Government of India
Ministry of Coal and Mines
Department of Mines

ANNUAL REPORT
2003-2004

Ministry of Coal and Mines

Department of Mines

Web Site Address: http://www. mines.nic.in/
Other important websites

GSI	-	http://www.gsi.gov.in
IBM	-	http://ibm.nic.in
NALCO	-	http://www.nalcoindia.com
HCL	-	http://www.hindustancopper.com
MECL	-	http://www.meclindia.com

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Chapter – 1

Highlights of 2003-2004

Mining Policy and Foreign Investment

1.1 The process of liberalisation in the mining sector, which was initiated with National Mineral Policy, 1993, has been further strengthened. It has been the endeavour of the Department of Mines to encourage greater private sector participation in exploration and exploitation of minerals. Mines and Minerals (Development & Regulation) Act, 1957 (MMDR) was amended and notified on 20.12.1999 delegating more powers to the State Governments. With the amendment in MMDR Act in 1999 the concept of reconnaiss-ance operations as a stage distinct from and prior to actual prospecting operations was introduced. This has made investment in the state-of-the-art technologies in mineral explorations more attractive. The policy changes have attracted many multinational companies for investment in exploration of basemetals, noble metals and other scarce minerals. 165 Reconnaissance permits involving an area of more than 2,19,665 sq. km. have been approved.

1.2 A number of amendments have been made recently in Mineral Concession Rules, 1960 (MCR) and Mineral Conservation and Development Rules, 1988 (MCDR) which inter-alia provide for a scheme of final and progressive mine closure plan for rehabilitation of area under mining lease after its abandonment, minimum size of mining lease for ensuring systematic and scientific mining, adoption of Unified National Framework classification for estimation of mineral resources in the country and time limit for conveying of decision on complete applications for grant of mineral concession and approval of mining plan.

1.3 Returns and Forms in Granite Conser-vation and Development Rules,1999 have been simplified.

1.4 A Study Group under the chairmanship of Additional Secretary (Mines) was constituted on 22.5 .2002 to review the existing rates of royalty and dead rent on major minerals (other than coal, lignite and sand for stowing). The Study Group has submitted its report to the Central Government, and necessary follow up action is being undertaken before notifying the revised rates of royalty in the Gazette of India.

1.5 A meeting of the reconnaissance permit holders, State Governments and concerned Ministries of the Central Government was held on 6.10.2003 under the chairmanship of Secretary (Mines) to review the progress of Large Area Prospecting Licences (LAPL) and Reconnaissance Permit (RP), and to remove the bottlenecks in the way of LAPL/RP holders in achieving their intended objective of exploration and identifying minerals and their development. To examine the changes in mining laws and procedures suggested in the meeting in detail, a committee was constituted under the chairmanship of the Additional Secretary (Mines). The Committee has since submitted its report and it is being considered.

1.6 A number of issues pertaining to granite and other dimensional stones were discussed in the meeting of the Granite Development Council held on 5.2.2004 under the chairmanship of the Secretary (Mines). Follow-up action on these decisions is being taken.

1.7 Rules pertaining to Offshore Areas Mineral (Development & Regulation) Act, 2002 are being finalized in consultation with Legislation Department.

1.8 During the year 2003-2004 one proposal involving Foreign Direct Investment (FDI) to the tune of Rs. 1 crore was approved through the Foreign Investment Promotion Board (FIPB) route, which takes the total number of FIPB approvals to 73, indicating an expected FDI inflow of Rs. 4044 crore.

Performance of Mineral Sector

1.9 The index of mineral production (base 1993-94=100) for the year 2003-2004 is estimated to be 147.00 as compared to 140.56 for 2002-2003, showing a growth of 4.6 percent.

1.10 In conformity with Government policy to balance the autonomy of PSUs commensurate with accountability and to set mutually acceptable targets, Memoranda of Understand-ing (MOU) were signed for 2003-2004 with National aluminium 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 the MOU signing PSUs.

1.11 NALCO has made a net profit of 735.60 crore which has surpassed the profits made by the company in previous years. During 2003-04 all the segments of operation i.e. Mines, Refinery, Smelter & Captive Power Plant (CPP), have achieved the rare distinction of highest ever production since inception. After first phase expansion, NALCO becomes the largest alumina producer in Asia with the capacity of 15,75,000 tonne per annum (TPA) with an exportable surplus of one million TPA after meeting the internal demands of its expanded smelter at Angul. NALCO's 8th Unit of CPP was commissioned on 25.2.2004. The expansion of smelter is also in advance stage of completion. There would be a saving of about Rs. 300 crore after this expansion.

1.12 After incurring loss for 90 consecutive months, HCL has made a turn around in financial performance by generating profits in the months of December, 2003, February, 2004 and March, 2004. The company has been able to confine its net losses to Rs. 62.42 crore (prov.) during 2003-04, which is much less than the net loss of Rs.147.70 crore incurred by the company during 2002-03.

1.13 MECL improved its performance by achieving positive gross margins throughout the year. It stood at Rs. 10.95 crore as against the loss of Rs. 4.99 crore during the previous year. The sales income of the company during 2003-04 was Rs. 60.10 crore as against the sales income of Rs. 44.83 crore in previous year. The total value of order booked during the year was over Rs. 94.00 crore. The Company has received individual orders worth Rs. 14.75 crore, for slim hole drilling for CBM on behalf of ONGC and orders worth Rs. 6.95 crore for drivage of incline on behalf of SCCL. Diversification activities continued in coal sampling and analysis, slim hole drilling for Coal Bed Methane studies and ballast stone supply and generated a revenue of Rs. 1075.82 lakh during 2003-04.

1.14 The Division Bench of Karnataka High Court in its order dated 26.9.2003 has upheld the winding up/closure orders passed by BIFR/AAIFR and Ministry of Labour in respect of Bharat Gold Mines Limited (BGML). The High Court has made certain recommendations which are under consideration of the Government.

International Co-operation

1.15 The third meeting of the India-Australia Joint Working Group on Energy and Minerals was held in Canberra on 29th -30th , January, 2003. This Joint Working Group was set up in pursuance of the decision of the sixth meeting of the India-Australia Joint Ministerial Commis-sion held in February, 1999. The meeting of the Joint Working Group reviewed the Protocol of the 1st and 2nd meetings and identified new project proposals in the fields of Mining, Coal, Power, Petroleum & Natural Gas and Non-Conventional Energy Sources. The then Minister of State for Mines (Independent Charge) visited Australia in September, 2003, to review the progress of the projects/proposals under the India-Australia Joint Working Group on Energy and Minerals.

1.16 The 17th meeting of the Indo-French Working Group on Mineral Exploration and Development was held in New Delhi on 24th - 25th November, 2003. The Working Group meeting reviewed the status of the completed projects, progress of ongoing projects and also identified and prioritised eight new projects for future co-operation.

1.17 The 9th Session of the Indo-Russian Working Group on Ferrous and Non-Ferrous Metallurgy was held in Mascow on 12th - 13th May, 2003. The protocol signed at the conclusion of the Working Group Meeting envisages strengthening co-operation in the ferrous and non-ferrous metallurgical sectors.

1.18 The 5th Session of the Indo-South Africa Joint Commission was held during 3rd - 5th July, 2003 in South Africa. The Department of Mines participated in the deliberations and also reviewed the progress of the projects/proposals identified under the Indo-South Africa Working Group on Geology and Mineral Resources.

1.19 The Department of Mines and the Department of Natural Resources, Government of Canada have signed a Memorandum of Understanding (MOU) for co-operation between India and Canada in the field of geosciences on 1st April, 2003 at Ottawa.

1.20 The 19th World Mining Congress was organised from 1st - 5th November, 2003 at New Delhi with the support of the Ministries/ Departments of Coal, Mines, Steel, Petroleum & Natural Gas, Commerce & Industry, Science & Technology, Environment & Forests, Power, and Small Scale Industries.

Regulation and Conservation

1.21 During 2003-2004, the Indian Bureau of Mines has taken action under the mining statutes for regulation and conservation of mines as shown in Table 1.1.

TABLE 1.1

Mines Inspected	2462
Mining Plans approved	453
Violations pointed out	2994
Violations fully rectified	1895
Mining Plans rejected	68
Mining Schemes approved	295
Mining Schemes rejected	59

Survey and Exploration

1.22 Highlights of performance of the Geological Survey of India (GSI) during 2003-2004 are as follows:

Mineral Finds

- 3548 million tonnes of coal
- 109 million tonnes of lignite
- 0.8 million tonnes of basemetal ore with 1% Cu and 1g/t gold in Dhani-Basri area, Dausa district, Rajasthan.
- 5 million tonnes of copper ore with average grade of 0.55% Cu and 25ppm Ag in Baniwala-Ki-Dhani and Dokan areas, Sikar district, Rajasthan.
- 0.53 million tonnes of base metal ore over a strike length of 225m with 12.30% Zn, 2.40 % Pb and 1.76% Cu over a true width of 6.90m in Muariya block, Betul district, Madhya Pradesh.
- 0.9 million tonnes of Mangnese ore with 20%+ Mn in Champasar-Bharatbahal blocks, Bolangir district, Orissa.
- 4 million tonnes of iron ore with 60% Fe in Pureibahal block, Sundergarh district, Orissa.
- 0.70 million tonnes of gold ore containing 1.88 g/t of Au in Delwara block, Banswara district, Rajasthan.
- 0.273 million tonnes of gold ore containing 1.89 g/t Au over 370m-strike length in Bhukia East central block, Banswara district, Rajasthan.
- 1.113 million tonnes of gold ore containing 1.16 to 6.28 g/t Au in Dona South block and 0.098 million tonnes of ore averaging 3.85 g/t Au in Dona North block in Anantapur district, Andhra Pradesh.
- 0.132 million tonnes of gold ore with 2.09 g/t Au in Dugocha North block and 0.216 million tonnes of gold ore with 3.05 g/t Au in Dugocha Central block in Udaipur district, Rajasthan
- 650.835 million tonnes of probable reserve of limestone of all grades in Jalaphet and Larket blocks, Jaintia Hills, Meghalaya.

Regional Systematic Surveys

- 7735.50 sq. km area covered by specialised thematic mapping.
- Aerogeophysical multi-sensor data acquired over 31,919 L.km.
- The Marine Wing of GSI has covered more than 97% of EEZ by now.
- Participated in XXIII Antarctica expedition covering 1000sq.km. Geological mapping in the icy continent.

Specialised Investigations

- Active fault zones have been delineated in two selected sectors of the eastern Himalayan foreland using multi-sensor image fusion.
- Cruises for geo chemical scan for hydro-carbon as sponsored work for ONGC by R.V. Samundramanthan were undertaken.
- Compilation of seismotectonic map of an area of 400 sq. km on 1:250,000 have been completed under seismic micro-zonation of Guwahati urban complex.

Research and Development

- Two principal laboratory facilities for Radio Carbon Dating have been acquired.
- One latest state-of-the-art ICP-MS has already started generating precise analytical data.
- A new Theropod Dinosaur from India, reconstructed from the fossil bones, has been announced through National Geographic Society at Mumbai.

Data Processing and Dissemination

- 240 nos. of geological quandrangle maps were published.
- Compilation of the Geological Maps on 1:50,000 scale and soft copy conversion has been taken up on priority basis and out of a total of 5104 sheets covering the entire country, 2161 sheets of Intra-Regional category have been compiled.
- Soft copy conversion of about 30,000 nos. of unpublished reports has been completed to make it available to the users on demand.

1.23 Highlights of performance of Mineral Exploration Corporation Ltd. (MECL) during 2003-04 are given below:

- During the year, MECL has completed 1,72,283 m of drilling during 2003-04 as against 1,19,994 m of drilling during the year 2002-03.
- 40 exploration reports were submitted and a total of 2081.18 million tonnes of mineral reserves have been added to National Mineral Inventory.
- In order to expand its activities MECL has entered into MOUs with M/s. BHP Billition India and KORES (A Korean Govt. Company) for exploration and is negotiating with M/s. KOPEX (A Polish Govt. Company) for taking up activities of developmental mining.

Chapter – 2

Role and Organisation of the Department of Mines

Role of the Department of Mines

2.1 The Department 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 (Development and Regulation) Act, 1957 in respect of all mines and minerals other than Coal, Natural gas and Petroleum. A list of subjects allocated to the Department of Mines is given at Box 2.1

BOX 2.1

LIST OF SUBJECTS ALLOCATTED TO THE DEPARTMENT OF MINES

- 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.
- 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 develop-ment of minerals in various States and the matters connected therewith or incidental thereto.
- All other metals and minerals not specifically allotted to any other Ministry/Department, such as Aluminium, Zinc, Copper, Gold, Diamonds, Lead and Nickel.
- Planning, development and control of, and assistance to, all industries dealt with by the Department.
- Metallurgical Grade Silicon.

Organisational Structure

2.2 The Organisational Chart of the Department of Mines is given at Annexure-1. The Department of Mines is headed by the Secretary, and has an Additional Secretary, two Joint Secretaries, one Financial Adviser (of the rank of Joint Secretary) common for Department of Coal and Mines, seven Directors, one Deputy Secretary, four Under Secretaries, two Principal Private Secretaries, one Junior Scientific Officer, fifteen Section Officers, seven Private Secretaries, one Assistant Librarian & Information Officer in addition to one Deputy Director and one Assistant Director for Official language. Besides this, the Department has a technical wing having sanctioned posts of one Industrial Adviser, one Additional Industrial Adviser and two Development Officers and two Assistant Development Officers. The total number of sanctioned posts for the Secretariat of the Department is 50 for Gazetted and 186 for Non-Gazetted. The status of sanctioned posts and employees in position in the Depart-ment of Mines under all categories as on 31.3.2004 (Group wise) is given at Table 2.1.

TABLE 2.1

STATUS OF SANCTIONED POST AND EMPLOYEES IN -POSITION IN DEPARTMENT OF MINES

Category	Total Sanctioned Strength	Persons in-position (Category-wise) Present incumbents	SC	ST	OBC	Minority	Women
Group-A	26	19	1	-	-	-	3
Group-B Gazetted	24	21	4	-	1	-	4
Group-B Non-Gazetted	50	42	5	3	2	-	13
Group-C	79	74	13	5	5	3	13
Group-D	57	56	16	1	-	-	5
Total	236	212	39	9	8	3	38

2.3 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.

2.4 For the Welfare of SC/ST/OBC, this Department 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 Department to resolve the complaints, if any, regarding sexual harassment of women working in the Secretariat Proper of this Department.

Subordinate Offices, Public Sector Undertakings, Joint Sector Companies and Research Institutions under the Department of Mines

2.5 The Department of Mines has two subordinate offices, four public sector under-takings under its administrative control. There are three research institutions which are also funded by the Department of Mines. The details of these bodies are as follows:

A. Subordinate Offices

1. Geological Survey of India (GSI) HQ, Kolkata.
2. Indian Bureau of Mines (IBM) HQ, Nagpur.

B. Public Sector Undertakings (PSUs)

There were four PSUs under the Department of Mines in 2003-2004, namely:

1. National Aluminium Company Limited (NALCO), Bhubaneswar;
2. Hindustan Copper Limited (HCL), Kolkata;
3. Mineral Exploration Corporation Limited (MECL), Nagpur;
4. 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.

C. Joint Sector Companies

In the following two companies, Government of India holds a minority stake after disinvestment and transfer of management control to Strategic Partners:

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

D. Research Institutions

There are three Research Institutions under the Department of Mines:

1. Jawaharlal Nehru Aluminius Research Development and Design Centre (JNARDDC), Nagpur;
2. National Institute of Rock Mechanics (NIRM), Karnataka, and
3. National Institute of Miners' Health (NIMH), Nagpur.

Chapter – 3

Mining Policy, Regulation and Conservation

Mining Law and Policy

3. 1 The Central Government can exercise power for regulation of mines and mineral development to the extent to which 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 develop-ment 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. Foreign equity holding is allowed upto 100% on the automatic route for all minerals except of diamond and precious stones for which the limit for automatic approval is 74% foreign equity.

3.2 In pursuance of the basic structural 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 recognised the need for encouraging private investment including foreign direct investment and for attracting state-of-the-art technology to the mineral sector. Further, the policy stressed that the Central Government, in consultation with the State Governments, shall continue to formulate the 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 twice 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 been also 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. The period of prospecting license is now three years, with possibility 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 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 license.

(v) Area restrictions notified for reconnaissance permit, prospecting license, 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, the mineral limestone was deleted from the First Schedule, and permission of the Central Government is now required for grant of mining lease, prospecting license, and reconnaissance permit 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 11th 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 on coal and lignite were revised on 16th August, 2002 under Second Schedule to the Act.

3.4 The Offshore Areas Mineral (Develop-ment and Regulation) Act, 2002 providing for development and regulation of mineral resources in the territorial waters, continental shelf, and the exclusive economic zone was notified on 31.1.2003. The legislation would enable streamlining of mineral exploration and development in the offshore areas and ensure systematic and scientific exploitation of mineral reserves (except petroleum, natural gas and hydrocarbon resources) for attracting private investment in the mineral sector. Offshore Areas Mineral Concession Rules are being finalized in consultation with Legislative Department.

Response of the Industry to the Policy Measures

3.5 In October 1996, the Department of Mines had issued guidelines to facilitate large area aerial prospecting, in response to which the entrepreneurs have taken 65 large area prospecting licenses, covering an area of over 90 thousand square kilometer. After the amendment in the MMDR Act, 1957 in 1999, 165 reconnaissance permits covering an area of over 219665.303 square kilometers have been granted till 31.03.2004, of which 46 reconnaiss-ance permits for an area of over 63891.656 square kilometers were granted during the year 2003-2004. The states for which reconnaissance permits have been approved are Andhra Pradesh (38), Karnataka (37), Rajasthan (34), Chattisgarh (23), Orissa (15), Madhya Pradesh (13), Uttar Pradesh (2), Jharkhand (1), Haryana (1) and West Bengal (1).

3.6 During the year 2003-2004, one proposal involving Foreign Direct Investment (FDI) to the tune of Rs. 1 crore was approved through the Foreign Investment Promotion Board (FIPB) route, which takes the total number of FIPB approvals to 73, indicating an expected FDI inflow of Rs. 4,044 crore.

Mining Regulation and Conservation

3.7 A Conference of State Ministers of Mining and Geology was held on 22.1.2003. Inter alia, it was decided in the Conference, as per consensus that

- MCR, 1960 and MCDR, 1988 would be amended to make appropriate provisions for mine closure. These provisions shall specify the duties and responsibilities of the mining lease holder and also provided for financial assurance for fulfilling the same.
- United Nations National Framework Classification (UNFC) for minerals would be adopted. The statutory forms would be recast accordingly.
- Mining law would be amended to provide for minimum size of mining leases in the interest of scientific mining.
- Revised guidelines, so as to adopt a transparent benchmark for valuation of minerals, would be adopted in the MCR, 1960 for computing royalty on minerals on ad valorem basis.
- Accordingly MCR, 1960 and MCDR, 1988 have been amended which inter-alia provide for a scheme of final & progressive mine closure plan for rehabilitation of area under ML after its abandonment, minimum size of ML for ensuring system-atic & scientific mining, adoption of UNFC for estimation of mineral resources in the country.

3.8 The Department of Mines discharges the function of regulation and conservation through the Indian Bureau of Mines (IBM), which is a subordinate office of the Department. These functions include enforcement of the Mines and Minerals (Development and Regulation) Act 1957, Mineral Conservation and Development Rules 1988, and the relevant provisions of the Mineral Concession Rules 1960. It also undertakes scientific, techno-economic, research oriented studies in various aspects of mining, geological studies, ore beneficiation and environmental studies.

3.9 The performance of IBM in respect of regulation and conservation during the period under review is indicated in Table 3.1. In addition, during the year 2003-2004, 2,994 violations under Mineral Conservation and Development Rules (MCDR) 1988 were pointed out in respect of 1,281 mines and 1,895 violations were fully rectified. 134 prosecutions were launched in various courts. Sixteen cases were decided and 24 cases were compounded. Besides, mining operations were suspended under Rule 13(2) of MCDR 1988 in respect of 3 mines out of which suspension orders have since been revoked in respect of 2 mines.

3.10 During the year 2003-2004 453 mining plans were approved and 68 were rejected. Since its inception, IBM has received a cumulative total of 12,130 mining plans for approval till March 2004, out of which, 9,822 mining plans were approved,1,298 were rejected, 901 withdrawn by the parties and 52 were referred back to the parties which are pending with them for modification. Besides, 57 mining plans were under scrutiny with the IBM at various Regional/ Zonal offices.

3.11 The inspections/studies for the enforce-ment of provisions of MCDR, 1988 also include provisions on protection of mines environment. During inspections it is ensured that mine operators are taking due care for removal and utilisation of top soil, storage of over-burden/waste rock, reclamation and rehabilitation of land, precaution against ground vibration, control of ground subsidence, abatement measures against air, water & noise pollution, restoration of flora etc, in addition to other conservation and developmental measures. Necessary guidance to mine managements/operators is also given for systematic and scientific development of mines including protection of environment. While approving the mining plans and the schemes of mining, it is ensured that the environment impact assessment studies have been carried out and to that effect, an environmental management plan has been incorporated for its effective implementation.

12 After the enforcement of MCDR, 1988, extensive afforestation has been undertaken in the mines. During the year 2003 about 3.14 million trees have been planted in and around mine areas. Thus, so far, 61.24 million trees have been planted with a survival rate of 71 percent.

3.13 Mines Environment and Mineral Conservation (MEMC) Weeks were organized in important mining centres every year through the regional offices of IBM to promote awareness amongst mine owners for minimising environmental pollution. During the year 2003-2004, twelve such programmes were organised, in which a total of 637 mines participated. Various activities during the MEMC weeks generated enthusiasm, wide publicity and awareness amongst mining community towards achieving better environment and eco-friendly mining.

3.14 Applied Mining Research is carried out by IBM on various mining aspects so as to help 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 2003-2004 nine such assignments have been completed.

TABLE 3.1
MINING REGULATION AND CONSERVATION (2003-2004)

S.No.	Item	Actual 2001-2002	Actual 2002-2003	Target 2003-2004	Achievement 2003-2004
1.	Inspection of Mines	2,219	2,719	2,450	2,462
2.	Approval of Mining Plans				
	(a) No. of Mining Plans				
	(i) Approved	620	494	–	453
	(ii) Rejected	62	54	–	68
	(b) No. of Mining Schemes				
	(i) Approved	195	255	–	295
	(ii) Rejected	41	30	–	59
3.	Updation of National Mineral inventory (NMI) as on 1.4.2000.				
	(i) Computerisation of updated inventories (No. of minerals)	33	15	–	–
	(ii) Data entry, computerization, generation of summary output of minerals as per UNFC		Allotted resource codes as per UNFC for 15,762 deposits covering in all 64 minerals	64	Data entry as per UNFC completed for 64 minerals and summary/ detailed outputs generated for all the 64 minerals
4.	Preparation of Multi Mineral Maps	21,496 (hect)	100 (multi mineral maps of Chhattisgarh and parts of Orissa)	100 (multi maps)	100 (multi-mineral maps of Orissa, AP & part of Jharkhand States
5.	Ore Dressing	66	69	70	69 completed and 32 in progress
6.	Chemical Analysis (No. of radicals)	48,112	49,424	50,000	50,871 completed and 2,171 in progress

Chapter- 4

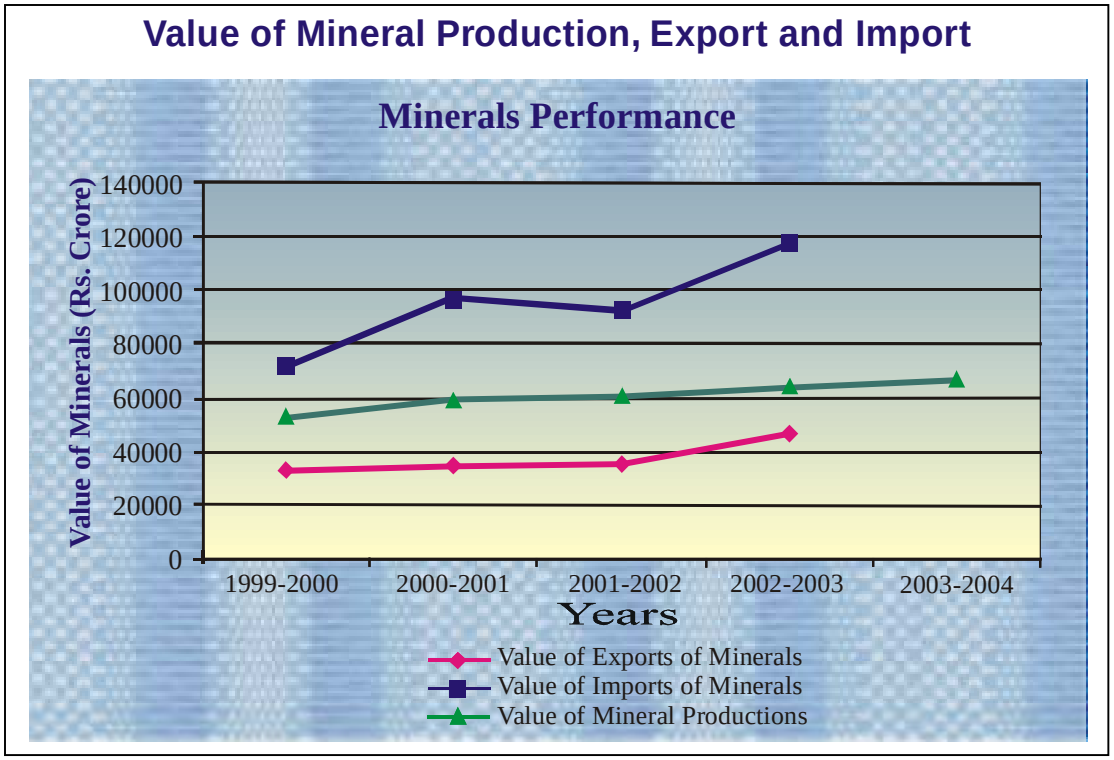
Performance of the Mining and the Mineral Sector

GENERAL PERFORMANCE

Mineral Production

4.1 The national mineral sector recorded a positive growth during 2003-04 as compared to 2002-03. The Index of Mineral Production (base year 1993-94=100) for 2003-04 for all minerals was higher by 4.6 percent, primarily on account of a positive growth of 5.7 percent in the coal and lignite sector which has a weight of 32.46 percent in the index, and a positive growth of 13.0 percent in the non-fuel major minerals which has a weight of 12.3 percent in the index.

4.2 Based on the overall trend so far, the index of mineral production (base year 1993-94=100) for the year 2003-04 was 147.00 as compared to 140.56 for 2002-03 showing a growth of 4.6 percent. The total value of mineral production (excluding atomic minerals) during 2003-04 stood at Rs. 66,308 crore, which shows an increase of about 4.36 percent over that of the previous year. During 2003-04, fuel minerals accounted for Rs. 53,101 crore or 80 percent, metallic minerals Rs. 55,19 crore or 8 percent and non-metallic minerals (including minor minerals) Rs. 7687 crore or 12 percent of the total value. Information on production and value of selected minerals from 1999-2000 to 2003-04 is appended as Annexure-II.



Export and Imports

4.3 The value of export of ores and minerals during 2002-03 was Rs. 46, 618 crore. Diamond (mostly cut) was the principal item of export during 2002-03 which accounted for 77 percent. Followed by iron ore with a contribution of 9 percent, granite with contribution of 5 percent and alumina and precious & semi-precious stones comprising 2 percent each. Building and monumental stones, chromite, coal, zinc ores and concentrates were the other important minerals exported during the year 2002-03. Data on export of ores and minerals during 1998-1999 to 2002-03 is presented at Annexure-III.

4.4 The value of import of ores and minerals during 2002-03 was Rs.1,17,294 crore. Petroleum (crude) was the main constituent of mineral import during 2002-03 which accounted for 66 percent of the total value of import of ores and minerals followed by diamond (uncut) with 25 percent. Coal, copper concentrate, coke, rock phosphate, precious & semi-precious stones and sulphur were the other important minerals imported during 2002-03. Data on import of ores and minerals during 1998-99 to 2002-03 is presented at Annexure-IV.

Price Trend

4.5 The Wholesale Price Index for non-fuel minerals (base year 1993-94=100) stood at 148.3 in March, 2004 and the corresponding Index for March, 2003 was 118.5. The minerals included in the Wholesale Price Index are iron ore, manganese ore, bauxite, chromite, limestone, fluorite, gypsum, fireclay, china clay, dolomite, magnesite, asbestos, barytes, steatite, silica sand, phosphorite, felspar, ochre, and vermiculite. The Wholesale Price Index for metallic minerals was 171.8 in March, 2004 as compared to 121.9 in March, 2003 and that of other minerals was 111.1 in March, 2004 as compared to 113.1 in March, 2003.

SURVEY AND EXPLORATION

Introduction

4.6 The Department of Mines discharges the function of survey and exploration through the Geolgical survey of India (GSI), which is a subordinate office of the Department, and the Mineral Exploration Corporation Limited (MECL), which is a Public Sector Undertaking under the administrative control of this Department.

GEOLOGICAL SURVEY OF INDIA

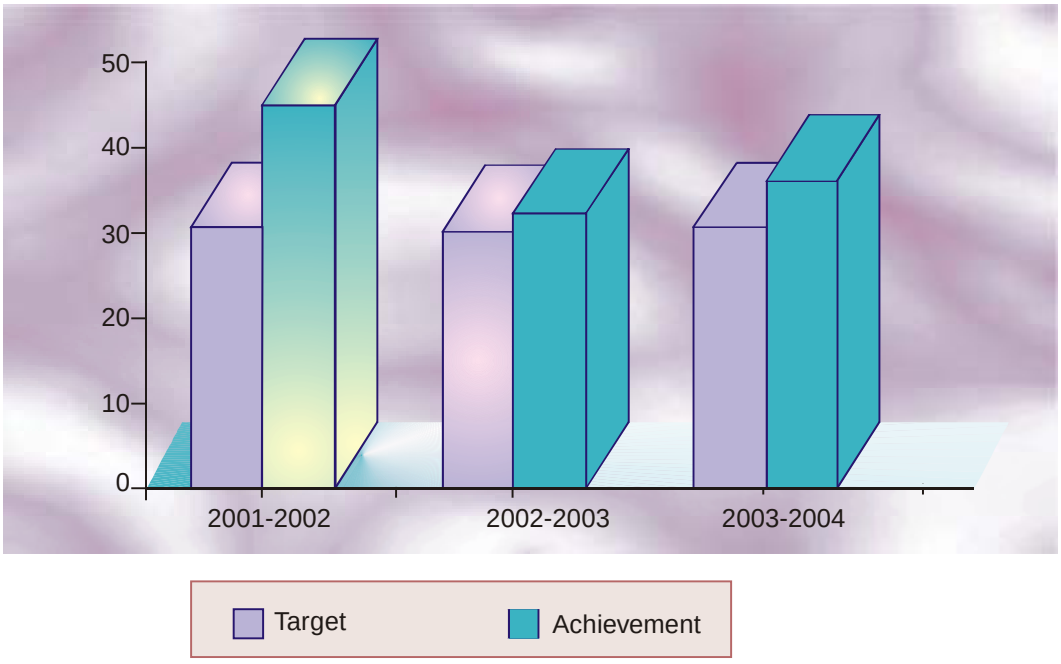
Specialised Thematic Studies

4.7 A total of 7735.50 sq km area have been covered in 30 projects/items distributed in different parts of the country. Some of the important findings are as follows :

- The mafic-ultramafic belt and enveloping gneisses/granitoids of J.C Pura and Arsikere area, Karnataka runs for a strike length of more than 50 km in NW-SE direction with an average width of 500m.

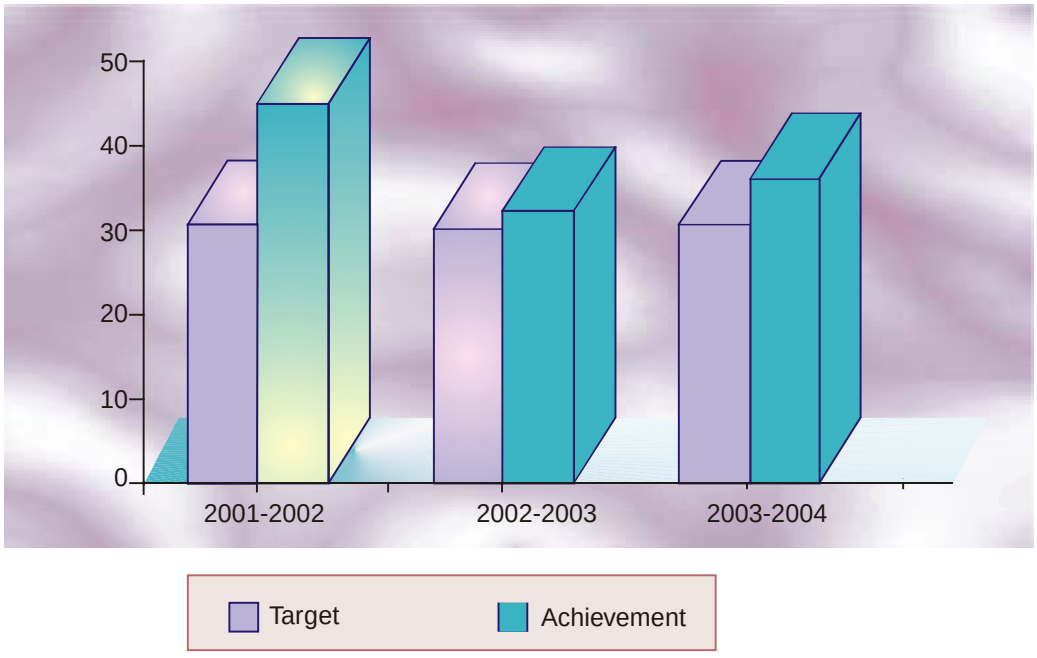
MINERAL EXPLORATION

Detailed Mapping (in sq.km.)



MINERAL EXPLORATION

Detailed Mapping (in sq.km.)

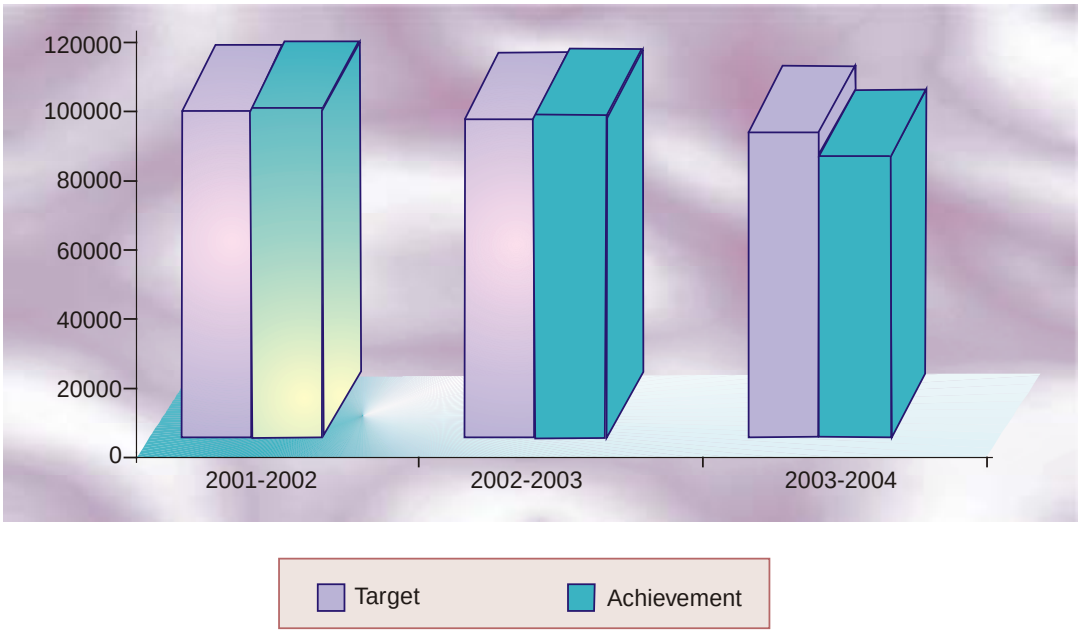


⌘ In Chitradurga Schist Belt (CSB) between Javagondanahalli and Srirangapatnam three phases of folding deformation have been recorded in both CSB and JB.

- Thematic mapping in the Jharol Group and the Udaipur Group of rocks in Rajasthan has brought out unconformable relationship marked by conglomerate.
- Study of the Sausar Group and associated gneiss- migmatite in Maharashtra and Madhya Pradesh has brought out two major lithotectonic ensemble (a) Tirodi Biotite Gneiss (TBG) and (b) Sausar Group (SG). EPMA studies of Mn-ore samples revealed the ore species 'pyrophanite' for the first time from the Sausar Mn-ore assemblage.
- Thematic studies along Gavilgarh-Tan mega-lineament has brought out an impressive zone of sulphide mineralization and hydrothermal alteration associated with felsic volcanics in Chhindwara district. Preliminary results indicate Zn from 550 ppm to 2.55%, Pb from 600 ppm to 1.51% and Cu from +75 ppm to 0.19 %.
- Specialised thematic mapping in the Sindhudurg district, western Maharashtra has enabled to classify the Precambrian rocks into three suites
- Specialized thematic mapping of Bilaspur-Raigarh belt (BRB), Chhattisgarh has been completed.
- Thematic studies for elucidating tectono-thermal evolutionary history of Betul belt, Madhya Pradesh have been completed.
- Thematic study on granitic magmatism along the Tan shear in Maharashtra and Madhya Pradesh has indicated emplacement at middle to upper crustal levels (4-7 Kbar pressure) in 650-7500C temperature range.
- Specialized thematic mapping of Wairagarh metasediments and adjacent gneiss-granite terrain, Western Bastar Craton, Maharashtra, has been completed with the objective of establishing stratigraphic status of Wairagarh Metasediments (WMS) and identifying its provenance and potentiality of diamond.
- Specialised thematic mapping of the Yinkiong-Belong-Menchuka-Tuting area of Arunachal Pradesh has revealed that Lohit granitoid, the northernmost tectonic unit shows a thrusted contact with the underlying Tuting metavolcanics.
- Thematic studies to establish lithostratig-raphy and age of the Miri Formation was undertaken in two areas - (1) Tirbiu-Sododoke-Bame area, West Siang district and (2) Pepiajuli- Parsen area, Lower Subansiri district. Two inliers of limestone (the Buxa Group), exposed due to erosion of domal structure, were identified to the west of Tirbiu and Sododoke.
- Thematic mapping to study tectono-stratigraphic relationship between Kamakhyanagar gneisses and Malayagiri greenstones in Kendujhar, Angul and Dhenkanal districts, Orissa has been taken up.

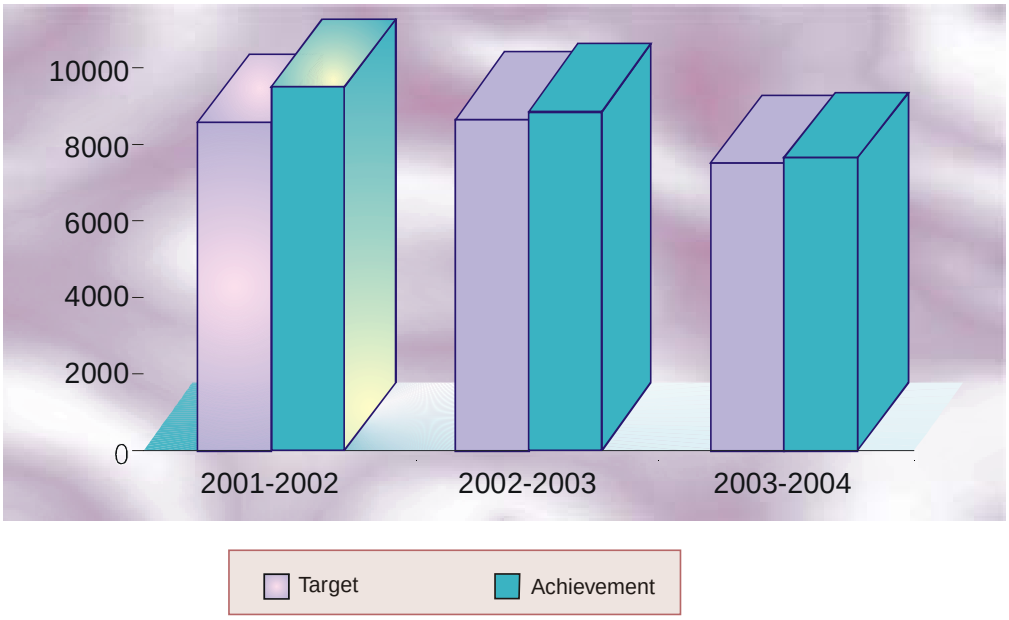
MINERAL EXPLORATION

Drilling (in meter)



SURVEY AND MAPPING

Specialized Thematic Mapping (in sq. km.)



Airborne Survey

Multi-sensor Survey with the Twin Otter

4.8 Aerogeophysical multi-sensor data have been acquired in Nalagonda and Mahaboob-nagar areas and Bangalore-Penukonda areas in parts of Andhra Pradesh and Karnataka covering 31,919 L.km.

Aerogeophysical Data Processing

4.9 Processing of aerogeophysical data is carried out in the Geophysical Mapping Centre (GMC) of AMSE for generation of total intensity magnetic maps and elemental distribution maps for U, Th, K and their total count. Processing of multi-sensor airborne data acquired over 14,670 sq km in Lalitpur, Mohaba-Panna (Jhansi east) area, Madhya Pradesh and Uttar Pradesh has been completed. Also, processing of multi-sensor aerogeophysical data acquired covering 5000 sq km in Nalagonda area and 2650 sq km in Mahaboobnagar area, Andhra Pradesh has been initiated. Conversion of VAX database into PC compatible format and storage on CD media has been completed.

Marine Survey

4.10 Marine Wing of GSI continued its offshore geoscientific programme with an ocean going research vessel R.V. Samudra Manthan deployed in the Exclusive Economic Zone (EEZ) and beyond and with two coastal research vessels viz. R.V. Samudra Kaustubh and R. V. Samudra Shaudhikama deployed within territorial waters (TW) along east and west coasts respectively. Areas very close to the coast in the nearshore zone (0-10m depth) were surveyed by small-mechanised boats utilising portable instruments and improvised sampling devices where coastal research vessel could not manoeuvre. Positioning is done through DGPS, which is installed in the research vessel.

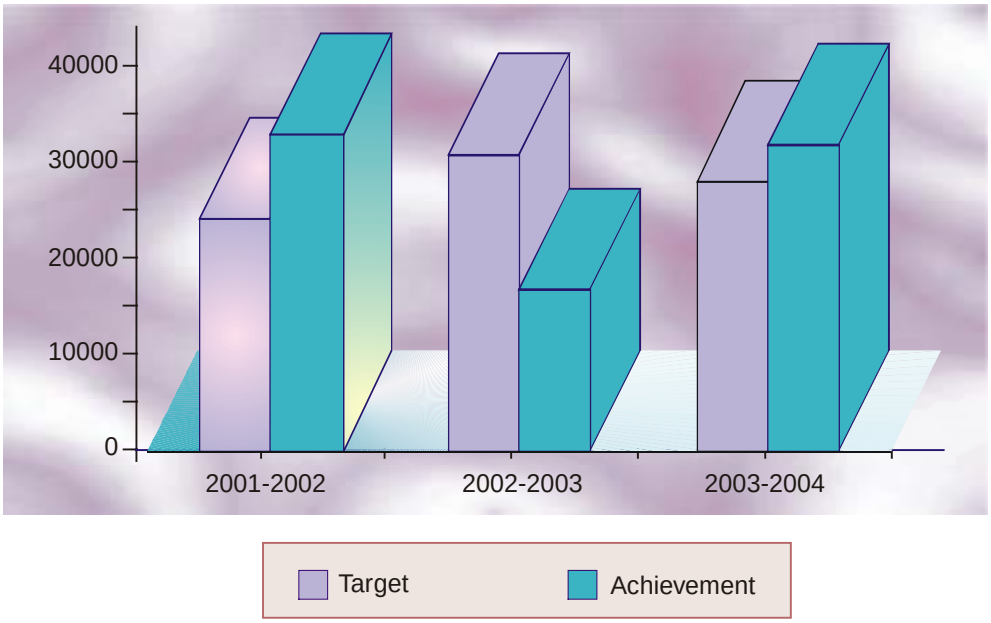
4.11 A total of seven cruises of R.V. Samudra Manthan were completed within the EEZ of India. As per the MoU between ONGC and GSI, both sediment and water samples for geochemical scan for hydrocarbons were collected from western offshore basin in the Arabian Sea. A total of four cruises and one part cruise were deployed to collect 2062 sediment samples from 7115 sq km area.

4.12 Under the seabed-mapping programme within the territorial water, one cruise by R.V Samudra Kaustubh and three cruises by R.V Samudra Saudhikama were planned. Two each cruises in the east and west coasts were planned for geotechnical studies off Pondicherry and Devi river in the east coast and off Devgarh, Maharashtra and Varkalai-Anjengo, Kerala in the west coast. Environmental studies were envisaged in two cruises in the offshore and onshore regions of Mahanadi Delta and Godavari Delta. Investigations for assessment for placer minerals were contemplated by two cruises off Orissa and Andhra coasts. Lastly, one cruise was planned for parametric studies of Kannur to Azhikode off the coasts of Kerala with the basic aim of delineating sand for constructional purposes.

4,13 Seabed mapping in the nearshore shallow water zone upto 5m water depths for six projects were undertaken by mechanized boat. About 61.5 sq km was covered by 216 L.km bathymetric survey. Besides, 198 sediment and water samples, 18 samples for suspended sediment concentration and 5 beach profiling data were collected during the survey.

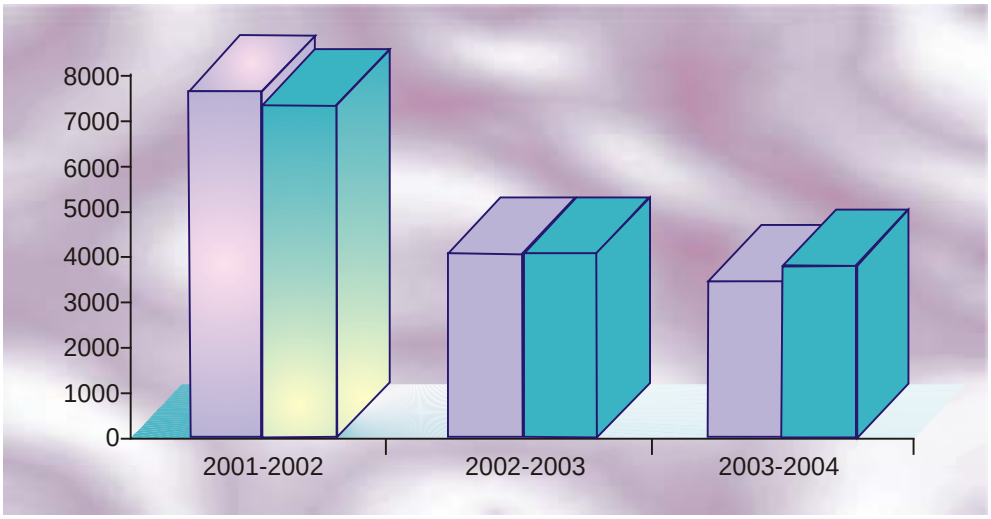
SURVEY AND MAPPING

Multisensor Survey (with Twin Otter) (in L.km.)



SURVEY AND MAPPING

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



4.14 A short-term field item involving drilling around Rameshwaram - Dhanushkodi / Adam's Bridge was taken up. Three vertical boreholes were drilled at three locations. Of the three boreholes two are on the mainland and one is on the islet. The boreholes drilled on the mainland were closed at 120.5m and 205m depths while the third was closed at 103m respectively. The different litho units encountered from top are brown dune sand, white calcareous sand, calcareous mud with coral debris, and hard compact olive clay. Correlation of the sediment sequence noticed in the three boreholes indicates a possible tectonic disturbance.

Geochemical Mapping

4.15 Geochemical mapping serves as an aid to mineral exploration, soil fertility assessment, human and animal health, establishing valid environmental baseline and understanding the chemistry of the environment. The country, which has a total land area of 3.28 million sq. km., is yet to be mapped geochemically. Hardly 0.3% of the land area has been systematically geochemically mapped, and that too, with a mineral exploration bias. Local and detailed scale mapping has been carried out in some areas for prospecting in identified mineralised belt and for specific environmental purpose. During the Xth Plan, National Geochemical mapping programme has been initiated in the country, which requires sampling and analysis of stream sediment, soil, stream water, humus etc. Stream sediment is the prime media of sampling. Stream sediments are proposed to be collected from a cell size of 1 km x 1 km and composited on 2 km x 2 km cell for analytical purposes. Samples from the other media will be collected on a 5'x5' cell size. Sampling will be carried out with 1: 50,000 toposheet as the base map.

4.16 Initial two years have been designed for pilot survey where programmes are to be mounted in different parts of the country with the aim of standardising sampling procedure, sample processing, analytical techniques, data processing and retrieval. An area of 19,391 sq. km. was covered under the National Geochemical Mapping Programme during the period under review.

Geophysical Mapping

4.17 With a view to cover the entire country, regional geophysical mapping programmes have been taken up utilising gravity-magnetic methods with the density of data collection being one reading per 2.5 sq. km. Seven nos. of items on regional gravity and magnetic surveys covering parts of U.P, Haryana, Maharashtra, Karnataka, Meghalaya and Orissa were taken up during the period under review.

Mineral Search and Evaluation

4.18 GSI continued with its broad based uniform national approach to data generation in respect of mineral resources. Preliminary appraisal to regional mineral exploration was continued for several commodities keeping in view the policy of the Government and directives of Planning Commission and recommendation of CGPB and SGPB.

4.19 Physical inputs for implementation of above programmes came from 1027 sq. km of large scale mapping, 36.26 sq. km of detailed mapping and 81,995.90 metres of drilling. Laboratory support in the form of chemical, petrological and mineralogical determinations were also given.

4.20 GSI in its aim to augment the mineral resources of the country through concept oriented search and regional mineral appraisal involving multidisciplinary integrated approach has established the following :

Base metal

- A provisional reserve of 0.8 million tonnes with 1% Cu and 1 g/t gold has been estimated in Dhani-Basri area, Dausa district, Rajasthan. This find has opened a new arena for search of base metal and gold in small inter-cratonic basins and shear zones within the Archaean Gneissic Complex in Rajasthan.
- A provisional reserve of 5 million tonnes of copper ore with average grade of 0.55% Cu and 25ppm Ag has been estimated in Baniwala-Ki-Dhani and Dokan areas, Sikar district, Rajasthan.
- A provisional reserve of 0.53 million tonnes of base metal ore has been proved over a strike length of 225m with 12.30% Zn, 2.40 % Pb and 1.76% Cu over a true width of 6.90m in Muariya block, Betul district, Madhya Pradesh.

Gold

- A provisional reserve of 0.704 million tonnes of ore containing 1.88 g/t of Au has been estimated in Delwara block, Banswara district, Rajasthan.
- 0.273 million tonnes of ore containing 1.89 g/t Au has been estimated over 370m-strike length in Bhukia East central block, Banswara district, Rajasthan.
- A provisional reserve of 1.113 million tonnes of ore containing 1.16 to 6.28 g/t Au in Dona South block and 0.098 million tonnes of ore averaging 3.85 g/t Au in Dona North block has been estimated in Anantapur district, Andhra Pradesh.

- Provisional reserves of 0.132 million tonnes with 2.09 g/t Au in Dugocha North block and 0.216 million tonnes with 3.05 g/t Au in Dugocha Central block have been estimated in Udaipur district, Rajasthan.

Manganese

- A provisional reserve of 0.9 million tonnes of Mn ore with 20%+ Mn has been estimated in Champasar-Bharatbahal blocks, Bolangir district, Orissa.

Iron Ore

- A provisional reserve of 4 million tonnes ore with 60% Fe has been estimated in Pureibahal block, Sundergarh district, Orissa.

Clay

- An additional reserve of 2 million tonnes of combined residual and sedimentary clays of refractory grade has been proved in Kasargod district, Kerala.

Limestone

- In Jalaphet block, Jaintia Hills district, Meghalaya a total of 230.10 million tonnes of probable reserve of limestone of all grades has been estimated.
- In Larket block, Jaintia Hills district, Meghalaya a total of 420.735 million tonnes of probable reserve of limestone of all grades has been estimated.

Coal and Lignite

- An additional reserve to the tune of 3.548 billion tonnes of coal from Sohagpur and Singrauli coal fields,Madhya Pradesh; Talcher and Ib coal fields,Orissa; Birbhum and Raniganj coal fields West Bengal; Rajmahal coal fields of Jharkhand and Tatapani-Ramkola coal field of Chattisgarh.
- 109 million tonnes of lignite reserve from lignite fields of Tamilnadu and Rajasthan.

4.21 The performance of Geological Survey of India is given at Annexure -V

MINERAL EXPLORATION CORPORATION LIMITED (MECL)

Ongoing Projects

4.22 During the year 2003-04, the exploration priorities continued for energy minerals i.e. Coal and Lignite on behalf of Department of Coal. In addition, exploration for Copper, Bauxite, Iron Ore, Manganese ore, Chromite , Ferrosilicon grade quartzite and slim hole drilling for Coal Bed Methane(CBM) studies was also carried out in different parts of the country as given below.

4.23 The following exploration programmes are continued during 2003-2004.

(A) Promotional Exploration on behalf of Department of Mines

- Copper at Malanjkhand (West) block, Madhya Pradesh.
- Copper at Bhagal & Multi-metal at Devtalai blocks, Rajasthan.
- Copper at Thanewasana, Maharashtra.
- Chromite at Nuggihalli block, Karnataka.
- Ferro-silicon grade quartzite, Kalaktang, Arunachal Pradesh.
- Remote sensing work for gold at Girar, Uttar Pradesh.
- Tungsten at Ratanpur block, West Bengal.
- Bauxite at Serengdag, Jharkhand.

(B) Exploration for Coal and Lignite on behalf of Department of Coal

- Coal in the command areas of Singareni Collieries Company Ltd. and Coal India Ltd. (SECL, WCL, NCL and NEC areas).
- Lignite in the States of Tamil Nadu & Rajasthan.

(C) Exploration under contractual work on behalf of various clients

- Manganese/Iron Ore at Joda/Bambebari, Orissa, on behalf of M/s. TISCO.
- Iron ore at Asniye, Maharashtra, on behalf of M/s. SMC.
- Bauxite at Lanjigarh, on behalf of M/s. STERLITE & at Panchpatmali on behalf of M/s. NALCO.
- Hard Rock at Rohil-Ghateshwar & Rohil-Central, on behalf of M/s. AMD.
- Slim hole drilling for CBM at Kalidaspur on behalf of M/s. GEECL, at North Karanpura and Bokaro on behalf of M/s. ONGC and Sanchor, Rajasthan, on behalf of Department of Petroleum, Govt. of Rajasthan.
- Lignite exploration at Kasanu & Sonari block, on behalf of M/s. RSMML.
- Coal exploration at Jamkhani, Lalgarh, Nakia and Utkal-F (Talchir) blocks on behalf of M/s. CMPDIL.
- Developmental mining for uranium at Jaduguda, Narwapahar, Turamdih and Bagjata, on behalf of M/s. UCIL in Jharkhand State.
- Developmental mining for coal at GDK mines, Andhra Pradesh on behalf of M/s. SCCL.

Review of major exploration programmes

Coal

4.24 Exploration for coal has been continued, on behalf of Department of Coal under priority regional exploration programme. Against an allocation of 46200 m for the year 2003-2004, achievement has been 44144 m, representing 96%. Besides, exploration for coal on contractual basis involving 21000 m of drilling, at Lalgarh in Jharkhand and Jhamkhani & Nakia in Chhattisgarh and Utkal-F in Orissa was taken up in November 2003 on behalf of M/s. CMPDIL and a total of 21758 m of drilling was successfully completed during 2003-04. The exploration at Pachwara North and Tubed involving 10500 m could not be taken up due to law and order problem.

Lignite

4.25 The priority regional exploration programme on behalf of Department of Coal for lignite exploration was continued in the states of Tamil Nadu and Rajasthan. Against 58800 m of drilling allocated, a total of 59398 m of drilling has been completed during 2003-04. Also lignite exploration at Kasanu and Sonari blocks, Rajasthan on behalf of M/s. RSMML and at Mine-II and Mine - III, Neyveli, Tamil Nadu, on behalf of M/s NLC was taken up and a total of 9367 m of drilling was completed.

Copper & Multi-metals

4.26 Detailed exploration under promotional programme for copper at Bhagal and multi-metal at Devtalai, Rajasthan on behalf of Department of Mines was concluded, where a total of 2525 m of drilling has been carried out. The assessment work at Malanjkhand (West) was completed and total of 402 m of drilling has been carried out. Detailed exploration for copper at Thanewasana, Maharashtra, was taken up and carried out 763 m of drilling and associated geological activities were carried out.

Bauxite

4.27 Exploration for Bauxite at Lanjigarh, on behalf of M/s. STERLITE and at Panchpatmalli, on behalf of M/s. NALCO was taken up and concluded. A total of 10751 m of drilling and 79 m of pitting was carried out during the year 2003-2004. Exploration for bauxite at Serengdag, Jharkhand, was commenced and till March '04, a total of 1927 m of drilling and 45 m of pitting was completed.

Uranium

4.28 Mine development activities on behalf of M/s UCIL was continued at Jaduguda, Narwapahar and Turamdih and commenced at Bagjata in Jharkhand. So far, a total of 2985 m of mine development work has been carried out during the year.

Iron Ore

4.29 Exploratory drilling for iron ore at Kesari and Asniye, Maharashtra was taken up on behalf of M/s. SMC and a total of 995 m drilling has been completed.

Manganese Ore

4.30 Exploration for manganese ore at Joda area on behalf of M/s. TISCO was taken up and a total of 5842 m of drilling was completed.

Coal Bed Methane

4.31 Slim hole drilling for CBM investigation at Kalidaspur on behalf of M/s. GEECL, at North Karanpura and Bokaro on behalf of M/s. ONGC and Sanchor, on behalf of M/s. DOP was taken up and a total of 7426 m of drilling has been completed.

Hard Rock

4.32 During 2003-04, a total of 5389 m of hard rock drilling has been carried out on behalf of M/s. AMD at Rohil-Ghateshwar and Rohil-Central blocks in Rajasthan.

Significant findings based on MECL's endeavour

- A total of 787 million tonnes of non-coking coal reserves and 97 million tonnes of semi coking coal reserves have been established in the states of Chhattisgarh and Andhra Pradesh.
- 946.75 million tonnes of lignite reserves with average Calorific Value of 2500 - 3500 K.cal/Kg established at Sindhari block, Barmer sector in the state of Rajasthan and 166 million tonnes of lignite reserves with average CV of 3000 K.Cal/Kg at Hodu block, Rajasthan.
- 1.78 lakh tonnes of Rare metal ore reserve with 0.443% cesium, 0.26% lithium and 0.102% rubidium was established at Beku block, West Bengal.
- 1.96 million tonnes of copper ore reserve with 1.067% Cu and 722 Kg of contained gold metal was established at Devtalai multi-metal deposit, Rajasthan.
- 76 million tonnes of bauxite reserve at Lanjigarh bauxite deposit, Orissa was established.
- 5.53 million tonnes of copper ore reserve with 0.76% Cu was established at Bhagal copper deposit, Rajasthan.

Performance of Important Non-ferrous Minerals/Metals

ALUMINIUM

4.33 There are five Companies in the manufacture of alumina/aluminium, viz. the National Aluminium Company Limited (NALCO), a public sector undertaking, Bharat Aluminium Company Limited (BALCO), a joint sector under-taking, Hindustan Aluminium Corporation Limited (HINDALCO), Indian Aluminium Comp-any Limited (INDAL), and Madras Aluminium Company Limited (MALCO), all in the private sector. The annual installed capacity for produ-ction of alumina and aluminum is at Table 4.1 & 4.2

TABLE 4.1
INSTALLED CAPACITY OF ALUMINA
(Tonnes per annum)

Company	Quantity	Location
NALCO	15,75,000	Damanjodi (Orissa)
BALCO	2,00,000	Korba (Chhatisgarh)
HINDALCO	6,60,000	Renukoot (UP)
INDAL	3,12,000	Muri, (Jharkhand): 2,000 Belgaum Karnataka) 2,40,000
MALCO	50,000	Chennai (Tamil Nadu)
Total	**27,97,000**	**All States**

TABLE 4.2
INSTALLED CAPACITY OF ALUMINIUM
(Tonnes per annum)

Company	Installed Capacity
NALCO	2,88,000*
BALCO	1,00,000
HINDALCO	3,45,000
INDAL	1,17,000
MALCO	25,000
Total	8,75,000

* The Government has already approved expansion of the capacity of NALCO's aluminium smelter from 2,30,000 tonnes per annum to 3,45,000 tonnes per annum which is in advanced stages of completion. The capacity will increase to 3,45,000 TPY after the completion of the project.

4.34 Production of Aluminium by the primary producers in the country during the last three year is given at Table 4.3.

TABLE 4.3
PRODUCTION OF ALUMINIUM

(In tonnes)

Company	2001-02	2002-03	2003-04
NALCO	231674	244708	298208
BALCO	70353	95490	97088
HINDALCO	261338	266837	323184
INDAL	41014	51140	65405
MALCO	29369*	30866	32618
Total 633748	689041	816503	

*According to latest reports from MALCO

4.35 It is estimated that during 2003-04, the primary producers of aluminium had exported 1,80,000 tonnes of aluminium and aluminium products.

4.36 During the financial year 2003-2004, the total World Aluminium supply was around 28.489 million tonnes and the total world consumption was 28.103 million tonnes, thus showing a net surplus of 0.386 million tonnes.

B. Copper

4.37 At present, the demand for copper minerals for primary copper production is met through two sources i.e. copper ore mined from indigenous mines and imported concentrates. The indigenous mining activity among the primary copper producers is limited to only Hindustan Copper Limited (HCL). The other primary copper producers in the private sector import the required mineral in the form of concentrate. HCL also imports some quantity of copper concentrates for its Smelter Plants to supplement the shortfall in indigenous production. Indian copper ores have low grade, and large scale mechanisation in the underground mines is rendered difficult due to the geometry of the ore body (narrow width and a flatter inclination). Manufacture of primary copper based on indigenous ores is character-ised by high energy consumption because of low scale of operations and minimal automation.

Production of Refined Copper

4.38 The production of refined copper in India has increased considerably since 1998-99 after private sector manufacturers started product-ion. The details of units of major players in copper industry and the production during 2003-04 are given at Table 4.4

TABLE 4.4
PRODUCTION OF REFINED COPPER

(In tonne)

Commodity	No. of Factories	Installed Capacity	Production during 2003-04
Cathode			
(a) HCL	2	47,500	30,598
(b)Sterlite	1	1,65,000	1,78,746
(c)Birla Copper	1	2,50,000	1,86,611
Total		4,62,500	3,95,955

Price of Copper

4.39 The domestic price of copper is linked to London Metal Exchange (LME) price. The price of copper declined sharply in 1998-99. Thereafter it appreciated and then again started declining during 2001-2002 and fluctuated till 2002-2003. However, during 2003-04, the LME price has shown a rising trend. The year-wise average LME price per tonne of copper is given at Table 4.5

TABLE 4.5
INTERNATIONAL PRICE OF COPPER

Year	Average LME price of Copper (US $ per tonne)
1995-1996	2844
1996-1997	2257
1997-1998	2096
1998-1999	1581
1999-2000	1670
2000-2001	1806
2001-2002	1527
2002-2003	1586
2003-2004	2046

Copper Survey

4.40 Copper is the base metal of strategic importance - an essential component of energy efficient motors and transformers. Its exceptional strength combined with ductility and resistance to creeping and corrosion makes it the preferred and safest conductor. Copper is a critical metal being used in areas such as Defence, Space Programme and Mint.

4.41 Developing countries account for over one-third of refined copper consumption and industrialised countries account for 60%. Global industrial demand for refined copper is over 14 million tonnes and its usage is growing by around 3% per annum.

4.42 The consumption of copper has been showing a steadily increasing trend. The total copper consumption including scrap was around 3,30,000 tonne during 2003-04 compared to 3,00,000 tonne during 2002-03.

Trends in Copper Consumption

4.43 Compared to the usage of copper in developed countries, the per capita usage of copper in India is rather low at around 0.3 kg.

4.44 The production, import and usage of refined copper in India from 1995-96 to 2002- 2003 is given at Table 4.6

TABLE 4.6
REFINED COPPER AND ESTIMATED USAGE

(In tonnes)

Year	Production	Import	Usage*
1995-96	41153	99429	183442
1996-97	38481	175626	214107
1997-98	57599	161630	219229
1998-99	131000	147000	278000
1999-00	226933	54400	281333
2000-01	263145	25000	288145
2001-02	305519	10000	300000
2002-03	377435	25000	425000

*Derived usage from production and imports, ignoring stock adjustments.

Copper Industry in India

4.45 Till 1997, the only producer of primary refined copper was Hindustan Copper Limited (HCL), a Public Sector Enterprise under the Department of Mines. The installed capacity for refined copper production at its two integrated copper plants was around 47,500 tonne per year, which used to meet approximately 25-30% of India's requirement for refined copper. The balance demand was met through imports. The other two primary producers of Copper in India now, are M/s Birla Copper and Sterlite Industries. Their present annual capacities are 2,50,000 MT and 1,65,000 MT (3,00,000 MT after capacity expansion project being completed shortly) of refined copper respectively. The plants of M/s Birla Copper and M/s Sterlite are based on imported copper concentrate

using OTOKUMPU and Mount Isa Mines (MIM) technology respectively. Another plant being installed by M/s SWIL Ltd. (having a capacity of 50,000 MT) is going to be based on Boliden process and will shortly produce Refined Copper through Secondary Route. Continuous Cast Rod (CCR) plants of M/s TDT and M/s Finolex are based on imported cathode.

LEAD & ZINC

4.46 India has about 231 million tonne of in situ reserves of lead and zinc ore, containing about 5.1 million tonne of lead metal and 17.02 million tonne of zinc metal. Rajasthan alone contributes about 87% of Indian reserves of lead & zinc ores. An area of 8221 hactres in India are held under mining lease for lead and zinc. Production of primary zinc metal was estimated at around 2,54,554 tonne, and primary lead metal at around 33,704 tonne in 2003-04 as compared to 2,35,525 tonne of primary zinc metal and 39,671 tonne of primary lead production in 2002-03.

4.47 The present smelting capacities for primary zinc and primary lead metals in the country are 2,60,000 tonne and 36,000 tonne per annum respectively. The break up of these capacities is indicated at Table 4.7.

TABLE 4.7

INSTALLED SMELTING CAPACITY OF ZINC & LEAD

(In tonne per annum)

Company	**Zinc**	**Lead**
Hindustan Zinc Limited (HZL)	2,30,000	36,000
Binani Industries Ltd. (BIL)	30,000	-
Total	260,000	36,000

4.48 Besides primary production, both zinc and lead metals are also produced through secondary routes from scrap, dross, residue etc. Most of the secondary lead production units are in the unorganized sector. Secondary zinc production during 2003-04 is estimated at 25,000 tonne and secondary lead production at 40,000 tonne. Zinc demand is estimated to grow at 12 to 14% per annum mainly due to increase in galvanizing capacity, which accounts for 70% of zinc metal consumption in the country. The Indian Lead industry is estimated to grow at a pace of 8% per annum. The main driver for this growth would be from the automotive and UPS/Inverter segment.

4.49 The total production of lead in the world was 6.663 million tonne during the year 2003, of which the share of India was 0.082 million tonnes. The largest producer of lead from lead mines is Australia followed by China, United States, Peru and Mexico. The refined lead consumption during 2003 was 6.639 million tonne of which India consumed 0.138 million tonne. The largest consumers of lead are United States, China, Germany, Republic of Korea and United Kingdom.

4.50 Total production of zinc in the world was 9.712 million tonne during the year 2003 of which the share of India was 0.283 million tonne. The largest producer of zinc from zinc mines is China followed by Peru, Canada and United States. The refined zinc consumption during the year 2003 was 9.369 million tonne of which India consumed 0.324 million tonne. The largest consumers of zinc are China, United States, Japan, Germany and Republic of Korea.

ANNUAL PLAN 2004-05

4.51 The annual plan outlay of the Department of Mines 2004-2005 is given in Table 4.8

TABLE 4.8
ANNUAL PLAN 2004-05

(Rs. in crore)

S.N.	Name of PSU/Organisations	Annual Plan 2004-05				
		OUTLAY	**IR**	**EBR**	**G.B.S.**	**N.B.S.**
1.	National Aluminium Co. Ltd.	310.00	310.00	–	–	–
2.	Hindustan Copper Ltd.	40.00	–	–	40.00	40.00
3.	Mineral Exploration Corpn. Ltd.					
	- Promotional	10.00	–	–	10.00	10.00
	- Capital	2.00	–	–	2.00	2 .00
4.	Geological Survey of India	162.00	–	–	162.00	162.00
5.	Indian Bureau of Mines	20.00	–	–	20.00 #	18.50
6.	Science & Technology	8.55	2.80	0.75	5.00	5.00
7.	Construction		–	–		
	(a) GSI	5.00	–	–	5.00	5.00
	(b) IBM	1.00	–	–	1.00	1.00
	TOTAL	**558.55**	**312.80**	**0.75**	**245.00**	**243.50**

Includes Rs.1.50 crore of BRGM Aid.

Chapter- 5

Geological Survey of India and Indian Bureau of Mines

GEOLOGICAL SURVEY OF INDIA

5.1 The Geological Survey of India (GSI), a premier scientific organisation in the country is relentlessly pursuing its objectives since 1851 to fulfill the society's requirement of minerals and raw materials for industrial growth besides, ensuring a safe community life free from the vagaries of natural hazards. The organisation has now successfully completed 152 years of glorious service to the nation.

Thrust Areas of Activity

5.2 The thrust areas of GSI's activities have evolved with the changing national priorities throughout the successive Five Year Plans and are presently oriented in the light of the objectives and goals set up for the Xth plan. The major thrust areas in respect of GSI identified in the Xth Five Year Plan are:

- Creation and updating of National geo-scientific database through specialised thematic studies, geochemical and geophysical mapping : Specialised thematic studies, multi-elemental geochemical mapping of the country with ultra-low detection level analytical facilities, low-altitude aerogeophysical multi-sensor surveys and ground geophysical mapping of prioritised areas have been stressed 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 materials in seabed.

- Concept oriented search for concealed mineral deposits with stress on deficient and high-tech minerals: The principal thrust of GSI in the mineral exploration would remain on noble metals, precious stone, base metal, coal and lignite. Appraisal will continue for ferrous and non-ferrous (bauxite), fertilizer, strategic, refractory and high-tech. minerals. In addition, to the mineral prognostication, the organization would continue with systematic updating of the data base 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.

- Seismic micro-zonation of urban clusters, active fault mapping and observational seismology for delineation of potential risk zones for geo-hazard management: Earthquake studies including active fault mapping, observational seismology for delineation of potential risk zones for geo-hazard management and seismic micro-zonation of urban clusters as a part of preparedness and hazard mitigation with state-of-the-art technology and instrumental support

- Compilation and digitisation of maps for archival preservation and dissemination: Information Technology is vital for preservation, management, retrieval and analysis of geoscientific data bank accumulated by GSI in past 152 years of existence. The task of soft copy conversion of all the reports taken up in previous year has almost been completed. GSI has also embarked upon an ambitious plan for creation of internet portal, which will provide uninterrupted connectivity among all the offices of GSI, spread over in 32 cities of the country. The portal, apart from dissemination of information via internet or intranet will also be useful to integrate work plan, collaboration, messaging and content management.

- Modernisation programmes of GSI: Modernisation as well as upgradation of laboratories as National, Regional and Operational level facilities to provide high quality laboratory support is continuing. It has remained constant endeavour to upgrade and modernise laboratory equipment. GSI procured Isotope Dilution Thermal Ionisation Mass Spectrometer (IDTIMS). Using separated U and Pb from mineral grains first time in India, age data has been determined which are regarded as global standards. Digital MEQ recorder for earthquake studies, micro-thermometric apparatus for geothermal studies and micro-gravimeter and ground conductivity meters for geophysical studies were also procured.

Expert Committee Report

5.3 The report of the Expert Committee set up by the Department of Mines to examine and recommend suitable changes in the Charter of GSI through assessment of the role and functions of GSI in the light of developments in the field of earth sciences over the last 30 years has been accepted by the Government. The committee has revised the Charter and functions of GSI and has made recommendations to make GSI more responsive to the scientific and societal needs and enhance its visibility.

5.4 Some of the important recommendations of the committee incorporated in the revised charter of functions of GSI are (i) setting up of Geosciences Institute for attaining excellence in R & D efforts, (ii) setting up of a commercial wing, (iii) developing strong Management Information System (MIS), (iv) upgrading and modernising laboratories, (v) training of middle level scientists, and (vi) restructuring of personnel management.

Mineral Exploration

5.5 During 2003-2004, one hundred fourteen (114) mineral investigations were taken up which include 36 for coal and lignite; 31 for gold; 20 for base metal; 3 for strategic and rare metals and rare earth elements; 8 for diamond; 3 for precious and semiprecious minerals and remaining for ferrous and industrial minerals. Region-wise break up of these programmes is given in Table 5.1

TABLE 5.1
MINERAL INVESTIGATION

Mineral	ER	NER	NR	SR	CR	WR	AMSE	Total
Coal/Lignite	13	–	–	4	18	1	–	36
Base Metal	1	–	–	–	4	14	1	20
Strategic & rare minerals	1	–	–	2	–	–	–	3
Gold	3	–	3	12	5	5	3	31
Diamond	1	–	–	4	2	–	1	8
Ferrous Mineral	5	–	–	–	–	–	–	5
Precious & Semiprecious minerals	1	–	–	1	–	–	1	3
Limestone/Dolomite	–	3	–	–	–	–	–	3
Bauxite	–	–	–	–	2	–	–	2
Other Industrial minerals	1	–	–	1	–	1	–	3
Total	26	3	3	24	31	21	6	114

Geoscientific Survey

Systematic Survey - Ground, Aerial and Marine

5.6 Creation and updating of geoscientific database through systematic ground, aerial and marine surveys continued. Thematic mapping of 7735.50 sq. km have been completed. The study has facilitated in solving intriguing tectono-stratigraphic problems and provides significant new insight into the existing database.

5.7 An impressive zone of sulphide mineralisation and hydrothermal alteration associated with felsic volcanics has been identified south of Bhuyari Village, Chhindwara district, Madhya Pradesh having Zn from 550ppm to 2.55%, Pb from 600ppm to 1.51% and Cu from + 75ppm to 0.19%

5.8 National Geochemical Mapping, a thrust area of activity of GSI, has been taken up in different areas of Andhra Pradesh, Maharastra, Uttar Pradesh, Uttaranchal, Punjab, Haryana, Jammu & Kashmir etc. envisaging geochemical mapping on a systematic grid pattern for creating multi-elemental database and locating geochemical anomalies for varied applications in the field of metallogenesis, mineral exploration, resource estimation, soil fertility, human and animal health etc. having a great bearing on socio-economic planning and development.

5.9 Under Geophysical mapping programme, regional gravity and magnetic surveys, refraction seismic surveys etc. were carried out in different areas of the country. Gravity and magnetic surveys could locate the Gondwana Formation below the Deccan trap, near Nagpur.

5.10 Nalgonda & Mahboobnagar areas and Bangalore-Penukonda areas in parts of Andhra Pradesh and Karnataka were covered through airborne survey. Significant achievement has been made in the ground follow up of air borne survey by locating two potential fields of kimberlitic clan rocks in Chhattisgarh & Orissa and another kimberlitic body near Mantralayam in A.P.

5.11 The GSI has covered more than 97% of EEZ and has also carried out drilling in non-inhabited islands in Gulf of Mannar for Palaeo-geographic studies.

Specialised Investigation

Geotechnical Investigation

5.12 38 items of Geotechnical and engineering geological studies have been undertaken for effective planning and execution of civil engineering projects for water resource management/ development/ creation of communication network, transport and other infrastructure facilities. Some of the important projects include:

- Thein Dam Project, Punjab
- Nathpa Jhakri Project, Himachal Pradesh
- Tehri Dam, Uttaranchal
- Ranganadi Hydel Project, NER
- Dargawati Dam Project, Bihar
- Narmada Sagar Project, Madhya Pradesh
- Purulia Pump Storage, West Bengal
- Surangi Project, Jharkhand
- Bhanwar-Senia Irrigation Project, Rajasthan
- Paykara Ultimate Stage HE Project, Tamil Nadu
- Maneri Bhali Hydel Scheme Stage – II, Uttar Pradesh
- Gabbar Hill Project, Gujarat
- Hasdev-Bango Project, Chattisgarh
- Suddavagu Reservoir Project, Andhra Pradesh
- Udhampur-Katra Railways Link Project, Jammu & Kashmir
- Lower Kopili Hydel Project, Assam
- The Greater Shillong Water Supply Scheme

Geoenvironmental Studies

- Geological Survey of India took up 34 geo-environmental investigations. These inve-stigations comprised geoenvironmental appraisal, geoenvironmental impact assessment and studies on natural hazards and geomorphic processes covering public health and landslide issues. In addition 31 items of Syn-Exploration Baseline Data Generation were also taken up.
- The collaborative research project between GSI & BRGM France initiated during 1999-2000 on impact of mining activity on water quality of Subarnarekha Basin, downs-tream of Jamshedpur, continued during 2003. The project involved capacity build-ing and transfer of technology through hands on training in field.
- Regional geo-environmental appraisal studies in Jhunjhunu district of Rajasthan have identified the problems of lowering of groundwater level due to recurrent draughts, alkaline nature (pH 7.4 to 8) of ground water with occasional high TDS and salinity, dune sand mobilisation and spoiling of agricultural fields. High fluoride content in ground water in few villages of the area has been demarcated.
- Multidisciplinary geological studies for the conservation of Jain monuments around Gwalior Fort area and Mala Devi temple, a Jain Monument at Gyaraspur, district Vidisha, Madhya Pradesh were carried out. Suitable remedial measures have been suggested.
- Geo-environmental studies of the urban agglomeration of Agartala Town, Tripura have revealed that the Agartala Town blocks the original natural course of the old river.

- Studies of arsenic pollution in the groundwater of Bhagirathi river delta in 24-Parganas (N) and Nadia districts of West Bengal revealed that the drainage areas of Ichamati and its distributaries contain high arsenic zones than that of Bhagirathi/ Hooghly River.
- A hazard zonation map of fluoride pollution in ground water around Daboka, Nagaon district, Assam has been prepared, which reveals the presence of three fluoride-contaminated zones.
- Study and correlation of the Late Cenozoic semi-arid fluvial systems along Thar Desert margins have revealed that some of the semi-arid/desert margin river systems, such as Luni and Sabarmati show changes in river dynamics due to neo-tectonics and fluctuations in sea level.
- Studies related to the coastal responses to wave dynamics in the Shankarpur/ Chandipur beach area of West Bengal and South of Narayanpur beach area of Orissa revealed nearly 1.25 km shifting of the shore-line towards south during the last 22 years.

Earthquake Geology

- Earthquake related studies like active fault mapping and seismic micro-zonation of urban complexes in different regions of the country coupled with routine posteart-hquake macro-seismic, and geophysical surveys, seismotectonic analyses of tremor parameters etc. constituted one of the major thrust areas of activity of GSI.
- GSI has updated the all India earthquake database up to the year 2000 and a total of 16136 events are now registered.

Neotectonic activity in the Frontal Himalayan Belt around Yamuna Tear Zone at Paonta Saheb.

- Active fault zones have been delineated in two selected sectors of the eastern Himalayan foreland using multi-sensor image fusion.
- A multi-institutional (GSI, IMD, NGRI, CBRI) DST-sponsored item of the Seismic Hazard and Risk Micro-zonation (SHRM) of Jabalpur area has been conducted for input to Indo-Italian collaborative research work on SHRM. The second level Seismic Hazard Micro-Zonation map of Jabalpur has been prepared.
- The broad band seismic observatory of GSI at Jabalpur with the installation of the GPS system by Geodetic and Research Branch, Survey of India, Dehradun is operational and data are being submitted on monthly basis to Survey of India, Dehradun since September 2002.
- The item of preparation of a document on seismic micro-zonation of Guwahati urban complex has been taken up at the behest of Government of Assam through DST. Compilation of seismotectonic map of an area of 400 sq. km on 1:250,000 scale have been completed.

Glaciological Studies

- GSI has generated data on glacier mass balance, flow hydrometric and secular movement of the Himalayan Glacier since 1978. GSI has also carried out recession studies of 30 glaciers and observed that almost all glaciers are passing through a phase of recession.

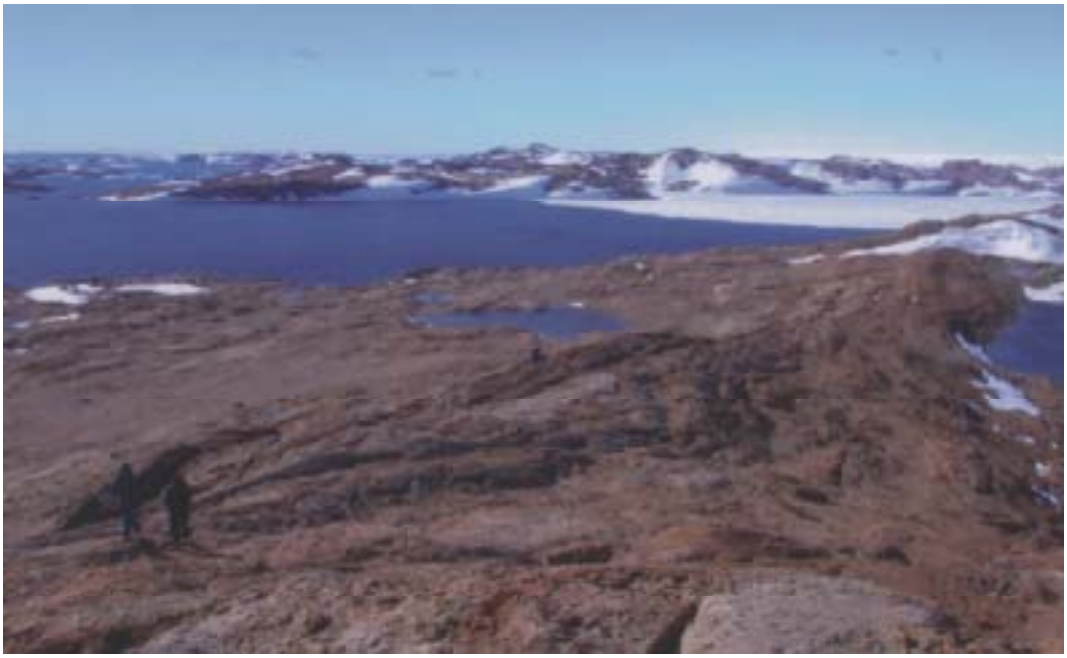
Antarctica Expedition

- Geological Survey of India yet again led the 23rd Indian Antarctic Expedition (IAE) that sailed from Cape Town on 19th December 2003. The team had a strong six member contingent from GSI. Two of them will be wintering over in Antarctica while others would return.
- GSI while continuing with its ongoing geological mapping and glaciological studies has also endured into globally relevant aspects of earth science related research that includes theme based geological and glaciological studies. For the 23rd IAE, a theme based geological study has been taken up to understand the widespread magmatism associated with Pan African tectonic event, an early phase of which has been manifested as massif anorthosite and mangerite-jotunite-charnockite suit. The other two programmes, namely understanding the ice dynamics and associated Neotectonic activity through broad based GPS network and limnological studies for paleo-climate will also be taken up during the current expedition.
- The special Task Force constituted for selection of a suitable site for the 2nd Indian Antarctic Base with Sri R Ravindra, Director as its leader is slated to zero on an area in vicinity of Amery Ice shelf-Lambert Glacier region. The Second Indian base in this region would offer an opportunity to evaluate the two sides of the pre-breakup Gondwanaland link between Lambert glacier and Mahanadi graben. Sri R Ravindra in his effort to pick up a suitable site will visit the Raur Group of Islands, Vestfold Hill area and Larsemann Hills between E long. 74o to 78o about 2000 km away from Maitri apart from visiting the Australian, Chinese, Russian and Japanese Research Stations in Antarctica.

Laboratory Studies, Research and Development

- Commensurate with the scientific and technological advancements and significant breakthroughs, GSI accorded high priority to laboratory studies and R & D efforts to back up the extensive fieldwork carried out by the scientists. Ultra level precision in detection is another basic necessity in such studies. GSI has initiated process to procure essential sophisticated state-of-the-art equipment as a part of modernisation to strengthen chemical, petrological, geochronological and other laboratories.
- In Geochronology & Isotope Geology Division two principal laboratory facilities for Radio Carbon Dating have been acquired e.g. Ultra Low Level Liquid Scintillation Counter for counting low level radioactivity and a glass vacuum system for synthesis of Benzene from geological samples. Besides a new MagiX XRF equipment has been installed.

- Photogeology and Remote Sensing studies in Kachchh region, Gujarat led to the identification and delineation of sites showing revival of palaeo-drainage and liquefaction, shift from dry to damp areas and vice-versa as well as emergence of land along the coast after the major earthquake events and the Rann and Banni-Plain are tectonically unstable.



Site of The Third Indian Scientific Station in Antarctica

- GSI carried out evaluation of the ground-water prospect in the hard rock terrain of parts of Karnataka in collaboration with Ground Water Department of Govt. of Karnataka using remote sensing and aeromagnetic anomaly data.
- The analytical wing of GSI for the ongoing investigations is providing continued strong support. One latest state-of-the-art ICP-MS has already started generating precise analytical data at a very low level of element concentration for about 40 trace elements (including REE and hydride forming elements) in soil and sediment samples.
- A new ICP-AES has been installed for the estimation of REE and PGE in addition to other trace elements in varied type of samples. Under the modernization plan, two more ICP-AES (sequential model) instruments are likely to be received shortly.
- To gear-up analysis of geothermal gases and various hydrocarbons in ocean water, two new latest state-of-the-art Gas Chromatograph instruments are being procured.
- Magnetic susceptibility and Curie-depth mapping from aeromagnetic data of parts of Singhbhum and Dharwar Cratons were carried out.
- A detailed analysis has been made to estimate three-dimensional seismic velocity structure of the crust and upper mantle up to a depth of 60 km beneath NE India using Local Earthquake Tomography (LET) method under the programme IGCP-411.
- An array of palaeontological research projects undertaken by GSI continues to delve in the nature and various aspects of life during the geological era and stratigraphic problems still confronting the earth scientists. The sophisticated SEM-EDX laboratory rendered substantial support to on-going exploration and other research projects.
- Many of the recent finds like discovery of pre-Gondwana land plants from South Sikkim, discovery of Lycopods of mega plant community from Raniganj Coal Field for the first time from Indian Gondwana and early mammalian tooth from the Pranhita-Godavari Valley in Andhra Pradesh has opened up a new field of palaeontological study having bearing on the palaeobiogeography and Stratigraphy.
- A new Theropod Dinosaur has been announced through National Geographic Society at Mumbai.

Information Dissemination

- The Geological Survey of India continued dissemination of the voluminous earth science data collected over the years of its existence in the form of maps, reports etc. and also through exhibits in various national and international forum including Indian Museum. To keep pace with the increasing demand of data dissemination to the Government agencies as well as to cater to the demands of the private sectors, the Survey has already initiated process of dissemination of the existing earth science data base in digital format as its thrust area.
- So far, about 30,000 reports have been converted into Portable Document Format (pdf).
- Compilation of the Geological Maps on 1:50,000 scale and soft copy conversion has been taken up on priority basis and out of a total of 5104 sheets covering the entire country, 2161 sheets of Intra-Regional category have been compiled during 2002-2003.
- Among the National Maps, Geomorphologic Map of India (Scale1:2 M) and Metallogenic Map of India (Scale 1:2 M) Mineral Map of India and adjoining countries (Scale 1:7.5 M), Geochronological Map of India (Scale 1:2 M) and Seismotectonic Map of India (Scale 1:2 M) have been completed.
- Out of 394 Quadrangle sheets covering the Indian territory, 11 Geological Quadrangle Maps have been published during 2002-2003 bringing the total to 240.
- Out of a total 63 nos. of Sea Bed Maps covering the entire EEZ of India a total of 22 sheets have been compiled. Out of 149 Sea bed sediment maps of Territorial Waters of India on Scale 1:50,000, 32 sheets have been compiled.
- State wise Geological and Mineral Maps and District Resource Maps are in advanced stages of compilation and some of which are already printed.
- Two priced and four unpriced publications have been released and eleven publications are in press. Information Brochures on Palaeontological Research and also on Gem Testing are to be released shortly.
- Introduction of computer based techniques and digitisation of maps has enhanced storage, archival, retrieval and dissemination of data. GSI has its own Website: www.gsi.gov.in with relevant information.
- Various Geoinformatics projects are being implemented for creation of a comprehe-nsive database of both graphic and attribute information. An ITC collaborative venture - Project: INDIGEO is also in progr-ess for providing necessary technical know-how and training on GIS, image processing, map digitisation etc.

Human Resource Development

- The GSI Training Institute conducts training in various disciplines of Earth Science including that on Geographic Information System, Digital Map Processing and Digital Image Processing etc. for effective manpower development. GSITI also conducts the DST sponsored programmes on Geological Mapping (under SERC Scheme) and glaciology and ISRO sponsored programme on remote sensing and GIS (under NNRMS) respectively. Besides, the Training Institute also conducts customised courses for other organisations such as Indian Navy on demand.

International Activities

- GSI continued cooperation with international organisations as in the previous years by participating in bilateral and collaborative exchange programmes and IGCP projects.
- GSI successfully organised the 4th South Asia Geological Congress during 13th - 15th November 2002 at New Delhi.317 registered delegates including 21 foreign delegates from Sri Lanka, Bangladesh, Iran, Pakistan, China and Cambodia participated in the Congress. Secretary, Department of Mines has released the Proceedings Volume of GEOSAS-IV containing 55 scientific papers on 19th April 2003 at Kolkata.
- As part of the Indo-Canadian Collaborative Programme, a MOU for collaboration between GSI and GSC was signed in April 2003.
- Based on the observations made by a Joint Inspection Team (Pennant Committee, Bhutan and GSI) geological investigation was undertaken in mining areas around Indo-Bhutan border to assess the quality of water system in Dolomite mining area and adjoining tea gardens of North Bengal. The investigation is aimed at evaluating environmental impact in the tea industries due to geochemical change of discharged water from the mining belt in Bhutan.

5.13 Employment position as on 31.3.2004 in GSI is given in Table 5.2.

TABLE 5.2
EMPLOYMENT OF PERSONNEL IN GSI

Class	Total No. of Employees in position	SC	ST	OBC	Women
Group A	2087	192	52	35	61
Group B (Gazetted)	761	148	45	29	66
Group B (Non-Gazetted)	820	172	52	10	98
Group C	5772	1224	517	257	412
Group D	2959	720	301	176	281
Total	12399	2456	967	507	918

INDIAN BUREAU OF MINES

5.14 The Indian Bureau of Mines (IBM) is a subordinate office under the Department of Mines. It is engaged in the promotion & conservation of minerals, protection of mines' environment and scientific development of mineral resources of the country, other than coal, petroleum and natural gas, atomic minerals 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 Conces-sion Rules, 1960 and Environmental Protection Act 1986 and Rules made thereunder. It also undertakes scientific, technoeconomic, research oriented studies in various aspects of mining, geological studies, ore beneficiation and environmental studies.

5.15 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.

Systematic bench formation in a Limestone mine. Rehabilitated waste dumps are seen in the background— Chandrapur District, Maharastra State

5.16 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.

Performance of IBM

5.17 The performance of IBM with regard to technical studies, investigation and preparation of mineral inventory/maps etc is indicated in the Table 5.3

TABLE 5.3
TECHNICAL STUDIES AND CONSULTANCY (2003-2004)

S.N.o.	Item	Actual 2001-2002	Actual 2002-2003	Target 2003-2004	Achievement 2003-2004
1.	Special Integrated Studies	13 studies	13 studies	14 studies	13 studies
2.	(a) Updation of National Mineral Inventory as on 1.4.2000.				
	(i) Computerisation of up dated inventories (No. of minerals)	33	15	–	–
	(ii) Preparation of Analytical Notes (No. of minerals).	–	21	49	43
	(iii) Revision of end-use grade classification.	–	–	64	64
	(b) Implementation of UNFC				
	(i) Data entry (No. of minerals)	–	Allotted resource codes as per UNFC for 15,762 deposits covering in all the 64 minerals.	64	64
	(ii) Computerization & generation of summary/ detailed output of minerals as per UNFC.	–	–	64	64
3.	Preparation of Mineral Maps	21,496	100 multi-mineral Hectares	100 multi-maps	100 multi-mineral maps mineral maps
4.	Preparation of forest cover maps in collaboration with Forest Survey of India (FSI) - (No. of digitised maps sent to FSI)	50	100	100	Digitisation of 100 multi-mineral maps was completed.
5.	OD Investigations	66	69	70	69 completed and 32 in progress.
6.	Chemical Analyses (No.of radicals)	48,112	49,424	50,000	50,871 completed and 2,171 in progress.
7.	Mineralogical Studies	2,438	2,256	2,300	2,352 completed and 39 in progress.
8.	Technical Consultancy assignments.	7	13	9	12
9.	Mining Research including Environmental Studies.	13	10	9	9
10.	Training	26	24	16	19

Preparation of Mineral Maps

5.18 During the year 2003-2004, 100 multi-mineral maps of Orissa, Andhra Pradesh and part of Jharkhand States were prepared and digitized. For preparing forest overlays, forest map data for these 100 maps is awaited from Forest Survey of India (FSI).

Mineral Beneficiation

5.19 Mineral beneficiation studies including mineralogical testing and chemical analysis is intimately related to both conservation and development of mineral resources. During the year 2003-2004, 69 ore dressing investigations, 50,871 chemical analyses and 2,352 mineralogical examination were completed. Besides, 32 in-plant studies were carried out during the year.
National Mineral Inventory (NMI)

5.20 Implementation of United Nations Framework Classification (UNFC) of Mineral Resources in India was in progress. During 2003-04, four training programmes were conducted on reserve estimation as per UNFC at Udaipur, Bhubaneswar, Chennai and Goa for State Government Officers, RQPs and representatives of mining industry

5.21 The programme on modification of the existing NMI Software as per UNFC was completed in collaboration with BRGM France. After development of software for conversion of NMI as per UNFC, the inputting of data as on 1.4.2000 was completed in respect of all the 64 minerals. Mineral-wise all India, State and District-wise summary outputs for all minerals as per UNFC were generated.

5.22 Amendments in MCDR, 1988 in tune with UNFC for National Mineral Inventory Database have been notified by gazette notification No. 185 dated 17.4.2003.

Market Survey of Minerals and Metals

5.23 Market Survey report on Chromite was released. Another Market Survey study on Dimension Stones (Marble, Slate and Limestone) was in progress.
5.24 An annual bulletin on Copper-Lead-Zinc, 2001-02 issue was released. Besides, four quarterly reports on End-use metal consumption for Copper-Lead-Zinc for quarters ending March, 2003, June, 2003, September, 2003 and December, 2003 were prepared.

Statistical Publications

5.25 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.

5.26 The statistical publications released during the year 2003-2004 include Statistical Profile of Minerals, 2002-03 issue, two issues of Indian Mineral Industry at a Glance (2001-02 and 2002-03) and 13 issues (December, 2002 to December, 2003) of Monthly Statistics of Mineral Production.

Consultancy Service

5.27 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. Twelve assignments completed during the year 2003-2004 were (i) Mining Plan of Kalwar Nagaur iron ore mine for M/s Bhilai Steel Plant (ii) Scheme of Mining of Amraiya Limestone Mine for Shri R.K. Pathak (iii) Schemes of Mining in respect of three pyrophyllite/dolomite mines for M/s Eastern Minerals (iv) Schemes of Mining for three mining leases in village Harriya for M/s Goenka Lime and Chemicals Ltd, Katni (v) Scheme of mining of Mainpat bauxite mine for M/s Bharat Aluminium Company Limited (vi) Validation of mineral excavation at Grasim Limestone mine for M/s Grasim Cements Limited (vii) Valuation of mineral property for ten mining leases of MOIL for M/s KPMG India Pvt. Limited. (viii) Excav-ation measurement at Tailangi Chromite mine of M/s Industrial Development Corporation of Orissa Ltd. for M/s Ferro-chrome Alloys Limited (ix) Topographic survey of Kasnau Matasukh block in Nagaur district, Rajasthan for M/s Rajasthan State Mines and Minerals Limited (x) Survey of dug wells in and around Durgapur and Padampur collieries in Chandrapur district, Maharashtra for M/s Western Coal Fields Limited (xi) DGPS survey work of Bhopal-

Kanpur cross country alignment section for M/s Ima GIS Engineering Solutions Pvt. Ltd. (xii) Annual check measurement of coal stock (2002-03) for M/s Coal India Limited. In addition to the assignments already completed, 21 other assig-nments were in progress.

Technical Publications

5.28 IBM brings out technical publications relating to mines and minerals, mineral based industries, trade, beneficiation, R&D activities, etc. During the year 2003-2004, Bulletin on Mining Leases and Prospecting Licences-2001 issue, three issues of half-yearly bulletin on Mineral Information (October, 2001-March, 2002, April-September, 2002 and October, 2002 - March, 2003) and Indian Minerals Year Book 2003 issue were released.

5.29 Under the series "Mineral Facts and Problems" the Monograph on Limestone and Dolomite was released and updating of Monograph on Chromite was in progress. Besides, seven bulletins on topical interest were at various stages of completion.

Mining Research

5.30 Applied Mining Research is carried out by 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 2003-2004, nine such assignments have been completed.

Old waste dumps converted into a beautiful park by landscaping and plantation in a Limestone Mine—Chandra pur District, Maharastra State

Training

5.31 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 2003-2004, 19 training programmes were conducted in which a total of 154 IBM personnel and 423 industry personnel including 37 from North-Eastern States participated.

Advisory Role

5.32 IBM continued to advise the Central and State Governments on matters concerning mines & minerals, mining legislation, export and import policies, mineral consumption and industrial utilisation, 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.

IBM-BRGM Project on Supply of Laboratory Equipments to IBM

5.33 The aim of this project was to get the equipment and expertise for characterisation of minerals and to study the environmental impact. The agreement was signed on 13th December 2001 during 15th meeting of the Indo-French Working Group held at New Delhi. The cost of the project is Rs. 4.03 crore mainly for purchasing of equipment.

5.34 Under this project, IBM has received from BRGM, France (i) CAMECA-Electron Microscope SX-100 with accessories (ii) LABOMAT Essor - LUCI 100 Spectral Colorimeter (iii) Micro-meritics- Sedigraph 5100 and (iv) SETARAM SEYSYS TG 16 Thermo Analyser with access-ories and kit of consumable parts for TG/BTA 1600ºC were received. Experts from BRGM, France visited IBM and installed the equipment in the Modern Mineral Processing Laboratory and Pilot Plant at Nagpur. They also imparted training to the IBM officials. Brightness tester supplied by BRGM was found to be suitable for only colour (tri-stimulus) determination, hence the matter has been taken up with BRGM for modification/ replacement of the same.

Implementation of United Nations Framework Classification for Mineral Resources Management in India

5.35 The objective of the project was to provide IBM with BRGM guidance to implement UNFC for mineral resources in India which is now used internationally. The project was spread in three phases namely (i) Analysis of design of proposed modifications to the NMI database (ii) Development of software upgrade and (iii) Validation of software upgrade.

5.36 The project commenced in November 2002. A team of BRGM experts visited IBM for providing technical support to develop the software needed for implementation of UNFC. The project was completed satisfactorily in April 2003 and the application software so developed is being utilized for implementation of UNFC to NMI.

IBM Advisory Board

5.37 Fourteenth meeting of the IBM Advisory Board was held under the chairmanship of the then Secretary (Mines) on 22 March, 2003 at Bangalore. Representatives from Planning Commission, Ministry of Steel, Ministry of Mines, NMDC, FIMI, Head of Mining Engineering (Jodhpur University) and IBM, participated in the meeting. The important decisions taken in the meeting were as follows: -

(i) A group of three to four officers of IBM be constituted to study the mechanism of identifying and classifying violations to ensure scientific and systematic mining, conservation of mineral and protection of environment.

(ii) IBM will continue consultancy work to generate revenue and other activities which are not regulatory in nature; however, IBM will not prepare mining plans and environmental management plans where it is also an approving authority.

(iii) IBM should not prepare mining plans. Instead IBM should help in evolving transparent procedure, furnish specific formats for preparation of mining plans. IBM should hold training courses for RQPs.

(iv) Awareness activities highlighting the importance of mineral conservation, systematic mining and protection of environment through media, observation of Mines Environment and Mineral Conservation Weeks should be continued.

(v) IBM should prepare a national level inventory of disused/abandoned or orphaned sites and evolve an action plan for their restoration in consultation with the state governments.

(vi) IBM publications which are of wider interest, should be made available in CD ROM.

Meeting with Directors of State Directorates of Geology and Mining

5.38 The Controller General, IBM and Joint Secretary (Mines) jointly conducted a meeting of Directors/Representatives of State Directorate General of Mines (DGMs) in the Department of Mines on 10th July, 2003 to discuss the modalities for implementation of recent amendments made in MCDR 1988 and MCR 1960. Various issues relating to implementation of amendments on minimum

size of area for grant of mining lease, submission of mine closure plan and submission of annual returns as per UNFC were discussed in detail.

Measures for Abatement of Pollution and Environmental Protection

5.39 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 removal and utilization of top soil, storage of over-burden/waste rock, reclamation and rehabilitat-ion of land, precaution against ground vibration, control of ground subsidence, abatement measures against air, water & 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.

5.40 After the enforcement of MCDR, 1988 extensive afforestation has been undertaken in the mines. During the year 2003 about 3.14 million trees have been planted in and around mine areas. Thus, so far 61.24 million trees have been planted with a survival rate of 71 percent.

5.41 IBM continued to take initiative to organize Mines Environment and Mineral Conservation (MEMC) Weeks every year in important mining centers through its regional offices to promote awareness amongst mine owners for minimizing environmental pollution. During the year 2003-2004, twelve such programmes were organized, in which a total of 637 mines participated. The various activities during the MEMC Weeks generated enthusiasm, wide publicity and awareness amongst mining community towards achieving mineral conservation, better environment and eco-friendly mining.

Revenue Generation in IBM

5.42 IBM generates revenue through promotio-nal activities. Revenue generated during 2003-2004 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.126.21 lakh.

Computerisation

5.43 Under Mineral Resources Intelligence System (MRIS), Indian Bureau of Mines is maintaining databases on National Mineral Inventory, Mines-Cum-Production, Mining Leases, External Trade, Mineral Consumption and World Mineral Intelligence. These databases are important information source for Government and private agencies on mining and mineral based industries. These databases are functional using Oracle-8 RDBMS on Windows NT platform.

5.44 Application software for conversion of existing resource classification in the National Mineral Inventory (NMI) as per United Nation Framework Classification of reserve/resources were completed in collaboration with BRGM, France. After successful testing and installation of this software at Central Headquarters, Nagpur, the databases at Zonal and Regional Offices were also updated to maintain the structural parity at all centres of IBM. The existing NMI data as on 1.4.2000 has been codified for all the 64 minerals as per UNFC and standard outputs have been generated successfully. Besides, the application software is also being used to provide mineral-wise and state-wise resource tables as per UNFC for Indian Minerals Year Book.

5.45 Besides Word Processing, computers are being used for preparation of Environment Management Plan, Ore body Modeling and Geo-statistical Analysis, Mine Planning and Designing, preparation of Mineral Maps using ML-GIS package. Advanced software like JKSIMMET, CANMET, BILCO 2.0, VISIO 2.0 etc are used in the Ore Dressing Laboratories and Pilot Plants. Data Acquisition System is used while conducting Pilot Plant test runs for controlling some of the circuits like pulp density in grinding circuits, pH in flotation circuit etc. and acquiring real time data from various field instruments. IBM has also added LibSys software for management of activities of its Central Library at Nagpur

5.46 In order to link all the Regional/Zonal offices and Headquarters of IBM, more sophisticated system based on client server architecture has been established with the help of BRGM, France, which includes new databases required by IBM. IBM has added

well established LAN facility, besides WAN system to communicate and exchange data from Regional, Zonal offices and Headquarters.

5.47 IBM is maintaining a website (http://ibm. nic.in) linked with the site of Department of Mines. This website provides information on the main functions and activities of IBM, services provided in the fields of geology, mining, environment, mineral beneficiation etc. to the mining industry, list of IBM publications alongwith contact persons and their addresses, and computerized information on mineral resources, production, exports and imports of minerals and metals.

Work Done Concerning Women (perspective Plan for Women)

5.48 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 11 percent. Training was imparted to some women employees in the field of technical as well as administrative matters.

5.49 Women employees are also actively participating in various cultural and extra-curricular activities organised by IBM from time to time. `Women's Day' was observed during the National Integration Week. A programme on "Cancer awareness for women" under National Policy for Empowerment of Women, was organised at IBM Head Quarters Nagpur on 11 September 2003, in which a renowned Gynecologist delivered a lecture on the subject and apprised the ladies with the facilities for diagnosing Cancer at preliminary stage. International Women's Day was observed at IBM Headquarters, Nagpur on 8 March, 2004.

5.50 After implementation of Recommendations of ERC, the employment position as on 31.03.2004 in IBM is given in Table 5.4

TABLE 5.4
EMPLOYMENT OF PERSONNEL IN IBM.

Group	Total No. of employees in position	Number of SC	ST	OBC	Minorities	Women
Group A	217	46	16	04	19	07
Group B	84	10	06	01	04	04
Group B (NG)	53	07	07	00	00	13
Group C	769	132	64	30	48	111
Group D	329	99	32	17	12	28
Total	1452	294	125	52	83	163

Chapter – 6

Performance of Public Sector and Joint Sector Companies in Mining, Mineral Processing and Exploration

6.1 The Department 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 in the field of mining and mineral processing, and Mineral Exploration Corpor-ation Limited (MECL) is in the field of mineral exploration. In addition, the Govern-ment holds 49% equity in Bharat Aluminium Company Ltd. (BALCO) and 29.54% equity in Hindustan Zinc Limited (HZL). The performance of these undertakings during 2003-2004 is given below.

(A) NATIONAL ALUMINIUM COMPANY LIMITED (NALCO)

6.2 National Aluminium Company Limited (NALCO) was incorporated on 7th January, 1981, as a Public Sector Enterprise of the Gover-nment of India. NALCO is Asia's largest integrated aluminium complex. Commissioned during 1985-87, NALCO has emerged as a star performer in production and export of alumina and aluminium, and more significantly, the company has been able to propel self-sustained growth.

Overview of Nalco's Smelter at Angul, after its capacity was expanded to 3,45,000 tonnes

6.3 Leveraging the technical collaboration with Aluminium Pechiney of France, with ISO 9002 certification of quality management, LME registration of products, environment care conforming to ISO 14001, international customer base (with export of products to more than 30 countries world over), at present NALCO is one of the lowest cost producer of Alumina & Aluminium in the world.

6.4 Since 1997 NALCO has undertaken phased expansion of production capacity at an investment of Rs.4200 crore. The Bauxite mine capacity has been raised to 4.8 million tonne since December 1999, Alumina Refinery capacity to 1.575 million tonne

since December 2001 and Smelter capacity has been raised to 288,000 tonne in March 2003 and Captive Power Plant (CPP) capacity has been augmented to 960 MW in February 2004. Expansion at Smelter complex will be completed shortly, when aluminium production capacity will reach 345,000 tonne.

6.5 During the year 2002-03, with export of over 1 million tonnes of alumina, the company established itself as a global alumina major, contributing nearly 10 % of global third party alumina transaction.

6.6 During the year 2003-04, all the segments of operation i.e. Mines, Refinery Smelter & CPP have achieved the rare distinction of highest ever production since inception. Physical sales in respect of aluminium export, domestic metal sale & total metal sale are the highest since inception and have surpassed the annual targets. In financial parameters all the previous records have been surpassed, with sales turnover, gross margin, export earning, profit before tax & profit after tax at highest since inception.

Physical Performance

6.7 The physical performance of the Company during the year 2001-02, 2002-03, and 2003-04 is given in Table 6.1

TABLE 6.1
PHYSICAL PERFORMANCE OF NALCO

S.No.	Product	Unit	2001-2002 Actual	2002-2003 Actual	2003-2004 Actual
A	PRODUCTION				
1.	Bauxite	MT*	3,522,059	4,777,003	4,816,762
2.	Alumina	MT*	1,113,000	1,480,600	1,550,100
3.	Aluminium	MT*	2,31,674	2,44,708	2,98,208
4.	Net Power (Generation)	MU**	3,970	4,291	5,109
B	SALES				
1.	Alumina Export	MT*	6,70,120	10,37,287	9,34,874
2.	Aluminium Export	MT*	1,06,282	1,07,302	1,29,718
3.	Domestic Metal Sale	MT*	1,23,095	1,35,193	1,66,650
4.	Total Metal sale	MT*	2,29,377	2,42,495	2,96,368
5.	Power to GRIDCO	MU**	342	411	484

*MT - Metric Tonne ** MU - Million Units

Financial Performance

6.8 The financial performance of the Company during the year 2001-02, 2002-03, and 2003-04 is given in Table 6.2. NALCO has paid Rs. 336.90 crore as dividend is Government of India for the year 2002-2003.

TABLE 6.2
FINANCIAL PERFORMANCE OF NALCO
(Rs in crore)

S. No.	Details	2001-2002 Actual	2002-2003 Actual	2003-2004 Actual
1.	Income	2380.61	2762.46	3322.98
2.	Operating Cost	1425.54	1545.22	1716.40
3.	Interest etc.	116.39	105.66	99.75
4.	Depreciation & Amortization	313.07	360.15	457.80
5.	Net Profit before Tax & Dividend (PBT)	525.61	751.43	1049.03
6.	Net Profit after Tax but before Dividend (PAT)	409.35	520.92	735.60

Sales Performance

6.9 The sales performance of the Company during the year 2001-02, 2002-03, and 2003-04 is given in Table 6.3

TABLE 6.3
SALES PERFORMANCE OF NALCO

Items		Unit	2001-2002 Actual	2002-2003 Actual	2003-2004 Actual
EXPORT SALES					
(a)	Calcined Alumina	MT	670120	1037287	934,874
(b)	Aluminium	MT	106,282	107,302	129,718
	Total Export earning	Rs. crore	1,235.42	1,532.79	1,717.27*
DOMESTIC SALES					
	Aluminium	MT	123,095	135,193	166,650

*Provisional

Expansion & Diversification

(i) Expansion of Smelter and Power Complex (8th unit of CPP)

6.10 The mechanical completion of 240 pots in the smelter was completed on 31.1.2003. 120 pots were operationalised on 31.3.2003. The remaining 120 pots will be operationalised shortly.

(ii) Commissioning of 8th Unit of CPP

6.11 The project was approved by Government of India on 14.02.2001 with a completion schedule of 36 months i.e. by 13.02.2004. The Boiler has been lighted up on 30.10.2003 and has been synchronized on 25.2.2004. It is expected that there will be a saving of about Rs.100 crore in this project from the approved cost of Rs.480 crore.

(iii) Rolled Product Unit (Formerly IAPL)

6.12 Government of India approved the revised cost estimates for the project on 28.03.2002. The Cold Rolling Mill was commissioned on 31.03.2002. The expected date of commissioning of Casters along with melting and holding furnace was scheduled to be 6 months from the date of approval of the revised cost estimate.

6.13 The revised capital cost of Rs.372.63 crore for the project was considered by the Board during its meeting held on 30.01.2003. The proposal was considered by the Standing Committee on Time and Cost Overrun on 17.4.2003 and it was agreed to recommend the proposal for consideration of Public Investment Board (PIB). Because of the delay in approval of the Revised/Cost Estimate, the cost of the project has further increased to Rs.398.36 crore on account of financing charges upto September, 2004 and for closure of lease agreement with M/s. Sundaram Finance.

(iv) 2nd Phase Expansion of Integrated Aluminium Complex.

6.14 The proposal for 2nd Phase expansion of NALCO's Integrated Aluminium Complex has been considered and recommended by the PIB for consideration of the competent authority in the Government on 6.2.2004. The cost estimates have now been revised to Rs. 4092 crore at July' 2003 price level. The capacity of Mines, Refinery, Smelter and CPP after 2nd phase expansion is given in Table 6.4.

TABLE 6.4
CAPACITY OF MINES, REFINERY, SMELTER & CPP

Sector	Present Capacity	Capacity after 2nd Phase Expansion
Bauxite Mines (TPY*)	48,00,000	63,00,000
Alumina Refinery (TPY)	15,75,000	21,00,000
Aluminium Smelter (TPY)	3,45,000	4,60,000
Captive Power Plant (MW)	960	1200

* Tonne per year

Energy Conservation

6.15 The following energy conservation measures have been adopted for optimal utilisation of energy resources in different units of NALCO during the period:

(a) Smelter

6.16 In the Anode Baking Furnace (in the expansion),PLC controlled heating regulation system has been introduced . Initial fuel oil consumption in the new baking furnance is approximately 40 ltr./tonne as against 65-70 ltr./tonne in old baking furnace.

6.17 Advanced pot regulation system ALPSYS has been successfully commissioned which assists in reduction of volt per pot, instability in pot and anode effect frequency. This leads to reduction in DC energy consumption per ton of metal production.

(b) Captive Power Plant

6.18 With operation of only 3 coal mills instead of 4, a power generation of 120 MW could be achieved by optimization of process parameters resulting energy saving worth Rs.38.71 lakh.

6.19 MS blades were replaced by energy efficient hollow FRP blades for all six cells of cooling tower number 4, resulting in saving is Rs.7.36 lakh per year.

6.20 Modification in illumination circuit in switch gear room & boiler area was done which saved electrical energy worth Rs.1.54 lakh per annum.

(c) Mines & Refinery Complex

6.21 Two cooling tower fans of SPP were replaced by FRP fans which resulted in achieving an average power saving of 25%.

Computerisation

6.22 Information to employees of the organization was facilitated by launching up-to-date HR manual, library information and access to inventory of spares of Refinery, Smelter and CPP units on NALCO's intranet. New hardware for commercial applications was provided at Mines, Regional Offices at Kolkata and Mumbai, and NSDL services for electronic trading of shares. Stabilization and strengthening of application package software in all areas was undertaken by supplementing audit and security modules, migration to new version of database (Sybase 12.5) and application development tool (Power Builder ver 9.0). Mail messaging services of the organization were integrated into a single domain.

Pollution Control and Environment

6.23 All the plants of NALCO operated with valid consent, authorization & clearances from statutory authorities. Mines, Alumina Refinery, Captive Power Plant & Smelter Plant maintained ISO-14001 Environment Management System certificate. Reclamation & rehabilitation of waste land with extensive plantation & developing green belt was done for improvement of environment. Treatment & re-cycling of effluents and zero-discharge of all the units was ensured.

6.24 CPP unit of NALCO was selected for Indira Gandhi Paryavaran Award-2000 for its Environment Management which is declared in the financial year of 2003-2004.

Research & Development Activities

6.25 Recognition of in-house R&D units of NALCO at M&R Complex, Damanjodi and S&P Complex, Angul has been renewed upto 31.03.2006 by Ministry of Science & Technology, Government of India.

6.26 Facilities available at both the R&D Centres are regularly utilised for addressing day-to-day problem solving, process and product development, energy conservation, waste utilisation etc. Emphasis is laid on development of in-house expertise for growth of indigenous technology by adopting innovative measures. Thrust is laid on patenting know-hows developed through in-house and collaborative R&D efforts.

6.27 A R&D Plan for the Company aimed at full scale technology absorption, assimilation and upgradation for attaining self-sufficiency in Alumina/Aluminium technology has been approved for implementation.

6.28 A Board level Technology Committee has been constituted which meets once in six months to review and give directions to the R&D and Technological up-gradation activities undertaken by the Company.

6.29 Special Grade Alumina pilot plant facilities were run to its full capacity. Different products produced from the facilities were supplied regularly to the user industries. 412.194 MT of Special Grade Alumina and 720.296 MT of Special Grade Hydrate were sold to the buyers during the year upto end March, 2004.

Ongoing R&D Projects

A. Collaborative R&D Activities

(i) A Joint Research Project (JRP) for extraction of iron from NALCO's Red Mud and preparation of Techno-Economic Feasibility Report (TEFR) for setting up of an optimal size commercial plant for production of iron by ROMELT Process has been completed in collaboration with MISA, Russia/RSIL, New Delhi.

Overview of Nalco's Alumina Refinery at Damanjodi, after its capacity was expanded to 15,75,000 tonnes

(ii) A project on dispersion pattern and behaviour of valuable trace and rare earth elements in Bauxite profiles at Panchpatmali deposits and scope of their recovery from rejects of Refinery plant has been completed in collaboration with Regional Research Laboratory (RRL), Bhubaneswar.

(iii) A project on development of Squeeze cast, premium quality aluminium alloy castings has been completed in July, 2003 in collaboration with Indian Institute of Science, Bangalore.

(iv) A project on studies on extraction of alumina from last washer mud of NALCO's Alumina plant has been completed in September, 2003 in collaboration with JNARDDC, Nagpur.

(v)A project on studies on Simulation of NALCO Alumina Precipitation Circuit is in progress in collaboration with EIL, New Delhi.

(vi) A project on studies on Mechanochemical activation of Bauxite to improve the performance of Bayer process for alumina production and minimise environmental impact of red mud has been undertaken in collaboration with NML, Jamshedpur.

(vii) A project on technology demonstration studies on effect of fly ash on soil fertility and crop yield at CPP, Angul and Demonstration trials in the farmers fields in five villages around CPP for popularisation of bulk use of fly ash are under progress in collaboration with RRL, Bhopal.

(viii) A draft contract with M/s Tyazhprom-export (TPE), Russia is under fianlisation for setting up of Gallium extraction facilities (3N grade, 10 TPY) from Bayer process liquor of NALCO's Alumina Refinery and its subsequent purification to 6N/7N grade.

B. In-house R&D activities

Alumina Refinery, Damanjodi

6.30 Improvement in flowability of zeolite-A, soda reduction from calcined alumina, studies on oil water emulsion samples of Smelter Plant, Angul and M/s CIBA specialities additive for TTD circuit continued to remain some of the main areas of R&D activities in M&R Complex, Damanjodi.

Smelter Plant, Angul

6.31 Determination of Baked Anode properties, study on Baking level, Aluminium fluoride control in pots, Bath inventory in pots, development of Cathode clad, Bush Bar coating and evaluation of Bake Oven performance were the R&D activities in the Smelter Plant, Angul for the reported year.

Industrial Relations

6.32 The industrial relations scenario of the Company during the period under report remained by and large peaceful.

6.33 In a company with total 24 registered Trade Unions, regular and structured interactions with the recognised Unions has helped keep the inter-union and intra-union rivalry in a subdued level.

6.34 Employee involvement through encouragement of more suggestions on production related issues, formation of quality circles, fostering of communication channels and training etc. are adopted continuously to overcome the environment of mistrust and to encourage employees participation in production and productivity missions. Competency mapping of individual employees and thrust on training and development is given to update the efficiency and raise knowledge level of employees.

Perspective Plan for Women Welfare

6.35 Despite the nature of job requirement of the company and dearth in availability of technically experienced women candidates in the labour market, the company has 276 women employees on its rolls. Equal opportunity is provided by the Company to the women in employment.

6.36 Apart from providing developmental and functional training programmes to the women employees, the company's thrust is to develop the women employee towards assertiveness and courage to deal with the issue of harassment of women at work place. Institutional mechanism through conduct rules has also been put in place to avoid sexual harassment of women.

6.37 Women executives of the company have become coordinator/member of national organizations like Women in Public Sector (WIPS). NALCO has been honored with the Best Enterprise Award for consecutively two years i.e. 2002 & 2003 by the Forum of Women in Public Sector (WIPS) formed under the aegis of SCOPE. In addition to this, supports in various forms are extended to members of ladies club/Mahila Samaj for the improvement of the cause of women.

Welfare Measures

6.38 The Alumina and Mines units of the company are placed in the midst of a predominantly tribal area at Damanjodi. The focus is therefore on the rehabilitation and provision of amenities for 600 families who have been affected by the establishment of the project. Development of roads, school, college, library, recreation center, ponds, wells and agricultural land etc. was undertaken along with the literacy development programme on the peripheral tribal dominated villages. Besides, direct employment in Nalco Damanjodi Sector has been provided to 490 persons on the basis of one able bodied person from each displaced family and opportunity has been provided to others for engagement with contractors.

6.39 Adherence to the Presidential Directives on reservation of SC/ST persons in employment has been the basic policy of the Company. There are also exclusive Cells constituted for the welfare of the SC/ST employees besides guidance and interaction with the welfare associations framed by the SC/ST employees at its various units.

6.40 The company respects the sentiment of various minority community with a greater objective of communal harmony. A member of minority community is invariably associated in the selection committees for filling up Group- 'C' & 'D' vacancies.

6.41 As a responsible Corporate Citizen, NALCO looks after the development and welfare of tribals and minorities residing in and around the Plant Units through its peripheral development activities. Since NALCO's community development and periphery development activities cover all sections of people living in the villages surrounding its plants at Damanjodi and Angul, it is difficult to apportion the activities between SC, ST and other Communities in some cases. Damanjodi being predominantly tribal, the welfare activities undertaken in this sector mostly benefit the ST communities. On the other hand, in Angul sector the beneficiaries will have a mixed pattern.

Progress Achieved with Regard to Well Being of the Older Persons During the Year

6.42 The Company, besides the statutory retirement benefits viz. Provident Fund, Group gratuity life assurance scheme, pension etc., has a contributory scheme for post retirement medical facilities to the superannuated employees and their spouse.

6.43 The Company also provides the re-creational facilities to the retired employees and their family members in its club, community center, etc.

Employment Under Disability Act, 1995

6.44 Notwithstanding the fact that the Company is established with state-of-the-art technology requiring mostly healthy and competent technical personnel, measures are being taken to achieve 3% representation in all posts in Group- C&D and in identified posts in Group-A&B under section 33 of the Persons with Disabilities (Equal Opportunities, Protection of Rights and Full Participation) Act 1995. As on 31.03.2004 there are 59 Physically Handicapped Persons in employment of the Company in various identified posts constituting 0.88% of the total work force.

6.45 Further keeping in view the limited scope for recruitment of disabled persons, the company has sought for exemption under referred provisions of the Act on recruitment of persons in Executives as well as Non-executive category, particularly in the technical stream.

6.46 The Table 6.5 shows the employment of personnel as on 31-3-2004 in NALCO.

TABLE 6.5
EMPLOYMENT OF PERSONNEL IN NALCO

Group	Total No. of employees	SC	ST	Ex-SM	PH	LDP	Minority	Women
Executives	1702	200	104	08	04	14	63	50
Non-executives	4946	903	1075	66	51	1633	198	221
Trainees	54	03	27	-	04	08	11	2
Total	6702	1106	1206	74	59	1655	272	273

Ex-SM—Ex-serviceman
PH = Physically Handicapped
LDP = Land Displaced Persons
N.B. : It may be noted that every third employee of the organisation either belongs to SC or ST category

MOU Rating

6.47 The MOU rating achieved during last three years is given at Table 6.6

TABLE 6.6
MOU RATING

Year	Composite Score	Grade
2001-2002	1.483	Excellent
2002-2003	1.427	Excellent
2003-2004 (Provisional)	1.49	Excellent

(B) HINDUSTAN COPPER LIMITED (HCL)

6.48 Hindustan Copper Limited (HCL) was incorpo-rated on 9th November, 1967, under the Companies Act, 1956. It was established as a Government of India Enterprise to take over
from National Mineral Development Corpo-ration Ltd., all plants, projects, schemes and studies pertaining to the exploration and exploitation of copper deposits, including smelting and refining.

6.49 The Government of India nationalised the only copper producing company, Indian Copper Corporation Ltd. at Ghatsila in Bihar in March 1972 and handed over its management and ownership to HCL. In November 1982, the prestigious Malanjkhand Copper Project comprising of a large and fully mechanised open pit mine and Concentrator plant was dedicated to the nation. 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.

6.50 Three copper mines of HCL at Khetri in Rajasthan, Ghatsila in Jharkhand and Malanjkhand in Madhya Pradesh supply concentrate to two smelters located at Khetri Copper Complex, Rajasthan and Indian Copper Complex, Jharkhand for processing copper cathodes. CC Rod plant at Taloja, Maharashtra converts copper cathodes to CC Rods.

6.51 The installed capacity of processing copper cathodes of Khetri Copper Complex and Indian Copper Complex is 31,000 tonne and 16,500 tonne respectively. Smelter of HCL also process sulphuric acid, gold and silver as by-products.

Physical Performance

6.52 The production of ore, metal in concentrates, refined copper (cathode) and wirerod during the year 2001-2002 to 2003-2004 are given at Table 6.7

TABLE 6.7
PHYSICAL PERFORMANCE OF HCL

(In tonne)

Products	**2001-02 Actual**	**2002-03 Actual**	**2003-04 Actual**
Ore Production (thousand)	3396	3064	2895
Metal in Concentrates	34282	30824	28306
Refined Copper (Cathode)	40218	36575	30598
Wirerod (Taloja)	29642	30346	28172

Financial Performance

6.53 The financial performance of the Company during the year 2001-02,2002-03 and 2003-04 is given at Table 6.8

TABLE 6.8
FINANCIAL PERFORMANCE OF HCL

(Rs in crore)

Details	2001-02 Actual	2002-03 Actual	2003-04 (Provisional)
Income	586.66	501.53	498.76
Operating Cost	645.15	531.95	442.39
Interest and Transaction Cost	67.43	59.57	58.93
Depreciation and Amortisation	58.12	57.71	59.86
Net Profit/(Loss) before Income Tax and Dividend	(184.04)	(147.70)	(62.42)

Sales Performance

6.54 The Company achieved a total sale of around 30,200 tonne of copper during the year 2003-2004 as against 37,274 tonne during 2002-2003.

Proposed Disinvestment in HCL

6.55 Government has decided to divest its entire share holding in HCL (98.95%) to an interested buyer. The receipt of financial bids has been kept in abeyance by the Government in view of litigation pending in the Courts against the disinvestment of HCL.

Energy Conservation

6,56 HCL maintains an internal Energy Audit system which monitors energy consumption. The overall consumption of Power and Fuel from 2000-01 onwards is given at Table 6.9

TABLE 6.9
ENERGY CONSUMPTION

Physical consumption	2000-2001	2001-2002	2002-2003	2003-2004
Power (Lakh KWH)	2795	2672	2338	1983
Fuel (Kilo litres)	35633	29589	28368	22213
Natural Gas ('000 M3)	1941	1817	1729	1655

Constant thrust is being maintained on improvement of Power factor.

Computerisation

6.57 Besides regular ensuring and timely operation of all on-going applications at the Head Office, the Units and the various Sales Offices of the Company, the following specific tasks were also taken up with reference to IT related activity during 2003-2004.

- Bangalore sales Office has also been computerized with effect from April, 2003
- Intranet facility at Head Office has been implemented and made functional.
- Existing website on the Internet has been made bi-lingual.
- NIT and/or Tender documents given to the press are being hosted on the website also.
- Generation of Data Warehouse & Development of query response system at Head Office is initiated.

Pollution Control and Environment Management Efforts

Water Pollution Control Measures

6.58 During the year 2003-04 effluent treatment facilities provided to all the 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.

Air Pollution Control Measures

6.59 The air pollution control projects that have been commissioned for meeting Pollution Control Board standards for gaseous emission from HCL's Smelter and other plants were also operational during the year 2003-2004. 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.

Afforestation

6.60 In addition to lumpsum payments towards compensatory afforestation by HCL for diversion of forest lands for mining purpose at all the units of the company, separate afforestation work like all previous years continued during the year 2003-04.

Industrial Relations

6.61 The industrial relations situation in the Company continued to be peaceful and harmonious during the year 2003-2004.

6.62 The Ministry of Labour, Government of India vide letter No.L-42024/53/2002-IR(Misc.) dated 5.6.2003 granted permission for closure of Surda Mine and other establishments and services of Hindustan Copper Limited at Mosaboni under Section 25(O) of the Industrial Disputes Act,1947 and accordingly the estab

lishments were closed w.e.f. 17.6.2003. All the workmen of the establishments were separated through the Voluntary Retirement Scheme of the Company. A proposal of the recognized union for transfer of the Surda Mine to a Workers' co-operative is India consideration.

Open Cast Copper Mine of HCL in Malanjkhand, Madhya Pradesh

6.63 The permission for closure of the Khetri Mine was also received from the Ministry of Labour, Government of India vide their letter No. 42024/54/2002-IR(Misc.) dated 1.10.2003. The Rajasthan High Court, Jaipur on a writ petition filed by four registered Trade Unions of Khetri Copper Complex against the permission of the Government granted stay on 31.10.2003 till the matter is decided by that Court. The SLP filed in the Supreme Court for vacating the stay order was heard on 28.11.2003. The Apex Court has directed the High Court to dispose of the matter preferably within three months. In view of the inevitable delay, the operation of Khetri Mine which was under suspension has been resumed to avoid payment of idle wages.

Welfare Activities

6.64 Measures have been taken to ensure strict compliance of all the provisions pertaining to women employees as provided in the Factories Act,1948, Mines Act,1952 and the Equal Remuneration Act.

6.65 In pursuance to a judgement of the Supreme Court, HCL has set up Committees at all the units and offices of the Company to check any form of harassment against women employees at the work place. A provision to this effect has also been incorporated in the "Conduct, Discipline and Appeal Rules" of the Company. During the year, there has been no incidence of discrimination/ harassment against female employees.

6.66 Various activities under the Prime Minister's 20 point programme for the welfare of Tribals and Minorities were conducted albeit in a small scale on account of the financial crisis in the Company.

6.67 The Presidential directives on the reservation of posts for Scheduled Castes and Scheduled Tribes is being followed in letter and spirit.

Employment

6.68 The Table 6.10 shows the employment of personnel as on 31-3-2004 in Hindustan Copper Ltd.

TABLE 6.10
EMPLOYMENT OF PERSONNEL IN HCL

Group	Total no. of employees	SC	ST	Ex.S.M.	P.H.	L.D.P.	Minorities	OBC	Female
A	664	62	19	5	1	0	40	40	16
B	160	28	9	2	1	0	15	23	11
C	4253	632	510	108	40	208	269	606	140
D	918	213	207	11	15	216	49	31	163
Total	5995	935	745	126	57	424	373	700	330

MOU Rating

6.69 The MOU rating during the last three years is at Table 6.11

TABLE 6.11
MOU RATING

2000-2001	-	Good
2001-2002	-	Fair
2002-2003	-	Good

(C) BHARAT GOLD MINES LIMITED (BGML)

6.70 Bharat Gold Mines Limited (BGML) was incorporated as a public sector undertaking in 1972. Since its inception, BGML has 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. The cost of production of gold by BGML was Rs.19,729/- per 10 grams at the time of closure. The total number of employees at the time of closure was 3580.

6.71 BGML was referred to Board for Industrial and Financial Reconstruction (BIFR) in 1992 when its net worth became negative due to continuous losses. The Government considered various options for its revival including joint venture route but came to conclusion that it is not feasible to revive BGML as even after infusion of fresh funds the revival of the company was uncertain. BIFR considered the case for eight years and three reports of Operating Agency and passed its final order on 12.6.2000 concluding that it was just, equitable and in public interest to wind up BGML under Section 20(1) of SICA, 1985 and forwarded its opinion to High Court of Karnataka on 30.6.2000. The order of BIFR was challenged by the employees union in Appellate Authority for Financial and Industrial Reconstruction (AAFIR). AAFIR dismissed the appeal filed by the employees and upheld the orders passed by BIFR vide its order dated 15.11.2000. In a separate proceeding the 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 vide their letter dated 29.1.2001.

6.72 The Employees' Union filed a number of Writ Petitions against the orders of BIFR, AAIFR, Ministry of Labour and introduction of Voluntary Separation Scheme (VSS) by the company in December, 2000. The Single Judge Bench of High Court of Karnataka passed the orders on 16.3.2001 dismissing writ petitions against introduction of VSS. However, orders of BIFR to wind up the Company and the order of the Ministry of Labour for closure of the company w.e.f. 1.3.2001 under Section 25(O) of I.D. Act.1947 were quashed and BIFR was directed to reconsider the claim made by the employees and find ways and means to revive BGML. Government of India moved the Division Bench of High Court of Karnataka against the order of the Single Judge Bench. The Division Bench in its order dated 26.9.2003 has set aside the order of the Single Bench, thus upholding the winding up/closure orders passed by BIFR/AAIFR and Ministry of Labour. The High Court has made certain recommendations which are under consideration of the Government.

6.73 After the closure of the company, the Government introduced Special Terminal Benefit Package (STBP). The STBP allowed the erstwhile employees an option to choose either Heavy Industry package or Gujarat package of voluntary separation on the lines of the package offered to the employees in December, 2000 prior to the closure. Later on, the sale of the hutments at reasonable price to those employees who opted for STBP was also offered. A total of 458 erstwhile employees have opted for STBP. At the same time ad-hoc payments have been made to the ex-employees of BGML in deference to the directions passed by the High Court of Karnataka and the Supreme Court from time to time.

(D) MINERAL EXPLORATION CORPORATION LTD. (MECL)

6.74 Mineral Exploration Corporation Limited (MECL) since its inception in the year 1972 has been carrying out its functions by steadily enlarging its volume & scope of activities. During the last 31 years it has established 114005 million tonne of mineral reserves in different states of the country.

7.75 The Company's registered office is at Nagpur, Maharashtra State, India and manages its functions at projects, the main production centres from the Corporate Office at Nagpur. Technical guidance to the projects, finalisation of geological reports, close liasoning with the clients and looking for new business opportunities is being carried out through the Zonal Offices located at Ranchi, Nagpur and Hyderabad. To facilitate the prompt mainte- nance of plants and machineries deployed at various projects, three Regional Maintenance Centres at Ranchi, Nagpur and Hyderabad are being operated. The commercial activities of the Company are managed from Nagpur apart from two units located at Delhi and Kolkata.

6.76 MECL, the premier exploration agency in the country, carries out its activities under two major heads:

- Promotional - on behalf of Govt. of India, in which projects are funded by Central Govt. on the basis of detailed exploration schemes formulated by the Company, in consonance with national priorities.

⌘ Contractual-on behalf of agencies including both Public & Private Sectors and also State Governments on mutually agreed terms and conditions.

6.77 Apart from core activities of mineral exploration, MECL has diversified its activities in the field of slim hole drilling for coal bed methane, coal sampling & analysis and ballast stone mining.

6.78 During the year 2003-04, MECL has completed 1,72,283 m of drilling & 3357 m of developmental mining and established 2081 million tonne of mineral reserves of coal, lignite, copper, bauxite & rare metal. The sales turn over of the Company is Rs. 6010 lakh and the gross margin is Rs. 1095 lakh.

6.79 As a part of diversification activities, MECL continued coal sampling and analysis work, slim hole drilling for CBM studies and ballast stone supply and generated a revenue of Rs. 1226.28 lakh.

Physical Performance

6.80 The physical performance of drilling, mining and the geological reports is at Table 6.12
Financial Performance

TABLE 6.12
PHYSICAL PERFORMANCE OF MECL

Details	**2001-2002 Actual**	**2002-2003 Actual**	**2003-2004 Target**	**2003-2004 Actual**
Drilling Metreage (m)	1,77,706	1,19,994	1,67,000	1,72,283
Productivity metre/drill/Months	326	277	300	289
Mining (Mtrs)	3,781	3,372	4,200	3,357
Final Geological Reports (Nos	33	27	--	40

6.81 The financial performance of the Company is at Table 6.13

TABLE 6.13
PHYSICAL PERFORMANCE OF MECL

Details	**2001-2002 Actual**	**2002-2003 Actual**	**2003-2004 Target**	**2003-2004 Actual (Provisional)**
Income	60.39	44.83	63.10	60.10
Operating Cost	50.78	49.69	50.20	49.15
Interest	7.56	7.94	10.20	10.07
Depreciation & amortisation	3.84	4.65	5.05	5.10
Net Profit before Income Tax & Dividend	(-)0.57*	(-)17.58*	(-)2.35	(-) 4.22

* After prior period adjustment and waiver of penal interest etc.

Energy Conservation

6.82 The core activities of the Company comprise exploratory drilling, exploratory and developmental mining and associated geological and laboratories studies. These are carried out through temporary industrial establishments located in various parts of the country. The machineries and vehicles used are mainly run by diesel engines. The electrical energy consump-tion is limited to offices and at mining sites.

6.83 MECL has taken up the following steps for energy conservation.

- Regional Maintenance Centres (RMCs) are in operation at Nagpur, Ranchi and Hyderabad for maintenance of the machineries /vehicles used at projects on regular basis to improve fuel efficiency.
- Machineries/vehicles consuming high POL are withdrawn from operations for immediate repair/ overhauling.
- While selecting an electric drive, care is being taken to match the power demanded by the load with nearest available KW for the drive. This reduces the wastage of electricity due to the minimum loss on reactive power.
- Operators are instructed to switch off power to the motor as soon as the requirement is over, and running of idle motor is kept to the minimum. Sequence control has been incorporated in the crushing plant at Birmitrapur.

Use of Diesel

6.84 MECL consumes diesel for projects in Greenfield areas, which are without the supply of power and also as stand-by power to cope up with load shedding and power interruptions. The diesel engine including its fuel pump, engine compression and engine lubrication is maintained in good operating conditions to keep the consumption of fuel to the minimum. The company monitors fuel consumption against the quantum of work done on day-to-day basis.

Training

6.85 The operating and maintenance personnel are trained to update their knowledge in respect of energy conservation measures.

Exploration Activities

6.86 During the financial year 2003-04, the company has carried out exploration for Copper ore at Malanjkhand (West), Malanjkhand Granitoid - Madhya Pradesh, and Bhagal Copper deposit and Devtalai Multimetal deposit, Rajasthan, Chromite in Nuggihalli Schist belt, Karnataka, Tungsten in Ratanpur area, West Bengal, Gold in Girar area, Uttar Pradesh, Thanewasna Copper Prospect, Maharashtra and Ferro-silicon grade Quartzite at Kalaktang (Phase-II) in Arunachal Pradesh, on behalf of Department of Mines under promotional exploration programme.

Bhagal Copper Deposit

6.87 5.53 million tonne of copper ore reserves with 0.76% Cu at 0.50% Cu cut off have been estimated.

Devtalai Multimetal Deposit

6.88 A total of 1.96 million tonne of in-situ copper ore reserves with 1.06% copper and 722 kg of contained gold metal were estimated.

Nuggihalli Chromite

6.89 So far a total of 1250 m of drilling in 4 completed and two running boreholes has been carried out. A total of 429 stations of gravity survey and 429 stations of magnetic survey has been completed. In borehole MBB-1, chromite bearing zone has been intersected.

Bankura Tungsten

6.90 A total of 60 sq.km. of regional geological mapping on 1:20,000 scale, 10 sq.km. of detailed geological mapping, geophysical sampling (100 m grid) of 10 sq.km. area and 1000 cu.m. of trenching has been completed.

Serendag (West) Gumla

6.91 A total of 89 primary samples were sent to laboratory for analysis of SiO_2 and Al_2O_3. Most of the boreholes intersected bauxite horizon having thickness around 2.0 m based on visual estimate.

Action Taken on Abatement of Pollution and Environment

6.92 The exploration activities of MECL do not cause any significant pollution. However, as a part of exploration work, MECL is carrying out environmental studies for helping the exploitation agencies to plan measures for abating possible pollution and Environmental Impact Assessment (EIA) in various exploration projects and a report on the same is included as a part of geological reports of the exploration projects.

Information Technology (IT)

6.93 The progress made in respect of IT is as follows:

- Computerised geological data processing 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 of MECL. This work was carried out for 12 exploration blocks of various minerals (Viz. Coal, Lignite, Gold, Base metal, Rare-earth etc.). Digital conversion of geophysical borehole logs was also carried out.
- Geological modelling involves preparation of geological plan, LV & geological cross sections, level plans etc. The data created is then integrated in Gemcom software for 3-D Ore body modelling by synthesizing & integrating exploration & map database.
- Digital conversion of geological reports of coal & lignite blocks was carried out to calculate reserves using In-house GIS technique developed on AutoCad map platform. (Figure 6.1)

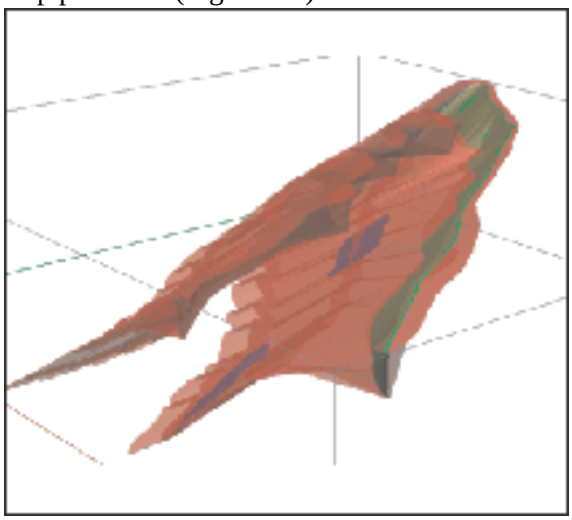


Figure 6.1

- Development of Customized package "Integrated Database Management System (Phase-I)" for Gujarat Ambuja Cement Limited was carried out. The package is divided into 4 different modules namely Survey, Exploration Database Creation, Mining Lease and Information System. (Figure 6.2)

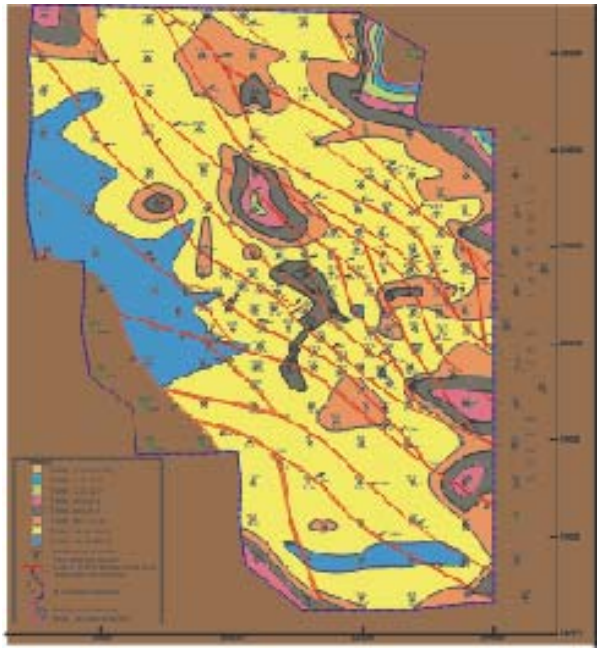


FIGURE 6.2

- Exploration report of Beku Rare-earth project is totally converted into digital media.

6.94 During the year 2003-04, training was imparted to the following outside agencies.

- Indian Bureau of Mines : 2 batches were imparted training on Page Maker etc.
- Gujarat Ambuja Cement Limited : 1 batch each in AUTOCAD Map & Visual Foxpro.
- one batch in GIS .
- In-house : one batch on Windows & MS-Office.

Business Development Activity

6.95 All out efforts are being made to change existing mind set of the employees and to improve work culture in the organisation. Through business development group, vigorous attempts are being made to obtain work from both private and public sectors through competitive bidding and a series of technical discussions.

6.96 The total value of order book during the year was over Rs. 94.00 crore. It has been possible as a result of vigorous marketing efforts and participating in tenders on competitive rates. A total of 102 offers were submitted to various clients while 52 work orders were received during the year.

6.97 MECL has received major share of work order from PSUs as well as Private organisations viz. M/s. TISCO, STERLITE, SMC, GEECL, AMD, ONGC, SCCL, UCIL, MCL etc. The company has received individual order of Rs. 14.75 crore, for slim hole drilling for CBM on behalf of ONGC and Rs. 6.95 crore for drivage of incline from SCCL. Both of these orders were obtained through competitive bidding basis.

(a) MOU signed with

- M/s. Korea Resources Corporation (KORES) for mutual co-operation between the two organisations for exploration and development of mineral resources in India and Abroad.
- M/s. Shiv-Vani Universal Ltd, regarding production well drilling for CBM studies.
- Draft MOU with M/s. KOPEX, Poland for association of both the organisations for mutual benefit. The MOU is proposed to be signed in the next Joint Commission meeting between the India and Poland.

(b) Agreement signed with

- M/s. UCIL for exploratory development at Narwapahar mines.
- M/s. Great Eastern Energy Corporation Ltd (GEECL) for drilling of one core hole for CBM investigation in Kalidaspur area, Raniganj coalfield.

Diversification Activity

6.98 Apart from the core activities, MECL diversified its activities in the following fields.

- Coal sampling and analysis.
- Remote Sensing and Environmental studies.
- Ballast stone mining for supply to SE Railway.
- Deep drilling for Coal Bed Methane (CBM) studies on behalf of ONGC and other organisations.

Manufacturing Unit

6.99 MECL has a well equipped central workshop and manufacturing unit at Nagpur to cater to the needs of drilling and 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 drilling. Also, it has sophisticated CNC lathe machine for the manufacturing of drill rods and drill tubulars. During the year 2003-04, a total of 10412 items were manufactured, which include 3286 Nos. of TC bits and 2054 Nos. of other drill accessories and 5072 Nos. threading/ re threading of drill rods.

Coal Sampling and Analysis

6.100 As a third party agency, MECL continued coal sampling and analysis work on behalf of various Coal Companies, Steel Plants and Thermal Power Plants. During 2003-04, eight projects are in operation at different coalfields (CCL, BCCL, MCL, SECL & NCL) and a total value of work amounting to Rs. 299.71 lakh has been carried out.

Welfare Measures

6.101 Due to ongoing financial constraints in MECL, welfare activities are kept at the barest minimum. However, the following were organised within the funds available.

- MECL employees donated Rs.1933.30 collected on Flag Day during Communal Harmony Week organised from 19th to 25th November, 2003 and the amount was remitted to National Foundation on Communal Harmony, New Delhi.
- 15 Unserviceable BQ Drill Rods were donated to Shri Ayyappa Seva Sangham, Malanjkhand for constructing shelter in front of Shri Ayyappa Temple, Malanj-khand.

Welfare of Tribal and Minorities:

- MECL has given due importance to meet socio-economic needs of the tribals and minority communities living in and around each camp/project site. However, in view of continued financial constraints being faced by the Company, no welfare activities were undertaken during the period under review.

Perspective plan for women welfare:

- The company stands for raising and improving the socio-economic status of women. For this purpose, the company provides them training to acquire new skills for the career development.
- 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.
- MECL gives equal status to its women employees and the Service Rules, etc. are uniformally made applicable. The women employees in the Company are provided Maternity benefits as per rules.

Industrial Relations

6.102 Industrial Relations remained, by and large, peaceful & cordial in all the establishm-ents of the company during the period from 1-4-03 to 31-3-04.

Employment under Disability Act, 1995

6.103 Status of Implementation of Persons with disability Act, 1995, specially on Implementation of Section 33 on reservation Vacancies for the Persons with Disabilities is given at Table 6.14.

TABLE 6.14
VACANCIES FOR THE PERSONS WITH DISABILITIES

Groups	Total no. of identified posts	Employed	Percentage
A	58	01*	1.72
B	Nil	–	–
C	1897	08*	0.42
D	97	01**	1.03

*Orthopaedically handicapped **Visually handicapped

Employment

6.104 The Table 6.15 shows the employment of personnel as on 31-3-2004 in MECL.

TABLE 6.15
EMPLOYMENT OF PERSONNEL IN MECL

Groups	Total No. of employees	SC	ST	Ex-Service-man	OBC	Minori-ties	Women
A	329	46	21	02	15	24	05
B	10	03	Nil	Nil	01	Nil	Nil
C	1897	262	136	11	99	149	36
D	97	25	08	Nil	05	10	12
Total	2333	336	165	13	120	183	53

Joint Sector Companies

(E) BHARAT ALUMINIUM COMPANY LIMITED (BALCO)

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

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

Physical Performance

1.107 The physical performance of BALCO is given in Table 6.16.

TABLE 6.16
PHYSICAL PERFORMANCE OF BALCO

(In tonne)

Particulars	2001-02	2002-03	2003-04 (Provisional)
Production	70353	95490	97088
Sales	69134	99575	96835

Note: Production during 2001-02 was adversely affected due the 67 days strike immediately after the disinvestment.

Financial Performance

6.108 The financial performance of BALCO is given in Table 6.17

TABLE 6.17
FINANCIAL PERFORMANCE OF BALCO

(Rs in crore)

Particulars	2001-2002 Actual	2002-2003 Actual	2003-2004 Provisional
Income [Net sales & Other income]	632.29	897.24	920.01
Operating Cost	582.07	749.18	724.09
Interest	11.94	6.22	8.50
Depreciation	36.09	35.71	47.19
Non-recurring expenses (VRS. & prior period adjustments)	–	10.10	68.35
Profit/ (Loss) before tax	2.19	96.97	71.88

Note: The performance of the Company in 2001-02 was adversely affected due to the 67 days strike immediately after the disinvestment.

6.109 BALCO has taken over the management of its captive power plant from NTPC with effect from 1st July 2002. No retrenchment of any workmen in the Company has taken place after disinvestment. BALCO has initiated expansion of the Smelter capacity to 3,45,000MT per annum from the existing 1,00,000MT per annum. BALCO has initiated expansion of the installed capacity of its captive power plant to 810 MW from existing 270 MW. Industrial relations in BALCO continue to be peaceful

(F) Hindustan Zinc Limited (HZL)

6.110 Hindustan Zinc Limited is a leading producer of zinc & lead in the country. It was incorporated in January 1966 as a public sector company to develop mining and smelting capacities to substantially meet the domestic demand of zinc and lead metals. Govt. of India disinvested its 26% equity in HZL in favour of Sterlite Opportunities and Ventures Ltd. (SOVL) on 28th March, 2002 and the management control of the company was transferred to SOVL on 11th April, 2002. Subsequently, SOVL acquired 20% equity shares of HZL from the market through its open offer. On 11th November, 2003, Government of India further offloaded 18.92% of its equity in HZL in favour of SOVL in response to the call option exercised by SOVL in terms of the Shareholders' Agreement. The current shareholding of the SOVL in HZL is 64.92% and that of Government of India is 29.54%.

6.111 HZL's operations are broad based and its activities range from exploration, mining and ore processing to smelting and refining of lead, zinc, silver, cadmium, copper and sulphuric acid. With its Headquarters at Udaipur, HZL operates three lead-zinc mines (Zawar Group of mines at Udaipur, Rajpura Dariba Mine in Rajsamand, Rampura Agucha Mine in Bhilwara, all in Rajasthan) with a total lead-zinc ore production capacity of 4 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 2.30 lakh tonnes per annum of zinc and 36,000 tonnes of lead.

Physical Performance

6.112 The physical performance of the company for the last three years is given at Table 6.18.

TABLE 6.18
PHYSICAL PERFORMANCE OF HZL
(In tonne)

Product	2001-2002 Actual	2002-2003 Actual	2003-2004 Target	2003-2004 Actual
Lead-Zinc Ore	2724514	3068794	4135000	3644163
Lead-Zinc Conc.	450438	544986	705696	663234
Zinc Metal	176395	207066	230820	225337
Lead Metal	37860	39314	36000	33704

Financial Performance

6.113 The financial performance of HZL is given at Table 6.19. HZL has paid Rs. 16.38 crore as dividend to Government of India for the year 2002-2003.

TABLE 6.19
FINANCIAL PERFORMANCE OF HZL
(Rs.in crore)

Details	2001-02 Actual	2002-03 Actual	2003-04 Actual
Income (excluding excise duty)	1250.88	1487.17	1935.89
Operating Cost	1054.68	1156.74	1275.09*
Interest	17.42	0.30	0.75
Depreciation & Amortisation	74.67	100.77	75.31
Net Profit (PBT)	104.11	229.36	584.74

* Includes Rs. 210.90 crore Voluntary Retirement expenses incurred before 1st April, 2003 charged to Profit & Loss Account.

Sales Performance

6.114 Zinc metal sale in the domestic market during the year 2003-04 was 253529 tonne, which was about 24% higher than the corresponding period of previous year. In addition the company exported 10140 tonne of PW zinc metal. Zinc and Lead concentrates export during the report year was 154974 tonne and 10293 tonne respectively, besides 5600 tonne of zinc concentrate sale in the domestic market. Lead metal sale during 2003-04 was 25488 tonne.

Expansion Projects:

6.115 In view of annual growth rate of 8-10 % in zinc metal consumption in the country and a huge gap between the indigenous demand and supply of zinc metal, HZL is going ahead with expansion of zinc smelting capacity by 170,000 tonne with matching expansion in mining capacity and by installing a captive power plant of 154 MW capacity. The estimated capital outlay for the expansion project is Rs. 1550 crore. It is expected to bring this capacity on stream by early 2005.

Developing Technology for Recovery of Metals from Polymetallic Nodules

6.116 After commissioning the pilot plant in April, 2002, for recovery of copper, nickel, cobalt and manganese from polymetallic nodules of Indian Ocean, test campaigns have been carried out in consultation with Department of Ocean Development (DOD) using the ammoniacal leaching process developed by Regional Research Laboratory, Bhubaneswar - RRL(B). The Joint campaign with participation from RRL(B), National Metallurgical Laboratory, Engineers India Ltd. and DOD were taken up during the year under report. The final joint campaign on RRL(B) Process with modified process parameters was carried out from 22.3.2004 to

8.4.2004. The downstream process route developed by BARC for recovery of nickel and cobalt from nodules was also operated in several campaigns during this period. On the request of DOD, HZL has assured to extend necessary support for continued management of pilot plant upto March 2007, to complete techno-economic evaluation of three short-listed process routes.

Chapter- 7

Science and Technology

7.1 The Science and Technology programmes (S&T) of the Department of Mines initiated in 1978, cover the disciplines of Geology, Exploration, Mining and Environment, Bleaching, Beneficiation, Rock Mechanics, Ground Control and Non-Ferrous Metallurgy. A total of 123 projects have been completed so far and 30 are in progress.

7.2 The projects are approved by the Standing Scientific Advisory Group (SSAG) of the Department of Mines under the Chairmanship of Secretary (Mines). The Department of Mines provides support to different organizations as well as Public Sector Undertakings for implementing S & T programmes.

7.3 During the 10th Five Year Plan emphasis will be on multi-disciplinary, multi-organisational projects catering to the national requirements, and on building the capabilities and strengths of the mineral and non-ferrous metal industries.

Financial Outlay

7.4 In the Revised Estimates (RE) 2003-04 an outlay for S&T programmes has been retained at at Rs. 8.05 crore (budget support Rs. 4.50 crore). An outlay of Rs. 8.55 crore (budget support Rs. 5.00 crore) has been approved in Budget support 2004-05.

Centres of Excellence

7.5 Three Centres of Excellence set up under the Science & Technology Programme of the Department of Mines intended for research in specialised areas are: -

- National Institute of Rock Mechanics (NIRM), Kolar Gold Fields—rock mechanics and ground control.
- Jawaharlal Nehru Aluminium Research Development and Design Centre, (JNARDDC) Nagpur—bauxite, aluminium and alumina technology.
- National Institute of Miners' Health (NIMH), Nagpur—occupational health monitoring and mitigation of health hazards.

National Institute of Rock Mechanics (NIRM) Kolar Gold Fields, Karnataka

7.6 The NIRM was registered as a society in July, 1988 to conduct research, render guidance and provide consultancy in mining and civil engineering sectors. NIRM has been accredited as ISO 9001 organisation in August, 2002. With a total strength of 66 scientists and staff, 24 projects have been conferred, 42 projects are under implementation and 26 new projects have been approved. The scientists have published 36 research papers (15 international & 21 national).

7.7 The total external cash flow till March, 2004 was Rs. 336 lakh. During 2003-04 Department of Mines released Rs. 62 lakhs under plan head and Rs. 104 lakh under non-plan head as grants-in-aid to the Institute. The Institute has created a corpus of Rs. 3.5 crore from the surplus generated in last 3 years. A budget support of Rs. 80 lakh (Plan) and Rs. 110 lakh (Non-Plan) was made in BE 2003-04, and was retained in RE 2003-04. In BE 2004-05, a budget support of Rs. 60 lakh (Plan) and Rs. 115 lakh (Non-Plan) has been made.

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

7.8 Jawaharlal Nehru Aluminium Research Development & Design Centre was registered as a society in 1987. The objective of the Centre is to assimilate the technology available in the country for production of alumina and aluminium including aluminium alloys and to develop technical know-how for the basic engineering. The centre's 41 scientists and staff are involved in nine projects. An income of Rs. 51.43 lakh was generated till March 2004. During 2003-04, a Budget Support of Rs. 100 lakh (Plan) and Rs. 90 lakh (Non-Plan) has been provided. During 2003-04, Rs. 35.24 lakh under plan and Rs. 68.32 lakh under Non-Plan has been released as grant-in-aid. For 2004-05, a provision of Rs. 100 lakh (Plan) and Rs. 90 lakh (Non-Plan) has been made.

National Institute of Miners' Health (NIMH)

7.9 National Institute of Miners' Health was registered as an autonomous society in February, 1990 to address exclusively the occupational health problems of miners caused due to their long exposure to the mining environment. The Central laboratory of the Institute at JNARDDC Campus Nagpur has become functional on 16th July 2002. New S&T project "intervention studies in coal, bauxite and zinc mines" at a cost of Rs. 66 lakh has been taken up. The recruitment of staff and procurement of equipment is in progress. For 2003-04 a provision of Rs. 50 lakh under Plan head and Rs. 25 lakh under Non-Plan head was made. During 2003-04 Rs. 12.83 lakh under Plan and Rs. 13.79 lakh under Non-Plan has been released as grant-in-aid. A provision of Rs. 25 lakh (Plan) and Rs. 25. lakh (Non-Plan) has been approved in BE 2004-05.

Other S& T Projects Completed

7.10 Advanced Process Control and optimization technology for mineral processing plants - Tata Research Development and Design Center, Pune - The SSAG approved the revised cost of Rs. 317.7 lakh for the project. The increase will be shared proportionately by the Hindustan Zinc Ltd., Department of Science & Technology and Department of Mines. The completion report was adopted by SSAG in its meeting held on 19th December 2003. For the first time the software for control of grinding and floatation circuits was developed indigenously and installed at Rampura-Agucha mines of HZL. Net increase of 2.4% in zinc recovery and 2% reduction in specific energy consumption in the grinding circuit along-with lesser variability of plant operation and output obtained. By reduction in re-circulating load the grinding circuit throughput increased from 35 tonnes per day to nearly 100 tonnes per day. Optimization technology developed could be used in other processing plant like those of Hindustan Copper Ltd. and National Aluminium Company Ltd.

7.11 Setting up of Granite mining cell - National Institute of Rock Mechanics, Kolar Gold Fields- The completion report of the project has been adopted by the SSAG in its meeting held on 19th December 2003. The project was formulated on the basis of popular industry demand for testing and consultancy services in Granite mining. After implementing the recommendation of report the wastages have been reduced from the 70 % to 50% at a few granite mines. Six training courses including lectures and mines visits have been conducted. NIRM offered consultancy to set up Research & Development Wing of the Centre for Development of Stones at Jaipur.

Other Major Sponsored On-going Projects

7.12 Extraction of magnesium from indigenous raw materials - National Metallurgical Laboratory, Jamshedpur - The project was approved by the SSAG in its 22nd meeting held on 19th December 1997at a cost of Rs. 229 lakh. The Department of Mines is to contribute Rs. 184 lakh and Department of Science & Technology Rs. 45 lakh. The objective of the project is to develop indigenously a Silico - thermic reduction process which is more efficient than the process currently used for extraction of magnesium.

7.13 A pilot plant of 100 kg/day capacity has been commissioned. Enhancement of purity of magnesium metal produced and optimization of the process are in progress. Till date Rs. 132 lakh has been released by the Department of Mines and Rs. 30 lakh has been released by Department of Science & Technology.

7.14 National Facility for Semi Solid Forming - Indian Institute of Science, Bangalore - The project was approved by the SSAG in its 29th meeting at a cost of Rs. 409 lakh out of which Department of Mines is to contribute Rs. 292 lakh, Department of Science & Technology Rs. 92 lakh and Defence Research and Development Organisation would contribute Rs. 25 lakh. The cost of the project has now been revised to Rs. 476 lakh. The objective of the project is to set up a national facility to develop Semi Solid forming technology to produce quality aluminium casting for automotive and other sectors. The MoU has been signed by the Department of Mines, Department of Science & Technology, Defence Research and Development Organistation and Indian Institute of Sciences. The design and fabrication of prototype Magneto Hydro Dynamic Stirrer System has been taken up. The order for import of die casting machine at cost of Rs. 2.10 crore has been placed. The construction of the building to house the national facility has started. Till date Rs. 100 lakh has been released for the project.

7.15 Integrated Approach for Sustainable Develop-ment of Natural and Geological Resources in Bundelkhand Region - Department of Geology, Bundelkhand University, Jhansi - The project was approved in March 2003 at a cost of Rs. 285.19 lakh. The Department of Mines will contribute Rs. 233.95 lakh and Bundelkhand University will contribute Rs. 51.24 lakhs. The objective of the project is to create infrastructure for research in geology and to create data base on prospective mineral deposits for overall development of Bundelkhand region. The administrative approval has been issued in May 2003. The first instalment of Rs. 30 lakh has been released in August 2003.

7.16 Simulation assisted development of aluminium metal foam through liquid metallurgy route for engineering applications - Regional Research Laboratory, Bhopal - The project was approved by SSAG in its 32nd meeting held on 10 January 2003 at a cost of Rs. 80 lakh to be financed by the Department of Mines (Rs. 28 lakh), Defence Research and Development Organisation (Rs. 17 lakh), Department of Science & Technology (Rs. 20 lakh), and Regional Research Laboratory, Bhopal (Rs. 15 lakh). The objective of the project is to develop new aluminium metal foam material of varying density and mechanical properties through liquid metallurgy route and to explore different applications in automobile components, defence and general engineering applications etc. The new material will be one fifth in weight of aluminium metal and will have comparable mechanical properties. The MoU has been signed by the Department of Mines, Department of Science & Technology, Defence Research and Development Organisation and Regional Research Laboratory, Bhopal. The administrative approval has been issued in January 2004.

New Projects (Approved by SSAG)

7.17 Development of Integrated technology for processing of East Coast bauxite for production of alumina- JNARDDC - The project has been approved at a cost of Rs. 34.42 lakh to be financed by NALCO. The objectives are to:- 1) beneficiate east coast bauxite and mixture of bauxite and overburden laterite by using wet high density magnetic field separator, 2) generate optimum digestion conditions for highest digestion efficiency, 3) adopt organic control method to purify the process liquor after digestion and 4) optimize precipitation parameters using purified aluminate liquor to achieve maximum liquor productivity.

7.18 Evaluation of grain refining efficiency of commercially available grain refiner alloys - JNARDDC- The project has been approved at a cost of Rs 5.75 lakh to be financed by NALCO. The objective is to evaluate grain refiners being used in India and develop new ones.

7.19 Study on Impurity Build-up during Bauxite Processing and its effect on Bayer Liquor Chemistry- JNARDDC - The project has been approved at a cost of Rs. 32 lakh to be financed by NALCO. The objective is to estimate concentration and physical nature of different impurities like Fe, Ti, Ca, Mn, Mg accumulated in the Bayer liquor in the alumina refinery.

7.20 Ultrasonic Treatment of Spent Pot-lining- JNARDDC - The project has been approved at a cost of Rs. 12 lakh to be financed by NALCO. The objective is to develop an economic and effective process of treating spent pot-lining material, which safely destroys toxic cyanide compounds and permits recovery of useful by-products.

7.21 Die-casting technology and applications development centre and technology up-gradation and development of non-automotive applications for zinc die casting in India -Indian Lead Zinc Development Association- The project has been approved at a cost of Rs. 610 lakh to be financed by Common Fund for Commodities, UN financing Agencies (Rs. 297 lakh), International Zinc Association (Rs. 75 lakh), Govt. of India (Rs. 150 lakh out of which Department of Mines would contribute Rs. 130 lakh and Department of Science & Technology would contribute Rs. 20 lakh) and Indian Industry (Rs. 88 lakh). The objective of the project is to create a resource center for technology upgradation in zinc die-casting industry in the country. The center will be first of its kind in the Asian region

7.22 Pilot scale smelting and pre-feasibility studies on nickel - chromium -cobalt bearing magnetite ores of Nagaland for an economically viable plant - National Metallurgical laboratory and Directorate of Geology and Mining, Govt. of Nagaland - The project has been approved at a cost of Rs. 78 lakh to be financed by the Ministry of Steel (Rs. 21 lakh), Department of Science & Technology (Rs. 21 lakh), Department of Mines (Rs. 21 lakh) and Govt. of Nagaland (Rs. 15 lakh). The objective is to conduct pilot scale smelting trials in 500 KVA Submerged arc furnace at Natural Metallurgical Laboratory using upto 5-6 tonnes per day of magnetite ore from Nagaland for pre-feasibility study for an economically viable plant. This plant when set up would help in development of North-Eastern Region by producing abrasion resistant steel alloy, which would be used as a grinding media.

Chapter- 8

International Co-operation

8.1 International co-operation continued to be a thrust area in the Department of Mines during the year 2003-2004. Concerted and continued efforts were made to project the mineral sector as an attractive investment destination. The International Co-operation Section of the Department played an active role in achieving this goal, the key objectives being to further strengthen areas of bilateral co-operation with countries where bilateral agreements already exist, and also to enter into fresh agreements with countries that are technologically advanced, and to offer India's assistance in developing the mineral resources of other countries. Attracting foreign direct investment (FDI) and facilitating inflow of state-of-the-art technologies, was another area where emphasis was laid. The total number of Foreign Investment Promotion Board (FIPB) approvals till date has reached 73, indicating an expected FDI flow of Rs. 4,044 crore.

Indo-french Working Group on Mineral Exploration and Development

8.2 The 17th Meeting of the Indo-French Working Group on Mineral Exploration and Development was held in New Delhi on 24th - 25th November, 2003. The meeting reviewed the status of the completed projects, progress of on-going projects, and expressed satisfaction at the pace at which the projects and programmes were moving. The meeting also discussed new project proposals and identified and prioritised the following eight projects for future cooperation besides training programmes, viz.: (1) Capacity building at State Level for Mineral Development and Environmental Management; (2) Supply of oceanographic equipment and technical and scientific assistance to the Indian programme of seabed investigations in the Exclusive Economic Zone of India (Geological Survey of India) ; (3) Management of Solid Waste from Mining in India (Indian Bureau of Mines) ; (4) CESMAT training programme; (5) BRGM training in India , (6) Fly Ash Disposal of NALCO, (7) Mine closure planning and (8) Development of eco-friendly mining technology in environmentally fragile areas and hilly regions.

8.3 The meeting reviewed the progress on the two on-going projects; viz., (a) Supply of one Electron Probe Micro Analyser (EPMA) to Geological Survey of India; (b) Supply of laboratory equipment for physico-chemical characterization of minerals to Indian Bureau of Mines, and expressed satisfaction on the progress made to implement these projects. The Working Group has also expressed satisfaction on the recently completed projects, viz. Impact Assessment of mining activities in the Subarnarekha Basin and Implementation of United Nations Framework Classi-fication for Mineral Resources Management in India.

8.4 The 17th Meeting of the Indo-French Working Group on Mineral Exploration and Development concluded with the signing of a Protocol between the Secretary, Department of Mines and the Director General, Energy and Raw Materials, Ministry of Economy, Finance & Industry, Government of France on 25th November, 2003.

India-Australia Joint Working Group on Energy and Minerals

8.5 Australia has a highly developed and competitive mineral exploration and mining industry using advanced geological concepts and technology and has a comprehensive and high quality geoscientific knowledge base. There has been a very rapid growth of mineral industry in Australia and their exploration techniques have been innovative and successful.

8.6 The sixth meeting of the India-Australia Joint Ministerial Commission held on 26th February, 1999 at New Delhi reiterated the need to establish a Joint Working Group on Energy and Minerals. It was, therefore, decided that the Department of Mines, Department of Coal, Ministry of Power, Ministry of Petroleum & Natural Gas and Department of Non-Conventional Energy Resources would form the Indian Side for the Joint Working Group.

Mr. D. Mallard, Director General for Energy and Raw Materials, Ministry of Economy, Finance & Industry, Govt. of France and Mr. C.D. Arha, Secretary, Department of Mines, Govt. of India during signing of protocol at the 17th meeting of the Indo-French Working Group on Mineral Exploration and Development.

8.7 The then Minister of State for Mines (Independent Charge) visited Australia in September, 2003, to review the progress of the projects/proposals under the India-Australia Joint Working Group on Energy and Minerals. The Indian delegation presented an overview of the investment climate in the mining sector and informed about the major liberalisation steps introduced in India. The Australian side showed great interest in investing in India. It was felt that dissemination of information about the latest technology would be useful to the mining industry in India.

Indo-South African Co-operation

8.8 South Africa is one of the major mineral producing and exporting countries in the world, with the largest known reserves of gold, chromium, platinum and vanadium. South Africa has an impressive track record of mineral development and holds great potential for meaningful and mutually beneficial co-operation in the mineral sector. Ever since diplomatic ties with South Africa have been established in November, 1993, the Department of Mines has been exploring the possibility of co-operation with South Africa as both countries have geological similarities.

8.9 India and South Africa entered into an Agreement for co-operation in the field of Geology and Mineral Resources on the 7th October, 1997. For the implementation of this Agreement a Joint Working Group was formed, and the First Meeting of the Working Group was held at Johannesburg, South Africa in August 1998 and a Protocol was signed in Cape Town on the 18th August, 1998, identifying six projects for mutual cooperation. The six projects identified for co-operation are: (1) Establishment of a detailed correlation on a formation level between the Karoo sequences in Southern Africa and the Gondwana sequences in India; (2) Geoscience Mapping in the near-shore environment along the eastern Indian coastal margin for the purpose of identifying off-shore diamond deposits; (3) Development of a pre-Gondwana precambrian crustal evolution and metallogenic map for India and Southern Africa; (4) Evaluation of stability of underground mine workings through micro-seismic techniques; (5) Hydro-fracturing for street measurement; and (6) Characterisation and processing of gold, diamond and platinum group of metal ores and to evolve suitable beneficiation processes.

8.10 Three meetings of the India-South Africa Joint Working Group have so far been held. Eight new projects were identified for co-operation in the second Working Group meeting. The JWG reviewed the implementation of the identified projects in the 3rd meeting. Implementation of the projects would upgrade the capabilities of the Indian organisations like Geological Survey of India, Indian Bureau of Mines, National Institute of Rock Mechanics and National Institute of Miners' Health.

8.11 The 5th Session of the Indo-South Africa Joint Commission was held during 3rd to 5th July, 2003 in South Africa. The Department of Mines participated in the deliberations and reviewed the progress of the projects/proposals identified under the Indo-South Africa Working Group on Geology and Mineral Resources.

Russia

8.12 The ninth session of the Indo-Russian Working Group on Ferrous and Non-Ferrous Metallurgy was held in Moscow on 12th -13th May, 2003. The meeting reviewed the progress on bilateral co-operation in the areas identified by earlier Working Group meetings. The protocol signed at the conclusion of the Working Group Meeting envisaged strengthening of co-operation in the ferrous and non-ferrous metallurgical sectors. India and Russia agreed for technical cooperation and research and development in both ferrous and non-ferrous sectors. Both sides decided that one institute each in the ferrous and non-ferrous sectors in both countries would be identified for closer ties. The identified institutes would work towards exchange of information on technologies, joint projects, organizing conferences and seminars as well as for exchange of visits by scientists.

Canada

8.13 The Department of Mines and the Department of Natural Resources, Government of Canada signed a Memorandum of Understanding (MOU) for co-operation between India and Canada in the field of geosciences on 1st April, 2003 at Ottawa. The then Minister of State for Mines (Independent Charge) signed the MOU on behalf of the Indian side. The areas of co-operation and collaboration identified under the MOU include environmental geology and geo-hazards, economic geology, geological mapping, hydrocarbon basin analysis, marine and coastal geology, basin analysis, marine and coastal geology, exploration geochemistry and geophysics, geoscience information systems and remote sensing and data integration including cartography.

8.14 The Assistant Deputy Minister, NR Can Earth Sciences Sector led a Canadian delegation to India on 10th November, 2003 to hold discussions for setting up a Joint working group for the implementation of the cooperation programme envisaged in the MOU. Secretary (Mines) led the Indian side at the discussions.

8.15 The first meeting of the India-Canada Joint Working Group on Geosciences set-up by the Department of Mines, Government of India and the Department of Natural Resources, Canada for implementation of the MOU was held during 11th-12th March, 2004. Secretary (Mines) led the Indian delegation as the Co-Chairman of the Working Group from the Indian side. This was the follow-up of the Memorandum of Understanding between the Department of Mines and the Department of Natural Resources, Canada on co-operation in the Geosciences signed in April, 2003. Various collaborative projects on geosciences were discussed during the meeting. Both sides agreed on the Terms of Reference of the Working Group.

World Mining Congress

8.16 The 19th World Mining Congress was organised from 1st to 5th November, 2003 in New Delhi by the Indian National Committee of the World Mining Congress, the Institution of Engineers (India) with the support of the Ministries/Departments of Coal, Mines, Steel, Petroleum & Natural Gas, Commerce & Industry, Science & Technology, Environment & Forests, Power, and Small Scale Industries. The theme of the Conference was "Mining in the 21st Century - Quo Vadis?". 1405 delegates attended the Conference from 49 countries (1029 Indian delegates and 376 overseas delegates). The Congress Declaration covers 10 major areas viz. (1) striving for significant increase in key result areas of production, productivity, safety, health and environment and reclamation and rehabilitation; (2) increasing investment in exploration, strengthening earth science and research organisations; (3) ensuring compatibility between environment and mining with new technology tools; (4) developing appropriate sustainability criteria; (5) intensifying development of innovative solutions to problems in exploration, extraction, safety and environmental management; (6) intensifying research efforts in biotechnology; (7) improving health, safety and environmental performances; (8) concerted worldwide effort to develop appropriate general and specific curriculum for the emerging role of mining engineering professional; (9) restructuring strategies to meet the challenges of privatisation, liberalization and globalisation; and (10) declaring selected mining sites around the world as World Heritage Sites.

Chapter –9

Progresive Use of Hindi

Introduction

9.1 As per Article 343 of the Constitution, Hindi has been adopted as official language of Union of India. The Hindi section in the Department of Mines ensures the compliance and monitoring of the Official Language policy of the Government of India in the Department and in its subordinate offices, and the public sector undertakings under its control. There is one post each of Deputy Director (Official Language), Assistant Director (Official Language) and Senior Hindi Translator and three posts of Junior Hindi Translator in Department of Mines. The Department of Mines is continuously striving for promotion of Hindi and for its progressive use in official work as per the Official Language policy of the Government.

Compliance of Section 3(3) of Official Language (OL) Act,1963

9.2 During the period under review section 3(3) of Official Language Act, 1963 was fully complied with. All documents under this section e.g. General Orders, Notifications, Resolutions, Administrative and other reports etc. were issued bilingually.

Hindi Training

9.3 Officers/employees are nominated under Hindi Teaching Scheme of Ministry of Home Affairs for training in Hindi Language (Prabodh, Praveen & Pragya) Hindi stenography and Hindi typing. More than 90 percent of the officers/employees of the Department have working knowledge of Hindi. Two LDCs were nominated for Hindi typing training during the period under report.

Hindi Salahakar Samiti

9.4 Hindi Salahakar Samiti is a high powered committee which reviews the progress of Hindi in the Ministries/Departments and in the subordinate offices, PSUs under their 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. Hindi Salahakar Samiti of the Department was reconstituted in April, 2003. the Samiti held two meetings in May, 2003 and October, 2003 and reviewed the progress of Hindi work in the Department of Mines, its subordinate offices and the PSUs under its control.

Meetings of Official Language Implementation Committee

9.5 An Official Language Implementation Committee has been constituted in the Department for ensuring compliance of Official Language Policy and for periodical reviewing of the progress made in use of Hindi. The meetings of the committee were held regularly during the period under report. Dr. Hira Lal Bachhotia, a member of Hindi Salahakar Samiti of the Department was nominated as observer for the Official Language Implementation Committee (OLIC) meetings of the Department. In these meetings progress made in use of Hindi and the achievement made by Department of Mines in meeting the targets prescribed in the Annual Programme 2003-04 prepared by the Department of Official Language were reviewed.

Inspections by the Third Sub-committee of the Parliamentary Committee on Official Language

9.6 The third sub-committee of the Parliamentary Committee on Official Language inspected Hindustan Copper Ltd., a PSU under the Department of Mines, on 4.11.2003.

Inspection of Subordinate Offices/PSUS

9.7 In order to assess the progress made in use of Hindi in subordinate Offices /PSUs under the control of the Department of Mines, Director (Finance), Department of Mines inspected National Aluminium Company Ltd., Bhubaneshwar on 21.06.2003. Similarly, Deputy Director(OL), Department of Mines inspected Mineral Exploration Corporation Ltd., Nagpur and Indian Bureau

of Mines, Nagpur on 14.7.2003 and 17.7.2003 respectively. The shortcomings detected during the course of inspection were brought to the notice of the concerned offices and measures for overcoming the shortcomings were suggested.

Inspection of Sections of the Department of Mines

9.8 In order to assess the progress of use of Hindi in the various sections of the Department of Mines, 8 sections were inspected during the period under review. Shortcomings found during the inspection were brought to their notice and remedial measures were suggested.

Measures for Implementation of Official Language Policy

9.9 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 Department to do 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. Seven employees of the Department were awarded Cash Awards under Hindi Noting and Drafting Scheme.

Hindi Workshops

9.10 A day long Hindi workshop was organized on 11.6.2003, and 26 officers/employees of the Department participated in it. Besides, a two-day-workshop was also organized on 9th -10th September, 2003 and 26 Officers/employees were imparted training in the workshop.

Hindi Fortnight

9.11 With a view to create a conducive atmosphere for the progressive use of Hindi in the Department, Hindi fortnights are being observed every year. Accordinly, Hindi Divas was celebrated in Department of Mines on 15th September, 2003 and Hindi fortnight was organized from 1st - 15th September, 2003. During this period, various competitions e.g. Hindi essay competition, Hindi Noting-Drafting competition, competition to assess Hindi knowledge, Hindi Typing competition, Extempore Speech competition and Hindi Quiz competition were held. A Computer training programme was also organized for the employees to enable them to do their work on computer in Hindi. Prize distribution function was held on 23-10-2003 for awarding certificates and cash awards to the winners of the competitions held during Hindi fortnight.

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

9.12 In order to ensure the compliance of Official Language policy in subordinate offices/PSUs of Department of Mines, directions were issued to them by the Department from time to time and their work was duly reviewed by the Department.

9.13 The subordinate offices/PSUs of the Department 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.

9.14 Official Language Implementation Comm-ittees under the chairmanship of the Head of Offices have been constituted in all the subordinate offices/PSUs of the Department of Mines. The meetings of these committees were regularly held during the year under review.

9.15 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 were called for from every subordinate office and Public Sector Undertaking under the Department. Their reports were reviewed and shortcomings noticed were intimated to the concerned offices and remedial measures were also suggested to overcome the same.

Notifying of Offices Under Rule 10(4) of Official Language Rules 1976

9.16 During the period under report, Indian Bureau of Mines, Bangalore was notified under Rule 10(4) of Official Language Rule, 1976.

Scheme for Promoting Original Book Writing in Hindi

9.17 A Scheme for promoting original book writing in Hindi on the subjects pertaining to Mining and Minerals is being implemented in the Department . 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 winners respectively Besides there are three consolation prizes of Rs. 5000 each. Any citizen of India can take part in this scheme.

Publication of 'khan Sampada'

9.18 Department 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. During the period under report, three issues of 'Khan Sampada' were published.

Translation Work

9.19 During 2003-04, all translation work and Hindi typing work relating to preparation of Annual Report, Performance Budget, Standing Committee, CAG audit para, Minister's speech 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 Department, Parliament Questions and other important material received during Parliament Session were also attended to.

Chapter- 10

Welfare Measures

Welfare of Scheduled Castes (SC), Scheduled Tribes (ST), Women and other Weaker Sections

10.1 The Department of Mines, its subordinate offices and the Public sector Undertakings under its administrative control continued with the efforts to fill up the backlog vacancies in respect of SC/ST. The PSUs also continued the process of identifying and implementing programmes aimed at upliftment of weaker sections of society 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 programmes, school health programmes and medical camps in rural areas, were undertaken by the PSUs for upliftment of the community surrounding their township as part of their social responsibility.

Redressal of Public Grievances

10.2 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 in the Department of Mines has been designated as the Director of Grievances. He has been vested with adequate powers in respect of all matters pertaining to the grievances received in the Department. Whenever a grievance is found to be genuine, directives for appropriate corrective measures are given to the concerned executive authorities.

10.3 The Department of Mines has under its administrative control two subordinate offices and four 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 Department. These reports are, in turn, sent to the Department of Administrative Reforms and Public Grievances. During the year 2003-2004, 19 cases were received, out of which 8 cases have been disposed of. In addition, as per instructions of the Department of Personnel & Training, periodic inspections are also conducted to check the working of the Public Grievances Redressal Machinery in the four public sector undertakings and the two sub-ordinate offices viz GSI & IBM under the administrative control of the Department. The grievance cases were also reviewed by Secretary (Mines) in Quarterly Perfo-rmance Review Meetings held in respect of these organisations.

10.4 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 promotions, proper medical facilities, granting timely pensionary benefits, etc. The Department of Mines and its subordinate offices including the PSUs under its administrative control have, accordingly, designated such Staff Grievance Officers also.

Chapter- 11

Development of North Eastern Region

Work Done by Geological Survey of India (GSI) in North Eastern Region (NER)

11.1 A total number of 25 investigations were carried out in NER (including Sikkim) during 2003-2004.

Specialized Thematic Mapping

11.2 Specialised thematic mapping of the Yinkiong-Belong-Menchuka-Tuting area of Arunachal Pradesh has revealed that the Lohit granitoid, the northernmost tectonic unit shows a thrusted contact with the underlying Tuting metavolcanics. The intrusive member of the Lohit granitoid might presumably be a late phase of the granitoid. The Yang-Sang-Chu Formation is represented by garnet (syntectonic with asymmetric inclusion trails), staurolite, graphite bearing schists and amphibolites and is thrusted over porphyroclastic, mylonitic and migmatitic gneiss and amphibolite equivalent to the Ziro Gneiss/Siang Formation. A sequence of quartzite, sheared mica schist, carbonaceous shale, chert, marble with interleaves of basic volcanics was also found to unconformably overlie the Ziro Gneiss. The dextral sense of shear recorded in the sediments, abundance of microcrystalline graphite indicated entrapment of sediments at the margin of Indian and Tibetan plate.

Site of the dam axis (270m high dam), Debang Valley Multipurpose Project, Debang Valley District, Arunachal Pradesh.

11.3 Specialised thematic mapping in the lesser Himalaya across the recess zone/ culmination structure exhibited by Main Central Thrust (MCT) in Sikkim Himalaya revealed a lithopackage (south to north) comprising the Daling metapelites, the Lingtse Gneiss, medium - high grade rocks of the Chunthang Formation (equivalent to the Jaishidanda Formation of Bhutan) and the Darjeeling Gneiss. The garnetiferous mica schist, quartzite and calc-silicate rock of the Chunthang Formation form the cover sequence of the Lingtse Gneiss basement. The Lingtse Gneiss also occurs as slices forming imbricate stack within the Daling metapelites away from the MCT zone. In the western side of the corridor, Dalings are directly overlain by the Darjeeling Gneiss in Pelling area whereas in Tashiding Yoksum area, garnetiferous biotite schist (the Jaishidanda Formation) occurs in between the

Daling schist and Darjeeling Gneiss. The Daling dome has been found to be asymmetric on an E-W transect with a shorter western limb.

Regional Geochemical Surveys

11.4 Three items of Regional Geochemical Mapping one each in the states of Arunachal Pradesh, Assam and Meghalaya were taken up, the details of which are given in Table 11.1

Mineral Investigation

11.5 In Meghalaya, two investigations for limestone were taken up in Jalaphet block, west of Litang river, and Larket block, East of Litang river, both in Jaintia Hills district.

11.6 In Jalaphet block, west of Litang River, Jaintia Hills district, fossiliferrous Prang limestone was explored by six boreholes (JJP-1 to JJP-6). A total of 230.11 million tonne of probable reserve of limestone of all grades has been estimated in the area. The field investigation has been completed.

TABLE 11.1

S. No.	Item	Achivement	Highlights
1	Regional geochemical mapping in parts of Lower Subansiri and Papumpare districts, Arunachal Pradesh	GCM 650 sq.km Sample 271 nos.	The area studied lies in parts of T.S. No. 83A/11,12,15 and E/16.
2	Regional geochemical mapping, Karbi Anglong and Nagaon districts, Assam.	GCM 651 sq.km Samples 424 nos.	The area covered lies in parts of T.S. No. 83B/8. Samples were collected on 1km × 2km grid basis. Water samples were collected in three different media and were submitted for analysis. Stream sediment and soil samples are being processed.
3	Regional geochemical mapping in parts of Ri-Bhoi and West Khasi districts, Meghalaya.	GCM 553 sq.km Samples 553 nos.	The area covered lies in parts of T.S. No. 78O/13. Stream samples from 1st and 2nd order streams were collected from every 1 km × 1km grid. The samples were sun-dried before seiving through 120 mesh size cloth and sent for chemical analysis. A number of lamprophyre bodies (?) have been located at different localities.

11.7 In Larket block, thickly bedded fossiliferrous horizon belonging to Prang limestone of Upper Syhlet member of the Shella Formation was explored by drilling at an interval of 500m x 300m. A total of 10 boreholes (JLK-12 to 20 and JLK-25) were drilled and an average thickness of 110m of limestone was encountered. Probable reserve of 420.735 million tonne of limestone of all grade has been estimated in the area based on the boreholes JLK-1 to JLK-11 drilled earlier. The field investigation has been completed.

11.8 In Mizoram, search for limestone and construction material was carried out in parts of toposheet Nos.84F/1 and E/4. Hard, massive and compact sandstones suitable as construction material have been located in different localities. The investigation has been completed.

11.9 Investigation for basemetal (Cu) in Rungdu-Sodunglakha-Kerabari area, East district, Sikkim was taken up in the F.S. 2001-02. In Rungdu area three boreholes (RN-1 to 3) drilled did not show any encouraging intersection/ result.

11.10 In Rangpo area (Bhotang Lode), Sikkim, two completed boreholes did not show any good intersection or encouraging analytical result. The third borehole RGP-3 is in progress.

Geoenvironmental Studies

11.11 Geo-environmental appraisal of Pakyong, east district of Sikkim, has recorded gentle and very stabilised eastern and north eastern slope of the NE-SW trending hill range. Major part has thick soil cover and is mostly cultivated. Subsidence of road has been observed at a few places.

11.12 Geo-environmental, geo-hydrological, geotechnical appraisal and micro-zonation studies of the urban agglomeration of Agartala Town, Tripura, were carried out with the help of PGRS input. These studies have revealed that Agartala Town is situated between Haora River and Katakhal which may be the vestiges of an original gigantic river over this flood plain. As the township is spread from bank to bank between these two rivers, it blocks the original natural course of the old river. As a result Agartala town faces grave flood hazard and water logging problem.

11.13 A hazard zonation map of fluoride pollution in ground water around Daboka, Nagaon district, Assam, has been prepared, which reveals the presence of three fluoride contaminated zones. Two of the contaminated zones conform to the major NE-SW trending fracture zone. Fluoride values ranging between 1-12.4 ppm were recorded from all over the contaminated zones. The area mostly comprises Quaternary sediments flanked by the Shillong Group of rocks in the North and North-West and by pink granite in North-East and East. Symptoms of tooth decay, development of black spots on teeth, stiffening of joints and weakening of bones resulting into twisted limbs due to osteo-and skeletal fluorosis have been observed among the local people consuming fluoride contaminated ground water.

Earthquake Geology

11.14 Work on active fault mapping along various lineaments and faults in Garo hills, Meghalaya and Goalpara district, Assam has been concluded this year. A number of linear depressions along Kulsi lineament have been observed.

11.15 The item on preparation of a document on seismic microzonation of Guwahati urban complex has been taken up at the behest of Govt. of Assam through DST. Compilation of seismotectonic map of an area of 400 sq.km. on 1: 250,000 has been completed. Compilation and preparation of first-cut maps on geology and geomorphology covering nearly 600 sq. km. has been completed. Out of 600 sq.km. of geological compilation, about 260 sq. km. is covered by hard rock, 240 sq. km. by soft sediment and 100 sq. km. by water bodies. GSI has also taken up site response studies in the area from Kamakhya Devalaya Hill in the west to Khanapara in the east with station density of one station per square kilometer. Digital MEQ recorders of Kinemetrics make with short period three component sensors have been utilized to collect the background micro-tremor noise. Data will be processed by Nakamura method to extract the site response.

Geotechnical Investigations

Communication Projects

11.16 Rang road, North Sikkim, reveals that water surcharged huge debris subsided during monsoon due to piping action and finally failed due to shooting boulders through a rocky conduit near the road level and below. Detailed slope stability analysis is under progress. On the basis of detailed geotechnical study of the 125 m high and 55 m wide Maltene rock slide at 4.46 km on Chungthan-Lachung road, North Sikkim, diversion of the existing nala over the crown, widening of the existing road by valley filing, construction of a 60 m long bridge, rockbolting of the vertical rockface have been suggested to contain this slide. The proposed road alignment between Rangpo and Melli along the right bank of Tista River passes through high hill slope comprising weathered Daling Group of rocks. It has been suggested to examine the viability of driving a few short tunnels in some identified stretches to negotiate high steep distressed hill slopes. On the basis of feasibility study of the proposed road alignment between Ranipul and Gangtok, a few sinking zones and distressed hill slopes have been demarcated for further detailed slope instability study. The alignment is prima facie feasible. Extensive slope protection measures have been suggested between RD 2.18 km and RD 2.30 km and between RD 8.5 km and RD 9.70 km.

Miscellaneous Projects

- Sikkim : On the basis of preliminary geotechnical appraisal of the proposed Pamteng Cantonment site, it has been suggested to restrict construction of different types of buildings between RL 1500m and RL 1700m. Study of a few trial pits reveals that most of the structures are to be founded on regolithic soil or deeply weathered mica schist. The study of a few trial pits at the proposed Multistoried Commercial Complex near Lalmarket, Gangtok, reveals the occurrence of slopewash materials upto depths varying between 3 m and 5 m, underlain by partially weathered biotite gneiss. Raft foundation has been designed over the overburden material at an approximate depth of 1.5 m. It has been suggested to provide a 1 m deep shear key into the rock connecting the upslope end of the raft. On the basis of geotechnical appraisal of the proposed housing complex site for the Judiciary near Lower Senchey,, three types of zones with respect to their suitability for the proposed construction have been identified. As the foundation is to be laid on overburden materials, appropriate slope protective measures and drainage network have been suggested to ensure safety to the structure. At the proposed Govt. Housing colony site at Sinchey, Gangtok, four categories of zones according to their suitability for construction have been delineated. Detailed zone specific slope stability assessment indicates the presence of active slide area at the uppermost part of the slope. It has been suggested to avoid this site for the construction of any structure.

Water Resource Development Projects

- Assam : At the Lower Kopili Hydel Project, hard and fresh granite gneiss exposed in the Kopili river bed, forms the foundation rock for the proposed 71.35m high and 504m long concrete dam. Reconnaissance traverse around the proposed Powerhouse site on the right bank indicates that fresh foundation grade rock is expected at a shallow depth. At the Karbi Langpi Hydel Project, detailed geological mapping of the dam foundation block no.9 reveals that fresh granite containing small patches of biotite schist forms sound foundation rock for the 54.50 m high and 606.70m long concrete gravity dam across Borapa River.
- Manipur : At the Thoubal Multipurpose Project, construction of a 88m high Earth Dam across Thoubal River with a chute spillway on the right flank and a dam toe surface powerhouse is under progress. Thinly laminated and highly fissile folded argillaceous rocks, susceptible to slackening quickly on exposure to atmosphere, are exposed in the project area. After detailed study of 17 nos. of geological cross sections, the most suitable spillway site was finalized on techno-economical consideration.
- Meghalaya : The Greater Shillong Water Supply Scheme is under advance stage of construction. The dam top is to be connected by a road at the upstream of dam block no.8 on the right bank. The area upto 15 m upstream of the dam axis exposes highly to moderately weathered boulder conglomerate with patches of debris cover. The area beyond 15 m upstream of the dam axis is mainly occupied by 2 m to 5 m thick debris underlain by weathered boulder conglomerate. At the Umiam-Umtru stage -IV Hydel Project, post- construction stage geotechnical investigation of the damaged and daylighted Head Race Tunnel at ch.1870 m reveals that very poor rock mass class; low cover at this chainage gave rise to tunnel collapse. Extension of steel liner up to 100m from the above mentioned chainage has been suggested to restore the collapse zone.
- Mizoram : At the Turial Hydel Project, the excavation of diversion tunnels from both intake and adit sides, is under progress. This tunnel passes through an interbedded sequence of silty sandstone, sandstone/ claystone and laminated silty sandstone.

11.17 In addition to the aforesaid projects, the following geotechnical investigations have also been undertaken :

- Arunachal Pradesh : Ranganadi Hydel Project, Kameng Dam Project, Lohit Dam Project, Water Resources Development Projects on Nuranang and Tawang chu Rivers, Noa-Dihing Dam Project, Debang Dam Project, Etalin Twin Reservoir Multipurpose Project, Dikrong Hydel Project.
- Assam : Kulsi Multipurpose Project.
- Maghalaya: Myntdu Laska Hydel Project, Umngot Hydel Project.
- Mizoram : Tuirini Hydel Project.

Geophysical Surveys

11.18 Four items of Geophysical Surveys Mapping one each in the States of Assam and Meghalaya were taken up, the details of which are given in Table 11.2.

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TABLE 11.2
GEOPHYSICAL SURVEYS

S. No.	Item	Highlights
1.	Gravity- Gravity-Mapping in parts of Ri-Bhoi Ri-Bhoi and East Khasi Hills district, Meghalaya.	Gravity-Magnetic survey for 12-line km was completed.
2.	Active fault mapping in parts of Meghalaya and adjoining Assam.	Monitoring of 4 MEQ recorders established at Boko, Hajo,Rani in Assam and Byrnihat in Meghalaya carried out.12 events have been recorded out of which 6 events have S-P value more than 10.
3.	Seismic microzonation studies in Guwahati area Kamrup district, Assam.	Interim report has been submitted.
4.	Gravity magnetic mapping of area north of Brahmaputra river, Guwahati, Kamrup district, Assam.	Data are being processed.

Landslide Hazard Zonation

11.19 Landslide Hazard Zonation of Guwahati urban region has been undertaken on priority basis as a part of seismic microzonation of Guwahati urban region. The whole area was divided into 456 facets following the BIS code. The area of each facet calculated and subsequently slope direction and amount of slope was computed in each facet. The slope morphomentry map of the area was finalised.

Research Investigation

11.20 To establish lithostratigraphy and age of Miri Formation a research programme was undertaken in two area - (1) Tirbiu-Sododoke-Bame area, West Siang district and (2) Pepiajuli- Parsen area, Lower Subansiri district. Miri Formation was previously described as a rock suite unconformably overlying a denuded basement of Ragidoke Formation and is represented by a basal oligomictic conglomerate (Sododoke Conglomerate), pink sandstone (Nikte quartzite) and diamictite. The present study demonstrated that the basal conglomerate rests over a laterite (paleosol) developed over oolitic dolomite of the Buxa Group. The basal conglomerate contains pebbles of limestone and laterite in addition to pebbles of quartzite. Two inliers of limestone (Buxa Group), exposed due to erosion of domal structure, were identified to the west of Tirbiu and Sododoke.

11.21 Fragmentary Fossilised dinosaurian bones have been collected from Dirang near Ranikor along Ranikor-Nongnah section, West Khasi Hills district, Meghalaya. Study confirms that the bones belong to Sauropodian stock.

11.22 Under Search for elements of Cathysian Flora in Kameng district, Arunachal Pradesh Litchi-Potin sector was studied and Gondwana rock samples have been collected.

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

11.23 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 16 mines were inspected for enforcement of provisions of MCDR, 1988 and for processing and disposal of mining plans.

11.24 IBM has also taken up the following studies, which are in progress.

- Three technical consultancy assignments on preparation of mining plan/mining scheme and topographic survey.
- Preparation of Environmental Management Plans in respect of four mines.

11.25 In addition to the assignments in progr-ess, IBM submitted a consolidated report on S&T project on 'Characterisation of clay and silica sand deposits occurring in North-Eastern states and their techno-economic evaluation for industrial uses' to the Department of Mines. A bench scale metallurgical studies on Ni-Co-Cr bearing magnetite sample from Nagaland was completed and report submitted to DGM Nagaland. Besides, an assignment on generation of baseline data and preparation of comprehensive EMP for Bhotang copper mine was completed and report submitted to the Sikkim Mining Corporation.

11.26 A meeting with the senior officers of Directorates of Geology and Mining of North-Eastern states was convened at IBM Nagpur. During the meeting various requirements of North-Eastern states and the possible assistance that can be rendered by IBM under its North-Eastern states assistance programme were discussed in detail and an action plan was formulated.

11.27 IBM conducted four training programmes separately for the technical/scientific personnel of North-Eastern region on (i) Chemical analysis (ii) Mineralogy (iii) Computer fundamentals and MS office and (iv) Mine closure plan/scheme of mining, resource availability and estimation, in which a total of 37 personnel were trained.

Work Done by Mineral Exploration Corporation Ltd.(MECL) in North Eastern Region

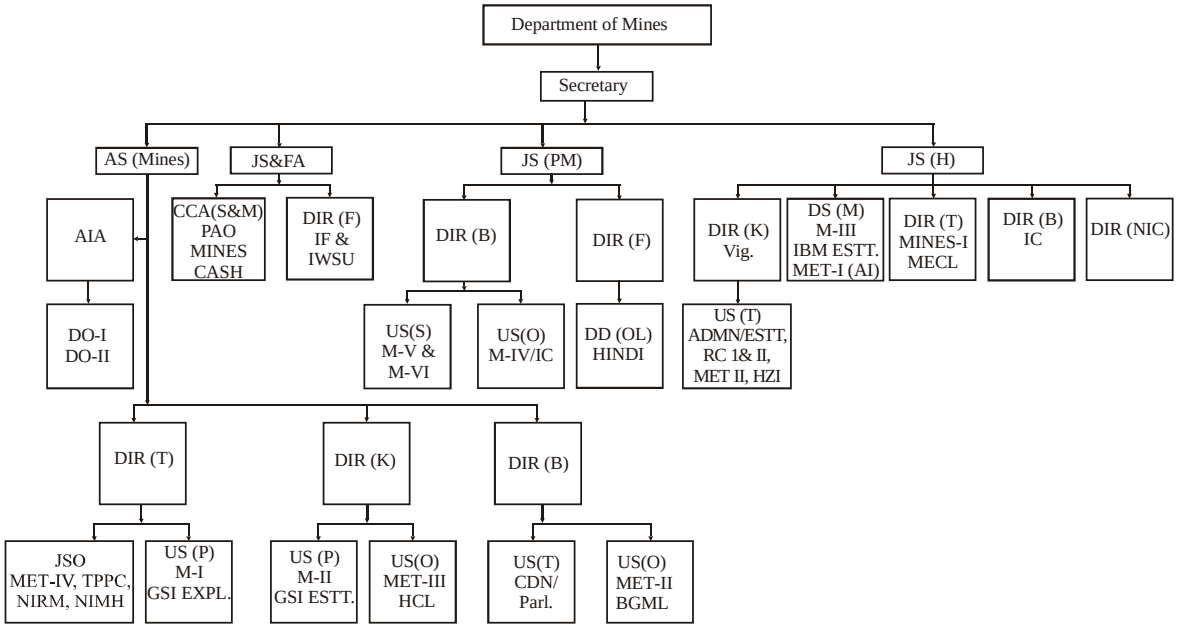
11.28 MECL has been associated with mineral exploration activity and geo-technical studies in the North eastern region in last 25 years. So far, it has completed exploration for coal in the states of Assam, Arunachal Pradesh, Nagaland and Meghalaya on behalf of Department of Coal, North Eastern Council and CMPDIL. Also it has completed exploration for sillimanite and Ferro-Silicon grade quartzite on behalf of Department of Mines in Meghalaya and Arunachal Pradesh. In addition, it has carried out geo-technical studies on behalf of Bhramputra Flood Control Board in the state of Assam and Arunachal Pradesh and consultancy work for remote sensing studies at Tripura on behalf of Department of Mines.

11.29 During the year 2003-04 , MECL contin-ued exploration activity in the following projects.

- Exploration for coal at Margherita, Assam on behalf of Department of Coal.
- Exploration for Ferro-Silicon grade quartzite at Kalaktang Phase-II, Arunachal Pradesh on behalf of Department of Mines at an estimated cost of Rs. 197.46 lakh.

11.30 MECL has drawn the proposal of exploration for glass sand, Jiajuri deposit, district Nagaon, Assam at an estimated cost of Rs. 214.61 lakh which has been approved in the Xth SCPP. The financial sanction is awaited.

Annexure-II



Name & Designation

Shri. C. D. Arha, Secretary
Smt Sudha Pillai, Addl. Secretary (Mines)
Shri Harbhajan Singh, JS & FA
Shri Prashant Mehta, JS(PM)
Shri Hem Pande, JS(H)
Shri D.N. Pathak, CCA(S&M)
Shri M.K. Banerjee, AIA
Shri Sunil Barthwal, Dir.(B)
Shri Vinod Kumar, Dir.(K)
Shri Nawal Kishore, Dir.(F)
Shri Deepak Srivastava, Dir.(T)
Shri H.L. Sharma, Dir.(NIC)
Shri K.P. Mishra, DS(M)
Shri S.N. Singh, DO-I
Shri. Prem Prakash, US(P)
Shri O.P. Kathuria, US(O)
Shri S.C. Bhatia, US(S)
Shri T.S. Bhatia, US(T)
Shri P.W. Bakhle, JSO
Dr. C.P. Singh Sengar, DD(OL)
Shri J.M. Sharma, DO-II

Annexure- II

PRODUCTION OF SELECTED MINERALS, 1999-2000 TO 2003-2004

(Value in Rs. Crore)

Mineral	Unit	1999-2000		2000-2001		2001-02		2002-03 (P)		2003-04 (P)	
		Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value
All Minerals			52306.61		58765.25		60832.37		63540.35		66307.70
Fuel			42676.17		47901.03		49323.72		51317.24		53101.10
Coal	M.Tonnes	304	19741.33	314	20351.97	328	21647.96	341	22426.24	361	23649.21
Lignite	M.Tonnes	22	1051.03	24	1417.54	25	1695.12	26	1776.63	28	1882.51
Natural Gas(Utilised)	M.C.M.	26885	7145.41	27860	8070.24	28037	8138.82	29969	8709.42	30932	8976.72
Petroleum (crude)	M.Tonnes	32	14738.40	32	18061.28	32	17841.82	33	18404.95	33	18592.66
Metallic Minerals			3550.47		3728.56		3987.49		4540.58		5519.17
Bauxite	th. tonnes	7054	130.17	7993	178.75	8689	192.31	9777	215.66	10929	237.88
Chromite	th. tonnes	1738	346.72	1972	364.98	1549	266.04	3066	497.25	3469	503.92
Copper Conc.	th. tonnes	165	310.57	164	324.33	164	278.93	153	242.96	143	212.67
Gold	Kg.	2586	155.76	2615	123.49	2810	128.11	3049	139.16	3363	155.92
Iron Ore	th. tonnes	77604	1973.76	80587	2117.95	86226	2496.92	96962	2710.45	119780	3629.01
Lead Conc.	th. tonnes	63	90.40	54	79.80	52	64.99	59	64.12	73	73.14
Manganese ore	th. tonnes	1586	193.10	1595	197.75	1587	213.24	1662	245.52	1734	274.66
Zinc Conc.	th. tonnes	360	306.79	366	305.48	399	305.29	486	380.01	590	420.83
Other met. Minerals			43.20		36.03		41.66		45.45		11.24
Non-Met. Minerals			1853.49		2034.44		2046.73		2208.10		2213.00
Ball Clay	th. tonnes	424	4.39	462	4.86	595	9.48	620	9.13	762	10.00
Barytes	th. tonnes	361	15.45	845	37.33	916	35.38	675	32.51	721	36.95
Diamond	Carats	40956	21.40	57407	30.07	81436	39.60	84407	39.63	71259	31.81
Dolomite	th. tonnes	2842	68.44	3032	74.43	3201	75.80	3329	85.73	3818	82.77
Fire clay *	th. tonnes	407	4.72	487	5.55	494	5.99	463	5.09	574	6.34
Garnet Abrasive	th. tonnes	193	5.34	232	6.50	281	8.46	443	9.91	472	10.28
Gypsum	th. tonnes	3247	51.20	2667	44.07	2859	40.14	2842	39.4	2854	32.26
Kaolin	th. tonnes	816	64.21	873	76.01	854	80.87	797	88.65	846	95.40

(Contd.)

Annexure-II (Contd.)

Mineral	Unit	1999-2000 Qty	1999-2000 Value	2000-2001 Qty	2000-2001 Value	2001-02 Qty	2001-02 Value	2002-03 (P) Qty	2002-03 (P) Value	2003-04 (P) Qty	2003-04 (P) Value
Laterite	th. tonnes	795	5.61	606	3.17	615	3.99	606	4.23	700	6.60
Lime shell	th. tonnes	98	5.35	85	4.58	128	7.47	120	6.31	134	6.80
Lime stone	M. tonnes	129	1261.11	127	1347.45	131	1384.41	146	1524.94	154	1534.22
Magnesite	th. tonnes	326	37.78	318	38.02	283	34.70	273	31.84	324	41.23
Phosphorite	th. tonnes	1192	177.17	1351	234.13	1239	188.53	1197	198.83	1060	173.91
Pyroxenite	th. tonnes	107	3.00	15	0.57	170	5.08	237	7.21	244	8.44
Sand (Others)	th. tonnes	2153	5.32	1817	6.17	1886	7.48	2135	11.07	1773	5.60
Silica Sand	th. tonnes	1558	16.36	2364	18.05	1652	18.01	1691	15.75	2316	22.93
Sillimanite	th. tonnes	15	5.63	15	5.87	15	5.43	14	4.73	19	6.73
Steatite	th. tonnes	557	32.21	596	37.75	579	35.27	676	33.01	716	33.91
Wollastonite	th. tonnes	117	10.14	122	9.27	136	9.44	173	11.90	151	10.19
Other Non -Met.Min.			58.66		50.59		51.20		48.23		56.63
Minor Minerals			4226.48		5101.22		5474.43		5474.43 (R)		5474.43 (R)

M.Tonnes - Million tonnes, 000'tonnes - Thousand tonnes, M.C.M. - Million cubic metre, Kg - Kilogram, ++ - Negligible
(P) Provisional and based on monthly returns to the extent available with IBM.
* Excludes the production of fireclay, if any recovered incidental to coal mining
(R) - Previous years figures repeated as current data have not been received yet.
NOTE : (1) The value figures pertain to pithead value.
(2) Data based on the returns received under MCDR, 1988 except coal, lignite, petroleum (crude), natural gas (utilised) and minor minerals.
Source : (a) Coal and Lignite : Coal Controller, Kolkata
(b) Petroleum (crude) and Natural Gas : Ministry of Petroleum & Natural Gas, New Delhi
(c) Minor Minerals : State Governments

Annexure- III

EXPORTS OF ORES & MINERALS 1998-99 TO 2002-03

(Value in Rs. Crore)

Minerals	Unit	1999-2000		2000-2001		2001-02		2002-03 (P)		2003-04 (P)	
		Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value
All Minerals			24622		32752		34411		35136		46618
Abrasives (natural)	tonne	42495	23	31629	27	63779	36	50680	28	105428	42
Alumina	tonne	216881	163	86064	91	189311	198	263103	216	1101618	926
Barytes	tonne	106232	15	37806	6	153934	31	177639	41	314546	43
Bauxite	tonne	98943	24	596802	30	1248178	125	979571	67	1785352	156
Bentonite	tonne	179314	34	123859	18	118612	19	124710	21	91958	24
Building & Monu stones (NES)	tonne	295814	84	355980	115	750644	155	1181770	250	861606	271
Cement copper (ppt.)	tonne	0	0	1	++	3	++	25	++	1457	12
Chromite	tonne	492540	176	714448	172	659882	182	1181792	276	1098343	261
Coal	'000 t	823	141	1157	118	1290	168	1902	290	1516	259
Copper Ore & Conc.	tonne	10	++	++	++	87254	35	9	++	121173	36
Diamond (mostlycut)		*	19977	*	27909	*	28248	*	28206	*	35850
Emerald		*	143	*	168	*	308	*	196	*	132
Felspar (Natural)	tonne	52631	11	56983	14	164118	33	157030	29	200921	36
Felspar (cut & uncut)		*	6	*	18	*	8	*	36	*	47
Flint	tonne	2183	++	7394	1	67909	4	18160	2	94172	6
Fullers earth	tonne	31660	6	36143	6	19655	4	94736	25	52079	9
Garnet (Cut & Uncut)		*	13	*	23	*	7	*	17	*	5
Garnet (natural)	tonne	42519	15	60410	19	57034	16	146758	42	150419	42
Granite	tonne	778643	1013	1489167	1564	1582170	1860	1673862	1874	2183570	2375
Gypsum & Plaster	tonne	38735	4	31765	3	37554	6	63099	7	47079	6
Ilmenite	tonne	64955	30	55168	28	50171	23	36196	41	101083	61
Iron Ore (Contd.)	th.tonne	22274	1615	15717	1175	20162	1634	23086	2034	57094	4200

Annexure-III (Contd.)

Minerals	Unit	1999-2000		2000-2001		2001-02		2002-03 (P)		2003-04 (P)	
		Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value
Kaolin	tonne	7810	3	9337	4	8462	4	9169	3	8925	4
Lead Ore & Conc.	tonne	0	0	162	1	13997	7	28651	28	834	5
Limestone	tonne	219319	8	209186	24	178143	10	167513	12	185911	12
Manganese Ore	tonne	166963	19	75685	20	265010	60	248103	54	335672	69
Marble	tonne	69800	111	105664	174	163848	240	170344	184	252964	189
Mica	tonne	50245	70	46558	64	64624	88	58299	78	34705	64
Natural gas	tonne	25708	12	18397	24	539	++	1095	3	60101	86
Prec.& semi prec. stones (NES)		*	685	*	661	*	545	*	716	*	857
Quartz & Quartzite (Natural)	tonne	32045	9	48980	15	95652	23	47962	17	40103	13
Red oxide	tonne	2034	2	2610	3	1903	2	3577	8	1519	4
Rutile	tonne	6744	16	13390	20	8581	18	8916	23	6345	15
Salts (other than common salts)	tonne	21254	4	141995	13	122423	10	250257	23	237939	19
Sand (excl. metal bearing)	tonne	13367	4	3801	2	48406	14	144908	31	182867	25
Silica sand	tonne	15595	10	26217	19	74998	53	90655	32	37396	24
Slate	tonne	88131	87	240623	110	131501	143	107373	125	118311	133
Sodium nitrite	tonne	1547	3	2080	3	2181	3	1060	2	2464	4
Steatite	tonne	32226	15	12379	9	24287	12	21011	14	29384	17
Sulphur	tonne	3611	14	2557	13	3606	15	3675	12	9158	17
Wollastonite	tonne	7939	6	8260	7	14697	12	6639	6	10275	10
Zinc ores & conc.	tonne	30921	27	32315	39	11580	13	21316	24	327676	209
Other Minerals			24		22		39		43		43

*Quantity figures are not given due to partial coverage, Value figures, however, have full coverage.
'++ : Negligible
@: Including re-exports
NES : Not Elsewhere Specified
Source : DGCI&S. Kolkata

Annexure-IV

IMPORTS OF ORES & MINERALS 1998-99 TO 2002-03

(Value in Rs. Crore)

Minerals	Unit	1999-2000		2000-2001		2001-02		2002-03 (P)		2003-04 (P)	
		Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value
All minerals			37349		71878		96522		92797		117294
Abrasive (Natural)	tonne	1501	2	2568	5	3221	6	4200	7	4536	8
Alumina	tonne	11030	34	14582	39	12629	33	15067	40	24993	55
Asbestos	tonne	76094	159	60583	120	60625	113	97884	161	98772	150
Ball clay	tonne	4414	4	5169	5	8094	8	19727	13	39511	18
Bauxite	tonne	59026	20	29902	16	27098	14	20830	13	44183	22
Borax	tonne	39097	55	36311	56	40217	56	47453	67	49327	70
Building & monu. Stones NES	tonne	903	3	812	2	485	2	1840	8	4927	8
Coal	'000 t	16537	3556	19702	3548	20929	4053	20549	4536	23026	4994
Cobalt Ore & Conc.	tonne	2465	28	2355	17	4029	27	2124	13	4180	10
Coke	'000 t	1569	565	2385	811	2890	986	2284	917	2208	1004
Copper Ore & Conc.	tonne	296110	570	400550	872	471540	984	827577	1749	697636	1677
Cryolite & Chiolite	tonne	2410	5	435	1	215	++	589	1	3603	8
Diamond (uncut)		*	15556	*	23108	*	21536	*	21635	*	28933
Emerald		*	42	*	60	*	56	*	48	*	88
Felspar (Natural)	tonne	23	++	231	++	5	++	246	++	8219	5
Fluorspar	tonne	72352	38	76295	42	59676	36	91459	58	76001	49
Graphite (natural)	tonne	694	3	979	4	987	4	1662	6	2799	7
Granite	tonne	2577	3	957	2	1329	2	1588	3	5007	9
Gypsum & Plaster	tonne	14627	10	10125	6	20136	7	25326	6	11531	6
Iron Ore	'000 t	149	25	644	108	487	75	395	84	520	103
Kaolin	tonne	4826	6	6689	9	6671	9	10624	14	17080	21
Kieselgurh (Contd.)	tonne	1364	2	1312	2	2456	2	2166	4	2035	4

Annexure-IV (Contd.)

Minerals	Unit	1999-2000		2000-2001		2001-02		2002-03 (P)		2003-04 (P)	
		Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value
Limestone	'000 t	1378	98	1225	103	1184	102	1019	88	1036	90
Magnesite	tonne	42102	57	57212	82	66216	86	62419	73	71665	92
Manganese Dioxide Elec.	tonne	1699	10	2977	18	881	4	924	5	2755	12
Manganese Ore	tonne	4343	5	5102	10	2888	4	7722	11	7621	11
Marble	tonne	21956	23	49401	77	65115	97	52358	92	86853	148
Mica	tonne	405	8	477	4	422	5	1033	6	1296	6
Natural Gas	tonne	1761	4	2000	2	++	++	13877	17	40553	73
Nickel Ore & Conc.	tonne	1131	19	367	9	448	13	562	12	931	21
Petroleum (crude)	th. tonne	39686	14906	58384	40790	74120	66093	79420	61476	83677	77726
Precious & semi-precious stones (NES)		*	195	*	359	*	478	*	324	*	280
Red Oxide	tonne	108	2	395	7	574	10	587	14	1082	18
Rock phosphate	'000 t	3099	834	3138	883	4281	1002	3622	791	3889	889
Silica Sand	tonne	2069	3	2037	2	31243	10	8323	5	49428	13
Sodium Nitrate	tonne	656	1	1570	2	974	1	3633	4	3617	4
Sodium Nitrite	tonne	2893	4	4488	6	2921	4	3361	4	3630	5
Sulphur	'000 t	1583	282	2025	505	1803	411	1639	276	1388	405
Tungston Ore & Conc.	tonne	210	3	130	2	44	1	145	3	241	4
Vanadium Ore & Others	tonne	7504	68	6765	60	6899	62	11769	83	18976	139
Zinc Ore & Conc.	tonne	62668	88	49460	72	34537	52	68148	78	37550	50
Other Minerals			53		52		78		52		59

* Quantity figures not given due to partial coverage. Value figures, however, have full coverage.
++ : Negligible
++ : ux.;
NES : Not Elsewhere Specified
Source : DGCI & S. Kolkata

Annexure-V

PERFORMANCE DURING 2003-2004

Sl. No.	Name of the Scheme/ Project/ Programme	Programme Target for 2001-02	Achievement for 2001-02	Programme Target for 2002-03	Achievemen for 2002-03	Programme Target for 2003-04	Achievement for 2003-04
I.	MINERAL EXPLORATION						
(i)	Large Scale Mapping (sq.km.)	1405.83	1081.63	1189.54	1254.80	1021.05	1027
(ii)	Detailed mapping (sq.km.)	30.688	45.177	30.316	32.286	30.745	36.26
(iii)	Drilling (meter)	94,962	95,554	92,798	93,388.78	88540.70	81,995.90
II.	SURVEY & MAPPING						
(a)	Ground Survey						
	Spl. Thematic Mapping (sq.km.)	8721.80	9647	8778	8975	7627	7735.50
(b)	Aerial Survey						
	Multisensor/Aeromagnetic Survey (with Twin Otter) (Lkm)	24,350	33,037	30,800	16713 @ l.km.	28000 l.km.	31,919 l.km.
(c)	Marine Survey						
(i)	EEZ mapping (sq km) (R V Samudra Manthan)	18,000	27,970	+	+	*	++
(ii)	Territorial water (coastal launches) (sq km)	7667	7359	4100	4100	3470	3825

@ Delay in getting MOD & DGCA clearance resulting shortfall.

\+ Parametric studies were carried out. Data presented in the following tables.

* 5 cruises (SM-166-169, 170 part and 171 part) planned for Geochemical scan for Hydrocarbon in the Western offshore and Krishna Godavari basin under sponsored project of ONGC.

++ 5 cruises (SM 166-169, 170 part and 171 part) for Geochemical scan for hydrocarbon in the Western offshore and Krishna Godavari basin under sponsored project of ONGC have been taken up.

A. Coverage by R.V.Samudra Manthan

(i)	Parametric studies carried within and beyond EEZ	Programme Target for 2001-02	Achievement for 2001-02	Programme Target for 2002-03	Achievement for 2002-03
(a)	Bathymetry (Lkm)	9580	8812	1800*	2472

Annexure-V (Contd.)

* Targets of the Field Season 2002-2003 have been revised. Marine Wing, GSI was engaged in carrying out sponsored programme of survey for Geochemical scan for ONGC. Sampling will be done accordingly and analyses will be carried out in the laboratory of GSI.

B. Coverage by Coastal Launches (including boat)

(ii)	Parametric studies carried within TW	Programme Target for 2001-02	Achievement for 2001-02	Programme Target for 2002-03*	Achievement for 2002-03	Programme Target for 2003-04	Achievement for 2003-04
(a)	Bathymetry (Lkm)	2846	1490	1835	2193	1700	2247
(b)	Shallow seismic/sub-bottom (Lkm)	3320	915	1612	924	2505	2439
(c)	Side Scan Sonar (Lkm)	280	511	450	828	100	226

* Target revised.