greater investment in exploration and mining, there is a need to make coordinated efforts to remove bottlenecks which hinder the productivity and efficiency of this sector. Recognising this need and to further improve the investment climate for mining in the country, the Planning Commission set up a High Level Committee under the Chairmanship of Shri Anwarul Hoda, Member, Planning Commission, to review the National Mineral Policy and recommend possible amendments to the Mines and Minerals (Development and Regulation) Act, 1957 (MMDR Act). The High Level Committee submitted its report to the Government on 20th July, 2006 with recommendations on changes in the National Mineral Policy to attune it to the present requirements of the world economy for evolving of a mining code adapted to the best international practices, streamlining and simplifying of procedures for grant of mineral concessions to reduce delays, strengthening the infrastructure for mining activities and recommendations on other issues for improving the environment for investment in the mining sector. Based on the recommendations of High Level

Committee and after intensive consultations with State Governments, and concerned Ministries/Departments of Central Government, a new National Mineral Policy has been approved.

1.2 The Government has decided for setting up of a High Powered Committee to thoroughly review the functioning of Geological Survey of India and assess its capacity to meet the emerging challenges taking into the organization's technological and manpower resources.

1.3 Ministry of Mines had set up a Study Group under the Chairmanship of Additional Secretary (Mines) with Joint Secretary (Mineral Policy), representatives from the Ministry of Steel, Department of Atomic Energy, Indian Bureau of Mines and Federation of Indian Mineral Industries (FIMI), and Secretary of Mines and Geology Department of State Governments of Jharkhand, Karnataka, Orissa, Chhattisgarh and Rajasthan as members for revision of rates of royalty and dead rent on major minerals (other than coal, lignite and sand for stowing) and to make appropriate recommendations to the Government. The Study Group has submitted its report to the Government which is being examined in consultation with the Ministries/Departments concerned.

1.4 In order to take effective steps for prevention of illegal mining State Governments have been empowered to frame Rules under Section 23C of the MMDR Act, 1957. Regular meetings with State Governments have been conducted to review the progress made regarding framing of rules under Section 23C of the MMDR Act, 1957, constitution of Task Force/Flying Squads at State and district level and furnishing of quarterly returns on illegal mining and action taken thereon. So far 16 States have framed rules under Section 23C of the MMDR Act, 1957 and 20 States have constituted Task Force/Flying Squads.

## Performance of Mineral Sector

1.5 The index of mineral production excluding fuel and atomic minerals, (base year 1993-94=100) for the year 2007-08 is expected to be 170.39 as compared to 163.21 in 2006-07, showing a positive growth of 4.4 percent.

## Public Sector Undertakings

1.6 In conformity with Government policy to balance the autonomy of public sector undertakings (PSUs), commensurate with accountability and to set mutually acceptable targets, Memoranda of Understanding (MoUs) were signed during the financial year 2007-2008 with National Aluminum Company Limited (NALCO), Hindustan Copper Limited (HCL) and Mineral Exploration Corporation Limited (MECL). Greater autonomy is expected to result in quicker decision making, enhanced efficiency and increased productivity of these PSUs.

## National Aluminium Company Limited (NALCO)

1.7 The 2<sup>nd</sup> phase expansion of NALCO's Bauxite Mines from 48,00,000 TPY to 63,00,000 TPY, Alumina Refinery from 15,75,000 TPY to 21,00,000 TPY, Aluminium Smelter from 3,45,000 TPY to 4,60,000 TPY and Captive Power Plant from 960 MW to 1200 MW at revised estimated cost of approx. Rs. 5000 crore (at March, 2007 price level) to be completed in 50 months, approved by the Government on 26.10.2004, is under implementation by the Company. The expansion project is likely to be completed by December, 2008.

## Mineral Exploration Corporation Limited (MECL)

1.8 The Government of India has conveyed its approval for financial restructuring and wage revision in MECL vide its letter No. 40(1)/2004-MI (Vol.III) dated 8.8.06 and 17.8.06. This has been implemented during 2006-07. As the company has achieved the physical



Sh. Sis Ram Ola, Hon'ble Minister of Mines, holding discussions with HE Mr. Ian Macfarlane, Minister of Industry and Mr. John McCarthy, High Commissioner of Australia

and financial targets for the year 2006-07, arrears of wage revision for two years i.e. 2003-04 and 2004-05 have been paid during 2007-08.

### Hindustan Copper Limited (HCL)

1.9 The Government has approved the financial restructuring proposal in respect of HCL. It includes the following:-

- (i) Conversion of non-plan loan amounting to Rs. 50.00 crore into equity (Rs 25 crore each released in 2005-06 and in 2006-07).
- (ii) Waiver of 7.5% non-cumulative redeemable preference share amounting to Rs. 180.73 crore and its adjustment against accumulated losses.
- (iii) Restructuring of capital through reduction of face value of equity share from Rs. 10 to Rs. 5 amounting to Rs 382.21 crore and its adjustment against the accumulated losses.
- (iv) Restoration of superannuation age to 60 years to preserve skills and provide breathing time to the organization for formulation of a proper succession plan.
- (v) Creation of post of Director (Mining) to drive the growth agenda in the mining domain.

1.10 The company has registered a net profit of Rs.313.94 crores (after tax) during 2006-07.



Sh. Sis Ram Ola, Hon'ble Minister of Mines, Sh. J.P. Singh, Secretary (Mines) and other officials during the visit to HCL's Khetri Complex

### International Co-operation

1.11 Geological Survey of India (GSI) and the China Geological Survey signed a Memorandum of Understanding for cooperation in the field of geosciences on 14<sup>th</sup> January, 2008 during the visit of the Prime Minister of India to the People's Republic of China.

1.12 The fifth meeting of the Australia-India Joint Working Group on Energy and Minerals was held on 2<sup>nd</sup> and 3<sup>rd</sup> July, 2007. A Protocol was signed at the end of the meeting. The Working Group discussed issues related to power, coal, Oil and Gas, Renewable Energy, mining and mineral processing, Asia- Pacific Partnership on Clean Development and Climate, etc. Ministry of Mines is the nodal Ministry for holding this Working Group on Energy and Minerals.

1.13 The 20<sup>th</sup> meeting of the Indo-French Working Group on Mineral Exploration and Development was held on 3<sup>rd</sup> – 4<sup>th</sup> April, 2007 in France. The meeting was preceded by a technical experts level meeting on 2<sup>nd</sup> April, 2007. The meeting reviewed the status of the on-going projects as well as new project proposals.

1.14 An 'India Day' was organised on 6<sup>th</sup> March, 2007, concurrently with the 75<sup>th</sup> International Convention, Trade Show & Investors Exchange (PDAC 2007) organised by the Prospectors and Developers Association of Canada in Toronto, Canada.



Sh. Sis Ram Ola, Hon'ble Minister of Mines, Dr. T. Subbarami Reddy, MOS (Mines), Dr. Pradeep Kumar, the then Special Secretary (Mines), with delegation from Namibia led by Mr. Marco Hariker, Foreign Minister of Namibia

## Chapter 2

# Role and Organization of the Ministry

### Main Functions

2.1 Ministry of Mines is responsible for survey and exploration of all minerals, other than natural gases, petroleum and atomic minerals; for mining and metallurgy of non-ferrous metals like aluminium,

copper, zinc, lead, gold, nickel etc. and for administration of the Mines and Minerals (Regulation and Development) Act, 1957 in respect of all mines and minerals other than coal, natural gas and petroleum. A list of subjects allocated to the Ministry of Mines is given at Box 2.1 .

### Box 2.1

#### List of subjects allocated to the Ministry of Mines as per the Government of India (Allocation of Business) Rules, 1961.

1. (a) Legislation for regulation of mines and development of minerals within the territory of India, including mines and minerals underlying the ocean within the territorial waters or the continental shelf, or the exclusive economic zone and other maritime zones of India as may be specified, from time to time by or under any law made by Parliament.
  - (b) Regulation of mines and development of minerals other than Coal, Lignite and Sand for stowing and any other mineral declared as prescribed substances for the purpose of the Atomic Energy Act, 1962 (33 of 1962) under the control of the Union as declared by law, including questions concerning regulation and development of minerals in various States and the matters connected therewith or incidental thereto.
2. All other metals and minerals not specifically allotted to any other Ministry/Department, such as Aluminium, Zinc, Copper, Gold, Diamonds, Lead and Nickel.
3. Planning, development and Control of, and assistance to, all industries dealt with by the Ministry.
4. Geological Survey of India
5. Indian Bureau of Mines
6. Metallurgical Grade Silicon.

### Organizational Structure

2.2 The Secretariat of Ministry of Mines is headed by the Secretary and includes the following officers: an Additional Secretary, two Joint Secretaries, one Joint

Secretary & Financial Adviser common for Ministries of Coal and Mines, nine Directors / Deputy Secretaries, five Under Secretaries, two Principal Private Secretaries, one Junior Scientific Officer, twenty-five Section Officers, Ten Private Secretaries, one Assistant

Librarian and Information Officer in addition to a Joint Director and Assistant Director each for Official language. Besides this, the Ministry has a technical wing comprising the posts of one Industrial Adviser, one Additional Industrial Adviser and two posts for Development Officers each. The total number of sanctioned posts for the Secretariat of the Ministry of Mines is 65 Gazetted and 181 for Non-Gazetted (details given in **Table No. 2.1**). In addition, there is a Chief Controller of Accounts assisted by a Pay and Accounts Officer and Assistant Accounts Officer and 31 Non-Gazetted Staff in the Pay & Accounts Office.

2.3 For the welfare of SC/ST/OBC, this Ministry has constituted a SC/ST Cell, which looks after the Welfare of SC/ST/OBC employees. A Women Cell has also been constituted in this Ministry to look into the complaints, if any, regarding sexual harassment of women working in the secretariat proper of this Ministry.

2.4 To ensure transparency in the functioning of the Ministry of Mines, a Public Information Cell has been constituted under the Right to Information Act ,comprising a Public Information Officer, Assistant Public Information Officer, Section Officer and one Assistant.

2.5 In accordance with the directions from the Cabinet Secretariat, Ministry of Home Affairs and CERT-IN on the Computer Security Guidelines 2006, the Ministry has appointed a Nodal Cyber Security Officer and initiated suitable steps to ensure the security of hardware and data in soft copies and on web in association with the National Informatics Centre. All the Subordinate Offices, PSUs and Research Institutions were also directed to comply with the said security guidelines.

**Table No.2.1**

**Sanctioned strength and present incumbency of Officers/Officials in Secretariat proper of Ministry of Mines as on 31.12.2007**

	Sanctioned	Total Number of Present incumbents (including General)	Number of SC / ST / OBC / Minority / Women out of Present incumbents.				
			SC	ST	OBC	Minority	Women
Group-A Gazetted	26+2*	19+2*	2	1	-	1	3
Group-B Gazetted	37**	32	3	-	1	1	5
Group-B Non-Gazetted	50	47	5	3	2	2	20
Group-C	75**	56	6	3	3	1	5
Group-D	56	53	16	1	1	-	5
<b>Total</b>	<b>244 +2*</b>	<b>207 + 2*</b>	<b>32</b>	<b>8</b>	<b>7</b>	<b>5</b>	<b>38</b>

\* DoP&T vide their letter dated 3rd August 2004 fixed the strength of CSS officers in DS Grade at 2 for this Ministry. Accordingly two more DS/ Directors have been accommodated and it has been decided to await the further reference from DoP&T in this regard.

\*\* DoP&T vide their letter dated 21<sup>st</sup> November 2005 have increased the sanctioned strength of Steno Grade A&B (Merged) from 7 to 10 and have decreased the sanctioned strength of Steno Grade D from 8 to 5. But presently, there are 6 Steno Grade D working in this Ministry. It has been decided to await further reference from DoP&T in this regard. 1 post of Staff Car Driver has been abolished under Annual Direct Recruitment Plan.

The progress in the matter, in terms of steps required as per security guidelines, is being regularly monitored through data received from Subordinate Offices/PSUs/ Autonomous Bodies, NIC and Secretariat in the Ministry. A quarterly compliance report on the subject is being sent to the Ministry of Home Affairs.

### IT Support by NIC at Ministry of Mines

2.6 National Informatics Centre (NIC) of the Department of Information Technology is providing network backbone and e-Governance support to the Ministry of Mines. The NIC Computer Centre was set up in the Ministry of Mines in 1985. The following are the IT Services that NIC is providing to the Ministry of Mines-

- **Local Area Network (LAN)** has been established in the Ministry, which interconnects various officers/staff in the Ministry. Documents can be shared among the officers and sections on the computer. At present approximately one hundred forty users have been connected to the LAN of the Ministry of Mines. The LAN is connected to the internet through a proxy server and all LAN users have access to e-mail and internet.
- **Web site** of Ministry of Mines has been created on 1<sup>st</sup> January, 1999 which provides comprehensive information on various subjects including National Mineral Policy, information about the Indian Mineral sector, current status of the Revision Petitions, PL/ML cases and Public Grievances cases, Annual Report of the Ministry and provides links to its PSUs and Offices.
- **Intranet:** To make the information available on a single window, related to various areas of the day-to-day functioning of the Ministry, an intranet based web portal for the Ministry of Mines has been developed. The key driver for this intranet based web site is to reduce the Ministry's workload & increase overall efficiency by promoting 'self service'. The computerization has been done in the area of Approvals of Prospecting Licenses & Mining Leases, File & Receipt tracking, Revision Applications, Payroll, Public Grievances, Court Case Management. The various **applications**

which are operational in the Ministry are as follows:

- Mineral Concession Approval System.
- Revision Application System.
- OPA(Office Procedure Automation).
- Court Case Management System.
- IntraMines – An intranet based website of Ministry of Mines.
- Composite Payroll System.
- Network Call & Asset Management System.
- Public Grievance Monitoring System.
- Complaint Monitoring System – equipments.
- E-Notice Board.
- RTI Monitoring System.
- NIC Unit imparts time-to-time **training** to the staff of the Ministry on various subjects like Email, Internet, file sharing, Power Point, Excel and word processing.
- **Video Conferencing (VC)** facility is also available in the Ministry. Organisations like NALCO, HCL, GSI, MECL are connected to the Ministry through VC.

### Subordinate Offices, Public Sector Undertakings, Disinvested Companies and Research Institutions under the Ministry of Mines

#### A. Subordinate Offices

2.7 At present there are two subordinate offices of this Ministry:

- Geological Survey of India (GSI) having headquarters at Kolkata.
- Indian Bureau of Mines (IBM) having headquarters at Nagpur.

#### B. Public Sector Undertakings (PSUs)

2.8 In 2006-2007, there were four Public Sector Undertakings under this Ministry, namely:

- National Aluminium Company Limited (NALCO), Bhubaneswar

- Hindustan Copper Limited (HCL), Kolkata
- Mineral Exploration Corporation Limited (MECL), Nagpur
- Bharat Gold Mines Limited (BGML), Kolar Gold Fields (Karnataka)\*

\*Bharat Gold Mines Ltd. (BGML) has been closed under Section 25 (O) of the Industrial Disputes Act, 1947 from 1.3.2001. After the approval of the Cabinet, BGML has filed a Company Application before the High Court of Karnataka for its closer/winding up which is under consideration of Hon'ble High Court.

### **C. Disinvested Companies**

2.9 There are two companies, which have been disinvested with transfer of management control to strategic partners. This Ministry holds minority shareholding in these two companies.

- Bharat Aluminium Company Limited (BALCO), Korba, Chattisgarh.
- Hindustan Zinc Limited (HZL), Udaipur, Rajasthan.

### **D. Research Institutions**

2.10 There are three research institutions, which are autonomous bodies of this Ministry namely:

- Jawaharlal Nehru Aluminium Research Development and Design Centre, (JNARDDC) Nagpur;

- National Institute of Rock Mechanics, (NIRM) Kolar; and
- National Institute of Miners Health (NIMH), Nagpur.

### **Response of the Industry to the Policy Measures**

2.11 After the introduction of the concept of reconnaissance permit, 263 reconnaissance permits covering an area of 3,62,217.322 sq. kms have been granted till 31.12.2007 of which 56 reconnaissance permits for an area of 76482.58 sq. kms were granted during the year 2007-2008. The States for which reconnaissance permits have been approved are Rajasthan (48), Andhra Pradesh (47), Karnataka (43), Chhattisgarh (29), Orissa (24), Madhya Pradesh (41), Uttar Pradesh (14), Gujarat (4), Jharkhand (3), West Bengal (3), Haryana (1), Kerala (1), Arunachal Pradesh (1), Maharashtra (3), Manipur (1).

2.12 The PSUs/Organisation-wise distribution of Approved Outlay for Annual Plan 2008-2009 showing Internal Resources (IR), Extra Budgetary Resources (EBR), Gross Budget Support (GBS), Net Budget Support (NBS) and NER is given in Table 2.2.

**Table 2.2**  
**Annual Plan 2008-09**

No	Organisations	OUTLAY	IR	EBR	G.B.S	N.B.S	NER	Rs. in Crore
1	NALCO	1888.00	1738.00	150.00	-	-	-	
2	HCL	60.00	60.00	-	0.00	0.00		
3	MECL -Promotional -Capital	12.00 8.00	- 8.00	- -	12.00 -	12.00 -	- -	
4	GSI Const-GSI	160.00 5.00	- -	- -	160.00 5.00	160.00 5.00	16.00 -	
5	IBM Const-IBM	19.00 1.00	- -	- -	19.00 1.00	19.00 1.00	1.90 -	
6	S & T	7.00	3.62	0.38	3.00	3.00	-	
	<b>Total</b>	<b>2160.00</b>	<b>1809.62</b>	<b>150.38</b>	<b>200.00</b>	<b>200.00</b>	<b>17.90</b>	

IR- Internal Resources  
NBS- Net Budget Support

EBR- Extra Budget Resources  
S & T- Science and Technology

GBS-Gross Budget Support

## Chapter 3

# Mining Policy, Regulation and Development

### Mining Law and Policy

3.1 The Central Government can exercise powers for regulation of mines and development of minerals to the extent that such regulation and development under the control of the Union is declared by Parliament by law to be expedient in the public interest, as per Entry-54 of List-I of the Seventh Schedule to the Constitution of India. The State Governments on the other hand have been given powers under Entry-23 of List-II for regulation of mines and mineral development subject to the provisions of List-I with respect to regulation and development under the control of the Union. Parliament has enacted the Mines and Minerals (Development & Regulation) Act, 1957 (MMDR Act, 1957) under Entry 54 of List-I to provide for the regulation of mines and development of minerals under control of the Union.

3.2 In pursuance of the reforms initiated by the Government of India in July 1991 in fiscal, industrial and trade regimes, the National Mineral Policy was announced in March 1993. The National Mineral Policy recognized the need for encouraging private investment including foreign direct investment and for attracting state-of-the-art technology in the mineral sector. The policy stressed that the Central Government, in consultation with the State Governments, shall continue to formulate legal measures for the regulation of mines and the development of mineral resources to ensure basic uniformity in mineral administration so that the development of mineral resources keeps pace, and is in consonance with the national policy goals.

3.3 In furtherance of the objective of the National Mineral Policy, the MMDR Act, 1957 has been amended in 1994 and 1999. The Mineral Concession

Rules, 1960 (MCR) and the Mineral Conservation and Development Rules, 1988 (MCDR), framed under the MMDR Act, 1957 have also been modified. Salient features of the amended mining legislation are as follows:

- (i) There is no restriction on foreign equity holding in mining sector companies registered in India.
- (ii) There is a greater stability on tenure of mineral concessions, since the minimum period of a mining lease is twenty years with a maximum period of thirty years. A mining lease may be renewed for a period not exceeding 20 years and may again be renewed for a period not exceeding 20 years in respect of minerals specified in Part C of the First Schedule of the Act. In respect of minerals specified in Part A and B of the First Schedule of the Act, such renewal is to be granted with previous approval of the Central Government. The period of prospecting licence is now three years, with scope of renewal by a further period of two years.
- (iii) Thirteen minerals like iron ore, manganese ore, chrome ore, sulphur, gold, diamond, copper, lead, zinc, molybdenum, tungsten, nickel and platinum group of minerals, which were reserved exclusively for public sector exploitation, have been thrown open for exploitation by the private sector.
- (iv) With the 1999 amendment, a concept of reconnaissance operations as a stage of operation distinct from and prior to actual prospecting operations was introduced. The period of reconnaissance permit is three years. A reconnaissance permit holder enjoys preferential right for grant of prospecting licence.

(v) Area restrictions notified for reconnaissance permit, prospecting licence and mining lease have been made applicable State-wise, instead of the country as a whole.

(vi) In 1994, fifteen minerals were removed from the list of minerals included in the First Schedule to the MMDR Act, 1957. With further amendments in 1999, limestone was deleted from the First Schedule, and permission of the Central Government is now required for grant of reconnaissance permit, prospecting license and mining lease in respect of only 10 non-fuel and non-atomic minerals. These minerals are asbestos, bauxite, chrome ore, copper ore, gold, iron ore, lead, manganese ore, precious stones and zinc.

(vii) State Governments have been delegated powers to grant mineral concessions even for areas which are not compact or contiguous.

(viii) State Governments have been empowered to permit amalgamation of two or more adjoining mining leases.

(ix) State Governments have been empowered to renew prospecting licences/mining leases in respect of specified minerals listed in Part C of the First Schedule, and approval of Central Government is not necessary.

(x) State Governments have been delegated powers to approve mining plans in respect of 29 non-metallic/industrial minerals in case of open cast mines.

(xi) A time limit of ninety days has been prescribed for the Indian Bureau of Mines and the State Governments to convey decision on the mining plan submitted for approval.

(xii) Time limits have been prescribed for conveying a decision on applications for mineral concessions, viz. six months for reconnaissance permits, nine months for prospecting licences and twelve months for mining leases.

(xiii) The provisions of MCDR, 1988 were amended on 11<sup>th</sup> January, 2002, inserting a new rule providing for intimation of amalgamation of mining leases in 30 days, enhancing the penalties for violation of rules, etc.

(xiv) Rates of royalty of major minerals (other than coal, lignite and sand for stowing) were revised vide Gazette Notification dated 14.10.2004.

(xv) To adopt a transparent benchmark value of minerals, guidelines for computation of royalty on ad valorem rates for different minerals have been amended.

(xvi) In the interest of scientific mining, minimum area for grant of mining lease has been fixed as one hectare in respect of small deposits (including float ore deposits), two hectares for beach sands or placers; and four hectares for all other mineral deposits.

(xvii) Provisions regarding submission of progressive mine closure plan and final mine closure plan and financial assurance for fulfilling the reclamation and rehabilitation cost have been included.

(xviii) Statutory forms have been suitably amended and guidelines issued for implementation of the United Nations Framework Classification (UNFC) of mineral reserves/resources in the Annual Returns under MCDR, 1988.

(xix) Rule 66A of MCR was amended to include special provisions relating to atomic minerals for better management of such minerals.

(xx) Rule 22 D of MCR, 1960 was amended thereby inserting a provision that in case of renewal of mining lease, the restriction of minimum area for grant of ML shall not be applicable.

3.4 For a comprehensive review of the National Mineral Policy and to further improve the investment climate for mining in the country, the Planning Commission constituted a High Level Committee under the Chairmanship of Shri Anwarul Hoda, Member, Planning Commission. The High Level Committee submitted its report to the Government on 20th July, 2006 with recommendations on changes in the National Mineral Policy to attune it to the present

requirements of world economy, evolving of a mining code adapted to the best international practices, streamlining and simplifying of procedures for grant of mineral concessions to reduce delays, strengthening the infrastructure for mining activities and recommendations on other issues for improving the environment in the mining sector. Based on the recommendations of High Level Committee and after consultations with State Governments, and concerned Ministries/Departments of Central Government, a new National Mineral Policy has been approved.

3.5 In order to review royalty rates and dead rent, a Study Group was constituted by the Ministry of Mines on 24.8.2006 for revision of rates of royalty and dead rent of major minerals (other than coal, lignite and sand for stowing) and to make appropriate recommendations to the Government. The Study Group has submitted its report to the Government and has been examined in consultation with concerned ministries/departments of the Central Government and proposal for revision of royalty rates and dead rent for major minerals (other than coal, lignite and sand stowing) is under consideration of the Government.

3.6 A proposal for introducing auction of coal mining blocks for captive use through competitive biddings as the selection process for allocation by amending

the MMDR Act, 1957 has been approved by the Government and after the approval from Legislative Department, a bill for amendment in the MMDR Act, 1957 is being introduced in the Parliament.

3.7 The Ministry has reviewed extensively the issue of illegal mining with the State Governments and various decisions were taken to prevent illegal mining, transportation and storage of minerals. Accordingly, so far 20 State Governments, namely Andhra Pradesh, Assam, Bihar, Chhattisgarh, Goa, Gujarat, Haryana, Himachal Pradesh, Jharkhand, Karnataka, Madhya Pradesh, Manipur, Mizoram, Nagaland, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal, have constituted Task Forces for prevention of illegal mining. Besides, so far 16 State Governments, namely Andhra Pradesh, Bihar, Goa, Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Madhya Pradesh, Maharashtra, Nagaland, Orissa, Rajasthan, Uttar Pradesh, Uttarakhand and West Bengal, have framed the Rules under Section 23C of MMDR Act, 1957 for prevention of illegal mining, transportation and storage of minerals and notified in the Gazette. Quarterly report on illegal mining is received by IBM and reviewed in the Ministry regularly to take stock of the progress made/steps undertaken for prevention of illegal mining.



Mining Operations at HCL Copper Mine Malanjkhand

## Chapter 4

# Performance of the Mining and Mineral Sector

### (A) General Performance

#### Mineral Production

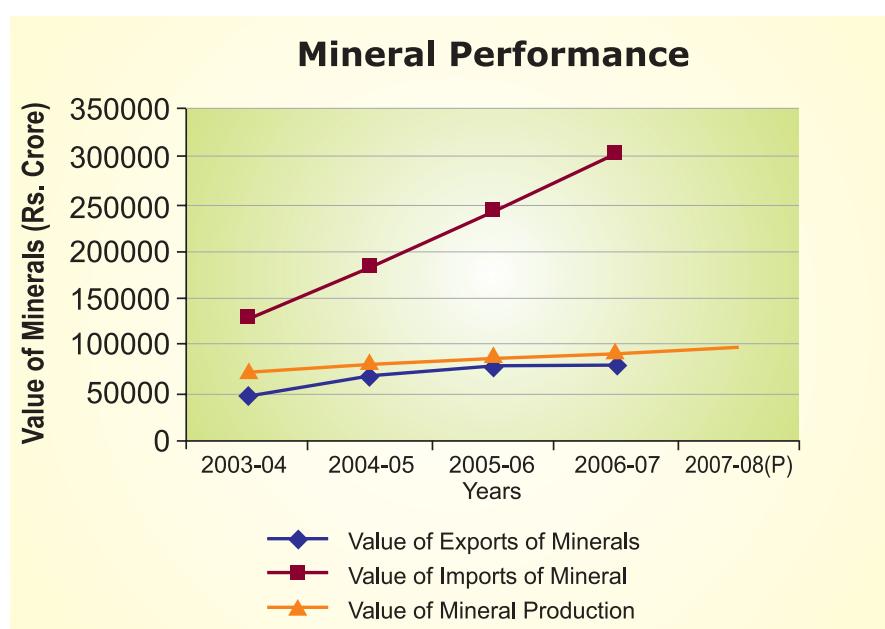
4.1 Based on the overall trend so far, the Index of Mineral Production (base year 1993-94=100) for the year 2007-08 is expected to be 170.39 as compared to 163.21 for the year 2006-07 showing a positive growth of 4.4 percent. The total value of mineral production (excluding atomic minerals) during the year 2007-08 is estimated at Rs. 99,533.10 crore which shows an increase of about 9.0 percent over that of the previous year. During the year 2007-08 provisional value of fuel minerals would account for Rs. 68,229.40 crore (69 percent of the total value), metallic minerals Rs. 19,755.66 crore (20 percent of the total value) and non-metallic minerals (including minor minerals) Rs. 11,548.04 crore (11 percent of the total value). Information on production and value of selected

minerals from 2003-04 to 2007-08 is appended at **Annexure – II.**

#### Export and Import

4.2 The provisional value of export of ores and minerals during the year 2006-07 was Rs. 80,912 crore. Diamond (mostly cut) was the principal item of export during 2006-07, which accounted for 59.2 percent, followed by iron ore with a contribution of 21.8 percent, granite with a contribution of 5.8 percent, alumina with a contribution of 2.3 percent, precious & semi precious stones with a contribution of 1.0 percent and chromite with a contribution of 0.98 percent. Building and monumental stones, emerald, coal (including lignite), marble and bauxite were the other important minerals exported during the year 2006-07. Data on export of ores and minerals during 2002-03 to 2006-07 is appended at **Annexure – III.**

**Value of Mineral Production**



4.3 The provisional value of import of ores and minerals during the year 2006-07 was Rs. 3,05,028 crore. Petroleum (crude) was the main constituent of mineral import during the year 2006-07, which accounted for 69.9 percent of the total value of import of ores and minerals, followed by diamond (uncut) with 10.8 percent. Coal, coke, copper ores & concentrates, rock phosphate, sulphur & iron ore were the other important minerals imported during 2006-07. Data on import of ores and minerals during 2002-03 to 2006-07 is appended at **Annexure – IV**.

### Price Trend

4.4 The Wholesale Price Index for non-fuel minerals (base year 1993-94=100) stood at 429.8 in August 2007 and the corresponding index for August 2006 was 424.5. The minerals included in the Wholesale Price Index are bauxite, chromite, iron ore, manganese ore, asbestos, barytes, dolomite, felspar, fireclay, fluorite, gypsum, kaolin, limestone, magnesite, ochre, phosphorite, silica sand, steatite, and vermiculite. The Wholesale Price Index for metallic minerals was 622.7 in August 2007 as compared to 618.2 in August 2006 and that of other minerals was 125.2 in August 2007 as compared to 118.7 in August 2006. The Wholesale Price Index for coal showed no change in August, 2007 over August, 2006 and stood at 231.6. The Wholesale Price Index of Mineral oil stood at 384.0 in August 2007 and that in August 2006 it was 402.3.

### (B) Survey and Exploration

4.5 Geological Survey of India (GSI) is the main arm of the Government for geological survey and exploration of mineral wealth and creation of earth science database for harnessing natural resources. In addition, GSI is involved in the activities connected with the mitigation of natural hazards for the benefit of the country.

4.6 Significant events, policy developments and programmes in relation to GSI during the year 2007-08 are as under:

- The Cabinet has approved the acquisition of a new deep sea going research vessel for the Geological Survey of India at an estimated cost of Rs. 448
- crores for carrying out seabed surveys and exploration of resources. Procurement action for the Research Vessel is on.
- The Union Cabinet decided for setting up of a High Powered Committee to thoroughly review the functioning of the Geological Survey of India and redefine its role to meet the emerging challenges.
- Geological Survey of India is acquiring a heliborne survey system fitted with sensors for improving the quality of survey for exploration and for tapping deep seated mineral resources. MOU has been signed between Pico Enviortech Inc., Canada and Geological Survey of India for the purchase of the heliborne system.
- GSI's Enterprise Information Portal went live on Internet (<http://www.portal.gsi.gov.in>) and can be accessed by any user. It envisages providing real time data to various stakeholders and users, including entrepreneurs, academicians and common public.
- A disaster management control room has been created at GSI, New Delhi to be in operation on 24x7 mode and to be connected to the Disaster Management Support Network, National Disaster Management Act (NDMA).
- During 2007-08, mineral finds by GSI include assessment of an additional resource of 2290.14 million tonnes of coal, additional gold ore resource of 0.48 million tonnes in Tumkur district of Karnataka and 7.32 million tonnes in Banswara district of Rajasthan. GSI located two kimberlite (host rock of diamond) pipes each in Mahboobnagar and Anantapur districts of Andhra Pradesh. GSI also assessed iron ore resources in Tamil Nadu, Karnataka, Orissa and Chhattisgarh. Apart from this, GSI successfully explored various mineral resources like basemetal (copper ore) in Rajasthan and Maharashtra, Platinum Group Elements (PGE) in Karnataka, Manganese and Bauxite in Orissa, Graphite in Tamil Nadu and Limestone in Tamil Nadu and Meghalaya.
- GSI carried out regional systematic surveys in the states of Andhra Pradesh, Assam, Arunachal















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## Chapter 5

# Geological Survey of India

5.1 Geological Survey of India, the premier earth science organisation of the country, continues to provide vital input into all facets of national economic development. GSI is the prime provider of basic earth science information to the government, industry and the general public, as well as a responsive participant in international geoscientific forum. The vibrant steel, coal, metals, cement and power industries which expanded phenomenally in the post-independence era, bear eloquent testimony to the GSI's relevance in the national context.

5.2 Beginning as a department engaged primarily in search for coal, GSI in the last 156 years has expanded its activities manifold and has been involved either directly or indirectly in almost all areas of nation building. GSI is now the custodian of one of the largest and most comprehensive earth science database developed over the last one and half century. It has also diversified its activities covering almost the entire gamut of earth science including its applied aspects.

5.3 The rigorous field exercises put in by Geological Survey of India produce basic geological maps. These maps are 2D representation of spatial distribution of various rock types with azimuthally orientated data.

5.4 A good geological map in 1: 50,000 scale is a national property and any subsequent activity in the area be it exogenic, endogenic or anthropogenic can be predicted or planned from the study of such maps. The basic strength of GSI is in producing such maps. GSI has already mapped 98% of land area of India in 1: 63, 360 (1inch = 1mile) or 1: 50,000 (1cm= 500m) scale and these 1<sup>st</sup> generation geological maps are now ready in digital format. Attribute data from such maps are being made ready in geodatabase format to enable working under GIS platform and also are uploaded in

GSI portal. Nevertheless, as geological mapping is a subjective exercise, there is always a scope for qualitative improvement through revisiting in progressively larger and larger scale with contemporary advanced concepts.

5.5 With the near exhaustion of resources to the proximity of surface, it has become imperative to have a multidisciplinary approach to mineral exploration, which comprises large scale, and detail geological mapping aided by interpretative analysis of aerogeophysical and remotely sensed data, ground geophysical survey, geochemical prospecting and surface and subsurface exploration through pitting, trenching and drilling. Collection of baseline data on geo-environment has been made mandatory during the exploration of minerals, which would be of immense help in carrying out Environmental Impact Assessment and Environmental Monitoring and Production studies during exploitation stage.

5.6 Present day mineral search and assessment is undertaken with special emphasis on deficient commodity of high value (e.g. gold, diamond, PGE etc) as well as ores and minerals of high demand (basemetals, iron ore, coal, lignite, limestone for steel industry etc.).

5.7 GSI has made significant contributions in the Xth Plan period, and has rendered extremely valuable service to the nation by way of augmentation of resources of coal and lignite, gold, copper, manganese, limestone, etc. During the XIth Plan, GSI will maintain the sustained mapping and exploration activities for development of the country's mineral resources and refinement and updating of the geo-scientific database of the Survey for a wide spectrum of end-users.

5.8 At present, both Multi-National Companies and national agencies are actively engaged in mineral exploration and many new potential areas are being handed over to such private bodies for exploration under various licenses such as Reconnaissance Permits, Prospecting Licences, etc. These developments have heightened the need for strengthening the institutional role of the Government as a regulator for the exploration and mining activities. GSI plays a key role not only in guiding the Government in the grant of licenses but also ensuring that the exploration is carried out in accordance with the stipulated norms of the Government.

5.9 In the liberalised economic scenario, where both national and foreign agencies are actively engaged in mineral exploration, the earth scientists of GSI have made significant contributions to the growth and development of the mineral sector of the country. During 2006-07, several new findings have been reported. In search of diamond four new bodies of kimberlite have been found, out of which two are in Timmasamudram area, Anantapur district and two in Chagapuram area, Mahaboobnagar district, Andhra Pradesh. Besides locating copper in Maharashtra and Rajasthan, gold in Rajasthan, manganese ore in the Bonai-Keonjhar Belt in Orissa are some of the other recent achievements of GSI in the preceding year.

5.10 The 42nd Annual Meeting of the Central Geological Programming Board (CGPB) was held on 27<sup>th</sup> September 2007. The CGBP consisting of representatives of Central and State Governments, Public Sector Undertakings and some Private agencies, is the apex body at the national level to overview the programme of geoscientific activities including mineral exploration in the country.

### **Role of GSI vis-à-vis Thrust areas of activity**

5.11 GSI has already initiated activities under the XI<sup>th</sup> Five Year Plan (2007-2012) from 1<sup>st</sup> April, 2007 in accordance with projections in the XI<sup>th</sup> Plan Proposal. The thrusts of XI<sup>th</sup> Plan programmes have been formulated maintaining an umbilical link with those of the preceding plan period. This is in line with the basic philosophy of continuity in Five-Year Plans for ensuring logical conclusion of projects taken up in

the preceding plan periods. The thrust areas are identified keeping in mind the role of GSI, planned objectives of the XI<sup>th</sup> Plan and emerging national priorities.

5.12 The Charter of functions (revised, June 2003) laid down by the Government of India, detailing the scope of activities and responsibilities of the GSI encompasses practically the entire gamut of earth science activities. The Charter reflects the broad responsibility of GSI extending from the lofty peaks of the Himalaya to the remote continent of Antarctica and from the desert to the ocean and into the sky.

- Creation and updation of national geoscientific information and knowledge base through ground, marine and airborne surveys. Growing emphasis on concept oriented thematic geological mapping on progressively larger scales, geochemical and geophysical mapping.
- Identification as well as preliminary assessment of the mineral resources.
- Geoscientific input to water resource development, transport and miscellaneous civil engineering projects.
- Greater emphasis on natural hazard studies and disaster management including earthquake and landslide zonation studies.
- Shallow Subsurface Geology
- Geo-environmental investigations for both regional and site specific studies.
- Computerised archival, analyses, retrieval of geoscientific data and creation of theme-based relational database.
- Dissemination of data through maps, publications, customization, intranet/extranet facilities through GSI portal etc.
- Training in specialised fields for upgradation of technology and expertise.
- Modernisation and expansion of laboratories and survey facilities.

5.13 Specialised thematic studies, multi-elemental geochemical mapping of the country, low-altitude aerogeophysical multi-sensor surveys and ground geophysical mapping have been given priority to locate so far undiscovered and / or deep-seated /concealed prospects/deposits based on new concepts of ore genesis. Seabed survey will continue in Territorial Waters and parametric survey in EEZ along with preliminary assessment of economic resources in seabed.

5.14 The principal thrust of GSI in mineral exploration would remain on noble metals, precious stones, base metal, ferrous and non-ferrous (bauxite), fertilizer, strategic, refractory and high-tech. minerals along with coal and lignite. In addition to mineral prognostication, the organization would continue with systematic updating of the database in the mineral resource sector to provide reliable and relevant information on mineral and other natural resources to the public and private sector entrepreneurs to sustain investment in mineral sector.

5.15 Increased emphasis will be given on environmental geology programmes related to societal issues e.g. landslide studies, earthquake geology and health hazard related problems etc. and seismotectonic and landslide zonation studies. Intensification of programme on information technology will be another area of thrust.

5.16 Since its inception in 1976, the GSI Training Institute has conducted 616 training programmes (up to 2006-07) and trained 12,089 geoscientists of GSI, other earth science organizations and universities of the country and also geoscientists from ESCAP and

SAARC countries. The training programmes are focused on fundamentals and applied aspects of geosciences viz. Geology, Geophysics, Geochemistry, Natural Hazards, Remote Sensing, Drilling and Surveying. The Institute regularly conducts DST (Department of Science & Technology) supported programmes, ISRO (Department of Space) supported Remote Sensing (NNRMS) programmes, customized courses for other agencies and administrative courses for the departmental personnel. GSI will continue its role in providing professional training for the benefit of the department.

### Modernisation in GSI

5.17 As a result of systematic and concerted effort made in the Geological Survey of India during the Xth plan period to upgrade and modernize various laboratories, international standard laboratory back-up have been provided to all the ongoing field investigations with the help of state-of-the-art instruments. Since upgradation and modernisation of the laboratory facilities are continuous processes, the same will be continued during the XIth plan also and procurement and installation of instruments like DCARC Spectrometer, AAS, Marine Cesium Magnetometer, XRD, Echo-sounder, Shear wave velocity instrument, Magneto-telluric instrument, Absolute Gravimeter, Current Meter, Fusion Bead machine etc. have been planned.

5.18 During the X<sup>th</sup> Plan (2002-2007), a sum of Rs. 153.55 crore (including Rs. 38.76 crore towards IT equipment) has been utilised towards procurement of



Sh. J.P. Singh, Chairman & Secretary (Mines) and Dr. Pradeep Kumar, the then Special Secretary (Mines), releasing GSI Bulletin on Beas Sutlej Link Project at 42nd CGPB meeting on 27th September, 2007 at New Delhi



GSI scientists conducting Marine Survey on the ship

laboratory instruments, drilling accessories and IT equipment. The Planning Commission has accorded "In Principle Approval" for the acquisition of Geotechnical Vessel and the necessary DPR & EFC document have been submitted.

5.19 The Government has approved the acquisition of a new deep sea going research vessel for Geological Survey of India at an estimated cost of Rs. 448 crores for carrying out seabed surveys and exploration of non-living resources. Procurement action for the Research Vessel is on.

5.20 The Government has decided for setting up of a High Powered Committee to thoroughly review the functioning of Geological Survey of India and assess its capacity to meet the emerging challenges taking into the organization's technological and manpower resources.

5.21 Geological Survey of India is acquiring heliborne survey system fitted with sensors for improving the quality of exploration and for tapping deep seated mineral resources in addition to updating the techniques for ground geological and geophysical survey, precision analytical instruments and deep capacity drills. MOU has been signed between Pico Enviortech Inc., Canada and Geological Survey of India for the purchase of the heliborne system.

5.22 The details of the geoscientific surveys and mineral finds during the period by GSI are under :

### Systematic Geological Mapping

5.23 The most basic and fundamental activity of GSI is systematic geological mapping on 1:50,000 scale which provides data for National Geoscientific Information and knowledge base for undertaking almost all the subsequent earth science related programmes. An area of 395 sq. km. has been covered by Systematic Geological mapping in parts of Kokrajhar District, Assam. An area of 135 sq. km has been covered by the Systematic Geological Mapping in parts of Kohima and Peren Districts, Nagaland by photo-geological interpretation and field checks.

### Specialised Thematic Studies

5.24 GSI has mounted specialised theme oriented

large-scale (1:25,000 or larger) studies/mapping projects (Specialised Thematic Mapping or STM) to resolve many of the geological ambiguities. Thematic mapping has been carried out covering 1,28,114.5 sq km since the inception of STM. During the first year (2007) of the XIth plan period a coverage of 2606 sq. km. has been achieved. The Specialised Thematic Mapping is a very potent tool for not only solving complex geological problems but also an excellent tool for locating potential mineralized zones. Base metal investigation in Nimod Extension Block of Sikar District, Rajasthan has been taken up in 2007-08 on the basis of findings of STM. Preliminary investigation for phosphorite in the meta-sediments of Sirohi Group around Khivandi, NW of Sumerpur, Pali District, Rajasthan has been taken up in 2007-08 on the basis of the findings of earlier STM. Preliminary investigation for nickel, cobalt and platinoid group of elements in the basic-ultrabasic intrusive around Gondpiperi area, Chandrapur Dist, Maharashtra is also proposed to be taken as a spin off from thematic studies.

### Geochemical Mapping (GCM)

5.25 Though Geochemical Mapping (GCM) constituted a part of exploration from the late seventies, systematic coverage of the entire country through such mapping started in GSI only during 2001-02. Mapping is done in 1: 50,000 scale with sampling and analysis of stream sediment, soil, stream water, humus etc.

5.26 During the Xth Plan period 1,13,174 sq km and in XIth Plan 12,967 sq km (up to December 2007) has been covered. During the XIth Plan, the thrust on Geochemical Mapping will be continued in almost all the States.

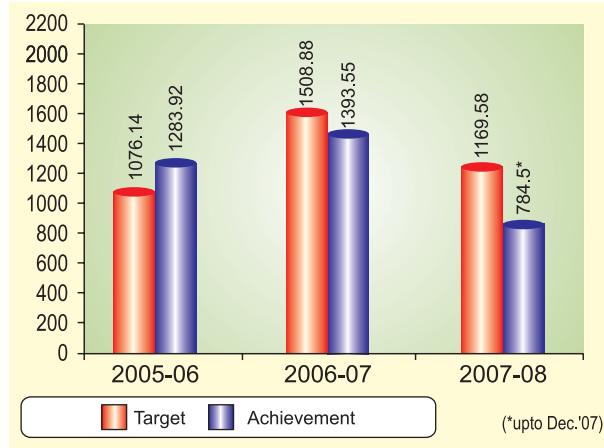
5.27 Analytical results received so far are being processed to generate the basic statistics of all the elements with the application of statistical software. A few mineral exploration programmes have been framed on the basis of the interpreted results of GCM in West Bengal, Rajasthan, Meghalaya, Andhra Pradesh, Kerala, etc.

### Geophysical Mapping (GPM)

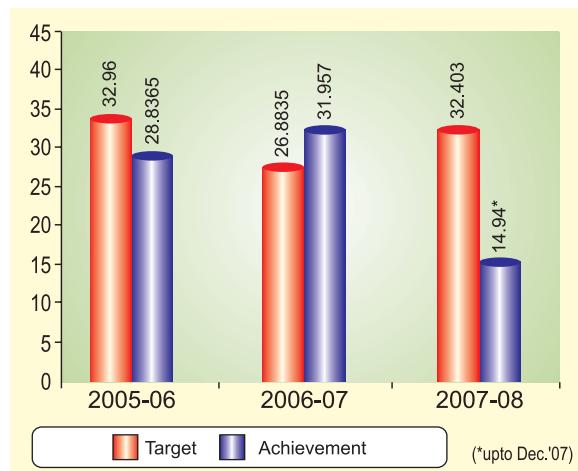
5.28 Systematic ground gravity-magnetic mapping for the preparation of Gravity – Magnetic (G-M) maps of

## MINERAL EXPLORATION — Target vs. Achievements

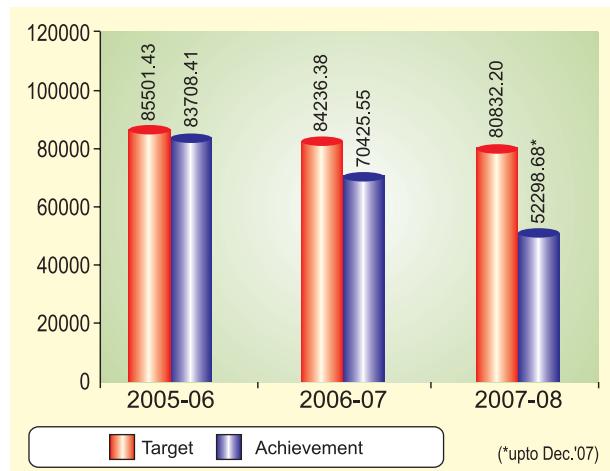
Large Scale Mapping (in sq. km.)



Detailed Mapping (in sq. km.)



Drilling (in meter)



the country in 1: 50,000 scale is one of the missions of GSI. This involves acquiring G-M data at an average frequency of one station per every 2.5 sq.km. over the entire Indian shield, the Indo-Gangetic plain, the Eastern and Western Ghat areas including the coastal plains and other covered areas. However, this excludes the inaccessible terrains both in the extra peninsular regions and in the shield. Such coverage will pave the way for grass root level planning in prognostication of potential areas for the exploration of metallic/non-metallic mineral deposits in addition to the demarcation of potential hazard areas from environmental point of view. Even 3D basin configuration and important geohydrological parameters can be mapped through such endeavour. Systematic gravity and magnetic (VF) mapping covering more than 100 toposheets (1: 50,000) with 70,183.30 sq. km. area has been completed during the Xth Plan period under this project. GPM of 13,406 sq km has been completed under the project Geophysical Mapping during the XI Plan period up to December 2007. A total of 10 items were taken up for Geophysical Mapping by different Regions.

### Air Borne Geophysical Survey

5.29 The Air Borne Mineral Survey and Exploration Wing (AMSE) of Geological Survey of India is engaged in air borne geophysical surveys by deploying magnetic and gamma ray spectrometric techniques. The surveys are subsequently followed up by data processing, preparation of aerogeophysical maps and their interpretations.

### Multi Sensor Survey with the Twin Otter Airborne Survey System (TOASS)

5.30 Since the acquisition and induction of TOASS by GSI in 1986, a total of 4,32,433 line km (lkm) over an area of 2,09,572 sq km was covered by multisensor surveys involving magnetic, spectrometric and electromagnetic methods.

5.31 A total of 28,777 line km over an area of 14,388 sq km has been covered [i.e. aerogeophysical multisensor data have been acquired for 18,071 line km involving an area of 9035 sq km in Nagpur – Wardha valley (Maharashtra) and 10,706 line km

involving an area of 5353 sq km in Baihar – Katru areas (extension of Malanjkhand area, Madhya Pradesh and Chattisgarh) during the Field Season 2006-07.

5.32 During the Field Season 2007-08 aerogeophysical surveys have been planned in the following areas: i) Western Off-shore of India between Kanyakumari and south of Kannur about 12,650 lkm with line spacing of 2.5 km. The item was kept as alternative item for the last two field seasons. ii) Kanker area in the Bastar Craton in Central India, Chhattisgarh state about 15,400 lkm with line spacing 500m., iii) Mauanipur-Sarila area, Jhansi and Gwalior districts, Uttar Pradesh and Madhya Pradesh respectively about 15,500 lkm with line spacing 500m is proposed as alternative item.

### Aerogeophysical Data Processing

5.33 Processing of multisensor aerogeophysical data acquired during the earlier field seasons for generation of total intensity magnetic and radiometric (U, Th, and the total count) has been completed for Bangalore-Penukonda area in parts of Karnataka and Andhra Pradesh and in Chhattisgarh Basin, Madhya Pradesh and Orissa. Processing of data for Nagpur-Wardha Valley and Kamptee coal field area, Maharashtra involving 32,500 lkm and Baihar-Kutru area involving 10,706 lkm are under progress.

5.34 The geophysical interpretation and prognosticated maps were prepared for Chhattisgarh area. Interpretation of aeromagnetic data in parts of West Khasi Hills and Kamrup districts of Meghalaya and Assam respectively, and Bangalore-Penukonda area in parts of Karnataka and Andhra Pradesh are in progress.

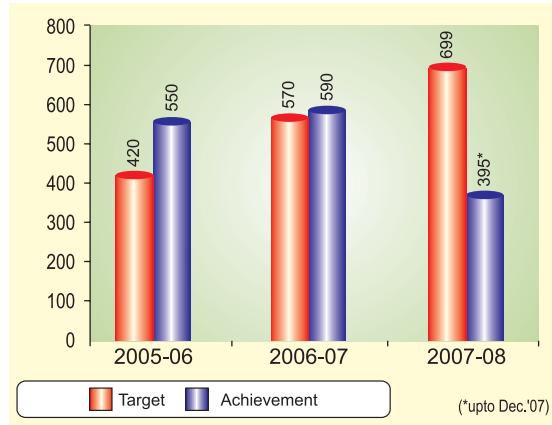
### Marine Survey

5.35 Geological Survey of India carried out off shore geoscientific studies both in the Exclusive Economic Zone (EEZ) and Territorial Waters (TW) along the East and West coasts of India. Surveys in the near shore zones (0m-10m isobaths) were carried out using hired small mechanical boats.

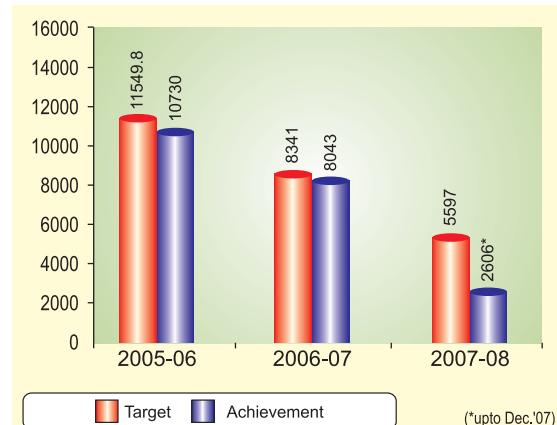
5.36 Three cruises aboard R.V. Samudra Manthan both within and beyond EEZ covering studies on

## SURVEY AND MAPPING — Target vs. Achievements

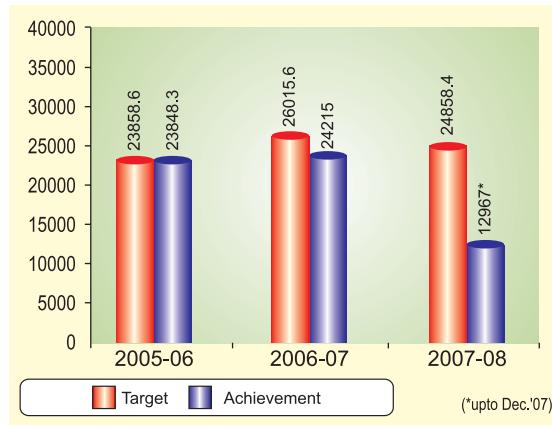
Systematic Geological Mapping (in sq. km.)  
(Scale 1:50,000)



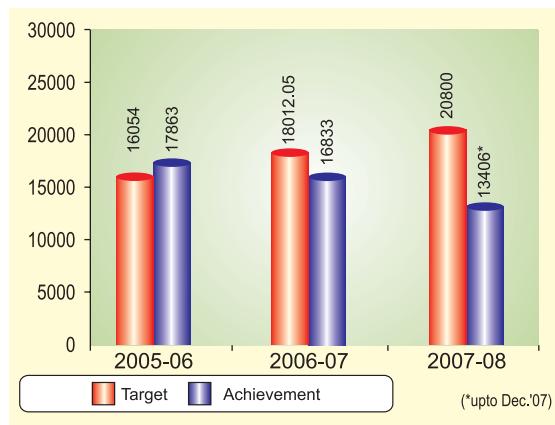
Special Thematic Mapping (in sq. km.)  
(Scale 1:25,000)



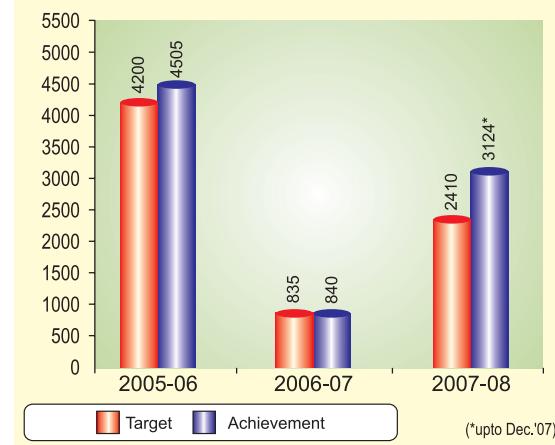
Geochemical Mapping (in sq. km.)  
(Scale 1:50,000)



Geophysical Mapping (in sq. km.)  
(Scale 1:50,000)



Territorial Water (coastal launches)  
(in sq. km.)



Geomorphological and Tectonic set up of Comorin Ridge off Kanyakumari; bathymetry and magnetic survey off (i) Kakinada-Visakhapatnam, (ii) Ongole and (iii) Puducherri-Nagapattinam; monitoring of Barren and Narcondam island volcano have been undertaken.

5.37 Six cruises aboard R.V. Samudra Kaustubh within the TW off the east coast covering: studies on the Seabed Morphology and Depositional Environment off Ganga Delta; Geotechnical appraisal of the shelf of Nagavalli River mouth, North Andhra Pradesh and parametric evaluation of Mahandi-Dhamra river mouths; Monitoring of coastal processes and shoreline changes off Godavari Delta-Visakhapatnam Sector, Mapping of the seabed within Territorial Waters off Tamil Nadu Coast have been taken up.

5.38 Six cruises aboard R.V. Samudra Saudikama within the TW off the west coast covering: studies on Geotechnical investigation around the Vengurla Fishing Harbour, Maharashtra; Mapping of the seabed within Territorial Waters off Maharashtra coast (Virar to Santa Cruz), Mumbai; Parametric studies within Territorial waters off Kerala coast between Azhikod and Ambalapuzha; Geotechnical investigation off Badagara, Kerala; Parametric studies within Territorial Waters off Kerala coast between Azhikod and Ambalapuzha; Preliminary evaluation of relict sands beyond territorial waters off Kerala coast between Beypore and Kannur have been taken up.

5.39 Other studies from Marine Wing include Taphonomic significance of benthonic foraminifers, ostracodes, pelecypods, gastropods and bryozoa in the shelf areas of Bay of Bengal and Arabian Sea during the Holocene Period; Development and Enrichment of Marine Geosciences Database; Study on the effect of salinity-temperature on recent planktonic foraminifera along a north-south transect in Bay of Bengal; Study of sediments from Central Andaman Trough/Spreading Centre; Study of creeks in Sundarbans; Bathymetric survey and geoenvironmental study of Hatalia-Doania River (between Muri Ganga & Saptamukhi River).

### Mineral Search and Evaluation

5.40 GSI is still regarded as the prime source for basic earth science data for India up to the level of

preliminary exploration. Therefore, to cater to the demand of the nation for providing reliable information on mineral and other natural resources to the public and private entrepreneurs, systematic updating of the database of the survey in the mineral sector is being continued. Thus, mineral investigation remains a primary thrust area for the activities of GSI.

5.41 The endeavor of earth scientists through their rigorous routine and theme based concept oriented survey over the country helped in estimation of additional resources for coal, platinum group of metals, gold, basemetals, iron ore, manganese, graphite, limestone, and in locating new bodies of kimberlites, the source rock for diamond. Present day mineral search and assessment is undertaken with special emphasis on deficient commodity of high value (e.g. gold, diamond, Platinum Group of Elements (PGE), etc) as well as ores and minerals of high demand (basemetals, iron ore, coal, lignite, limestone for steel industry etc.).

5.42 During Annual Programme (2007-08), a total of 103 items are planned for mineral investigation of which 22 items are under coal/lignite, and 81 items belong to ore and mineral (including ground follow up of air borne anomalies). Of the 81 items, 23 items for gold, 12 for diamond, 23 of base metal and 6 of ferrous minerals have been taken up. The state wise and region wise break up of these items is given in Table 5.1.

5.43 Physical inputs for implementation of above programmes were 784.50 sq. km for large-scale mapping, 14.94 sq. km of detailed mapping and 52,298.68 metres drilling (upto December, 2007) (Annexure-V). Laboratory supports in the form of chemical, petrological and mineralogical determinations were also given.

### Coal & Lignite

5.44 Exploration for coal has been carried out in different Gondwana basins of Andhra Pradesh (2 items), Chhattisgarh (5 items), Jharkhand (5 items), Madhya Pradesh (7 items), Maharashtra (2 items), Orissa (6 items) and West Bengal (2 items) totaling 29 items in all, including 9 promotional items. Six exploration items for lignite, three each in Rajasthan

**Table 5.1**  
**State-wise as well as Region-wise Mineral Investigations for FS 2007-08**

State/Region	Minerals								TOTAL
	Coal/ Lignite	Base Metal	Gold	Diamond	Strategic	Precious (PGE)	Iron	Manganese	
Andaman & Nicobar Islands									
West Bengal	1		2						3
Sikkim									
Jharkhand	5		4		1 (ASGE)				9+1 (ASGE)
Bihar									
Orissa	4			1+1 (ASGE)			1	1	7+1 (ASGE)
<b>Sub Total: Eastern Region</b>	<b>10</b>		<b>6</b>	<b>1+1 (ASGE)</b>	<b>1 (ASGE)</b>		<b>1</b>	<b>1</b>	<b>19+2 (ASGE)</b>
Maharashtra		2				1			3
Madhya Pradesh	4	3		1+2 (ASGE)					1 9+2 (ASGE)
Chhattisgarh	4			1+2 (ASGE)			1		6+2 (ASGE)
<b>Sub Total: Central Region</b>	<b>8</b>	<b>5</b>		<b>2+4 (ASGE)</b>		<b>1</b>	<b>1</b>		<b>1 18+4 (ASGE)</b>
Rajasthan	2	13	5				1		2 23
Gujarat									1 1
<b>Sub Total: Western Region</b>	<b>2</b>	<b>13</b>	<b>5</b>				<b>1</b>		<b>3 24</b>
Andhra Pradesh	1		3	3+1 (ASGE)	1				8+1 (ASGE)
Karnataka & Goa			6			3	1		10
Tamil Nadu	1		1		1 (ASGE)	2	1		1 6+1 (ASGE)
Kerala			1						1
<b>Sub Total: Southern Region</b>	<b>2</b>		<b>11</b>	<b>3+1 (ASGE)</b>	<b>1+1 (ASGE)</b>	<b>5</b>	<b>2</b>		<b>1 25+2 (ASGE)</b>
Uttar Pradesh						1			1
Uttarakhand			1						1 2
Himachal Pradesh		2							2
Haryana		1							1
Punjab									
Jammu & Kashmir									
<b>Sub Total: Northern Region</b>	<b>3</b>	<b>1</b>			<b>1</b>				<b>1 6</b>
Arunachal Pradesh									
Assam									
Manipur									
Meghalaya		1+1 (ASGE)				1			2+1 (ASGE)
Mizoram									
Nagaland									
Tripura									
<b>Sub Total: North Eastern Region</b>		<b>1+1 (ASGE)</b>				<b>1</b>			<b>2+1 (ASGE)</b>
<b>Grand Total</b>	<b>22</b>	<b>22+1 (ASGE)</b>	<b>23</b>	<b>6+6 (ASGE)</b>	<b>1+2 (ASGE)</b>	<b>8</b>	<b>5</b>	<b>1</b>	<b>6 94+9 (ASGE)</b>

ASGE - AIRBORNE SURVEY GROUND EVALUATION

and Tamil Nadu are continuing of which five items are promotional. An additional resource of 2290.14 million tonnes of Coal has been assessed from the data generated from regional exploration by GSI during 2006 -2007 (up to June, 07).

5.45 Regional exploration strategy for F.S. 2007-2008 has been designed on the basis of XIth Plan proposal of the Sub-Group III of Working Group on Coal and Lignite, government guidelines from time to time and the decision of the Sub Committee of Energy Minerals (Group III of Central Geological Programming Board) and XIth Plan proposals of GSI. GSI has formulated a total of 22 exploration items, out of which 18 items fall in Coal India Limited, 1 item in Singareni Collieries Company Limited and 3 items in Lignite bearing areas.

5.46 The geological resource of coal of the country stands at 257.38 billion tonnes and lignite at 38.75 billion tonnes as on 01.04.2007.

### Coal Bed Methane (CBM)

5.47 In course of regional exploration in Rajmahal – Birbhum Master Basin, gas desorption studies carried out by GSI in Kapasdanga-Bharkata and Salbadra-Gomarpahari and Gosaipahari-Siulibana sectors revealed low gas content (<0.5cc/gm) in most of the samples and the chromatographic study of these gas samples indicated abundance of methane (>99%) whereas higher hydrocarbons are present in traces.

### Resource Augmentation

#### Gold

- Exploration for gold in Ajjanahalli central and northern sectors, Tumkur district, Karnataka led to the estimation of additional resource of about 0.48 million tonne of gold ore with grade varying from 1.65 g/t Au to 1.70 g/t Au.
- Exploration for gold in Bangargatti block, (North & South sector), Dharwar district, Karnataka has been carried out. Bedrock and trench samples from Banded Magnetite Quartzite bands have indicated gold values from 0.03 to as high as 35.00 g/t.
- Exploration for gold-copper mineralisation in three blocks of Bhukia Gold belt, Banswara district,

Rajasthan led to the augmentation of gold ore resource of 7.32 million tonnes with average grade of 1.30 g/t gold. A total resource of gold ore in the area is 55.22 million tones with 1.87 g/t Au.

#### Diamond

- Two kimberlite (source rock for diamond) pipes each have been located near Chagapuram, Mahboonagar district and Timmasamudram area, Anantapur district, Andhra Pradesh.

#### Platinoid Group of Elements (PGE)

- Investigation for PGE mineralisation was continued in Hanumalapura area of Karnataka over 1.8 km strike length and resource of 0.546 million tonne of PGE ore with (Pt + Pd) values ranging from 0.50 ppm to 2.93 ppm has been augmented.

#### Basemetals

- In the Nim-Ka-Thana Copper prospect, Sikar district, Rajasthan a resource of 46.26 million tonnes has been estimated from four blocks. The main three contributing blocks being Dokan (25.56 mt), Baniwala-Ki-Dhani (13.17mt) and Dokan North (5.6 mt) with 0.38%, 0.45% and 0.30 % Cu respectively.
- Investigation for basemetals in Thanewasna and Dubarpeth- Karanji block, Chandrapur District, Maharashtra led to the estimation of 1.13 million tonnes of copper ore with average grade of 1.1% copper and 0.35 million tonnes of Copper ore with 0.67 % Cu respectively.

#### Bauxite

- From Kadalia, Kendujhar district, Orissa, a resource of 1.97 million tonnes bauxite with an average grade of 48.34%  $Al_2O_3$  has been estimated.

#### Iron Ore

- Investigation for iron ore in four blocks in Namakkal district, Tamil Nadu, was carried out. A resource of 14.03 million tonnes of magnetite ore with Fe content of 31 to 37% has been assessed.

- In NMDC block, in parts of Sandur Schist belt, Bellary district, Karnataka a resource of 8 million tonnes of iron ore with > 55% Fe has been assessed.
- Good quality iron ore have also been recorded from Ghutang and Pathargada area, Kendujhar District, Orissa and Aridongri area, Kanker district, Chhattisgarh.

### Manganese

- Exploration for manganese in Lasarda (Bolani) block, Bonai-Keonjhar belt, Kendujhar district, Orissa, was continued. A resource of 2.47 million tonnes manganese ore has been estimated with an average grade of 24.61% Mn. Resources estimated from the adjacent blocks explored earlier is 4.73million tonnes with average grade ranging from 22.27% to 26.15% Mn.

### Limestone

- A resource of 33.74 million tonnes marginal cement grade limestone has been assessed in Vridhachalam sub-basin, Cuddalore District, Tamil Nadu.
- Additional resource of 280.80 million tonnes of limestone of various grades has been estimated in Jaintia Hills district, Meghalaya.

### Graphite

- A resource of 0.76 million tonne of graphite (average grade of 13% Fixed Carbon) has been estimated for a strike length of 1 km in Arasanur block, Sivaganga District, Tamil Nadu.

### Geotechnical Investigations

5.48 The Geological Survey of India has made commendable contribution at different stages of geotechnical investigations for the successful completion of large numbers of Water Resource Projects like hydroelectric, irrigation and river linking projects within the country and outside. GSI has also extended its expertise in a number of communication projects, thermal power projects, defense installations, urban development, industrial estate development

projects etc. GSI took up 34 items of geotechnical and engineering geological studies through 276 investigations related to Civil Engineering projects for Water Resource Development, creation of communication network, river linking projects, transport and other infrastructural facilities in almost all the states of the country. Further GSI has also extended its expertise in International projects like Punatsangchhu Hydroelectric Project I & II, Bhutan and at Sunkosi-Sapta Kosi Project, Nepal.

### Landslide Hazard Studies

5.49 Being declared Nodal Agency on Landslide by the Government of India, GSI is systematically carrying out Landslide Hazard Zonation (LHZ) Mapping on different scales, Site Specific Study of Landslides for their stabilization and preparation of Inventory of Landslides. Further, Detailed Project Reports (DPR) of 9 proposed Hydroelectric Projects submitted to CEA by various states (e.g. Tamil Nadu, Manipur, Sikkim, Meghalaya and Uttarakhand) and central agencies for geotechnical appraisal and evaluation for techno-economic clearance have been scrutinized, offered suggestions and recommendations for further detailed geotechnical investigations after critical review of DPRs and made interaction with CEA / CWC and other agencies. Few salient assignments for landslide in different states are given below:

- Uttarakhand: Landslide hazard zonation in parts of Ramganga basin on Macro scale (1:50,000), Landslide hazard zonation along Tiuni-Harkidun communication route in Uttarkashi and Dehradun districts on Macro scale (1:50,000), Landslide at 83 km on Badethi-Banchoura-Bhadrigad Road of PWD, Thatyud, District Tehri Garhwal.
- Himachal Pradesh: At landslide and subsidence Zone at the road section between Kot nala and Khanag nala along Anni-Jalori Road, District Kulu.
- Jammu & Kashmir: Landslide hazard zonation on Meso scale (1:10,000) around Vaishnodevi Temple.
- Tamil Nadu: Site Specific Study of Landslides around Coonoor and Mettupalayam, District Coonoor.

- Kerala: Landslide Hazard Zonation around Kurusumala area, Dist. Kottayam, on Meso scale (1:10,000), Inventory of two Landslides namely Tinur slide in Kozhikode district and Valanthode slide in District Wynad.
- Karnataka and Goa: Study of unstable slopes in and around Mangalore.
- Maharashtra: LHZ on Macro scale (1:50,000) covering a length of 237.5 lkm along NH-17 between Mumbai and Goa Highway was carried out following modified BIS guidelines in collaboration with NRSA. The facet maps and other thematic maps are under preparation. The LHZ map will be developed after preparing all the thematic maps like slope, lithology, structure, landuse, landcover, relative relief, hydrogeology, slope erosion condition, landslide incidence etc. Site-Specific Study of Bhilar slide along Panchgani-Mahabaleshwar Road is being undertaken.

## Earthquake Geology

5.50 Work on seismic hazard microzonation of Mumbai area led to preparation of series of thematic maps for the purpose of ground characterization that classified Mumbai City into five zones.

5.51 There were reports of subterranean sounds and tremors in Nanded town, Maharashtra in two spells during December 2006 and April 2007. The microearthquake (MEQ) network recorded three seismic events from the area during the period of survey after December, 2006 incident.

5.52 Active fault studies in parts of piedmont belt at Nagrakata – Rajabhatkhawa sector, Jalpaiguri and Cooch Bihar Districts, West Bengal, was continued. With a view to study micro-earthquakes in Sikkim-Darjeeling Lesser Himalaya, four digital seismographs were installed in a network comprising Darjeeling, Kalimpong, Singtam and Jorethang.

5.53 In the Active Fault Studies in Himalayan Frontal Belt along Ropar Tear, traverse mapping (on 1:50,000 scale) covering 60 lkm was carried out along HFT and Ropar Tear between Sutlej and Ghaggar rivers for locating signatures of neotectonic activity in the area.

5.54 During Seismic Hazard Microzonation studies of Puducherri Urban Agglomeration, 45 sq km area was covered by detailed geological, geomorphological studies on 1:25,000 scale. Microzonation studies of Chandigarh Urban Complex have also been done. Field investigation in NE and SE parts of Bhavnagar town and preparation of surface lithological map was undertaken for seismic hazard microzonation of Bhavnagar Town, Gujarat.

5.55 Active Fault Studies along foothills of Bhutan Himalaya in the Kokrajhar district of Assam, covered an area of 200 sq km for preparation of morphotectonic /lineament map along with measurement of 9 lkm of scarp section.

5.56 Monitoring of GPS stations installed across Great Bengal Fault in Boghajot- Patharia-Dhumdangi-Daspara, Darjeeling & North Dinajpur District, West Bengal will continue along with monitoring of GPS stations installed in Andaman & Nicobar group Islands. Monitoring of ground motion across Mishmi Thrust and Lohit Thrust in parts of Upper and Lower Dibang Valley Districts and Lohit District, Arunachal Pradesh using DGPS has also been taken up.

5.57 Two broadband seismic observatories of GSI at Jabalpur and Nagpur are continuously engaged in monitoring and acquisition of seismic events.

## Geoenvironmental studies

5.58 Geological Survey of India took up 21 geoenvironmental investigations during Field Season 2006-07. Multiple investigations include Regional Geo-environmental Appraisal, Site/Theme Specific Geo-environmental studies, Public Health Hazard, Desert Geology and Studies of coastal dynamics and fluvio- geomorphic dynamics. A few significant programmes are discussed here:

- Detailed geoenvironmental appraisal covering 775 sq. km. area in parts of Bhabhar belt of Nainital district, Uttarakhand. Deepening of ground water level in the Bhabhar zone is a serious environmental hazard, where the depth to water level varies from 100m to 125m below ground level (b.g.l.) due to unconfined nature and high permeability of the strata.

- Studies on the development of Arsenic toxicity risk mitigation strategy in groundwater of West Bengal has established the geo-remedial measures for arsenic pollution in ground water in the areas around Gotra-Ghetugachi villages in Chakdah Block of Nadia district, West Bengal. The mode of occurrence of arsenic free Pleistocene "Orange sand", which is comparatively more common in the western part of West Bengal, has been delineated in the arsenic affected areas of the eastern part in the depth range of 40m to 50m. Geomorphological signatures for identifying the preserved extension of the "Orange sand" horizon have been established.
- Detailed geotechnical investigation for the conservation of the archaeological monuments at Ajanta and Ellora Caves, Aurangabad district, Maharashtra has been carried out.
- Geo-environmental appraisal covering 220 sq. km area in parts of Junagadh, Porbandar district, Gujarat was carried out to evaluate Geo-environmental impact of Mining Industry and the study of coastal process on the development of different types of landscape.
- Monitoring of coastal processes and shoreline changes off Godavari delta– Visakhapatnam sector, Andhra Pradesh was carried out.

### Glaciological Studies

5.59 Detailed glaciological studies on Hamtah glacier, Lahaul-Spiti district, H.P and study of recession pattern of glaciers in Bhaga basin, Lahual and Spiti Districts, H.P (on expedition basis) is in progress for monitoring the recessional pattern of glaciers in different orientations.

5.60 Palaeo-glaciation studies and dating the advance/retreat events in parts of Satluj valley, Kinnaur Dist, HP, reveals that at several places, the lateral moraines of the glaciers extend right up to the Satluj valley.

### Antarctica studies

5.61 Since the very first expedition in 1981, Geological Survey of India (GSI) has contributed significantly in the scientific and logistic aspects of

these multidisciplinary and multi-institutional expeditions in Antarctica. The major scientific programmes of GSI in Antarctica include geological mapping on 1:50,000 scale, large scale thematic mapping for petrochemical and geochronological studies, glaciological observations on advance and recessional behaviour of polar continental ice, studies on shelf ice for accumulation patterns, glacial dynamics recording the movement directions and velocity of glaciers and ice sheets, ice core drilling and lake sediment coring for palaeo-climatic studies, thermal profiling of glaciers and permafrost observations, Ground Penetrating Radar (GPR) survey for delineation of grounding-line of the shelf ice and plotting of lake-bathymetry.

5.62 During the 26<sup>th</sup> expedition, GSI team (along with a scientist from National Centre for Antarctic and Ocean Research, Goa) drilled two boreholes of ~77m and ~55 m depth on the Ice Shelf. While returning, GSI team carried out traverse-mapping in 50 sq km area in Larsemann Hills covering "Bharti", McLeod, Stornes and Fisher Islands.

### Human Resource Development

5.63 GSI Training Institute conducted 32 training programmes including 1 Orientation Course for Geologists, 6 Basic Courses, 8 Refresher Courses, 4 Advanced Courses, 5 Workshops, 5 Courses related to Digital Techniques, 2 ISRO sponsored programmes and 1 AEG sponsored programme. All the programmes were successfully completed.

### Dissemination of Information

5.64 GSI Enterprise Information Portal went live in the Internet (<http://www.portal.gsi.gov.in>) and can be accessed by any user. It envisages providing real time data to various stakeholders and users, including entrepreneurs, academicians and common public.

5.65 GSI net and enterprise portal help GSI automate its business processes and facilitate management of vast volume of geoscientific data gathered over last 156 years by way of a centralized digital archive and treat these as corporate resource with well-defined access protocol.

5.66 LAN has been completed in Operational Unit offices of ER (Patna, Bhuvaneswar, Sikkim), WR (Gandhinagar) and NER (Guwahati, Itanagar, Agartala and Dimapur). At Shillong, LANs in 3 buildings viz. Zorem, Motinagar and Kumud Villa have been completed; however inter-building connectivity will be completed along with the WAN. All these networks require to be maintained on a day-to-day basis for sustained connectivity.

5.67 GSI website ([www.gsi.gov.in](http://www.gsi.gov.in)) continued to disseminate up-to-date information on GSI activities.

5.68 Two hundred eighty two Geological Quadrangle Map sheets have already been printed. Sixteen sheets are under publication.

5.69 A total of 7,100 maps of archival value were converted to digital mode for storage/retrieval.

5.70 A total of 20 publications were released which included 16 priced and 4 un-priced newsletters from different regions.

5.71 Revised Gravity Map of India (scale 1:2 Million) has been published (a collaborative project GSI-NGRI-ONGC-SOI-OIL).

### **Laboratory Studies, Research and Development**

5.72 Augmented by the up gradation and establishment of state-of-the-art instrumental facilities in the fields of Petrology, Geochronology and Isotope Geology, Palaeontology, Photogeology and Remote Sensing, Geophysics, Mineral Physics, Analytical Chemistry etc., research and developmental activities continued to supplement the work in the various field investigations and activity domains in the Geological Survey of India.

5.73 One of the most exciting discoveries by GSI is a rare fossil snake from the Lameta Formation of Kheda district, Gujarat. This well-preserved specimen, about 70 million years old, not only represents the oldest snake in the world, but also enhances our knowledge on the origin and evolution of snake. Its occurrence in association with sauropod dinosaurian eggs and hatchlings provides a unique evidence of predation of Mesozoic snakes on dinosaur eggs.

5.74 Geo-remedial measures to mitigate the risk of

arsenic toxicity in ground water in parts of Nadia district, West Bengal has established the occurrence of Pleistocene "orange sand" in the depth range of 40 to 50m, which is found to yield arsenic free ground water. This will solve to a large extent the problem of getting arsenic free waters for domestic use for the people residing in the east of the Ganges in West Bengal.

5.75 In the research of meteorites, study of the primitive Ca-Al inclusions (CAI) in un-metamorphosed Indian chondrites, constrained the formation age of chondrules within one million year. The work was in collaboration with PRL, Ahmedabad.

5.76 Petrogenesis of gold-copper mineralization in Bhukia block, Banswara dist., Rajasthan reveals that host rock for gold mineralization is keratophyre, amphibole /dolomitic marble, calc silicates and metabasics. The high angle shear zones have provided the conduits for the ore forming fluids and depositional sites for the minerals. Au and Bi occur within lollingite and arsenopyrite.

5.77 Petrological and SEM-EDX studies on investigation for platinum group of elements (PGE) in Sittampundi layered ultramafic complex of Tamil Nadu has established the presence and mode of occurrences of several PGE phases. Evaluation for the PGE mineralization in Davangere district, Karnataka has helped to locate the most favourable host rocks of PGE. Oxide phases (magnetite-ilmenite) from chlorite schist yielded a total PGE of 1140ppb while chlorite gave 2767ppb.

5.78 Coal petrographic study reveals that the coal seams of Tendudol block of Singrauli Coalfield contain low vitrinite, high exinite and moderate inertinite. These have potential for methane gas generation but have poor methane storage capacity. Three coal seams of Jalatap block in Talcher Coalfield are characterized by sub bituminous C to B coals with high vitrinite, moderate exinite and low to moderate inertinite. These are less potential in methane gas generation but have a high gas storage capacity.

5.79 Coal Bed Methane study on samples of coal seams intersected at different bore holes in parts of Rajmahal-Birbhum Master Basin has indicated gas content ranges from 0.8 cc/gm to 1.3 cc/gm.

5.80 Analyses of subsurface geological data coupled with direct gas measurement to evaluate coal bed methane potential in the Kapasdanga-Bharkata sector of Rajmahal-Birbhum Master Basin enabled to identify a zone of higher gas concentration at depth range of 450 to 550m.

### Sponsored Work Undertaken

5.81 GSI has augmented its efforts in securing a number of sponsored projects and in this respect MOU have been concluded/being concluded during the period with several PSUs and Govt. agencies. Important among these are:

- Draft MOU between GSI and National Water Development Agency (NWDA) for Geological feasibility studies of Rajasthan-Sabarmati link canal project has been concluded.
- The Memorandum of understanding (MOU) on digitization of Geological and Geomorphological Map on 1:2,50,000 scale of Krishna Basin have been concluded between GSI and Inter State Water Resource and CAD department of Government of Andhra Pradesh.
- MOU between GSI and IL & FS Ltd., New Delhi has been concluded for time-to-time case specific Geotechnical works in NER.
- MOU for evaluation of Granite in Karnataka has been concluded between GSI and National Institute of Rock Mechanics (NIRM).
- An agreement with Coal India for Annual Coal Stock Measurement through Survey work by GSI has been signed.
- MOU for Iron Ore Investigation in Arhidongri Area, Kanker Dist, Chattisgarh concluded between Central Region (CR) and Chhatishgarh Mineral Development Corporation (CMDC).
- A MOU has been signed between GSI and NTPC on Geological, Geotechnical mapping and logging of boreholes and Laboratory studies for Super Thermal Power Project at Lara, Raigarh district.
- MOU between GSI and Nuclear Power Corporation of India Ltd. (NPCIL) for gravity/ Magnetic and resistivity surveys in Kakrapara Projects, Gujarat has been concluded.
- Collaborative research project between GSI and Benaras Hindu University on the study of Palynoflora and Deccan Volcanic associated sediments has been concluded through Memorandum of Understanding (MOU).
- Memorandum of Understanding (MOU) on Gravity/Magnetic Survey for ONGC in South Rajasthan- MP border, Tamil Nadu, entire UP and parts of Bihar is in concluding stage with GSI.
- Some other areas like Geotechnical Surveys and promotional drilling for M/s CMPDIL following FS 2006-07 where GSI is involved in sponsored work on continuing basis as a routine following the accredited programme of the Dept.

5.82 The Employment position in GSI as on 31.12.2007 in respect of SC/ST/OBC/Women, out of total no. of employees is given in Table 5.2

**Table 5.2**  
**Employment of Personnel in GSI**

Group	Total Number of Employees	SC	ST	OBC	Women
GROUP 'A'	1526	162	42	39	93
GROUP 'B'(Gaz.)	382	80	26	30	44
GROUP 'B' (NG)	727	140	69	10	92
GROUP 'C'	4644	967	431	205	393
GROUP 'D'	2546	612	272	212	285
<b>TOTAL</b>	<b>9825</b>	<b>1961</b>	<b>840</b>	<b>496</b>	<b>907</b>

## Chapter 6

# Indian Bureau of Mines

6.1 The Indian Bureau of Mines (IBM) is a subordinate office under the Ministry of Mines. It is engaged in the promotion of scientific development of mineral resources of the country, conservation of minerals, protection of environment in mines, other than coal, petroleum and natural gas, atomic mineral and minor minerals. It performs regulatory functions, namely enforcement of the Mineral Conservation and Development Rules, 1988, the relevant provisions of the Mines and Minerals (Development and Regulation) Act, 1957, Mineral Concession Rules, 1960 and Environmental Protection Act 1986 and Rules made there under. It also undertakes scientific, techno-economic, research oriented studies in various aspects of mining, geological studies, ore benefi-ciation and environmental studies.

6.2 IBM provides technical consultancy services to the mining industry for the geological appraisal of mineral resources, and the preparation of feasibility reports of mining projects, including beneficiation plants. It prepares mineral maps and a countrywide inventory of mineral resources of leasehold and freehold areas. It also promotes and monitors community development activities in mining areas. IBM also functions as Data Bank of Mines and Minerals and publishes statistical periodicals. It also brings out technical publications/monographs on individual mineral commodities and bulletins of topical interest. It advises the Central and State Governments on all aspects of mineral industry, trade, legislation, etc.

6.3 IBM imparts training to technical and non-technical officials of IBM and also persons from the mineral industry and other agencies in India and abroad.

### Organizational Set-up

6.4 IBM is organized into six functional divisions, namely :

- (i) Mines Control and Conservation of Minerals Division.
- (ii) Ore Dressing Division.
- (iii) Technical Consultancy, Mining Research and Publication Division.
- (iv) Mineral Economics Division
- (v) Mining and Mineral Statistics Division.
- (vi) Planning and Co-ordination Division having two sub-divisions :
  - a) Administration, Establishment matters (including training), Accounts with all other administrative and financial matters and;
  - b) Planning and Co-ordination.

6.5 IBM has its headquarters at Nagpur and 12 Regional Offices at Ajmer, Bangalore, Bhubaneswar, Chennai, Dehradun, Hyderabad, Jabalpur, Kolkata, Margao, Nagpur, Ranchi and Udaipur and 2 sub-regional offices at Guwahati and Nellore.

6.6 IBM has well equipped Ore Dressing Laboratories and Pilot Plants at Nagpur, Ajmer and Bangalore.

### Performance of IBM

6.7 The performance of IBM with regard to technical studies, investigation and preparation of mineral inventory/maps etc is indicated in the Table 6.1.

**Table 6.1**  
**Technical Studies and Consultancy 2007-08**

Sl. No.	Item	2005-06*	2006-07*	Target 2007-08	Upto December 2007*	
					Target	Achievement
1	Special Studies /Mining Geological Studies	12	12	12	12 (Annual)	12 in progress
2	Updation of National Mineral Inventory (NMI) as on 1/4/2005 adopting UNFC.	Updation of NMI adopting UNFC as on 1/4/2005 was in progress. Data-sheets in respect of 3,977 free-hold and public sector deposits and 8,000 data sheets in respect of private sector leaseholds were up-dated. Summary output for 15 minerals generated.	Data sheets in respect of 4,986 freehold and public sector deposits were updated and data entry of 14,865 deposits completed. Summary outputs for 43 mineral generated.	i) Completion of Updation of NMI as on 1.4.2005 in all respects and generation of summary output for all the 65 minerals.  ii) Preparation of analytical notes of NMI for 65 minerals  iii) Qualitative analysis of NMI for 65 minerals.	i) Generation of summary output for all the 65 minerals.  ii) Preparation of analytical notes for 42 minerals  iii) Qualitative analysis of NMI for 42 minerals.	i) Updation work completed and summary outputs for all the 65 minerals generated.  ii) Completed.  iii) Completed.
3	Preparation of multi-mineral maps with forest overlays	105 maps	113 maps	100 maps	90% work	73 maps completed and 47 were at various stages of completion.
4	OD Investigations	71	73	70	53	55
5	Chemical Analysis (No. of radicals)	51,146	50,579	50,000	37,500	35,440
6	Mineralogical Studies	2,455	2,409	2,300	1,725	1,774
7	Technical Consultancy Assignments	30	09	07	04	07
8	Mining Research including Environmental Studies	10	07	05	04	08
9	Training	19	16	16	12	12

\*Actual

## Inspection of Mines

6.8 During the year 2007-08 (upto December 2007), 1,985 mines were inspected for enforcement of the provisions of Mineral Conservation and Development Rules (MCDR) 1988 and for examination of mining plans/ schemes of mining / mine closure plans. Consequent to the inspection of mines, 1,505 violations under MCDR, 1988 were pointed out in respect of 764 mines and during the period 1,016 violations were rectified; 22 prosecution cases were launched in various courts; 01 case was decided in the Court in favour of IBM and 12 cases were compounded. Besides, mining operations suspended in respect of 02 mines were revoked.

6.9 State-wise break-up of inspection of mines carried out during 2007-08 (up to December 2007) is as follows :

S.No.	State	No. of Inspections
1	Andhra Pradesh	295
2	Assam	5
3	Chhattisgarh	64
4	Goa	103
5	Gujarat	135
6	Himachal Pradesh	28
7	Jharkhand	154
8	Karnataka	220
9	Kerala	13
10	Madhya Pradesh	228
11	Maharashtra	38
12	Meghalaya	12
13	Orissa	208
14	Rajasthan	257
15	Sikkim	2
16	Tamil Nadu	152
17	Uttaranchal	44
18	Uttar Pradesh	6
19	West Bengal	21
	<b>TOTAL</b>	<b>1985</b>

6.10 During the year 2007-08 (upto December 2007), 430 mining plans were approved and 20 were not approved, 253 schemes of mining were approved and 24 were not approved and 28 final mine closure plans were approved and 04 were not approved.

6.11 During the year 2007-08 (upto December 2007), 12 mining geological studies covering the aspects of community development in mining areas were at various stages of completion.

## Preparation of Mineral Maps

6.12 During the year 2007-08 (upto December 2007), preparation of multi-mineral leasehold maps of Maharashtra and Tamil Nadu (part) along with forest overlays, was taken up. Preparation of 73 maps was completed and 47 maps were at various stages of completion.

## Mineral Beneficiation

6.13 Mineral beneficiation studies including mineralogical testing and chemical analysis is intimately related to both conservation and development of mineral resources. During the year 2007-08 (upto December 2007), 55 ore dressing investigations, 35,440 chemical analysis and 1,774 mineralogical examinations were completed. Besides, 07 in-plant studies were also carried out.

## National Mineral Inventory

6.14 During 2007-08 (upto December 2007) updation of NMI as on 1.4.2005 adopting UNFC was completed in all respect for all the 65 minerals and summary outputs generated. Mineral-wise reserves / resources data as per UNFC as on 1.4.2005 has been published in the Indian Minerals Year Book 2006. Preparation of analytical notes & qualitative analysis for 42 minerals were also completed and the remaining 23 minerals will be completed by March 2008.

## Market survey of Mineral and Metals

6.15 Market Survey on Iron ore was completed and report released. Besides, three reports on end-use metal consumption for copper-lead-zinc for the quarters ending March, June and September 2007 were prepared.

## Statistical Publications

6.16 IBM disseminates statistical information on mines, minerals, metals and mineral based industries through its various publications. Information on mineral production, stocks, despatches, employment, inputs in mining, mining machinery and related matters received from the mine owners on statutory basis under the MCDR, 1988 and ancillary statistics on metals production, mineral trade and market prices of minerals, revenue from the mining sector, rent, royalty and cess on minerals, etc., from other agencies is compiled regularly by IBM.

6.17 The statistical publications released during the year 2007-08 (upto December 2007) include Statistical Profile of Minerals 2005-06 issue and 6 issues (September 2006 - February 2007) of Monthly Statistics of Mineral Production. Besides, Indian Mineral Industry at A Glance, 2005-06 issue was under printing.

## Consultancy Service

6.18 IBM provides technical consultancy services on prescribed charges for geological appraisals, survey of the areas, preparation of feasibility study reports, environment impact assessment and environment management plan, selection of suitable mining equipment, evaluation of feasibility report prepared by other consultants, financial institutions, etc. During the year 2007-08 (upto December 2007) seven assignments were completed and 06 were in progress.

## Technical Publications

6.19 IBM brings out technical publications relating to mines and minerals, mineral based industries, trade, beneficiation, R&D activities, etc. During the year 2007-08 (upto December 2007), Indian Minerals Year Book (IMYB) 2006 issue, Comparative Study of Mining Laws of India and Australia, Bulletin on Mining Leases & Prospecting Licenses 2005 issue and two issues of Half-yearly bulletin on Mineral Information (October 2005-March 2006 and April-September 2006) were released. Besides, preparation of Indian Minerals Year Book 2007 issue was in progress.

6.20 Under the series 'Mineral Facts and Problems' the Monograph on Chromite was under scrutiny and

modification. Updation of Directory of Mineral Consumers in India was in progress. Besides, two bulletins on (i) Recent Developments in Blasting Technology and (ii) Application of Rock Mechanics in Surface and Underground Excavations, were at various stages of completion.

## Mining Research

6.21 Applied Mining Research is carried out in IBM on various mining aspects so as to help in systematic development of mines and improvement in productivity in mines through evolution of suitable norms. Industry sponsored assignments on environment and rock mechanics on charge basis are also undertaken. During 2007-08 (upto December 2007), eight such assignments have been completed and another six assignments were in progress.

## Training

6.22 IBM imparts training to technical and non-technical officials of IBM and also to persons from mineral industry and other agencies in India and abroad. During the year 2007-08 (upto December 2007), 12 training programmes were conducted in which a total of 67 IBM personnel and 243 industry personnel participated.

## Advisory Role

6.23 IBM continued to advise the Central and State Governments on matters concerning mines and minerals, mining legislation, export and import



Ground vibration monitoring undertaken by Mining Research Cell, IBM at Parasakti (Jettipalem) limestone mine of M/s Parasakti Cement Industries Ltd., Distt. Guntur, Andhra Pradesh

policies, mineral consumption and industrial utilization, recovery of by-products, demand and supply of minerals, renewal of mining leases. Assistance was also rendered to private parties, institutions and foreign organizations on subjects like mineral production and other statistics.

### Measures for Abatement of Pollution and Environmental Protection

6.24 The IBM undertakes inspections/ studies for the enforcement of provisions of MCDR 1988 which include provision on protection of mines environment. During inspection it ensures that mine operators are taking due care for preservation and utilization of top soil, storage of overburden/waste rocks, reclamation and rehabilitation of land, precaution against ground vibration, control of ground subsidence, abatement measures against air, water and noise pollution, restoration of flora etc. in addition to other conservation and developmental measures. Necessary guidance to mine managements/operators are also given for systematic and scientific development of mine including protection of environment. While approving the mining plans and the schemes of mining, IBM ensures that environment impact assessment studies have been carried out and to that effect environmental management plan has been incorporated for its effective implementation. Besides provision for submission of progressive mine closure plan and final mine closure plan has been introduced for ensuring reclamation and rehabilitation of mined out areas. IBM also ensures that mining operations are carried out in accordance with the approved mining plan/scheme of mining.

6.25 As a result of follow up for implementation of EMP, extensive afforestation has been undertaken in the mines by the mine owners. During the year 2007-08 (upto December 2007), about 3.88 million saplings have been planted over an area of 1263 hect. in and around mine areas. Thus, so far, 86.63 million saplings have been planted over an area of about 36,271 hect. with a survival rate of 67 percent.

6.26 Simultaneous reclamation in working mines, and reclamation of abandoned mines are required to be carried out. During the year (upto December 2007),

simultaneous reclamation/ rehabilitation is going on in the working mines covering an area of about 108hect, taking the cumulative figure upto 11,222hect. So far, 53 abandoned mines covering an area of 660hect. has been reclaimed/ rehabilitated.

6.27 IBM continued to take initiative to organize Mines Environment and Mineral Conservation (MEMC) Weeks every year in important mining centres through its regional offices to promote awareness amongst mine owners for minimizing environmental pollution. During the year 2007-08 (upto December 2007) four such Weeks were celebrated in which 256 mines participated. Besides, 8 MEMC Weeks celebrations are slated for January/February 2008.

### Revenue Generation

6.28 IBM generates revenue through promotional activities. Revenue generated during 2007-08 (upto December 2007), from the consultancy work in mining, geology, ore dressing and mining research work, processing of mining plans/schemes of mining, training and through sale of publications, mineral maps etc. was Rs 156.35 lakhs.

### Computerization

6.29 The Regional/Zonal offices and Headquarters of IBM have been linked through a sophisticated system based on client server architecture established with the help of BRGM, France, which includes new databases required by IBM. IBM has well established LAN facility, besides WAN system to communicate and exchange data from Regional, Zonal offices and Headquarters. Wide Area Network through leased lines of BSNL has been established between IBM Head Quarters at Nagpur to Ajmer, Bangalore and Kolkata; between Ajmer Zonal Office and Regional Office; and between Kolkata regional office and Guwahati sub-regional office.

6.30 IBM is maintaining a website (<http://ibm.gov.in>) linked with the site of Ministry of Mines. This website provides information on the main functions and activities of IBM.

6.31 IBM has framed "IT Infrastructure Security Policy (version 1.0 of 2006)" as desired by the Ministry of

Mines, with a view to implementing Information Security to safeguard information infrastructure from possible attack through Internet or corruption, compromise of data etc, and the policy is under implementation.

6.32 On the instruction of Ministry of Mines, IBM website has been linked to the Grievance Portal of DoPT. Also on the instruction of CVO a link to the website of CVC, New Delhi was provided.

6.33 In principal approval of the project proposal on "Computerized Online Register of Mining Tenement System" was received vide Ministry's letter No. 37/5/2004-M-III dated 12/04/2007. Draft Expression of Interest for appointing Global Consultant was submitted to Ministry on 26/06/2007. A project proposal in the proforma for consideration of Standing Finance Committee was also sent to the Ministry. In a meeting of the Study Group constituted by the Ministry of Mines, it was decided that the existing leases will be digitized by Survey of India and new leases will be surveyed by IBM using GPS. Scope of the job to be undertaken by Survey of India in connection with this project proposal was sent to them for working out the cost estimates.

### Redressal of Public Grievances

6.34 At the beginning of the year, 01 grievance case was pending. During the year (upto December 2007), 06 cases were received and 02 cases were disposed off. Remaining 04 cases were under processing. Online facility for Registration for Public Grievances has been provided by linking IBM website with the Grievance Portal of DoPT "Central PGRAMS".

### Vigilance Cases

6.35 During the year 2007-08 (upto December 2007), 20 complaints were received, examined and brought to their logical conclusions. Besides, 03 complaints received from the Ministry were examined and necessary enquiry reports have been submitted to the CVO, Ministry of Mines and to the Chief Vigilance Commission, New Delhi. Vigilance Awareness Week was observed in the IBM HQs at Nagpur and in all the Regional Offices during 12-16 November 2007. During the Week, essay and debate competitions related to vigilance activities were organized.

### Workshop on R & D in Mineral Processing

6.36 IBM organised a one day workshop on "R & D in Mineral Processing" on 20 September 2007 at Nagpur. Sixty delegates from a spectra of mining/mineral industry participated in the workshop. Main objectives of the workshop were to receive feedback from Mineral Industry on the work carried out by IBM and to discuss future R&D needs. After the technical sessions, a visit of the delegates to the Modern Mineral Processing Laboratory and Pilot Plant at MIDC, Nagpur was arranged.

### Workshops on Review of Threshold Value of Minerals

6.37 In the light of technical developments and changing scenario of the demand pattern of mineral consuming industries in domestic and international market, a need has been felt to review the threshold value of important minerals. Accordingly, five workshops have been planned during this year to review the threshold values of 23 important minerals including base metals. So far three workshops have been organised at Udaipur on 26-27 September 2007, at IBM Headquarters, Nagpur on 31 October - 1 November 2007 and on 21-22 November 2007 at Donapaula, Goa. A total of 156 representatives from various mining companies, mineral administrators, R&D laboratories and academicians from universities participated in the workshop. Detailed discussions were held on new R&D developments towards utilisation of low grade minerals and suggested threshold value for important minerals specific to concerned regions. Views of the participants will be considered by the Core Committee to review the threshold values of 23 minerals after completion of deliberations in all the five workshops. Remaining two workshops are scheduled to be held at Bhubaneshwar and Bangalore.

### Meeting with DGMs of Dolomite Rich States

6.38 IBM organised a meeting of Senior Officers of DGMs of dolomite rich States to decide and formulate the guidelines for use of dolomite as minor mineral on 11 May 2007 at Nagpur, with the representatives of State Governments of Chhattisgarh, Madhya Pradesh, Rajasthan, Maharashtra and Gujarat.

### Parliamentary Standing Committee

6.39 Parliamentary Standing Committee on Coal and Steel had informal discussions with the representatives of IBM on 30 July 2007 at Goa. The committee had discussion on the subject " Development of Mineral Resources in Western Region specially in Goa" and also on the activities and performance of IBM.

6.40 Parliamentary Standing Committee on Personnel Public Grievance, Law & Justice for consideration of the subject " Public Grievance Redressal Mechanized and Backlog of Reserved vacancies of SCs/ STs/ OBCs/ Handicapped" held discussion with representatives of IBM on 1 November 2007 at New Delhi.

### Energy Conservation Day in IBM

6.41 In accordance with the instructions from the Ministry, Energy Conservation Day was observed in IBM Headquarters, Nagpur on 14 December 2007.

### Survey and Exploration by IBM

6.42 IBM is not carrying out any survey and exploration work except assignments on topographic survey on consultancy basis.

The employment position (as on 31.12.2007) and Expenditure is given below :

**Table 6.2**  
**Employment of Personnel in IBM**

Group	Total No. of employees in position	Number of				
		SC	ST	OBc	Minorities	Women
A	171	42	15	06	18	10
B(Gaz)	153	21	14	02	06	06
B (NG)	56	08	06	01	09	12
C	603	121	52	29	39	100
D	299	100	29	24	12	29
<b>Total</b>	<b>1282</b>	<b>292</b>	<b>116</b>	<b>62</b>	<b>84</b>	<b>157</b>

**Table 6.3**  
**Budget and Expenditure upto January, 2008**

(Rs. in lakhs)

	2006-07			2007-08		
	BE	RE	Actual Expenditure	BE	RE	Actual expenditure (up to Jan., 08)
Plan	2400.00	1700.00	1658.18	1700.00	2000.00	1324.21
Non-Plan	1613.00	1641.00	1625.47	1711.00	1703.00	1538.64
Construction (MoUD Budget)	75.00	75.00	0.00	100.00	100.00	0.00

BE - Budget Estimate

RE - Revised Estimate

## Chapter 7

# Performance of Public Sector and Disinvested Companies

7.1 The Ministry of Mines has four public sector undertakings (PSUs) under its administrative control. National Aluminium Company Limited (NALCO), Hindustan Copper Limited (HCL) & Bharat Gold Mines Limited (BGML), are operating in the field of mining and mineral processing, and Mineral Exploration Corporation Limited (MECL) is operating in the field of mineral exploration. The BGML however is closed since March, 2001. In addition, the Government holds 49% equity in Bharat Aluminium Company Limited (BALCO) and 29.54% equity in Hindustan Zinc Limited (HZL) after their disinvestment. The performance of these undertakings during 2007-2008 is given below:

### (A) National Aluminium Company Limited (NALCO)

#### Introduction

7.2 NALCO is a Schedule- 'A' Miniratna Central Public Sector Enterprise (CPSE) and has recently been recommended for giving Navaratna status. It is the largest integrated Alumina & Aluminium complex in the country. Its operating units consist of Bauxite mines, Alumina refinery, Aluminium smelter & Captive Power Plant located in the state of Orissa.

7.3 The company is one of the lowest cost producers of alumina & aluminium in the world due to highly efficient operation and very high asset utilisation with benchmark in smelting technology in its category and 2 patents in alumina technology. With sustained quality products, the Company's export earnings account nearly 40% of the sales turnover. The company has embarked upon 2<sup>nd</sup> phase capacity expansion, which is scheduled to be completed by the end of 2008.

7.4 Further, the company has taken up steps for acquiring new coal block & bauxite mines and setting up of caustic soda projects etc. The company has recently signed an MOU with Government of Indonesia for examining feasibility for setting up of an aluminium smelter of 5,00,000 Metric Tonne(MT) capacity per annum and 1250 MW power plant. The company is also exploring the possibility of setting up a smelter and power unit in the country or abroad, at a cost of apprx USD 3 billion.

7.5 Apart from exporting to more than 30 countries worldwide, the company has opened stockyards at various parts of India to facilitate domestic marketing. With its consistent track record in capacity utilization, technology absorption, quality assurance, exports performance and posting of profits, NALCO is a bright example of India's industrial capability.

#### Bauxite Mines

7.6 Located on the Panchpatmali hills of Koraput district in Orissa, a fully mechanised open-cast mine is in operation since 1985. The present capacity of Mines is 4.8 Million Tonnes Per Annum (MTPA), which is being further expanded to 6.3 MTPA under 2<sup>nd</sup> Phase Expansion.

#### Alumina Refinery

7.7 Alumina refinery is located at the foot hills of Panchpatmali hills, Orissa. The capacity of Refinery is 1.575 MTPA. It is being expanded to 2.1 MTPA under 2<sup>nd</sup> phase expansion.

#### Aluminium Smelter

7.8 The Aluminium smelter is located at Angul, Orissa having a capacity of 0.345 MTPA. The product profile

is mainly primary aluminium in the form of ingots, sows, wire rods, billets and cast strips. The primary aluminium is LME registered. The capacity is being further expanded to 0.46 MTPA under 2<sup>nd</sup> phase expansion.

### Captive Power Plant

7.9 Captive Power Plant with a capacity of 960 MW (8x120 MW) is located at Angul. The capacity of the Captive Power Plant is being expanded to 1200 MW (10x120 MW) in the 2<sup>nd</sup> phase expansion which is under progress.

**Table 7.1**  
**Physical Performance of NALCO**

Product	Unit	2005-06*	2006-07*	2007-08 (Target) RE	2007-08* upto Dec.'07 (Prov.)
Bauxite	MT	48,54,253	46,23,278	48,00,000	30,42,864
Alumina	MT	15,90,000	14,75,200	15,75,000	11,55,200
Aluminium	MT	3,58,954	3,58,734	3,37,230	2, 68,274

**Table 7.2**  
**Financial Performance of NALCO**

(Rs. in crores)

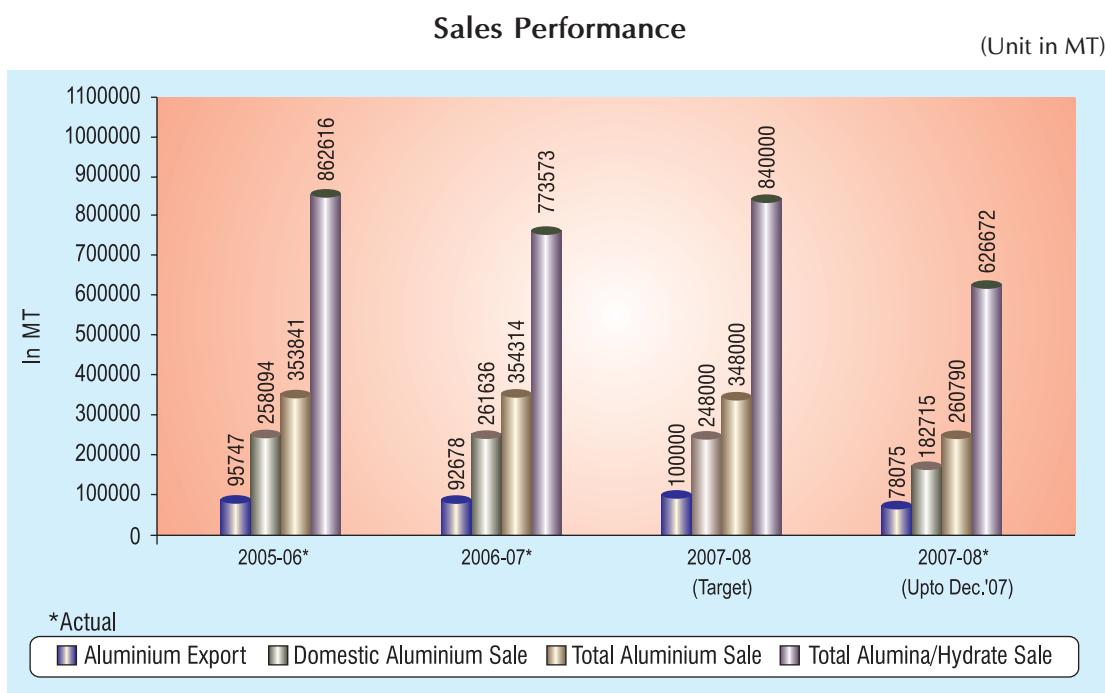
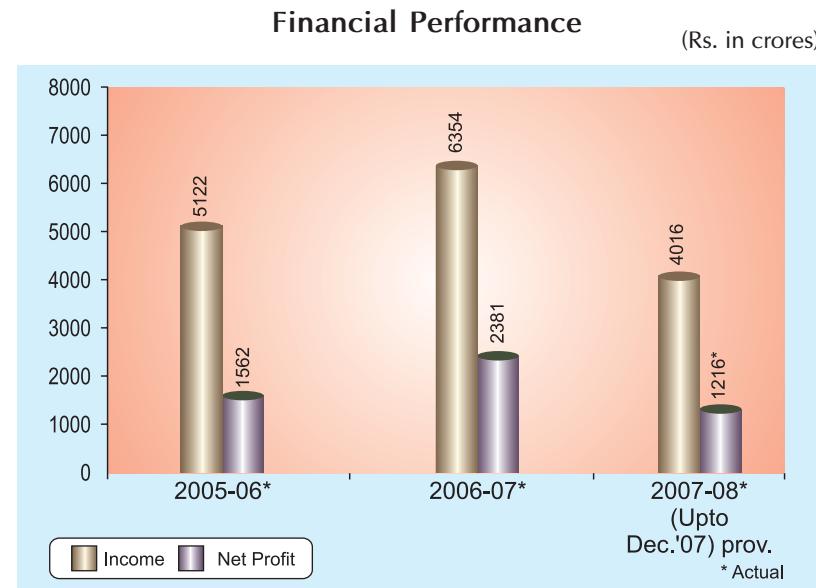
Sl. No.	Details	2005-06*	2006-07*	2007-08 Annual Budget Estimates (RE)	2007-08* upto Dec.'07 (Prov.)
1.	Income	5122	6354	5210	4016
2.	Operating Cost	2311	2412	3101	1958
3.	Interest etc.	0	0	0	0.91
4.	Depreciation & Amortization	381	322	287	204
5.	Net Profit before Tax & Dividend (PBT)	2430	3620	1822	1854
6.	Net Profit after Tax but before Dividend (PAT)	1562	2381	1200	1216

**Table 7.3**  
**Sales Performance of NALCO**

Items	Unit	2005-06*	2006-07*	2007-08 Annual Target	2007-08* upto Dec.'07 (Prov.)
Aluminium Export	MT	95,747	92,678	1,00,000	78,075
Domestic Aluminum Sale	MT	2,58,094	2,61,636	2,48,000	1,82,715
Total Aluminium Sale	MT	3,53,841	3,54,314	3,48,000	2,60,790
Total Alumina/Hydrate Sale	MT	8,62,616	7,73,573	8,40,000	6,26,672

\*Actual

## PERFORMANCE OF NALCO



## On-Going Projects

### Utkal-E Coal Block

7.10 NALCO has been allotted "UTKAL-E" Coal Block for its 9<sup>th</sup> and 10<sup>th</sup> Units of CPP. Investment decision at a capital cost of Rs.214.89 crores at October,'96 price level has been taken. Proposal for expression of interest for short listing of agencies for Coal and Over Burden extraction outsourcing and appointment of an EPC consultant has been initiated. All major environmental studies have been completed. Further studies based on the Terms of Reference conditions are underway.

### Expansion & Diversification

7.11 **Expansion:** The 2<sup>nd</sup> phase of expansion of NALCO, approved by Govt of India on 26.10.2004 is underway. NALCO will fund the capital cost of 2<sup>nd</sup> phase expansion of Rs 4091.51 crore (Rs.5003 crore at March, 2007 price level) partly through internal resources and partly from market borrowings. The proposed expansion will augment the capacity of bauxite mines to 6.3 MTPA from 4.8 MTPA, alumina refinery to 2.1 MTPA from 1.575 MTPA, smelter to 0.46 MTPA from 0.345 MTPA and power generation to 1200 MW from 960MW. The expansion is scheduled to be completed by December, 2008.

7.12 M/s EIL have been appointed EPCM consultant for mines, alumina refinery and aluminium smelter & M/s MECON for captive power plant and steam generation plant. M/s MN Dastur & Company has been assigned for Cost and Time Monitoring.

7.13 As of December, 2007, orders have been placed for 124 packages out of 155 packages of mines & refinery, 119 packages out of 139 packages for smelter and 26 packages out of 28 packages for CPP.

7.14 Total financial commitment up to 31.12.2007 is Rs 3594 crore & expenditure upto the same period is Rs. 1450 crore.

**Table 7.4**  
Status on physical progress upto  
December' 07 of NALCO

Sl. No.	Project Segment	Actual upto December'07
1.	Mines & Alumina	57.3%
2.	Smelter	55.1%
3.	CPP	72.15%

### Energy Conservation Measures

7.15 Energy Conservation measures taken by the company are furnished hereunder:

#### Alumina Refinery

- Specific consumption of coal in hydrate circuit has improved to 0.604 kg per MT from 0.615 kg per MT achieved in 2006-07. This has resulted in conservation of primary energy and annual savings due to this is estimated at Rs.2 crore.
- Specific consumption of electrical energy has improved to 80.78 Kwh/T from 82.85 Kwh/T achieved in previous year resulting in energy saving of 2100 MWH and annual savings due to this is estimated at Rs.53.84 Lakhs.
- Specific consumption of oil has improved to 78.35 ltr /T from 78.62 ltr./T achieved in previous year resulting in saving of 197 KL and annual savings due to this is estimated at Rs.58.8 Lakhs.

#### Smelter Plant

- In Smelter pot line-1, a R&D Project was taken up for reduction in bath (bubble) voltage drop over a period of 78 days. This has resulted in energy saving of 166 Kwh. per MT of metal and estimated annual savings for 3 pot lines is Rs.7.45 Crore.

#### Captive Power Plant

- Installation of soft touch radial seals has resulted in a saving of Rs 61.00 lakhs/ year.
- Modification of ACW outlet line from CEP Thrust bearing carried out in August, 07 has resulted in savings of Rs.5.27 lakh.

### Improvement in Quality of DM Water

- Quality of DM water improved due to timely acid soaking & treatment of resins resulting in reduction in DM water consumption from 6.5% to 5.44%, having financial savings of Rs.9.21 lakh.

### Computerization

7.16 Since its inception, NALCO has adopted Information Technology (IT) for various functions and has continuously expanded the IT coverage in all areas of finance, materials, marketing management and production processes. The application software of NALCO is predominantly on Client Server architecture. Generally, two-tier architecture has been adopted for deployment of applications. To a limited extent, Intel Servers with Windows 2000 & 2003 Operating Systems are used. In majority of the units, applications are deployed from a Central Server using Citrix metaframe.

7.17 All the production units have been connected with 1 MBPS Wide Area Network (WAN) Band width. The port facilities, regional offices and stockyards etc. have been connected through ISP using ISDN dial-up access.

7.18 Integration of ERP solution has been planned to be implemented by 2008-09 on turn key basis through global tendering with consultancy assistance of M/s. Price Waterhouse Coopers Pvt. Ltd.

### Use of Information Technology (IT) in the Organisation

7.19 Following e-Governance activities have been initiated besides implementation of integrated ERP solution across the company:

1. File tracking
2. Bill tracking
3. E-TDS returns
4. Online updation of price list in the web-site.
5. Employee helpline e-Sahayata
6. E-Tendering

### Pollution Control and Environment

7.20 During the financial year 2007-2008, the performance of the Company with respect to pollution control, safety, health & environment management, and plantation activities are satisfactory. As on date, the followings have been achieved:

- All the units have valid consent to operate under Air & Water Act.
- All the 5 units are certified for Environment Management System (EMS), Occupational Health & Safety Management System (OHSMS) and will be implementing Corporate Social Responsibility (CSR) with the international- standard Social Accountability (SA-8000).
- Four major units have valid authorization to handle hazardous waste materials.
- Both the hospitals of Damanjodi and Angul complex have valid authorization for handling bio-medical wastes.
- 16 Ha. mined out area has been rehabilitated by plantation of 42,000 plants.
- Zero discharge plant of mine has been completed and is in operation.
- Municipal solid waste plant at Damanjodi township has been commissioned and is in operation.
- Additional effluent pond in alumina refinery under completion.
- 3,03,600 plants have been planted in M&R & S&P Complexes.
- Pre-construction activities of secured engineering land fill of 40,000 tonne capacity has been started in smelter unit for management of hazardous waste.
- Installation of on-line monitoring system in old fume treatment plant (1&2) in smelter unit is in progress.
- Action initiated for complete waste water recirculation system in smelter unit.

- Stand post type water cum foam monitors (4 numbers) installed in Fuel Oil Pump house at CPP.
- Emergency Control room for control of Disaster at CPP has been established.

### Research and Development Activities

7.21 Both the in-house R&D Centres of NALCO at M&R Complex, Damanjodi and S&P Complex, Angul have been recognized by Department of Scientific & Industrial Research (DSIR), Ministry of Science & Technology, Government of India. Renewal of extension has been granted up to 31<sup>st</sup> March, 2009.

7.22 Both the in-house R&D Centres are addressing to day to day process related problems in addition to undertaking process & product development, cost reduction, energy conservation, waste utilization activities, etc. with emphasis on development of in-house expertise for growth of indigenous technology in the Company by adopting novel innovative practices.

7.23 Thrust has been laid on patenting of process know-how developed in the Company either through in-house or collaborative R&D efforts. So far, 13 Nos. of National & International Patents have been filed by NALCO. 2 Patents on Special Grade Alumina, 1 Patent on Smelting Reduction of Red Mud for Production of Cast Iron have been granted in India and 5 patents have also been granted in China, Australia, Russia, Germany & France on Detergent Grade Zeolite-A.

### Special Grade Alumina & Hydrate

7.24 Special Grade Alumina pilot plant facilities (600 TPA) were run to its full capacity. Different products developed and produced from the facilities are supplied regularly to the user industries. 528 MT of Special Grade Alumina and 827 MT of Special Grade Hydrate were sold to the buyers during the year up to December, 2007.

### Ongoing R&D Projects & Collaborative Activities

- Studies on Mechanochemical Activation of Bauxite to improve the performance of Bayer Process for Alumina Production and minimizing

environmental impact of red mud in collaboration with NML, Jamshedpur. Final Report is under preparation.

- Production of value added materials from Partially Lateritised Khondalite (PLK) of NALCO Mines in collaboration with IMMT, Bhubaneswar. Final Report has been submitted.
- Development of integrated technology for processing East Coast Bauxite for production of alumina in collaboration with JNARDDC, Nagpur. Draft final report has been submitted.
- Study on impurity build-up during bauxite process and its effect on Bayer liquor chemistry in collaboration with JNARDDC, Nagpur. The work is under progress at JNARDDC, Nagpur.
- Evaluation of Grain Refining Efficiency of commercially available grain refiner alloys in Collaboration with JNARDDC, Nagpur. The project is under progress.
- Development of effective technology for extraction of alumina from NALCO's Partially Lateritised Khondalites (PLK) with Moscow Institute of Steel & Alloys (MISA), Moscow, Russia/Romelt-SAIL India Limited (RSIL), New Delhi. The project is under progress at MISA, Moscow, Russia.
- Development of a viable process flow sheet to recover titanium and iron from the plant sand of NALCO's alumina refinery, Damanjodi in collaboration with IMMT, Bhubaneswar. Phase-II Report on Investigations of alternate route of reduction roasting followed by beneficiation of NALCO's plant sand have been successfully completed and report submitted. The process has been demonstrated. Further activities are under progress.
- Investigation & utilisation of spent pot lining materials (SPL) of smelter plant, Angul as a co-fuel at NALCO's Captive Power Plant in collaboration with Central Institute of Mining & Fuel Research (CIMFR), Dhanbad. Phase-I & II studies have been completed and reports have

been submitted. The reports are being evaluated.

- (ix) Plasma smelting of red mud for production of pig iron/cast iron & alumina rich slag in collaboration with IMMT, Bhubaneswar. Requisite samples have been delivered for commencement of research work.
- (x) Decontamination and recovery of carbon value from spent pot liner – a Pilot Plant Study in collaboration with IMMT, Bhubaneswar. Work order has been placed for project implementation. Further work is under progress.
- (xi) Development of process for extraction of vanadium sludge from NALCO's Green Liquor in collaboration with JNARDDC, Nagpur. Interim report has been submitted by JNARDDC and comments thereon were sent to JNARDDC, Nagpur.
- (xii) Preparation & certification of reference materials for selected ores & other materials in collaboration with JNARDDC, Nagpur. The work is under progress at JNARDDC, Nagpur.
- (xiii) Infrared thermography studies at alumina plant, Damanjodi in collaboration with JNARDDC, Nagpur. Work is in progress.

### Gallium Project

7.25 Letter of Intent has been placed with EIL in September, 2007 for preparation of Techno-Economic Feasibility Report (TEFR) for setting up of a Gallium Plant ( 7 TPA Capacity) at NALCO's alumina refinery, Damanjodi using spent liquor as the principal raw material in collaboration with Nippon Light Metal (NLM), JFE Shoji Trading Corporation (JFEST) , Japan & Sabsons International Private Limited (Sabsons), Chennai. Preparation of TEFR is under progress at EIL.

### Nickel Project

7.26 Preparation of Techno-Economic Feasibility Report(TEFR) for setting up of a 10,000 TPA Nickel Production Plant based on the know-how developed by Institute of Minerals and Materials Technology (IMMT), Bhubaneswar is under consideration.

**Table 7.5**  
**MOU Rating achieved during last three years by NALCO**

Year	Composite Score	Grade
2004-05	1.27	Excellent.
2005-06	1.253	Excellent.
2006-07	1.40	Excellent.

### (B) Hindustan Copper Limited (HCL)

#### Introduction

7.27 Hindustan Copper Limited (HCL) was incorporated on 9<sup>th</sup> November,1967, under the Companies Act,1956. It was established as a Govt. of India Enterprise to take over all plants, projects, schemes and studies pertaining to the exploration and exploitation of copper deposits, including smelting and refining from National Mineral Development Corporation Ltd.

7.28 The Government of India nationalised the only copper producing company in the private sector, Indian Copper Corporation Ltd. at Ghatsila in Jharkhand in March 1972 and handed over its management and ownership to Hindustan Copper Limited.

7.29 The Smelter Plant at Khetri Copper Complex (KCC) in Rajasthan with capacity of 31000 tonnes was dedicated to the nation on 5<sup>th</sup> February 1975.

7.30 In November 1982, Malanjkhand Copper Project comprising of a large and fully mechanised open pit mine and Concentrator plant was dedicated to the nation.

7.31 The Continuous Cast Copper Rod plant at Taloja Copper Project of Hindustan Copper Ltd. was commissioned in December,1989 with an installed capacity of 60,000 tonnes.

7.32 Present capacities of HCL's Mines and Smelters are given on the next page:

MINES		(Lakh tonnes/annum)
Location	Ore Capacity	
Khetri Copper Complex, Rajasthan	12.00	
Malanjkhand Copper Project, Madhya Pradesh	20.00	
<b>Total</b>	<b>32.00</b>	

SMELTERS		(Tonnes/annum)
Location	Metal capacity	
Khetri Copper Complex, Rajasthan	31,000	
Indian Copper Complex, Jharkhand	16,500	
<b>Total :</b>	<b>47,500</b>	

CC ROD PLANT		(Tonnes/annum)
Location	Capacity	
Taloja Copper Plant, Maharashtra	60,000	

### Physical Performance

7.33 Production of ore, metal in concentrates, refined copper (cathode) and wire rod during the year 2005-06, 2006-07 and 2007-08 (upto Dec'07) are given in Table 7.6.

### Financial Performance

7.34 Financial Performance of the Company since 2005-06 is given in Table 7.7.

**Table 7.6**  
**Physical Performance of HCL**

Sl. No.	Products	2005-06*	2006-07*	2007-08 (Target)	2007-08* (Upto Dec.'07)
1.	Ore Production('000MT)	2637	3271	3200	2399
2.	Metal in Concentrate(MT)	22984	30231	31000	23590
3.	Refined Copper(Cathode) (MT)	36087	39785	40000	32601
4.	Wire rod (MT)	34749	42745	37800	42084

\* Actual

**Table 7.7**  
**Financial Performance of HCL**

(Rs.in crores)

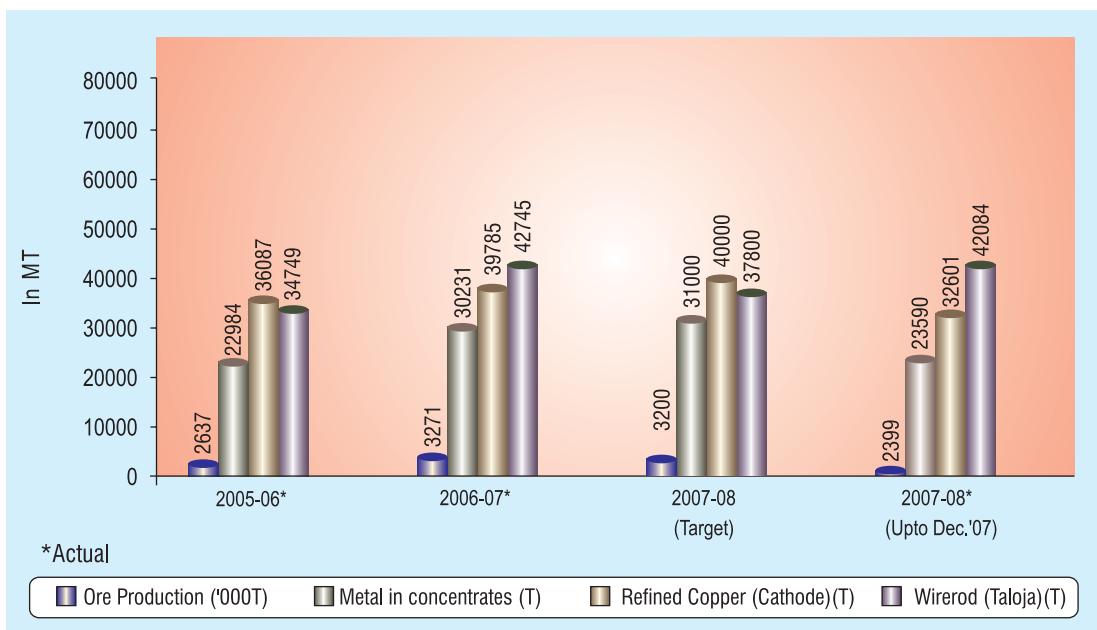
Sl. No.	Details	2005-06*	2006-07*	Target for 2007-08	2007-08* (Upto Dec'07 (Prov.))
1.	Income	1107.60	1909.19	1321.99	1409.37
2.	Operating Cost	910.47	1453.05	1037.46	1119.51
3.	Interest and Transaction cost	38.54	34.85	19.36	22.93
4.	Depreciation and Amortisation	58.37	89.46	77.28	62.32
5.	Net Profit/(Loss) before Income Tax	100.22	331.83	187.89	204.61
6.	Net Profit/(Loss) after income tax & dividend	105.88	313.94	166.80	181.19

\* Actual

## PERFORMANCE OF HINDUSTAN COPPER LIMITED

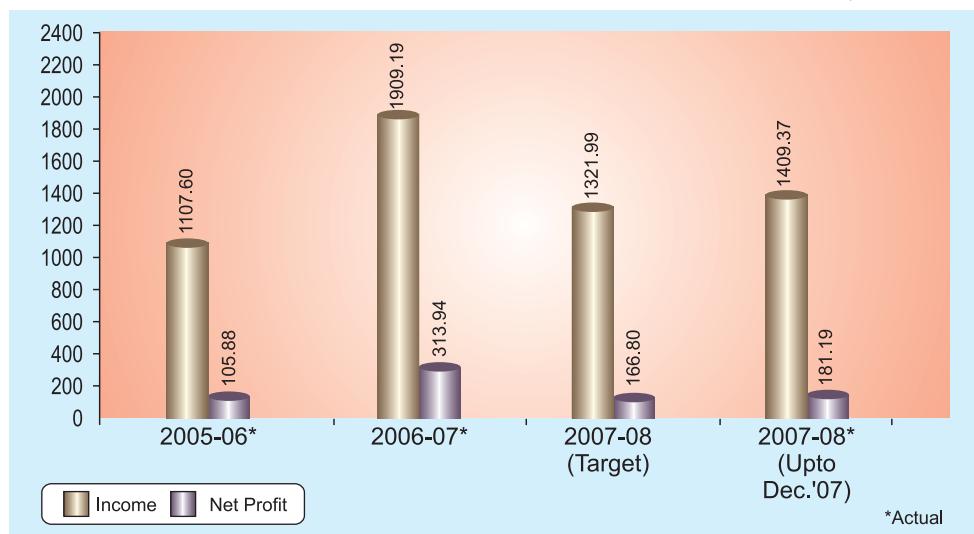
### Physical Performance

(Unit in MT)



### Financial Performance

(Rs. in crores)



**Table 7.8**  
**Energy Conservation**

Physical consumption	2004-05	2005-06	2006-07	2007-08 (upto Dec'07)
Power (Lakh KWH)	1960	2298.31	2316	1618
Fuel(Kilo liters)	11879	27474.23	25311	16429
Natural Gas ('000 NM <sup>3</sup> )	1629	2011.88	2341	1705

### Sales Performance

7.35 The Company has achieved total sales of 32,803 MT of copper upto December '07. This includes export of 503 MT of wire rod. The anticipated sales during 2007-08 would be around 42,500 MT.

### Restructuring Proposal of HCL

7.36 Govt. of India has approved the Financial Restructuring proposal in respect of Hindustan Copper Limited. The salient features of the Financial re-structuring of Hindustan Copper Limited (HCL) is as under:-

- (i) Conversion of non-plan loan amounting to Rs.50.00 crore into equity (Rs. 25 crore each released in 2005-06 and in 2006-07).
- (ii) Waiver of 7.5% non-cumulative redeemable preference share amounting to Rs. 180.73 crore and its adjustment against accumulated losses.
- (iii) Restructuring of capital through reduction of face value of equity share from Rs. 10 to Rs. 5 amounting to Rs. 382.21 crore and its adjustment against the accumulated losses.
- (iv) Restoration of superannuation age to 60 years to preserve skills and provide a breathing time to the organization for formulation of proper succession plan.
- (v) Creation of post of Director (Mining) to drive the growth agenda in the mining domain.

### Energy Conservation

7.37 HCL continues to give priority for energy conservation measures at various stages of process

from mining of ore to extraction of copper metal and other byproducts. Special efforts were made in making the operations energy efficient. For quantifying savings in energy and to improve energy efficiency in the all units, M/s Petroleum Conservation Research Association (PCRA) was appointed as technical consultant to carry out energy audit work and to identify & recommend various saving options during 2006-07. Most of the recommendations as projected by M/s PCRA in reports of different units have been implemented to save energy and balance are in progress. Energy audit cells of all the units are also constantly monitoring the energy consumption in mines, plants and township for overall reduction in energy consumption. Constant thrust was also given to improve power factor.

7.38 The overall consumption of Power and Fuel during 2006-07 and previous three years are given in Table 7.8.

### Science & Technology/R&D Activities

- (i) During the year, Company concentrated on improving the operational practices with a view to reduce processing cost. Towards R&D, HCL in collaboration with Institute of Minerals and Materials Technology (IMMT), Bhubaneswar has taken up a project on bio-heap leaching under Deptt. of Science of Technology (S&T), Govt. of India.
- (ii) Earth Resources Technology Consultants was engaged for optimisation of blasting fragmentation at MCP for productivity improvement. Various suggestions/ recommendations given by consultant have been implemented at MCP.

- (iii) Action has been initiated for procurement and installation of 300 Cu.ft cells to replace existing cleaner – I & Scavenger cells in Flotation circuit of KCC Concentrator plant for improving recovery and grade of Copper.
- (iv) Action has also been initiated for procurement of Pressure filters for reducing moisture percentage in copper concentrate in ore beneficiation plants of MCP and KCC.
- (v) Action has also been taken for procurement of latest CJD burner, modified cooling elements and Oxygen enrichment system in flash Smelter of Indian Copper Complex towards technology-upgradation and also to enhance the capacity of flash Smelter.
- (vi) NABL (National Accreditation Board for testing and Calibration Laboratories) accreditation of R&D laboratory for copper cathode of Indian Copper Complex has been obtained. Recommendation for KCC R&D lab from NABL shall be received shortly.

### Computerization

7.39 HCL has taken various e-initiatives on this front with projects such as Enterprise Resource Planning (ERP), Internet Banking Enterprise Procurement System (EPS). Other important developments:

- (a) Up gradation of IT infrastructure & networking in all units, Head office & Sales offices
- (b) ERP implementation, Oracle 12i ERP solution integrating all functional areas for faster information flow and efficient decision making.
- (c) 'Web based LME real time booking' to facilitate on-line booking by customers has been implemented.
- (d) New Mailing Solution – IBM Lotus Domino has been implemented by installing Mail server and creating uniform mail accounts across all units, Head office & Sales offices.
- (e) Company website (both in English & Hindi version) is being improved & modified for better content and look.

## POLLUTION CONTROL AND ENVIRONMENT MANAGEMENT EFFORTS

### Air Pollution Control Measures

7.40 The air pollution control projects which were commissioned for meeting Pollution Control Board standards for gaseous emission from HCL's Smelter and other plants were operational during the year. The ambient air quality at all the units of HCL was regularly monitored at various points in the mines, works and residential areas throughout the year.

### Water Pollution Control Measures

7.41 During the year, effluent treatment facilities provided in all units of HCL worked satisfactorily and met regulatory norms set for discharge water by the State Pollution Control Boards. The schemes for recycling the process discharged water for use in the plants, after treatment, also continued to function throughout the year.

7.42 Besides above, a consultant was also appointed to undertake environmental audit in all the four units of HCL towards improvement in environmental norms.

### Afforestation

7.43 In addition to lumpsum payments towards compensatory afforestation by HCL for diversion of forest lands for mining purpose at the units of the company, separate afforestation work like all previous years continued during the year. Plantation in ultimate benches, slopes of waste dumps, plant areas, tailing dumps and townships of the units were carried out to uplift environment.

7.44 The Group wise strength of female employees as on 31.12.2007 vis-a-vis the total strength of HCL is given in Table 7.9.

7.45 The representation of SC, ST and OBC employees out of the total manpower of 5415 as on 31.12.2007 is 16.36%, 12.52% and 12.21%, respectively.

7.46 The retired employees of the Company as well as their spouse are extended medical treatment at the Company's own Hospitals at the Projects. Company also extends support to 'Mahila Samity' and other

**Table 7.9**

Group	Total Strength	No. of female Employees	% of female Employees to total Strength
Group-A	687	25	3.64
Group-B	126	8	6.35
Group-C	3789	141	3.72
Group-D	813	133	16.36
<b>Total</b>	<b>5415</b>	<b>307</b>	<b>5.67</b>

institutions /NGOs in their endeavour to run 'Health camps' for the local population.

7.47 In the townships of the Company located at Khetri, Malanjkhand and Ghatsila as well as in other places of work, the employees of different caste, creed, religion, live together and celebrate all religious festivals with pomp and gaiety.

#### **The Status of Implementation of the Persons with Disability Act, 1985**

7.48 During last few years the manpower of the Company is being rationalized and therefore there has been no scope of fresh recruitment with the result physically challenged persons also could not be recruited. In addition, the mining operations of the Company being hazardous in nature, the scope of engagement of physically challenged persons is limited. The number of physically challenged persons employed in the Company as on 31.12.2007.

**Table 7.10**

Group	Number of physically challenged persons
A	2
B	0
C	41
D	14
<b>Total</b>	<b>57</b>

#### **Human Resource Development**

7.49 Training and Development of all levels of employees is given due priority by the Company to

increase effectiveness. Special emphasis was given to organisation Building and shaping right attitudes, team building and work culture besides preparing employees to understand the trends in fast changing technology/switching over to latest technology for achieving higher results in production, productivity and profitability.

#### **Redressal of Public grievances Machinery in Hindustan Copper Limited**

7.50 With a view to redress the grievance/complaints of the members of public, Complaint Officers have been appointed at Corporate Office as well as in all the Projects/ Offices of the Company who have been authorized to receive the members of the public who have any grievance/complaint. Notice to this effect has been displayed on the prominent places wherein the members of public have been requested to meet the concerned Complaint Officers with regard to their complaint/grievance. Similarly, complaint boxes have been put on prominent places in all the offices of the Company, where the members of public can put their complaint in writing. These boxes are opened by the Competent Officers every week and if there are any complaint/grievance, necessary remedial action is taken. SC/ST Grievance Cells have been constituted in the Offices of the Company to redress the grievance of SC/ST employees as also other members of the public belonging to weaker sections of the society. Grievance/complaints received from the women employees as also members of the public are given immediate attention with a view to redress their grievance. In addition, Complaint Registers are also available with the Complaint Officers where the

members of public can write down their complaints and meet with the Complaint Officers. In this connection, it may be mentioned that there has not been any serious grievances/complaints either in writing or verbal from the members of public against any individual or the Department of the Company which has not been redressed or action is pending. There is no case/complaint pending for disposal as on 31<sup>st</sup> December, 2007. A link to Public Grievances Site on Govt. of India [www.pgportal.gov.in](http://www.pgportal.gov.in) is provided in Company's website [www.hindustancopper.com](http://www.hindustancopper.com) main page as 'public grievance' in other information section at the bottom. Public grievances can be lodged through this link on main page of Company's website [www.hindustancopper.com](http://www.hindustancopper.com) .

#### 7.51 MOU ratings achieved by HCL

**Table 7.11**

Year	Grade
2003-2004	Very Good
2004-2005	Very Good
2005-2006	Very Good
2006-2007	Very Good

#### (C) MINERAL EXPLORATION CORPORATION LIMITED (MECL)

7.52 The Mineral Exploration Corporation Limited (MECL) since its inception in the year 1972 is carrying out mineral exploration activities. So far, it has added 1,25,879 million tonnes of mineral reserves to National Mineral Inventory.

7.53 The Company's registered office is at Nagpur, Maharashtra and it manages the functioning of projects through a 2 tier system from the Corporate Office at Nagpur. To facilitate the prompt maintenance of plants and machineries deployed at various projects, three Regional Maintenance Centres at Ranchi, Nagpur and Hyderabad are being operated. Technical guidance to the projects, finalisation of geological reports, close liaisoning with the clients and looking for new business opportunities is being carried out through the Zonal Offices located at Ranchi, Nagpur and Hyderabad. The commercial activities of the Company is being looked after by

Business Development and Planning Division, in addition two Business Development Centers are in operation at Delhi and Kolkata.

7.54 MECL is the premier exploration agency in the country and carries out its exploration activities under Promotional programme funded by Govt. of India and contractual programme on behalf of other agencies including Public Sector, Private Sector and State Governments on agreed terms and conditions. The share of promotional and contractual work is around 60 % & 40% respectively in its total turn over.

7.55 In addition to mineral exploration activities, MECL has taken up diversification programme(s) in the field of slim hole drilling for Coal Bed Methane, coal sampling and analysis as a referral agency and supply of ballast stone to Railways.

#### Financial Restructuring

7.56 The Government of India has conveyed its approval for financial restructuring and wage revision in MECL vide its letter No. 40(1)/2004-MI (Vol.III) dated 8.8.06 and 17.8.06. The same has been implemented during 2006-07. As company has achieved the physical and financial targets for the year 2006-07 as indicated by Govt. of India while conveying the approval of financial restructuring, arrears of wage revision for two years i.e. 2003-04 and 2004-05 have been paid during 2007-08.

#### Physico-Financial Performance 2007-08

7.57 The physical performance in drilling, developmental mining and geological reports for 2005-06, 2006-07, 2007-08 (upto December, '07) and anticipated for January, '08 –March, '08 is given in Table-7.12 and the financial performance is given in Table-7.13.

#### Monitoring System

7.58 For effective monitoring of the projects, regular management level meetings are being taken to review the performance of projects and actions were initiated for implementation of remedial measures at projects. Each project was closely monitored on day-to-day basis and corrective measures were taken to achieve the set monthly targets.

**Table 7.12**  
**Physical Performance of MECL**

Item	2005-06*	2006-07*	2007-08 MoU (Target)	2006-07* (upto Dec.'06)	2007-08* (upto Dec.'07)
Drilling Meterage (m)	1,78,425	1,96,979	1,95,000	1,31,616	1,42,249
Mining (Mtrs)	8,280	7,811	6,600	4,934	4,521
Final Geological Reports (Nos.)	45	41	25	27	23

**Table 7.13**  
**Financial Performance of MECL**

(Rs. In crores)

Details	2005-06*	2006-07*	2007-08 MoU (Target)	2006-07* (upto Dec.'06)	2007-08* (upto Dec.'07)
Gross Revenue	82.56	85.29	87.50	56.39	66.22
Operating Cost	60.74	74.08	78.93	52.76	60.10
Interest	—	—	—	—	—
Depreciation and amortisation	3.18	3.68	4.02	3.61	3.00
Extraordinary item (waiver of interest on Govt. loan)	—	55.69	—	—	—
Net profit before income tax & FBT	16.21	59.57	4.55	0.12	3.12

\*Actual

### Awards

**7.59 MoU Excellence Award:** For the outstanding performance during the year 2005-06, MECL was conferred with MoU Excellence Award by Department of Public Enterprises, Govt. of India.

**7.60 Best Chief Executive Gold Award:** Dr. A.K. Lomas, CMD, MECL was conferred with 'Best Chief Executive Gold Award' for excellence in Indian Industry by Public Sector Today magazine under the banner of Rajiv Gandhi Memorial National Award 2007.

**7.61 Udyog Rattan Award :** The Institute of Economic Studies (IES) New Delhi has conferred the "Udyog Rattan Award" on Dr. A.K. Lomas, CMD,

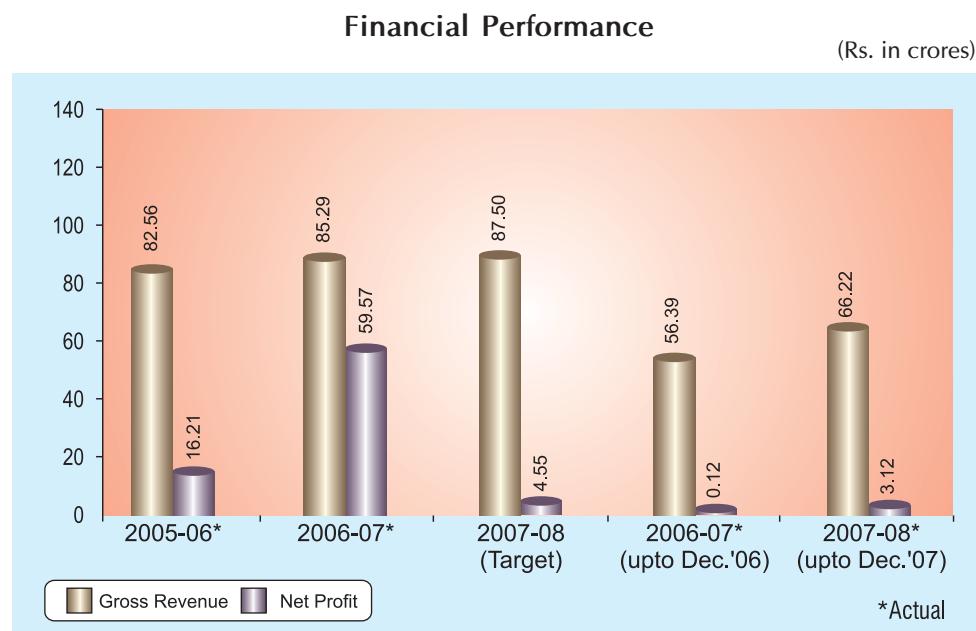
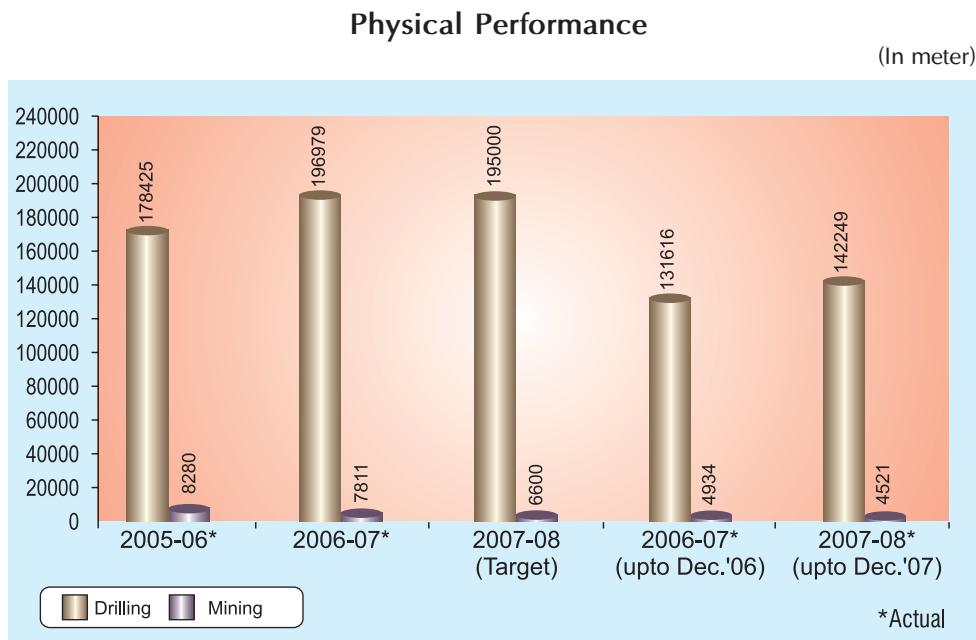
MECL and the "Excellence Award" to MECL during a seminar on Economic Studies held at New Delhi.

### Science & Technology

**7.62** The data acquisition of the Science and Technology project entitled "Development of Electromagnetic Tomography and Buried Electrode Method for Geo-technical Studies and base metal exploration was completed in July, 2004 and the final report was submitted in October, 2004.

**7.63** After some modification of the equipment the method can be used in future for following investigations:

## PERFORMANCE OF MINERAL EXPLORATION CORPORATION LIMITED



- Disposition of mineralized zone between two boreholes.
- In tackling geotechnical/geo-engineering problems.

At present no S&T project are with this Division.

### Energy Conservation

7.64 MECL has taken up the following steps for energy conservation:

- (i) Machineries/vehicles used at different projects are maintained on regular basis to improve fuel efficiency.
- (ii) While selecting an electric drive, care is being taken to match the power demanded by the load and nearest available KW for the drive. This reduces the wastage of electricity due to the minimum loss on reactive power.
- (iii) Running of idle motors is kept to the minimum and sequence control has been incorporated in the crushing plant at Birmitrapur.
- (iv) The operating and maintenance personnel are trained to update their knowledge in respect of energy conservation measures.
- (v) For developing more awareness of energy conservation, MECL is organising "Energy Conservation Week" every year. The experts on the subject are being invited to deliver lectures on new trend / matter for energy conservation.

### Perspective on Non-Ferrous Metals

7.65 During 2007-08 upto December, 2007, MECL has carried out exploration activity for gold in Bhukia East, Rajasthan and Parasi Central block, Jharkhand. For copper in Sanganer, Satkui and Dhani Basri block Rajasthan, Dhabani Mine area in Jharkhand. The brief account of exploration work carried out (Block-wise) by MECL is as under:

- **Bhukia (East) Gold block, Distt. Banswara, Rajasthan :**

7.66 Exploration proposal for gold in Bhukia (E) block was approved in 15<sup>th</sup> SCPP held on 17/11/06 involving

4180 m. of exploratory drilling and matching geological and laboratory work.

7.67 MECL commenced exploration work in December, 2006 and temporarily suspended the work in Oct.'07 awaiting forest clearance. During that period exploratory drilling of 1763 m. was carried out in 8 Bore holes with associated geological and laboratory work. It has been observed from the available laboratory results that the significant gold mineralization with good values have been intersected in boreholes. Exploration work in Bhukia East block will resume as soon as the forest clearance is received.

7.68 Exploration work in Timiranmata block will commence after getting forest clearance.

- **Dhani-Basri base-metal block, Distt. Dausa, Rajasthan :**

7.69 The exploration proposal for copper & associated precious metal in Dhani Basri block was approved in 16<sup>th</sup> SCPP held on 17/5/07 involving 3865 m. of exploratory drilling and associated geological and laboratory work.

7.70 Exploration work commenced in June, 2007 and a total of 3142 m of exploratory drilling in 11 boreholes with associated geological and laboratory work has been carried out. The analytical results received so far indicate encouraging results of significant mineralization of gold and copper values. Most of the boreholes intersected significant mineralized zones. Exploration is in progress.

- **Parasi Central (Gold) block, Distt. Ranchi, Jharkhand:**

7.71 The exploration proposal for gold in Parasi (Central) block was approved in 16<sup>th</sup> SCPP held on 17.5.07 involving 2700 m. of exploratory drilling and associated geological & laboratory work.

7.72 Exploration work commenced in May, 2007 and a total of 1427 m. of drilling in 10 bore holes with associated geological and laboratory work has been carried out. Significant mineralization has been intersected in boreholes, varying in thickness from 2 m. to 10 m. based on visual estimation. The laboratory study is in progress.

**□ Sanganer Copper block, Distt. Bhilwara, Rajasthan :**

7.73 The exploration proposal for copper in Sanganer block was approved in 15<sup>th</sup> SCPP held on 17.11.06 involving 2510 m. of drilling with associated geological and laboratory work. The exploration work commenced in December, 2006 and concluded in April, 2007. A total of 2604 m. of exploratory drilling has been carried out in 17 boreholes with associated Geological & laboratory work. Significant mineralized zones have been intersected in boreholes. A total of 17.21 million tonnes of copper ore reserves at average grade of 0.32% Cu at 0.20% cut off with associated 2.54 million tonnes of low grade (1.82% Pb & Zn) resources have been estimated. Geological report of the block was submitted in November, 2007.

**□ Satkui Copper block, Distt. Jhunjhunu, Rajasthan :**

7.74 Exploration proposal for copper in Satkui block was approved in 16<sup>th</sup> SCPP held on 17/5/07 involving 4450 m of exploratory drilling with matching geological and laboratory study.

7.75 Exploration work commenced in June,'07 and a total of 1362 m of exploratory drilling in 5 boreholes with associated geological and laboratory study have been carried out. In some of the boreholes, mineralized zone have been demarcated based on visual estimation. The exploration in the block is in progress.

**□ Dhobani Copper block, Distt. East Singhbhum, Jharkhand :**

7.76 Exploration proposal for copper in Dhobani block was approved in 16<sup>th</sup> SCPP held on 17/5/07 involving 4000 m. of exploratory drilling and associated geological & laboratory work.

7.77 Exploration work commenced in July,'07 and a total of 1720 m of exploratory drilling in 8 boreholes and matching geological and laboratory work have been carried out. Significant mineralised zone have been intersected in boreholes based on visual estimation. Work in Dhobani block is in progress.

**□ Banskhapa – Pipariya Lead-Zinc Sub-Block-I, Distt. Betul, Madhya Pradesh :**

7.78 Exploration proposal for Base Metal (Pb-Zn-Cu) in Banskhapa-Pipariya block was approved in 15<sup>th</sup> SCPP held on 17/11/06 involving 1250 m of exploratory drilling with associated geological and laboratory work.

7.79 MECL commenced exploration in Jan,'07 and concluded the exploration activities in March, 2007 by drilling 1250 m in 6 boreholes with associated work. A total of 1.198 million tones of ore reserves with grade – 2.75% Zn and 0.41% Cu at 1 % Zn cut off have been estimated in the strike length of 260 m. The Geological report was submitted in November, 2007.

**□ Garhi Dongri Gold Block, Distt. Balaghat, Madhya Pradesh :**

7.80 Exploration proposal for gold in Garhi Dongri block was approved in 14<sup>th</sup> SCPP held on 8/6/06 involving 800 m. of drilling and 2100 cu.m. of shallow trenching with associated geological and laboratory work. MECL commenced exploration in October, 2006 and concluded the physical work in March, 2007. A total of 801 m. of drilling in 5 boreholes, 2100 cu.m. of shallow trenching in 20 trenches and associated geological and laboratory work has been carried out. In shallow trenches presence of gold mineralization has been observed. Trench-III has given the highest value of 9.64 g/t gold in individual sample. In boreholes, the continuity of vein quartz was established at depth. Ore reserves could not be estimated due to poor value of gold mineralization in the block in general. Geological report was submitted in July, 2007.

**□ Dariba Akola Copper Block, Distt. Chittorgarh, Rajasthan :**

7.81 Exploration proposal for copper in Dariba Akola block was approved in 14<sup>th</sup> SCPP held on 8/6/07 involving 2375 m. of exploratory drilling with matching geological & laboratory work. MECL commenced work in July, 2006 and concluded the physical work in December, 2006. A total of 2375 m. drilling in 15 boreholes have been

achieved with associated geological & laboratory work. A total of 2.635 million tonnes of ore reserves with 0.80% Cu at 0.50%Cu cut off have been estimated in 4 lodes. Geological report was submitted in August, 2007.

□ **Devtalai Copper (Phase-II) block, Distt. Bhilwara, Rajasthan :**

7.82 Exploration proposal of Devtalai Copper (PH-II) was approved in 14<sup>th</sup> SCPP held on 8/6/06 involving 2900 m. of exploratory drilling with associated geological and laboratory work. MECL commenced exploration activity in July,'06 and concluded physical work in January, 2007. A total of 3002.65 m. drilling in 17 boreholes with associated geological & laboratory work have been carried out. A total of 1.58 million tonnes of ore reserves with average grade of 1.25 % Cu and 503 kg of in-situ gold has been estimated. Geological report was submitted in October, 2007.

**Action Taken on Abatement of Pollution and Environment:**

7.83 The exploration activities of MECL do not cause any significant pollution. However, as a part of exploration work, MECL is carrying out environmental studies to generate baseline environmental data, which includes geology & geomorphology, meteorology, air quality, noise, land use / land cover studies, soil quality, biota, water regime and socio economics.

7.84 For helping the exploitation agencies to plan measures for abating possible pollution and preparing Environmental Impact Assessment (EIA), a report on the same is included as a part of geological reports of various exploration projects.

**Information Technology (IT)**

7.85 Geological data processing of 15 exploration blocks viz. Sindesar, Dariba Akola, Devtalai, Garhi Dongri, Banskhapa, Sanganeer and Saipum on behalf of Ministry of Mines and Jalipa Central and South, Bapaieu, Girirajsar Extension and Noka Gravity, East of Basin Fatepur, West of Shadol, Raghavapuram, North of Jharna Extension on behalf of Ministry of Coal , of various minerals (viz. coal , lignite, copper, gold, limestone and lead & zinc), explored by MECL, were carried out. The work includes online database creation, numerical & graphical modeling and map

database creation by scanning & digitizing surface features, contours, geological features & litho-contacts, administrative boundary, mine workings, section line, etc. from geological and topographical plans.

7.86 Digital conversion of analog geophysical logs of 8 boreholes pertaining to lignite blocks have been done. This converted data and the digital data generated from geophysical loggers are brought into uniform format by using in-house developed utility interface. These geophysical logs are then plotted along with exploratory boreholes using indigenously developed software .

7.87 Exploration data processing and preparation of numerical and spatial Models of Koira Iron Ore Deposit on behalf of NINL and Dulunga Coal Block for NTPC were completed.

7.88 Exploration data processing of Nagaur Salt Deposit on behalf of ONGC was also completed.

7.89 Lithological and Block Modeling of Hadla and Jayamkondam Blocks were completed for NLC. Similarly Geological Modeling for Dulunga block, NTPC was also completed.

7.90 The Ore Body Modeling work for the following Blocks are in progress.

- Tilaipalli
- Bithnok

7.91 A database application has been developed for "Resource Estimation of Oil Shale Deposits and Syncrude Potential" Project in collaboration with BRGM, France.

7.92 Maintenance and updation of MECL's website were also carried out and following works were done during the period:

- Providing technical inputs for conversion and redesigning of MECL's Website
- Coordination with the domain registration, hosting and website conversion agencies.
- Assisting in uploading of tenders whenever required.
- Provided links of 'Public Grievances Registration', 'Vigilance', 'Details of Tenders/ Contracts

'Awarded', 'Technical Papers in Hindi" and uploaded the information regarding the same.

- e) Updation of MECMINDEX (Mineral Inventory of MECL's exploration reports) was done and various reports were generated as per the requirement of user division.
- f) Provided I.T support services to various departments of MECL and other Government departments for selecting and evaluating hardware and software, trouble shooting solutions related to internet, printers, video conferencing etc.
- g) Technical offers & proposals, cost estimates and presentations were also made for work generation.

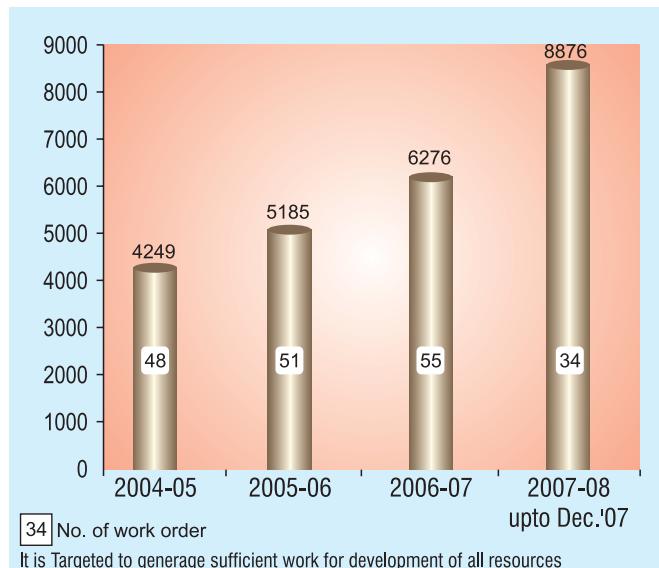
### Business Development Activity

7.93 Through business development group, vigorous efforts are being made to obtain work from both private and public sectors through competitive bidding and a series of technical discussions. As a result, during 2007-08 upto December '07, a total of 34 number of work orders were received valued at Rs. 88.76 crores.

7.94 The year wise break up of contractual work orders received during last 4 years is given in graph.

7.95 The work orders were received both from PSUs as well as Private organisations viz. M/s. ONGC, DGH, NTPC, UCIL, NLC, OMC/APMDC, MCL, HZL, JSW etc.

### Contractual Work Order (Value in lakhs)



### Diversification Activity

7.96 MECL diversified its activities in the following fields:

- (i) Deep slim hole drilling for Coal Bed Methane (CBM) studies on behalf of ONGC and other organisations.
- (ii) Remote Sensing and Environmental studies.
- (iii) Coal sampling and analysis.
- (iv) Supply of ballast stone to SE Railway.
- (v) Deep Drilling for Hydrological investigation / evaporites.

7.97 Further, MECL plans to enter in the following new areas for its growth & business development :

- Production support drilling for mine services.
- Production well drilling for CBM assessment.
- Drilling for underground coal gasification.
- Exploratory & production well drilling for geo-thermal energy.
- Lumpsum turn key project implementation
- Services of Information Technology Centre.
- Production mining of minerals and their marketing.
- Services of work over rig.

### MANUFACTURING UNIT

7.98 MECL has a well equipped central workshop and manufacturing unit at Nagpur to cater to the needs of drilling and developmental mining projects and to provide engineering support to field operations. It carries out repairing/overhauling of drilling and mining equipments and light/heavy vehicles. It manufactures TC bits and spares & accessories for coring and non-coring drill machines. Also, it has sophisticated CNC lathe machine for the manufacturing of drill tubulars.

### Coal Sampling and Analysis

7.99 As a third party agency, MECL continued coal

sampling and analysis work on behalf of various coal companies, steel plants, thermal power plants and electricity boards. In all, eight projects are in operation at different coalfields (CCL, BCCL, MCL, SECL & ECL) and a total value of work carried out during the year upto December,'07 was Rs. 126.37 lakhs.

### Salient Aspects of the Work being done by Advisory Boards/Councils

7.100 MECL is a member of several Boards/Committee of Central and State level which deal with geological/exploration work of minerals viz., Standing Committee on Promotional Project (SCPP), Central Geological Programming Board (CGPB), various sub-committees of CGPB for different minerals, National Mineral Advisory Council and State Geological Programming Board (SGPB).

7.101 During the period April to December, 2007, MECL has participated in the following meetings and had close interactions with various Central / State/ Public Sector Organisations in connection with formulation / review of exploration schemes and also for work generation:

- ❑ Meeting to review the guidelines stipulating the norms for survey and investigation on forest land at New Delhi on 3<sup>rd</sup> April, 2007.
- ❑ Meeting of SCPP on 17/5/07 regarding promotional projects.
- ❑ Meeting between MECL and CMDCL at Raipur, M.P. for finalization of work programme and MoU.
- ❑ A joint meeting of DGH, BRGM, France and MECL held on 15/6/07 at New Delhi regarding Oil Shale project.
- ❑ 46<sup>th</sup> Sub-committee Meeting on Energy Minerals (Group-III CGPB) held at CMPDIL, Ranchi on 11<sup>th</sup> & 12<sup>th</sup> July, 2007.
- ❑ Eleventh International Conference on Non Ferrous Metals 2007 held at Raipur, Madhya Pradesh.
- ❑ Meeting with ONGC and HCL held on 7/8/07 at Kolkata regarding work programme.
- ❑ Meeting between MECL and CMPDIL held on 8/8/07 at Ranchi to discuss on work programme in view of CGPB Gr.-III programme.
- ❑ A meeting of Bureau of Indian Standard on Ores and Raw Materials Sectional Committee, MTD-13 held at Goa on 13<sup>th</sup> & 14<sup>th</sup> August, 2007.
- ❑ A meeting with Haryana State Power Company Limited (HSPCL) to discuss the exploration strategy for allotted coal blocks held at Chandigarh on 21/8/07.
- ❑ Meeting with Minerals Metal Trading Corporation (MMTC) held at New Delhi on 22/8/07 to discuss on work programme.
- ❑ 8<sup>th</sup> CGPB Sub Committee Gr.-I Metallic Minerals Meeting held at Hyderabad on 22<sup>nd</sup> & 23<sup>rd</sup> August, 2007.
- ❑ A meeting with APMDC held at Hyderabad on 29/8/07 regarding coal exploration of the block allotted in Talchir coalfields.
- ❑ A Seminar on "Coal Resources Assessment" organized by Administrative Staff College of India (Planning Commission) at Hyderabad on 30<sup>th</sup> & 31<sup>st</sup> August, 2007.
- ❑ A consortium meeting between MECL, BRGM & DGH held at New Delhi on 20/9/07.
- ❑ A joint visit of BRGM, MECL, DGH / Oil Team regarding DGH Project Resource Estimation in respect of Oil Shale Deposits & Syncrude Potential in N.E. India organized on 22/9/07.
- ❑ 41<sup>st</sup> Meeting of SGPB Madhya Pradesh held at Bhopal on 27/9/07.
- ❑ 41<sup>st</sup> Meeting of SGPB Maharashtra held at Nagpur on 5/10/07.
- ❑ Expert Group Meeting convened by the Member (Planning) Central Electricity Authority and Chairman of Expert Group at New Delhi on 31<sup>st</sup> Oct.'07 regarding assessment of Geo-thermal potential at Puga, J&K, and site visit on 11.11.2007.

- A meeting convened by Member Secretary, Sub-committee CGPB Gr.III Energy Minerals on 20<sup>th</sup> & 21<sup>st</sup> November, 2007 at GSI, Kolkata regarding finalization of Status Map of coalfields.

#### **(D) BHARAT GOLD MINES LIMITED (BGML)**

7.102 The Bharat Gold Mines Limited (BGML) was incorporated as a public sector undertaking in 1972. Since its inception, BGML had been consistently making losses (except for a brief period of two years, namely, 1979-80 & 1980-81) due to depletion of reserves, deep level of mining, high cost of inputs and surplus manpower.

7.103 BGML was referred to Board for Industrial and Financial Reconstruction (BIFR) in 1992 who passed its final order on 12.6.2000 concluding that it was just, equitable and in public interest to wind up BGML. The verdict of BIFR was also upheld by AAIFR. Ministry of Labour, Government of India, accorded permission of closure of BGML w.e.f. 1.3.2001 under Section 25(O) of the Industrial Disputes Act, 1947. The Employees' Union challenged the orders of BIFR, AAIFR and Ministry of Labour before High Court of Karnataka. The cost of production of gold by BGML was about Rs.19,729/- per 10 grams at the time of closure. The total number of employees at the time of closure was 3580.

7.104 After prolonged litigation, the Division Bench of Karnataka High Court in its order dated 26.9.2003 upheld the winding up/closure orders passed by BIFR/ AAIFR/Ministry of Labour. The High Court also made certain recommendations like (a) allowing VRS package in terms of DPE's O.M. dated 6.11.2001, (b) sale of hutments/quarters to ex-employees, etc.

7.105 Government, on 27.7.2006, approved a proposal regarding VRS/STBP for ex-employees of Bharat Gold Mines Limited, sale of houses etc. and calling of global tender for sale of assets and giving purchase preference to the Employees' Co-operative Society/Society's Company subject to the approval of the High Court of Karnataka (Company Court) and viability of the project. Company Application has been filed by BGML in the Hon'ble High Court of Karnataka (Company Court) in this regard which is being pursued.

7.106 As per the Government decision, STBP amount has been distributed to the ex-employees of BGML and work on sale of houses at the rates suggested by the High Court of Karnataka(Company Court) is going on. An Inter Ministerial Group(IMG) has also been constituted to oversee the tendering process of BGML. On the recommendations of the IMG, Consultant has been appointed by BGML for asset valuation, preparation of global tendering document, etc. and further action is being taken up in the matter.

#### **DISINVESTED COMPANIES**

##### **(E) BHARAT ALUMINIUM COMPANY LIMITED (BALCO)**

7.107 Bharat Aluminium Company Limited (BALCO) was incorporated on 27<sup>th</sup> November, 1965 as a Central Public Sector Undertaking with an integrated Alumina/ Aluminium Complex and a 270MW Captive Power Plant at Korba presently in Chhattisgarh. The Alumina Plant on the date of disinvestment had 2,00,000 tonnes per annum (TPA) capacity and the smelter had a capacity of 1,00,000 MT per annum .

7.108 The Government of India disinvested 51% of equity in Company along with the transfer of management control in favour of M/s Sterlite Industries (India) Limited with effect from 2<sup>nd</sup> March, 2001 and consequently, the Company has ceased to be public sector undertaking.

7.109 BALCO has informed that post disinvestment, BALCO has implemented the expansion at a cost of over Rs.4000 crores leading to threefold increase in capacities. The smelter capacity has been increased to 3,45,000 MT per annum from 1,00,000 MT per annum and the capacity of the captive power plant from 270MW to 810 MW. The expanded capacity was fully commissioned in the third quarter of 2006-07.

7.110 BALCO has signed a Memorandum of Understanding with the Government of Chhattisgarh in October, 2006 for setting up a 1200MW power plant at an estimated cost of Rs.4800 crores. BALCO has commenced implementation of the power project and the project is expected to be fully commissioned in 2010-11.

7.111 BALCO has also signed a Memorandum of

**Table 7.14**  
**Physical Performance of BALCO**

Particulars	2005-06	2006-07	2007-08 (April-December, '07)	(In tonnes)
Production	173743*	313189	266496	
Sales	171206*	315002	264695	

\*Including production / sales during trial run of new smelter.

**Table 7.15**  
**Financial Performance of BALCO**

Particulars	2005-06	2006-07	2007-08 (April – December, '07)	(Rs. in crores)
Net Sales	1772	4100	3045	
Profit before interest & depreciation	494	1678	1017	
Depreciation	172	478	355	
Interest	60	151	68	
Exceptional Items (VRS)	10	10	-	
Profit before Tax	252	1037	594	

Understanding with the Government of Chhattisgarh in August, 2007 for expanding its aluminium production capacity by setting up of additional 6.5 lakh ton per annum aluminium smelter at an estimated cost of Rs.8100 crores. Upon the implementation of this expansion, BALCO's aluminium production capacity would be 1 million ton per annum.

#### Highlights of BALCO in 2006-07:

- 125% increase in gross turnover from Rs. 2050.15 crores in 2005-06 to Rs. 4610.54 crores.
- 299% increase in operating profit from Rs. 262.47 crores in 2005-06 to Rs. 1047.51 crores.
- 438% increase in PAT from Rs. 168.50 crores in 2005-06 to Rs. 906.52 crores.

#### Recognitions and Awards

The following awards have been won during 2006-07 and 2007-08 (till 30.11.2007):

- Golden Peacock Award, 2006 in the area of environment management,
- Greentech Environment Excellence Gold Award, 2006
- Greentech Safety Excellence Gold Award, 2007.
- BALCO's smelter plant has won the National Safety Awards [NSA]-2006.
- Greentech Platinum Environmental Excellence Award – 2007 in the Minerals and Metal Sector.
- Golden Peacock Gold Award for Environment Management – 2007.

#### (F) HINDUSTAN ZINC LIMITED

7.112 Hindustan Zinc Limited (HZL) is a leading producer of zinc and lead in the country. It was incorporated in January, 1966 as a public sector company after the take over of the erstwhile Metal Corporation of India Limited, to develop mining and smelting capacities to meet substantially the domestic

**Table 7.16**  
**Physical Performance of HZL**

(Unit in tonnes)

Product/ Production	2005-06*	2006-07*	2007-08 Year (Target)	2006-07* (upto Dec.'06)	2007-08* (upto Dec.'07)
Lead-zinc ore	4795124	5139915	6041200	3872115	4271758
Lead-zinc conc.	984745	1054720	1127349	799865	868921
Saleable Zinc	317558**	348567**	410000	253711	289678
Saleable Lead	23636	44552	78703	31953	41258

\* Actual

\*\* Includes tolled zinc of 34890 tonnes in 2005-06 and 251 tonnes in 2006-07 produced through outside smelters by conversion of own produced concentrate.

demand of zinc and lead metals. The Govt. of India disinvested its 26% stake in the equity capital of the company in favour of Strategic Partner (SP) i.e. M/s. Sterlite Opportunities and Ventures Ltd. (SOVL) and management control of the company has been transferred to SP with effect from 11<sup>th</sup> April, 2002. Presently, the stake of SOVL in the company is 64.92%, and the stake of Government of India is 29.54%.

7.113 HZL's operations are broad based and its activities range from exploration, mining and ore processing to smelting and refining of zinc and lead with silver, cadmium, and sulphuric acid as by products. HZL, with its headquarters at Udaipur, operates three lead-zinc mining units - Zawar Group of Mines in Udaipur, Rajpura Dariba Mine in Rajsamand and

Rampura Agucha Mine in Bhilwara (all in Rajasthan), with a total lead-zinc ore production capacity of about 5.85 million tonnes per annum. HZL also operates three smelters - Debari Zinc Smelter in Udaipur, Chanderiya Lead-Zinc Smelter in Chittorgarh (both in Rajasthan) and Vizag Zinc Smelter in Andhra Pradesh, with a combined capacity of 5.81 lakh tonnes per annum of zinc metal and 85,000 tonnes per annum of lead metal.

#### Physical Performance

The physical performance of the Company for the last three years is given in Table 7.16.

#### Financial Performance

The financial performance of the Company for the last three years is given in Table 7.17.

**Table 7.17**  
**Financial Performance of HZL**

(Rs. in Crore)

Details	2005-06*	2006-07*	2006-07* (upto Dec.'06 (unaudited)	2007-08* (upto Dec.'07)
Income (Excluding Excise Duty)	3992.78	8791.49	6687.85	6136.77
Operating cost	1575.13	2152.80	1524.00	1712.31
Interest	47.40	28.44	26.12	19.25
Depreciation & Amortisation	140.68	156.59	110.93	148.26
Net Profit (PBT)	2229.57	6453.66	5026.80	4256.95

\* Actual

## Expansion Projects

7.114 HZL has informed that the Company has recently commissioned its 170,000 tpa zinc smelter at Chanderiya, District Chittorgarh, Rajasthan. To support the increased production capacity, HZL's Rampura Agucha Mine is also being expanded to increase lead-zinc ore production capacity from 3.75 mtpa (metric tonnes per annum) to 5 mtpa, taking HZL's total ore production capacity to 7.10 mtpa. The company has also informed that it is currently engaged in de-bottlenecking of its existing zinc plants, which is expected to be completed by mid 2008. This would further increase additional zinc metal production capacity by 88,000 tpa.

## Research & Development Efforts

### Ore Dressing

- Maximizing the lead and zinc recovery in the beneficiation plant at Rajpura Dariba Mine by



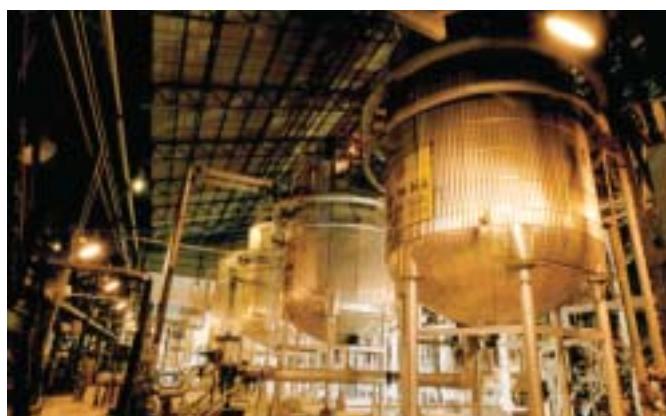
Control Room of Captive Power Plant of NALCO

producing lead-zinc bulk concentrate and its suitability to ISF plant.

- Producing silver rich residue by flotation of intermediates containing lead-silver, produced in Hydrometallurgical zinc plant.
- Production of bulk (zinc-lead) concentrate from Rampura Agucha Mine tailings and its suitability to smelters.

## Extractive Metallurgy

- Testing and validation of zinc hydrometallurgy flow sheets at hydro Phase-I zinc plant at Chanderiya Lead-Zinc Smelter.
- Recovery of value metals such as zinc, lead, cadmium, antimony, copper, silver etc. from slags/ wastes/ residues.
- Optimization of parameters for performance improvements in zinc plant.



Zeolite Plant at Alumina Refinery NALCO



Overview of NALCO's Port facilities at Vishakha Pattanam



Eco-friendly Power Plant of NALCO at Angul

## Chapter 8

# Science and Technology

8.1 The Science and Technology programme of the Ministry of Mines initiated in 1978, cover the disciplines of geology, exploration, mining and environment, bio-leaching, beneficiation, rock mechanics and ground control and non-ferrous metallurgy. During the current year, 15 new projects have been received and there are 6 ongoing projects.

8.2 Out of the total proposed outlay of Rs. 20.07 crores (budget support of Rs. 3.00 crores (Plan) and Rs. 2.70 crores (Non-Plan) have been provided in BE 2007-08 for S&T programmes. Out of the total proposed outlay of Rs. 19.40 crores (budget support of Rs. 2.55 crores (Plan) and Rs. 2.51 crores (Non-Plan) has been proposed for the year 2008-09.

### National Institute of Rock Mechanics (NIRM)

8.3 The National Institute of Rock Mechanics (NIRM), a premier centre for research in applied and basic rock mechanics has been carrying out quality research work through both government-funded and industry-sponsored S&T and consultancy projects. The Institute has been extending its R&D support to the mining sector (both coal and metal mine), hydroelectric and tunnelling sector, and other civil construction projects pertaining to infrastructure development. The Institute got the ISO-9001:2000 Accreditation renewed for its R&D and consultancy services.

8.4 The support to these industries are primarily confined in the areas of geotechnical studies, ground control investigations, geophysical investigations for site characterisation, numerical modelling, design of controlled blasting and laboratory testing of samples. Apart from them, support is also extended in the areas of environmental studies, exploitation of dimensional stones and seismological studies.

8.5 During the year, in-situ investigations involving parametric determination of horizontal and vertical stresses, deformability and shear parameters were determined for four major hydel projects.

8.6 The institute carried out mapping of discontinuities, design the support measures, stability analysis and feasibility studies on innovative mining techniques under difficult geomining conditions. The institute has been awarded a major collaborative S&T project by the Ministry of Coal to study the caveability in longwall panels.

8.7 The institute is involved in the blast design, instrumentation and monitoring, and support design aspects for the India's first underground LPG storage cavern at Visakhapatnam, Andhra Pradesh. The institute has also secured the project for subsurface investigations at an oil storage cavern site in Karnataka.

8.8 Instrumentation and monitoring was done for a series of excavations in mining and hydroelectric projects for their stability analysis. Prominent among them include ground stability studies in the Hutt Gold Mines, designing method of work under special conditions in the coal mines of SCCL. In addition, slope stability studies were carried out for designing the ultimate angle of the pit slopes in the opencast mines of the Mysore Minerals Ltd. (MML), in Sandur taluk, Bellary district, Karnataka.

8.9 In the area of engineering geophysics, mapping of the subsurface using seismic refraction and cross-hole tomography as well as non-destructive investigations using GPR profiling and tomography were done. During the period, investigations were completed for mapping subsurface profile at tunnel portals and bridge abutments for Katra-Qazigund rail-

link project of Northern Railway. Seismic survey including cross-hole tomography was also done for mapping bed rock profile at Teesta Stage-II and Stage-VI project in Sikkim. Cross-hole seismic tomographic investigation across Teesta river has shown a modified bedrock profile across the river.

8.10 In the area of seismological investigations, monitoring in the KGF mining regime was continued with the broad-band station under DST project. The Institute conducted a training Programme on Scientific Quarrying & Production at Madurai and at NIRM. In addition, technical assistance was provided in setting up of a Test House at Jaipur. Technical assistance was also provided to the quarrying industries at Karnataka

8.11 Numerical modelling studies were done for the stability analysis of earth dams and slopes by using 2D and 3D software. Apart from this, studies were also carried on the instrumentation and monitoring of prestigious excavations for their stability analysis. Important of them include instrumentation, monitoring and Data Analysis of Underground Powerhouse Complex, Desilting Chambers of Tala Project, Bhutan.

8.12 The Institute provides solutions to challenging problems in blasting for various mining and civil engineering projects to optimise blast design parameters for surface and underground excavations. NIRM carried out fundamental research in the area of engineering and mechanical properties of rock joints under shear, and studies on Kaiser effect, in the field of Rock Fracture Mechanics Laboratory testing of rock samples was done as per ISRM standards for a number of user industries. Material testing on wire-rope and in-situ NDT testing was done using ultrasonic detectors.

8.13 The Institute has sustained the growth of the previous years, and is marching ahead towards the mission goal of self-sufficiency. During the year 2005-06, the Institute registered an external cash flow of Rs. 358.00 lakhs in the year 2005-06 and carried out investigations in 10 S&T projects and 40 industry sponsored projects. By the end of the year, investigations were completed for 25 projects and the work is continuing for other 20 projects. In total, 15 technical papers were published during the year. The institute organised two training courses and its scientists delivered talks and lectures at various conferences and seminars/ symposia.

### National Institute of Miners' Health (NIMH)

8.14 National Institute of Miners' Health conducts basic and applied research in the field of occupational health and hygiene for subjects employed in mining and mineral based Industry. Pursuing its vision of "Safe Mines and Healthy Miners - 2020", the Institute has carried out following work in the year 2007-08 with total staff strength of 16 (including 2 administrative staff).

### Environmental Monitoring studies in Mines

8.15 During the year 2007-08, NIMH has conducted Environmental Monitoring studies in one mine each of National Mineral Development Corporation Limited (NMDC), National Aluminium Company Limited (NALCO) and Neyveli Lignite Corporation (NLC) and two mines of Associated Cement Company (ACC) Limited. During the above studies, NIMH had collected and studied 105 samples for respirable dust concentration and free silica analysis, 78 samples for Area Noise survey and Personal Noise Dozimetry and 57 samples for Whole Body Vibration.

### S & T project of Coal - Phase I

8.16 Baseline data of 1553 employees working in Nagpur area of Western Coal Fields Limited (WCL) was collected and compiled. Detailed medical examination of a sub-sample of 280 employees for audiometric, spirometry, hematology and biochemical variables has been completed.

### 8.17 Social Welfare

- **Study on noise hazard of fire crackers:** The Institute carried out a study on the noise hazard of chain firecrackers used extensively during festivals. The study was sponsored by Citizen Forum of Nagpur. It was observed that the all the fire crackers tested exceeded CPCB permissible exposure limits and likely to cause Noise Induced Hearing Loss (NIHL).
- **Silicosis:** In consonance with the National Program on Silicosis, the Institute felt priority to focus on the subject and has prepared a pamphlet on Silicosis for wide distribution in the mineral industries. The pamphlet highlights the cause of the disease and methods of prevention

### 8.18 Human Resource Development and consultancy services

- NIMH provided training to the staff of M/S Startech Laboratories, Hyderabad in observing statutory regulations while monitoring environmental parameters in mines.
- B.B. Mandal, Senior Research Officer of NIMH delivered lecture on invitation at the Visvesvaraya National Institute of Technology (VNIT), Nagpur on "Human response to mechanical vibration" in March 2007
- Dr. Anand Kamavisdar participated in G8 UNESCO World Forum on "Education, research and Innovation: New partnership for sustainable development in Trieste, Italy from 10th to 12th May 2007.
- During the year, NIMH staff participated in training workshops, seminars, symposia on ILO Classification 2000 of chest radiographs, Biomedical Communication, Ion Chromatography, & Environmental Health and Safety.

### Projects in Pipeline

8.19 Respirable dust survey with free silica analysis - Work Order for second season received from Donimalai Iron-ore Mines of NMDC.

8.20 Respirable dust survey with free silica analysis - Work Order for second season received from Rajanka Limestone Mines of NMDC.

8.21 Respirable dust survey with free silica analysis - NIMH has received project offers from

- Wadi Limestone Mines,
- Lakeri Cement works,
- Madhukarai lime stone Mines and
- Keymore Cement Works of ACC Limited.

8.22 Institute has received offers for conducting occupational health studies of employees working in NALCO and in Lakeri Cement Works of ACC Limited.

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

8.23 JNARDDC was registered as a society in 1987. The objective of the Centre is to assimilate the technology available in the country and abroad for the production of alumina & aluminum including aluminium alloys as well as develop technical know-how for the basic engineering process and downstream areas. The centre also provides technological support for setting up Alumina refinery in the country. Furthermore the Centre caters to the R&D needs of Primary Producers.



Scientist at work in R&D Lab in Malanjkhand Copper Project



Scientists at Training Center in Khetri Copper Complex

8.24 With a total strength of 48 employees (including 20 Scientists), during April-December, 2007 the Centre has completed five national projects. Subsequently, five projects are under implementation. The Centre has been awarded an International Thermography Project by Aquaba Container Terminal, Jordan. JNARDDC has also got excellent response in the field of organizing Training Programmes. The Centre is successfully providing Training on "Aluminium Technology" for NALCO, Angul Operators. The Training programme is expected to generate about Rupees One Crore revenue to the Centre over the next two years.

8.25 The Scientists of the Centre have published technical papers in 4 international & 5 national journals. One Senior Scientist was nominated by United Nations as a UNIDO expert for setting up a Metallurgical Laboratory in Libya in May, 2007.

Another Scientist was nominated as a member for Editorial Board and a peer reviewer, for Journal of Chromatographic Science, USA.

8.26 JNARDDC has been nominated as the nodal agency from India for activities on red mud utilization and high Silica bauxite in the seven nation Asia-Pacific Partnership Programme (AP-7).

8.27 Several projects are under negotiation with international companies like RUSAL-VAMI Russia, BHP Billiton Australia, SECAT-USA etc.

8.28 An income of Rs.105.00 lakhs was generated till December, 2007. This is the highest internal revenue generation by the Centre during the last five years. During 2007-08, a budget support of Rs. 100 lakhs (Plan) and Rs. 120 lakhs (Non-Plan) has been provided. For 2008-09 a provision of Rs. 130 lakhs (Plan) and Rs. 130 lakhs (Non-Plan) has been proposed.



GSI Scientists conducting research at Antarctica

## Chapter 9

# International Cooperation

### MoU with Uzbekistan

9.1 A Memorandum of Understanding (MoU) for cooperation in the fields of geology and mineral resources was signed between the Ministry of Mines and the State Committee on Geology and Mineral Resources of the Republic of Uzbekistan in the presence of the Hon'ble Prime Minister and the President of Uzbekistan on 26<sup>th</sup> April, 2006 in Uzbekistan. The MOU envisages enhancing bilateral co-operation between the two countries in the field of geology and mining. For the implementation of the MOU a Joint Working Group has been established. The first meeting of the Joint Working Group was held in Tashkent, Uzbekistan in June, 2006. Proposal received from the Uzbekistan State Committee on Geology and Mineral Resources for exploration and mining of gold and diamonds in Uzbekistan is under process.

9.2 MECL has expertise in the field of prospecting and exploration. They have been nominated as the nodal agency from the Indian side to explore possibilities for prospecting of gold and diamond deposits in Uzbekistan.

### MoU with China

9.3 The Ministry of Mines, and the Ministry of Land & Resources of the People's Republic of China have signed a Memorandum of Understanding (MoU) for cooperation in the field of geology and mining on 15<sup>th</sup> September, 2005. This MOU is expected to set-up a framework to promote cooperation on the basis of applied research in the field of metallic and non-metallic minerals, formulation of mining regulations and policies, technical assistance and training programmes and also undertaking joint ventures in other countries.

9.4 To enhance cooperation between the two countries, the Geological Survey of India (GSI) and the China Geological Survey signed a Memorandum of Understanding for cooperation in the field of geosciences on 14<sup>th</sup> January, 2008 during the visit of Hon'ble Prime Minister of India to People's Republic of China.

### India-Australia Joint Working Group on Energy and Minerals

9.5 The India-Australia Joint Working Group (JWG) on Energy and Minerals has been established in the year 2000 for enhancing bilateral co-operation in the energy and mineral sectors. The fifth meeting of the Australia-India Joint Working Group on Energy and Minerals was held on 2<sup>nd</sup> and 3<sup>rd</sup> July, 2007. A Protocol was signed at the end of the meeting. The Working Group discussed issues related to power, coal, coal and Mining Forum, Oil and Gas, Renewable Energy, mining and mineral processing, Asia- Pacific Partnership on Clean Development and Climate, etc. Ministry of Mines is the nodal Ministry for holding this Working Group on Energy and Minerals.

9.6 In the fourth meeting of India-Australia JWG, Geological Survey of India, Indian Bureau of Mines and Mineral Exploration Corporation had shown interest in entering into collaboration with their Australian counterpart agencies for state-of-the-art technology in exploration and exploitation of minerals. As a follow-up to the meeting, an India-Australia Coal & Mining Forum was also held in India to enhance the collaborative relationship between India and Australia and to further facilitate information exchange and joint projects. The interaction between the Indian and the Australian sides were beneficial and a general consensus was that the Government and the

industry representatives of both sides would work in close cooperation for the mutual benefit of both countries and carry forward the process of dialogue for enhancing cooperation.

9.7 An MoU was signed between Ministry of Environment and Forest, Ministry of Mines, Federation of Indian Mineral Industries with Western Australia in May, 2005, on Cooperative Staff Development related to Environmental Governance and Mine Rehabilitation. A five member Australian delegation visited mines of Orissa and Goa in November, 2005 to familiarize about the problems and issues of mine rehabilitation in India. Subsequently, an Indian delegation visited Western Australia to study the practices of mine rehabilitation done in bauxite, coal and beach sand mines of Western Australia.

9.8 An Indian delegation visited Australia on the invitation of the Premier of Western Australia for further enhancing bilateral co-operation under the above MoU with Western Australia in June, 2007. The Ministry of Mines, Geological Survey of India and Indian Bureau of Mines were represented in this delegation.

#### Indo-French Working Group on Mineral Exploration and Development

9.9 The 20<sup>th</sup> meeting of the Indo-French Working Group on Mineral Exploration and Development was



Sh. Sis Ram Ola, Hon'ble Minister of Mines holding discussions with Mr. Simon Crean, Australian Trade Minister

held on 3<sup>rd</sup> – 4<sup>th</sup> April, 2007 in France. The meeting was preceded by technical experts level meeing on 2<sup>nd</sup> April, 2007. The meeting reviewed the status of the on-going projects as well as new project proposals viz. Computerised on-line register of mining tenements system in India; Management of Solid Waste from Mining in India; Supply of oceanographic equipment and technical and scientific assistance to the Indian programme of seabed investigations in the Exclusive Economic Zone of India; and Mine Closure Planning. A protocol was signed at the conclusion of the Working Group meeting

#### India-Canada Geosciences Working Group

9.10 The fourth meeting of the India-Canada Working Group on Geosciences was held in September, 2006 in Canada under the MoU signed between India and Canada in the field of geosciences. The meeting reviewed the progress of Phase I of the Arsenic Toxicity Project on groundwater of West Bengal, draft proposals for Phase II of the Arsenic Toxicity Project, monitoring of landslides at selected sites in India, mine closure etc. This collaborative project between Geological Survey of India and NRCan is progressing as per the schedule.

#### PDAC Convention

9.11 An 'India Day' was organised on 6<sup>th</sup> March, 2007, concurrently with the 75<sup>th</sup> International Convention,



Sh. Sis Ram Ola, Hon'ble Minister of Mines, Sh. J.P. Singh Secretary (Mines), Sh. S. Vijay Kumar, Addl. Secretary (Mines), Dr. J.S. Mann, PS to MoM, holding discussions with Australian delegation

Trade Show & Investors Exchange (PDAC 2007) organised by the Prospectors and Developers Association of Canada in Toronto, Canada.

### Indian Bureau of Mines (IBM)

9.12 An Indian delegation led by Secretary (Mines) participated in the 20th meeting of the Indo-French Working Group on Mineral Exploration and Development held at Paris on 3-4 April 2007. Three project proposals of IBM viz. (i) Computerised online Register of Mining Tenements System in India (ii) Management of Solid Waste from Mining in India and (iii) Mine Closure Plan, were discussed in the meeting. Prior to this, a technical experts meeting was held on 2nd April 2007 at Orleans. Shri Ranjan Sahai, Controller of Mines, IBM was one of the members of the delegation.

9.13 On the invitation of Premier of Western Australia an Indian Delegation under the Leadership of Secretary (Mines) visited Australia for enhancing bi-lateral cooperation under MoU with Western Australia during 18-21 June 2007. Shri M.K. Prasher, Regional Controller of Mines was one of the members of delegation.

9.14 An Indian delegation led by Shri V.K. Thakral, Joint Secretary (Mines) visited Australia during 2-6 July, 2007 for attending the 5th meeting of the India-Australia Joint Working Group on Energy and Minerals. Shri Singa Tiu, Regional Controller of Mines, IBM was one of the members of the delegation. IBM evinced interest on cooperation on technical matters related to mine closure and deep seated low grade gold mining and training.

### Geological Survey of India (GSI)

9.15 GSI has been participating in different International Geological Correlation Programmes (IGCP). During 32<sup>nd</sup> meeting of Indian National Committee (INC), 16 ongoing IGCP projects were reviewed; future plans were discussed and one new proposed project IGCP 507 was approved for Indian participation.

9.16 GSI has been identified as the co-ordinator of South and East Asian part of the compilation Project - 'International Geological Map of Asia' (IGMA 5000) on 1:5 million scale.

9.17 India and China inked eleven documents in presence of the Prime Minister of India, Dr. Manmohan Singh and the Prime Minister of China, Shri Wen Jiabao that covered five Memoranda of Understanding on 14<sup>th</sup> January 2008 at Beijing. It includes Memorandum of Understanding on Cooperation between the Geological Survey of India and the China Geological Survey in Geo-Sciences, which will aim to extend mutual cooperation in research and development projects in areas such as palaeo-climatic and palaeo-environmental changes in the Asian continent etc.

9.18 Under Bilateral collaborative activities, Studies on 'Public Health Hazard' problems due to arsenic toxicity in groundwater in the parts of West Bengal and Monitoring/ Mitigation of landslides at selected sites in India were carried out with Department of Natural Resources, Canada (NRCan). The second project has been extended up to December 2009 which was to be completed by March 2008.

9.19 Under India-Netherlands collaboration, two scientists of GSI are carrying out research in ITC, the Netherlands on 'Use of New Earth Observation Techniques for Landslide Hazard and Risk Assessment'.

9.20 A MoU was signed between GSI and Joint Project Office, Sapta Kosi Sun Kosi Investigation (JPO-SKSKI), Nepal on 'Consultancy Services for carrying out Geological Investigations required for the preparation of Detailed Project Report of Sapta Kosi High Dam Multipurpose Project and Sun Kosi Storage-cum-Diversion scheme in Nepal'.

9.21 As per the signed agreement between GSI and Water and Power Consultancies Services (India) Ltd. (WAPCOS), GSI has carried out geotechnical investigations of the Punatsangchhu H.E. Project in Bhutan.

## Chapter 10

# Progressive Use of Hindi

### Introduction

10.1 The Hindi section functioning in the Ministry of Mines is responsible for ensuring compliance of the Official Languages Act, the rules made thereunder and the administrative instructions regarding use of Hindi in the Ministry of Mines and in the subordinate offices and PSUs under its administrative control.

### Compliance of Section 3(3) of Official Languages (OL) Act, 1963

10.2 Section 3(3) of Official Languages Act, 1963 has been complied with fully during the period under report and all the documents covered under this section have been issued bilingually. The position of the same is being monitored through the quarterly meetings of the Official Language Implementation Committee chaired by Joint Secretary and monthly meeting of all sections conducted by Director (Incharge of Hindi).

### Hindi Training

10.3 Under Hindi Teaching Scheme of Ministry of Home Affairs, Department of Official Language the officers/employees are nominated for training in Hindi Language (Prabodh, Praveen & Pragya), Hindi stenography and Hindi typing.. One officer and one employee has been nominated under Hindi Teaching Scheme. One stenographer and one LDC has been given training in Hindi stenography and Hindi typing respectively.

### Hindi Salahakar Samiti

10.4 Hindi Salahakar Samiti is a high powered Committee which reviews the progress of Hindi in the Ministry and in the Subordinate Offices/ PSUs under

its administrative control. It also recommends effective measures to increase the use of Hindi and for removing the difficulties faced in ensuring the compliance of Official Language Policy. So far three meetings of Hindi Salahakar Samiti have been convened. First meeting was held at Delhi under the chairmanship of the Hon'ble Minister of Mines and two meetings were held out of Delhi i.e. at Bangalore & Jaisalmer, Rajasthan. All members expressed their satisfaction with follow up actions taken on the minutes of the last meetings. The chairman assured the members that appropriate actions will be taken on the suggestions given by the members in future also.

### Meetings of Official Language Implementation Committee

10.5 The Official Language Implementation Committee has been constituted in the Ministry headed by the Joint Secretary. All Officers of the rank of Section Officer and above up to the rank of Director are members of the Committee. The Quarterly Hindi Progress Reports received from the Sections of the Ministry are reviewed in the meetings of the Committee and remedial measures are suggested to remove the shortcomings. The quarterly meetings of the Committee are held regularly. In addition, for effective monitoring of progressive use of Hindi, monthly review meeting under the chairmanship of Dir (N)/ Joint Director (OL) were also held regularly during the period under report.

### Inspection of Parliamentary Committee of Official Language

10.6 Third Sub-Committee of Parliamentary Committee of Official Language inspected the Ministry

of Mines to review the progress of Hindi in the Ministry on 7th February, 2008. During the inspection an exhibition was also organised regarding works done in Hindi and its achievements. Hon'ble Members of Parliament expressed satisfaction on progress of Hindi in the Ministry of Mines and gave some suggestions, their compliance will also be ensured.

### Official Language Inspection

10.7 In order to assess the progress made in the use of Hindi in subordinate offices /public sector undertakings under the administrative control of the Ministry of Mines, Joint Director (OL) inspected Offices of G.S.I., Operation Office Gandhi Nagar, Gujarat; Hindustan Copper Limited, Sales Office Mumbai; NALCO, Marketing Office Mumbai, Bangalore; Hindustan Copper Limited, Marketing Office Bangalore; GSI, Operation Office, Patna; GSI, Operation Office, Jammu & Kashmir. The shortcomings detected during the course of inspection were brought to the notice of the concerned office and measures for overcoming the shortcomings were also suggested.

### Measures for Implementation of Official Language Policy

10.8 It is the policy of the Government to propagate the use of Hindi through inspiration and incentive. In order to inspire and encourage the officers/employees of the Ministry to do their work in Hindi, various Cash Award Schemes of the Department of Official Language such as Hindi Noting and Drafting Scheme, Hindi Dictation Scheme and Hindi Typing/ Stenography incentive allowance scheme have been implemented.

### Hindi Workshops

10.9 With a view to encourage more and more employees to do their official work in Hindi, Hindi workshops are organised from time to time for officers/ employees of the Ministry.

### Hindi Fortnight

10.10 With a view to create a conducive atmosphere for the progressive use of Hindi in the Ministry, every year on occasion of Hindi Divas, Hindi fortnight is organized. This year Hindi fortnight was observed from

11-25 Sept., 2007. Various Hindi competitions e.g. Hindi Essay Writing competition, Hindi Noting-Drafting competition, Hindi Gyan Competition, Hindi Typing competition, Extempore Speech competition, and Quiz competition, were held during Hindi fortnight. Maximum dictation in Hindi and Maximum noting/drafting in Hindi during the Hindi fortnight from 11.9.07 to 25.9.07 were also held. In all eleven competitions were held. The winners of the competitions were given cash award and certificate by Secretary (Mines) on 12.10.2007.

### Measures Adopted by the Ministry of Mines to Propagate the use of Hindi in its Subordinate Offices/PSUs.

10.11 In order to ensure the compliance of Official Language policy in subordinate offices/PSUs of Ministry of Mines, directions are issued to them by the Ministry from time to time and their work is duly reviewed by the Ministry.

10.12 The Subordinate Offices/PSUs of the Ministry of Mines have their respective Hindi Sections and they are making their best efforts for implementing the Official Language policy of the Union in their respective offices.

10.13 Official Language Implementation Committees under the chairmanship of the Head of Offices have been constituted in all the Subordinate Offices/PSUs. The meetings of these committees are being held regularly.

10.14 In order to assess the progress made in the use of Hindi in official work and the implementation of Official Language Policy of the Government, quarterly progress reports are called for from every Subordinate Office and Public Sector Undertaking under the Ministry. Their reports are reviewed and shortcomings noticed were intimated to the concerned office and remedial measures were also suggested to overcome the shortcomings.

10.15 The orders issued by the Department of Official Language on the recommendation of the Parliamentary Committee contained in Part-7 of the report were brought to the notice of Subordinate Offices and PSUs under the administrative control of the Ministry.

10.16 Messages of Minister, State Minister and Secretary Mines to observe Hindi Day and promote Hindi as far as possible were circulated to all Subordinate Offices and PSUs and same has also been made available in the website of Ministry of Mines in Hindi.

### Scheme for Promoting Original Book Writing in Hindi

10.17 A Scheme for promoting original book writing in Hindi on the subjects pertaining to Mining and Minerals is being implemented in the Ministry. There is a provision for cash award of Rs. 25,000/-, Rs. 15,000/- and Rs. 10,000/- for the 1st, 2nd, and 3rd prize respectively. Besides, there are three consolation prizes of Rs. 5000 each. Advertisements were issued for inviting entries under the scheme for the year 2005-07. So far 20 persons has been sent details of the scheme.

### Publication of 'Khan Sampada'

10.18 Ministry of Mines has been publishing its quarterly house journal 'Khan Sampada' since 1998. Articles pertaining to Technical subjects, propagation of Hindi and literary topics are published in the said journal.



Sh. J.P. Singh, Secretary (Mines) and other officers of the Ministry during the inspection of Parliamentary Committee on Official Language

### Translation Work

10.19 During the period, all translation work and Hindi typing work relating to Standing Committee, CAG audit paras, Cabinet Note, Minister's speech, Citizen Charter of the Ministry and M.O.U for International Cooperation in the field of mines & mineral with various countries was attended to with full efficiency and dedication. Besides these, the Hindi translation and typing work of day-to-day material received from the various Sections of the Ministry, Parliament Questions and other important material received during Parliament Session were also attended to.

### Other Activities

10.20 Joint Director (OL) represented Ministry of Mines in the 8<sup>th</sup> World Hindi Convention organised in New York from 12-15 July, 2007. AD (OL) participated in the Raj Bhasha Sammelan held in Trivandrum from 2-4 October, 2007.

### Progressive use of Hindi by Geological Survey of India

10.21 The Geological Survey of India, one of the largest departments of the Government, makes an all out effort in pursuit of implementing the official language policy



Hon'ble Members of Parliamentary Committee on Official Language at the inspection of Ministry of Mines

of the Government and encourages fullest utilization of Rajbhasa in all the scientific, technical and administrative work. The following are the main achievements of Geological Survey of India while promoting and encouraging Hindi as official language.

### **Use of Hindi in Annual Programme (Field Season Programme)**

10.22 The annual programmes of GSI symbolize pathways of GSI in nation building and its stride towards societal contribution. The Hindi version of 'Introduction to Annual Programme' (Red Book) incorporating highlights of previous years' achievements as well as focus of ensuing programmes is brought out every year at the beginning of field season programmes. Hindi versions of parts of annual programmes of some of the Regions and Wings have also been brought out.

### **Publication of Scientific and Technical Books**

10.23 The Geological Survey of India has been bringing out the scientific and technical Books in Hindi from time to time for last several years for the benefit of the common people and to propagate scientific and technical activities to a larger community. The abstracts of technical investigation reports have been brought out in Hindi. The Northern Region of GSI has translated and edited Miscellaneous Publication No. 30, part-16 (Delhi) for printing in Hindi. The district Resource Maps of Mathura and Lalitpur districts, Geological & Mineral map of Punjab & Chandigarh and the Geological & Mineral map of Haryana have been prepared in Hindi. The latest issues of Narmada, Chetna, Dhauli and Smarika, the house magazines in Hindi of Central Region, Training Institute, Operation: Orissa and Operation: M.P & Chhatishgarh respectively have also been published.

### **Hindi Workshops**

10.24 As per directives of the Department of Official Language, 10 (ten) Hindi workshops have been organized at the level of Central Headquarter as well

as Regional Offices & Operational Units at Kolkata, Lucknow, Hyderabad, Jaipur, Nagpur and Shillong. More than three hundred officers and staff were provided training to write noting and drafting in Hindi.

### **Hindi Fortnight**

10.25 With a view to motivate the staff and officers to take up Hindi in all official work and increase the progressive use of the official language in the organization, a Hindi Fortnight was celebrated by the Geological Survey of India, CHQ and its subordinate offices from 14<sup>th</sup> to 28<sup>th</sup> September, 2007. During this period various competitions i.e. Hindi Essay competition, Hindi Noting and Drafting competition, Hindi debate, Hindi typing competition and Administrative terminology competition have been organized. One documentary film on Dinosaur was prepared and shown at Northern Region, Lucknow. The Western Region Office, Jaipur organized one lecture series on scientific and technical topics in Hindi during the Hindi fortnight.

10.26 The CHQ, Kolkata and Central Regional Office, Nagpur was entrusted with the responsibility of Town Official Language Implementation Committee. In view of implementing that, GSI organized various Hindi programmes.

### **Review of Quarterly Progress Reports**

10.27 The review of quarterly progress of Hindi has been made in the periodic meetings and the quarterly progress reports have been regularly endorsed to the Ministry.

### **Assessment of Progress of Hindi**

10.28 In order to assess the progress of Hindi in the offices of the Geological Survey of India, the Dy. Director (Official Language) inspected seven offices, which include Operation Tamilnadu, Puducherri & Kerala at Chennai, Operation Karnataka & Goa at Bengaluru, AMSE Wing, Bengaluru, Tripura & Mizoram Division, Agartala, North Eastern Regional Office,

Shillong, Operation Punjab, Haryana & Himachal Pradesh at Faridabad and Chandigarh. The assessment reports have been sent to the above offices for necessary follow up action.

### Implementation of Official Language (Hindi) in IBM

10.29 Hindi Fortnight was observed at Head Quarter during 10-25 September 2007 and at all regional offices of IBM during 01-15 September 2007. During the fortnight various competitions were organized to encourage the implementation of Official Language.

10.30 Thirty English stenographers were imparted training in Hindi stenography.

### Progressive use of Hindi in Official Work in NALCO

10.31 During the year efforts were made for compilation of Official Language rules for achieving the targets of Annual Program.

10.32 Hindi week was observed at all the offices and units of the Company in September, 2007. On this

occasion Hindi competitions like essay, calligraphy, debate, self-composed poetry, letter-writing, noting, dictation and slogan etc. were organised. Prizes were distributed to the winners and participants on the concluding day. At Corporate Office, a special issue of Hindi magazine 'Akshar' was released, in which selected articles, poems and stories written in Hindi by employees were published. Hindi magazine named 'Teen Suman' was published from Damanjodi Unit.

10.33 Employees were nominated for Hindi Typing (through computer) and stenography trainings under Hindi Teaching Scheme. Hindi Training continued at the sites through correspondence courses. Hindi workshops were organised for GETs. Website of NALCO was made available in Bilingual form viz. Hindi and English in internationally standardized Unicode encodings.

10.34 Bilingual format of different forms and a collection of English-Hindi notings were computerized by Hindi Cell, which were uploaded at Intranet of the Company for use of all.



Sh. J.P. Singh, Secretary (Mines) being presented the orders of the President by Sh. Ram Dev Bhandari, Chairman, Parliamentary Committee on Official Language



Sh. J.P. Singh, Secretary (Mines), Smt. Ajita Bajpai Pande, Jt. Secretary and other senior officers at Rajbhasha Awards Ceremony

## Chapter 11

# Welfare Measures

### Welfare of Scheduled Castes (SCs), Scheduled Tribes (STs), Women and other Weaker Sections

11.1 The Ministry of Mines, its Subordinate Offices and the Public Sector Undertakings under its administrative control, have already strived to fill up the backlog vacancies in respect of SC/ST. For upliftment of weaker Sections of society, PSUs identify and implement a number of programs in the peripheral areas of their units/locations. A number of activities like community education programmes, facilitating availability of drinking water, repair and development of approach roads of surrounding areas, arranging health awareness programs, and medical camps in rural areas, were undertaken by the PSUs for upliftment of the community in and around their townships as part of their social responsibility.

11.2 For the Welfare of Persons with Disabilities in the Ministry, due attention was given to Section 33 of the Persons with Disabilities (Equal Opportunities, Protection of Rights and Full Participation) Act, 1995, which provides that every appropriate Government shall appoint in every establishment such percentage of vacancies not less than three per cent for persons or class of persons with disability of which one per cent shall each shall be reserved for persons suffering from (i) blindness or low vision; (ii) hearing impairment; and (iii) locomotor disability or cerebral palsy; in the posts identified for each disability. The instructions/guidelines on the subject received from Ministry of Social Justice and Empowerment/Department of Personnel and Training are complied with in this Ministry. PWD Report I & II showing the representation and number of persons with disabilities in services and appointed during the year, respectively, in respect of secretariat proper, Geological Survey of

India and Indian Bureau of Mines is prepared and forwarded to Department of Personnel and Training by this Ministry every year. GSI is observing implementation of national policy for persons with disabilities. NALCO has taken up the economic rehabilitation measures and has contributed Rs. 12,08,000/- for the cause of PWD during the year 2006-2007.

### Redressal of Public Grievances

11.3 In pursuance of the instructions and guidelines issued on 1st March, 1988 by the Department of Administrative Reforms & Public Grievances to strengthen the internal grievance redressal machinery in each Ministry/ Department of the Central Government, the Joint Secretary of the Ministry of Mines has been designated as the Director of Grievances and has been vested with adequate powers in respect of all matters pertaining to the grievances received in the Ministry. Whenever a grievance is found to be genuine, directives for appropriate corrective measures are given to the concerned executive authorities.

11.4 The Ministry of Mines has, under its administrative control, two Subordinate Offices and three Public Sector Undertakings. The Chief Executives of the PSUs and the Heads of the subordinate offices have been entrusted with the responsibility of strengthening the grievance redressal machinery by designating senior level officers to look after the job and to report directly to the respective Chief Executive/ Head. Quarterly reports about the grievances received and disposed of are submitted by these Undertakings and Subordinate Offices to the Ministry. During the year 2007-2008 (upto December, 2007), 15 cases of GSI, IBM, MECL, NALCO and BGML were received;

out of which 7 cases have been disposed of. The Department of Administrative Reforms & Public Grievances (DAR&PG) has developed the Centralised Public Grievances Redress & Monitoring System (CPGRAMS) launched for prompt and effective redressal of grievances of citizens. The system is a single window grievance portal for the Ministries/ Departments/Organisations to record and receive the grievance online and redress them indicating actions at different levels. The portal also facilitates to receive the grievances lodged online through Internet by the citizens from any geographical location. Moreover, the system will effectively help monitor the grievances across the subordinate and attached organizations and will provide the overall scenario of grievances in the Ministries/Departments/ Organisations. The system enables the Departments/ Organisations to settle grievances online and the system eliminates/ reduces correspondence and curtails time for settling grievance. The Joint Secretary (Mines) reviews the pending cases of Public Grievances on quarterly basis. The grievance cases are also being reviewed by Secretary (Mines) in Quarterly Performance Review Meetings of these Organisations.

11.5 In order to obviate the tendency of Government employees to seek outside help for redressal of grievances relating to normal service matters, the Government issued instructions in December, 1988 for designating Staff Grievance Officers in the Central Ministries/Departments and their attached and Subordinate Offices to deal effectively and equitably with the grievances relating to service matters, like fair promotion, proper medical facilities, granting timely pensionary benefits, etc. The Ministry and the Subordinate Offices including the PSUs under its administrative control have accordingly designated such Staff Grievance Officers also.

### Right to Information Act

11.6 Following the enactment of the Right to Information Act, 2005, the Ministry of Mines, Subordinate Offices and Public Sector Undertakings (PSUs) under the charge of this Ministry had promptly appointed Central Public Information Officers (CPIO) and Appellate Authorities. The Ministry has also set up a Facilitation Counter for applicants and

constituted a new 'Public Information Cell' for processing of the requests and their monitoring in the Ministry. The Ministry alongwith its Subordinate Offices and PSUs has been receiving various requests under RTI Act, which are properly and timely responded to.

11.7 In 2007-08 (1.4.2007-31.12.2007), 217 applications were received in Ministry of Mines, which were timely responded. 17 Appeals were also received from the applicants against the decision of the CPIO, and the same were also disposed off within the stipulated time frame.

11.8 The Ministry along with its Subordinate Offices has also been furnishing the monthly, quarterly and annual report on the receipt and disposal of the requests seeking the information, from time to time promptly and accurately.

11.9 The Ministry of Mines is among the first Ministries to immediately implement the RTI Request and Appeal Management Information System (RTI-MIS) module. An applicant can send in the request in Electronic Form using this module; CPIO and Appellate Authority can monitor the disposal of pending applications/appeals.

### Vigilance Cases

11.10 During the year 2007-08 (upto December, 2007), 21 complaints were received. After examination, 10 complaints brought to their logical conclusion and 11 complaints are still under investigation. Vigilance awareness week was observed during 12-16 November, 2007. During the week, essay competition related to Vigilance activities was organised.

### Welfare Measures Being Taken by Subordinate Offices/Public Sector Undertakings

#### Indian Bureau of Mines

#### Work Done Concerning Women (Perspective Plan for Women)

11.11 Indian Bureau of Mines has not drawn up any specific perspective plan for women. However, out of a total strength of employees, women employees constitute about 12.25 percent. Training was imparted

to some women employees in the field of technical as well as administrative matters.

11.12 Women employees are also actively participating in various cultural and extracurricular activities organized by IBM from time to time.

#### **Reservation of Vacancies for persons with Disabilities as on December 2007**

11.13 IBM is strictly following the various instructions of the Government from time to time regarding reservation of vacancies for persons with Physical disabilities. As on 31.12.2007, 21 physically handicapped persons were under employment in IBM, of which 4 are visually handicapped one is hearing handicapped and 16 are orthopaedically handicapped.

#### **National Aluminium Company Limited (NALCO)**

##### **Industrial Relations**

11.14 Employee involvement through encouragement of more suggestions on production related issues, fostering of communication channels, training including total quality movement, periodic structured and informal meetings with the recognised Unions/ Officer's Association have helped in keeping the industrial relations scenario in the Company by and large peaceful. Continuous efforts on building up the efficiency and knowledge level, environment of mutual co-operation and trust have helped in reaping better productivity in harmonious atmosphere. There has been almost no man-days loss due to industrial relations problem.

##### **Perspective Plan for Women Welfare**

11.15 The Company has adopted the principle of equal opportunity to the women employees in the matter of employment and the Company has 318 women employees at different levels and categories.

11.16 Need based developmental and functional training programmes are provided to the women employees. Institutional mechanism through conduct rules has also been put in place to avoid sexual harassment of women. As a mark of development in their individual leadership, women executives of the company have got a place as Coordinator/member of

National Organizations like Women in Public Sector(WIPS).

#### **Welfare of Tribals and Minorities**

11.17 The Presidential Directives issued from time to time on reservation of Scheduled Tribes in employment has been scrupulously followed by the Company. At Damanjodi Sector, the Company has constructed two rehabilitation colonies for 600 Land Displaced Persons, most of whom are tribals. Besides, one able bodied persons from each such Land Displaced Persons have been provided with employment in the Company. The Company, besides providing various social & physical facilities in these rehabilitation colonies, earmarks about 0.4% of its net profit for the peripheral development at Damanjodi Sector, a tribal dominant area.

#### **Progress Achieved With Regard to Well Being of the Retired Employees During the Year**

11.18 The Company has a contributory scheme for post retirement medical facilities to the superannuated employees and also their spouse besides other statutory retirement benefits viz. Provident Fund, Gratuity, Pension etc.

**The Status of Implementation of the Persons with Disability Act, 1995 Specially on Implementation of Section 33 on Reservation of Vacancies for Persons with Disabilities**

11.19 The Company has been taking efforts to achieve representation in all posts in Group - C&D and in identified posts in Group - A&B as per section 33 of the Persons with Disabilities (Equal Opportunities, Protection of Rights and Full Participation) Act, 1995 in spite of its state-of the-art technology requiring mostly healthy and competent technical personnel. As per Section-33 of the above Act, 3% of vacancies are being reserved for persons with disabilities of which one percent each is reserved for person suffering from (i) Blindness or low vision (ii) Hearing impairment & (iii) Locomotor disability or cerebral palsy.

11.20 As on 31.12.2007 there are 70 Physically Handicapped Persons in employment of the Company in various identified posts.

**Table 11.1**  
**Employment of Personnel in NALCO as on 31.12.2007**

Group	Total No. of Employees	SC	ST	EX-SM	PWD	LDP	Minority
Executives	1797	209	16	09	06	19	77
Non-executives	5555	966	1203	36	61	1934	195
Trainees	32	03	6	NIL	03	16	09
<b>TOTAL</b>	<b>7384</b>	<b>1178</b>	<b>1325</b>	<b>45</b>	<b>70</b>	<b>1969</b>	<b>281</b>

EX-SM=Ex-servicemen, PWD=Person with disability, LDP=Land Displaced Person SC-Schedule caste, ST-Schedule tribe.

N.B.: It may be noted that every third employee of the organisation belongs to SC or ST community.

## HINDUSTAN COPPER LIMITED (HCL)

### Industrial Relations

11.21 Industrial Relations situation in all the Units of the Company continued to be harmonious and peaceful during the year 2007-08.

### Welfare Activities

11.22 Over the years, Employees participation in Management has been the backbone of harmonious Industrial Relations in the Company. The successful operation of various Bi-partite forums at all three levels namely at the Apex level, Unit level and Shop floor level has immensely contributed in the smooth performance of the Company. Quality Circles which were introduced in all the production units of the company have been successfully functioning. Six Sigma has been introduced in the Smelter and Refinery section of KCC.

11.23 In order to stimulate a culture of innovative thought process and to tap the latent potential of

employees, an Employees Suggestion Scheme christened 'SRIJAN' has been introduced. Further, in order to infuse inter-unit competition in the Company, an Award Scheme has also been introduced.

11.24 In pursuance to the judgment of the Supreme Court, HCL has set up Committees in all the Units/ Offices of the Company for the Prevention of Sexual Harassment of Women in work place. A provision in this regard has also been incorporated in the Conduct, Discipline and Appeal Rules of HCL. During the year under report, no incidence of discrimination amongst employees on the basis of gender has come to light.

### Manpower Strength

11.25 The manpower strength of the Company is 5415 as on 31.12.2007.

### Status of VRS

11.26 During the current financial year i.e. 2007-08 (Upto December, 2007), 3 employees were released on VRS.

**Table 11.2**  
**Employment of Personnel in HCL as on 31.12.2007**

Group	Manpower	SC	ST	Land Displaced Person	Minorities	OBC	Female
A	687	82	23	-	42	46	25
B	126	17	6	-	3	23	8
C	3789	601	508	202	240	562	141
D	813	186	141	207	46	30	133
<b>Total</b>	<b>5415</b>	<b>886</b>	<b>678</b>	<b>409</b>	<b>331</b>	<b>661</b>	<b>307</b>

## MINERAL EXPLORATION CORPORATION LIMITED (MECL)

### Welfare of Tribal and Minorities

11.27 MECL gives due importance to meet the socio-economic needs of the SC & ST communities. During 2007-08, one scholarship has been awarded and two scholarships of wards of 2 SC employees were renewed under "MECL employees grant of scholarship to employees children scheme".

### Perspective Plan for Women Welfare & Weaker Section

11.28 MECL stands for raising and improving the socio-economic status of women and weaker section. For this purpose, it provides training to acquire new skills for the career development.

11.29 In order to avoid sexual harassment of women at work places, a Grievance Committee on 'Sexual Harassment' on women at work place has already been constituted and is functioning in the Company.

11.30 MECL gives equal status to its women employees and the Service Rules, etc. are uniformly made applicable. The women employees in the Company are provided Maternity benefits as per rules.

### Citizen Charter

11.31 Chief Manager (P&A), MECL, has been appointed as Nodal Officer under Citizen Charter.

### Industrial Relations

11.32 Industrial Relations remained, by and large, peaceful & cordial in all the establishments of the company during 2007-08 (upto December, '07).

### Redressal of Public Grievance

11.33 No public grievance case has been received during the period from 1-4-07 to 31-12-07.

### Right to Information Act (RTI)

11.34 On enactment of Right to Information Act, MECL took appropriate action and nominated Information Officer and Appellate Officer as per the requirement of the said Act. The details have also been put up on MECL's website.

### Employment

11.35 The category wise employment position including general/SC/ST/OBC/Minorities/Women (As on 31.12.2007) in the company is given in Table-11.3.

**Table – 11.3**  
**Employment of Personnel in MECL as on 31.12.2007**

Group	Total No. of employees	SC	ST	OBC	Minorities	Women
A	229	40	15	09	15	04
B	72	11	05	02	06	03
C	1657	232	117	88	134	31
D	82	19	05	05	08	10
<b>Total</b>	<b>2040</b>	<b>302</b>	<b>142</b>	<b>104</b>	<b>163</b>	<b>48</b>

## Chapter 12

# Development of North Eastern Region (NER)

### Work done by Geological Survey of India (GSI) in North Eastern Region

12.1 A total of 28 investigations were carried out in NER (including Sikkim) during annual programme of 2006-2007 ( Oct.06 - Sept.07). A brief summary of the highlights pertaining to that period is given below:

#### SURVEY & MAPPING

##### Regional Systematic Survey

- An area of 395 sq. km. has been covered by Systematic Geological mapping in parts of Kokrajhar District, Assam.
- An area of 135 sq. km is covered by the Systematic Geological Mapping in parts of Kohima and Peren Districts, Nagaland by photo-geological interpretation and field checks.
- Programme on geochemical mapping has covered 2590 sq km in Arunachal Pradesh, Assam, Meghalaya, Mizoram and Sikkim.
- An area of 1100 sq km has been completed by ground geophysical mapping in parts of Darrang, Morigaon, Nagaon and Sonitpur Districts, Assam.

#### MINERAL EXPLORATION

##### PGE - Nickel

12.2 An investigation for Platinoid Group of Elements (PGE) and nickel was taken up in Mawpyut area, East Khasi hills district, Meghalaya.

##### Limestone

12.3 In the Jaintia Hill District of Meghalaya, investigation for limestone of chemical and other grades was continued in Lum Syrman block. Limestone was intersected below 3 to 6 m alluvial overburden where the thickness varied from 27.00m to 39.20m. A total resource of 280.80 million tonnes of limestone has been estimated.

### SPECIALIZED INVESTIGATION

#### Geotechnical Investigations

12.4 Geotechnical studies have been carried out in Arunachal Pradesh (Kameng, Ranganadi, Tawang Chu etc. Hydroelectric projects), Assam [Karbi Langpi hydroelectric, Umium (Killing) Dam projects], Meghalaya (Jadukata Multipurpose Project, Myntdu Leshka Hydroelectric Project etc.), Manipur (Thoubal Multipurpose Project, Irang H.E. Project) and in Sikkim (for market complexes etc.).

#### Landslide Hazard Studies

12.5 Sonapur Landslide on NH-44, Jaintia Hills District, Meghalaya has been taken up for monitoring. Landslide Hazard Zone (LHZ) mapping on meso scale (1:10,000) covering 28 sq km in and around Lunglei town, Mizoram area has been carried out. LHZ mapping covering a length of 170 km with a 2 km wide strip along the NH-39 between Jiribam and Imphal (Manipur) has been carried out on macro scale (1:50,000). LHZ mapping on macro scale has also covered an area of 560 sq km in parts of Sikkim Himalaya. At 9th Mile Landslide-cum-Subsidence Zone on NH-31A, Sikkim, 190 numbers of survey pillars were installed around and on the slides-cum-subsidence zone.

#### Earthquake Geology

12.6 Active fault studies along Bhutan Himalaya and Kokrajhar, Assam including geophysical work of 145 gravity and magnetic observations were done. Using DGPS monitoring of ground motion across MBT (Mishmi thrust) and MFT in parts of Dibang valley District, Arunachal Pradesh and across MBT and MCT thrust zones in Darjeeling-Sikkim Himalaya over pre-established 22 GPS stations were carried out.

#### Environmental Studies

12.7 Geo-environmental appraisal covering 180

sq.km in and around the limestone mining area of Jaintia Hills District, Meghalaya was carried out and effect of mining on eco-system assessed.

12.8 One new item 'geoenvironmental appraisal of Imphal Valley, Manipur for deciphering arsenic related pollution in ground water' is being taken up during Field Season 2007-2008 under the mission geoenvironmental and fragile ecosystem.

### RESEARCH AND DEVELOPMENT

12.9 In the West Khasi Hills, Meghalaya, rib bones and limb bones of sauropod dinosaurs have been recovered from the Dirang-Mawkyrwat section. Palaeobotanical study of the Gondwana-equivalent sediments exposed in the tectonic window in South Sikkim has yielded different Permian plant species, besides upper Carboniferous plant species. Sikkim is the second reported pre-Gondwana floral occurrence in India after the Gund Formation of Kashmir.

### DISSEMINATION OF INFORMATION

12.10 Compilation, collation & synthesis of data on limestone deposit in Litang valley, Jaintia hills district was taken up. Regional investigation for limestone carried out in the Litang valley since 1989-1990. The scientific data accumulated so far is being collated and synthesized with a view to evolving a depositional model with depiction of grade wise levels of the limestone. Preparation of a landslide inventory of the North Eastern Region is in progress. Installation of LAN was successfully completed in offices of NER, at Shillong, Guwahati, Dimapur, Agartala and Itanagar.

### Work Done by Indian Bureau of Mines (IBM) in North-Eastern Region

12.11 Sub-regional office of IBM at Guwahati continued to undertake inspection of mines/studies on development of resources of the North-Eastern region. During the period 19 mines / areas were inspected for enforcement of provisions of MCDR, 1988 and for processing & disposal of mining plan.

12.12 During the period, report on consultancy assignment on Ground vibration study due to blasting at Kheilijhri limestone mine for M/s Meghalaya Cements Ltd in Jaintiya Hill District, Meghalaya was prepared and submitted to the party.

12.13 One training programme exclusively for the North Eastern Personnel on MM (D&R), Act 1957, MCR, 1960 and MCDR, 1988 was conducted, in which 12 personnel from North-Eastern region participated.

12.14 Equipment / instruments worth Rs. 142.50 lakhs were identified for providing to various NE States and procurement action is in progress.

### Work Done by MECL in North Eastern Region

12.15 MECL has been associated with mineral exploration activities and geo-technical studies for the development of mineral industry in the North Eastern Region in last 26 years. It has completed exploration for coal in 11 blocks in the states of Assam, Arunachal Pradesh, Nagaland and Meghalaya on behalf of Ministry of Coal, North Eastern Council and CMPDIL. Under its promotional programmes funded by Ministry of Mines, it has completed eight schemes for copper, sillimanite, glass sand, shell limestone and ferro-silicon grade quartzite in states of Assam, Meghalaya, Mizoram, Sikkim and Arunachal Pradesh. In addition, it has carried out geo-technical studies on behalf of Brahmaputra Flood Control Board in the state of Assam and Arunachal Pradesh and consultancy work for remote sensing studies at Tripura on behalf of Ministry of Mines.

12.16 Further, the promotional exploration on behalf of Ministry of Mines for limestone at Nimi deposit, Kiphire dist, Nagaland at an estimated cost of Rs. 273.26 lakhs was approved in 12th SCPP. MECL had mobilized the resources for commencement of work; however, same were withdrawn on account of law and order problem in the area.

12.17 MECL under its promotional exploration programme funded by Ministry of Mines has taken up Saipum shell limestone project, Mizoram at an estimated cost of Rs. 95.36 lakhs. The physical work was commenced in December, 2005 and was concluded in May, 2006. The geological report has been submitted in March 2007.

12.18 During 2007-08, MECL proposes to take up the coal exploration work under promotional exploration programme funded by Ministry of Coal at West of Tirap, Makum Coalfield, Dist Tinsukhia, Assam involving 2625 metres of drilling with supplementary studies at an estimated cost of Rs. 357.89 lakhs. As a follow up the resources have been mobilised to West of Tirap and the work will start shortly.

12.19 Further to above, on behalf of Directorate General of Hydrocarbons, Govt. of India, MECL with BRGM, France has started studies for resource estimation in respect of oil shale deposit in an area of 254 sq.km. of Assam & Arunachal Pradesh. This will help in revealing the oil potential in the shales of North Eastern Region of the country.

**ANNEXURE-IV**  
**Imports of Ores & Minerals 2002-03 to 2006-07**

(Value in Rs. Crores)

Mineral	Unit	2002-03		2003-04		2004-05(R)		2005-06(P)		2006-07(P)	
		Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Abrasives (natural)	tonne	4536	8	5248	8	13155	17	14220	14	11425	12
Alumina	tonne	24993	55	28783	69	39253	99	189469	449	347636	698
Asbestos	tonne	98772	150	182762	257	177251	272	236492	415	253382	519
Ballclay	tonne	39511	18	17743	14	37188	24	111051	52	77013	42
Bauxite	tonne	44183	22	37432	21	56398	42	45240	36	47138	40
Borax : Total	tonne	49327	70	55910	68	51642	78	59839	89	63066	102
Building & monumental stones NES	tonne	4927	8	103276	17	145528	20	596819	27	1953304	58
Coal	'000 tonnes	23026	4994	21682	5008	28949	10266	38587	14909	43081	16689
Cobalt ores & concs.	tonne	4180	10	5481	30	8073	67	8313	74	9473	125
Coke	'000 tonnes	2208	1004	1894	1474	2841	4104	2619	2219	4686	4021
Copper ores & conc.	tonne	697636	1677	488063	1341	774160	3146	1072905	5198	2707370	23841
Cryolite and chiolite : Total \$\$	tonne	3603	8	—	—	—	—	.....	.....	....	....
Diamond (uncut)		*	28935	*	32312	*	41779	*	39644	*	33081
Emerald (uncut & cut)		*	88	*	113	*	107	*	239	*	233
Felspar (natural)	tonne	8219	5	1507	1	2238	3	6032	3	53127	13
Fluorspar	tonne	76001	49	100062	68	84169	65	105952	93	131000	117
Granite(Total)	tonne	5007	9	8536	18	13528	23	19281	33	41302	84
Graphite (natural)	tonne	2799	7	5586	9	6291	13	8029	19	9927	21
Gypsum & plaster	tonne	11531	6	18502	6	34250	9	75911	13	421772	53
Iron ore	'000 tonnes	520	103	1587	359	485	178	611	274	483	245
Kaolin	tonne	17080	21	28258	24	30757	37	40999	38	29805	39
Kieselgurh	tonne	2035	4	23	++	1	++	1	++	24	++
Lime stone	'000 tonnes	1036	90	1214	133	1349	182	1604	222	2300	268
Magnesite : Total	tonne	71665	92	90543	116	88602	140	83732	140	92125	157
Manganese dioxide electrolytic \$\$	tonne	2755	12	—	—	—	—	.....	.....	....	....

## ANNEXURE-IV (Contd...)

(Value in Rs. Crores)

Mineral	Unit	2002-03		2003-04		2004-05(R)		2005-06(P)		2006-07(P)	
		Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Manganese ore : Total	tonne	7621	11	6258	8	240914	209	13281	18	284202	169
Marble : Total	tonne	86853	148	96635	174	134851	256	182106	341	212521	423
Mica : Total	tonne	1296	6	256	11	1002	10	1135	16	1578	28
Natural gas	tonne	40553	73	82818	116	2371848	1558	4776791	3209	7044455	6716
Nickel ores & concs.	Tonne	931	21	428	1	37	++			85	1
Petroleum (crude)	'000 tonnes	83677	77726	93178	86512	96694	118932	99334	172429	106828	213088
Precious&semi-prec. stones NES : Total		*	280	*	306	*	382	*	496	*	494
Red oxide(Ochre)##	tonne	1082	18	1087	9	858	6	905	5	1408	5
Rock phosphate	tonne	3889221	889	2311886	602	4290427	1291	4477862	1391	5009214	1614
Silica sand	tonne	49428	13	3361	5	10713	13	3635	5	6947	14
Sodium nitrate \$\$	tonne	3617	4	—	—	—	—	.....	.....	....	....
Sodium nitrite \$\$	tonne	3630	5	—	—	—	—	.....	.....	....	....
Sulphur : Total	tonne	1387865	405	1003136	396	1433396	575	1390259	602	1401893	494
Tungsten ores & concs.	tonne	241	4	190	3	258	2	104	2	149	++
Vanadium & other ores &conc	tonne	18976	139	300	1	269	3	140	9	....	
Zinc ores & concs.	tonne	37550	50	103007	144	81547	135	40187	133	52003	345
Other Minerals			56		306		724		991		1192
<b>All Minerals</b>			<b>117294</b>		<b>130060</b>		<b>184758</b>		<b>243839</b>		<b>305028</b>

\*: Quantity figures not given due to partial coverage

++: Negligible

NES: Not elsewhere specified

p: Figures are provisional and likely to be revised

#: Includes yellow ochre for 2003-04

\$\$: Shifted from ores & minerals and reclassified as mineral based products.

R: Revised

Source: DGCI&S, Kolkata