MINISTRY OF MINES

Web Site Addresses:

Ministry of Mines - http://mines.gov.in
Geological Survey of India - www.portal.gsi.gov.in
Indian Bureau of Mines - www.ibm.nic.in
National Aluminium Company Limited - www.nalcoindia.com
Hindustan Copper Limited - www.hindustancopper.com
Mineral Exploration Corporation Limited - www.meclindia.com
Jawaharlal Nehru Aluminium Research Development and Design Centre - www.jnardddc.gov.in
National Institute of Rock Mechanics - www.nirm.gov.in
National Institute of Miners Health - www.nimh.gov.in
Non- Ferrous Technology Development Centre - www.nftdc.res.in
Centre for Techno Economic Mineral Policy Options (C-Tempo) - www.c,tempo.org
<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1</td>
<td>Status of Reconnaissance Permit (RP) proposals during the period 1.4.2011 to 31.12.2011</td>
</tr>
<tr>
<td>5.2</td>
<td>Status of Prospecting Licenses (PL) proposals during the period from 1.4.2011 to 31.12.2011</td>
</tr>
<tr>
<td>5.3</td>
<td>Status of Mining Lease (ML) proposals during the period from 1.4.2011 to 31.12.2011</td>
</tr>
<tr>
<td>6.1</td>
<td>Existing Rates of Royalty of Some Important Industrial Use Minerals</td>
</tr>
<tr>
<td>7.1</td>
<td>Exports of Metals and Alloys, 2006-07 to 2010-11</td>
</tr>
<tr>
<td>7.2</td>
<td>Imports of Metals and Alloys, 2006-07 to 2010-11</td>
</tr>
<tr>
<td>7.3</td>
<td>Sectorwise Despatches of Iron Ore for Domestic Consumption and Export in 2011-12 (April to August 2011)</td>
</tr>
<tr>
<td>7.4</td>
<td>Data Export of Iron Ore during the year 2009-10 and 2010-11</td>
</tr>
<tr>
<td>7.5</td>
<td>Data Import of Iron Ore during the year 2009-10 and 2010-11</td>
</tr>
<tr>
<td>8.2</td>
<td>Target vs. Achievement during the Last Three Years (2009-12) of XI Plan (2007-12) of Geological Survey of India</td>
</tr>
<tr>
<td>8.3</td>
<td>Free Data Policy of 5th June, 2009</td>
</tr>
<tr>
<td>9.1</td>
<td>Principal violations of MCDR, 1988 detected by IBM during 2011-12 (up to December, 2011)</td>
</tr>
<tr>
<td>9.2</td>
<td>Status of Mining Leases in the Country in respect of scheduled minerals</td>
</tr>
<tr>
<td>9.3</td>
<td>State-wise Mining Plans / Schemes of Mining / Final Mine Closure Plans approved By IBM during 2011-12 (up to December 2011)</td>
</tr>
<tr>
<td>9.4</td>
<td>Details on Modification of Mining Plans / Schemes of Mining</td>
</tr>
<tr>
<td>9.5</td>
<td>State-wise Number of Mines Working on Deemed Extension as on December 2011</td>
</tr>
<tr>
<td>9.6</td>
<td>Status of Reconnaissance Permits in India as on 31.12.2011</td>
</tr>
<tr>
<td>9.7</td>
<td>Status of Prospecting Licences in India as on 31.12.2011</td>
</tr>
<tr>
<td>9.8</td>
<td>Return on Illegal Mining (Major Minerals) for the year 2011-12 (upto September 2011)</td>
</tr>
<tr>
<td>9.8(A)</td>
<td>Return on Illegal Mining (Minor Minerals) for the year 2011-12 (upto September 2011)</td>
</tr>
<tr>
<td>15.1</td>
<td>RTI Application / Request Status (1st April, 2011 to 31st December, 2011)</td>
</tr>
<tr>
<td>15.2</td>
<td>RTI Appeal Status (1st April, 2011 to 31st December, 2011)</td>
</tr>
<tr>
<td>15.3</td>
<td>CIC 2nd Appeal Status (1st April, 2011 to 31st December, 2011)</td>
</tr>
<tr>
<td>16</td>
<td>Statement showing pending Audit Para in the Ministry</td>
</tr>
</tbody>
</table>
NEW LEGISLATION

New Mines and Minerals (Development and Regulation) Bill, 2011.

1.1 The Mines and Minerals (Development and Regulation) Bill, 2011, prepared by the Ministry to replace the existing Mines and Minerals (Development and Regulation) Act, 1957 approved by the Cabinet and the Bill has been introduced in Lok Sabha on 12th December, 2011. The Bill has been prepared after several rounds of consultation and workshop with all Stakeholders. The Bill seeks a complete and holistic reform in the mining sector with provisions to address issues relating to sustainable mining and local area development, benefit sharing mechanism to the people affected by mining operations. The Bill, also, aims to ensure transparency, equity, elimination of discretions, effective redressal and regulatory mechanisms along with incentives encouraging good mining practices, which will also lead to technology absorption and exploitation of deep seated minerals. The Bill has been referred to Standing Committee on Coal & Steel on 5th January, 2012 and the recommendations of the Standing Committee on Coal and Steel are awaited.

National Geoscience Awards - 2010

1.2 To honour geoscientists for their outstanding contribution in the field of mineral discovery, exploration, mining and applied geosciences, the Ministry of Mines has expanded the National Mineral Award Scheme instituted in 1966 and renamed it as “National Geoscience Award” Scheme from 2009. The selection of awardees is the outcome of rigorous mechanism of scrutiny and evaluation undertaken by the various members of expert committee constituted by the Ministry under the Chairmanship of Secretary (Mines).

Mrs. Meera Kumar, Hon'ble Speaker of Lok Sabha conferring National GeoScience Award 2010 on 16th February, 2012 at Vigyan Bhawan, New Delhi.
1.3 Forty Three (43) Geoscientists and Engineers were selected for ‘National Geoscience Awards-2010. Hon’ble Speaker of Lok Sabha Smt. Meira Kumar conferred the awards in a function held on 16th February 2012 at Vigyan Bhawan, New Delhi, in the presence of Shri Dinsha Patel, Hon’ble Minister of State (Independent Charge). Prof. Chervela Leelanandam Emeritus Scientist, Council of Scientific and Industrial Research (CSIR) was conferred the Award for Excellence for his lifetime achievement in the field of Mineralogy, Petrology & Geochemistry and, Shri Yogesh Ray of Wadia institute of Himalayan Geology, Dehradun received the Young Researchers Award.

Strategic Plan for Ministry of Mines

1.4 The Ministry of Mines has finalised a detailed Strategic Plan document “Unlocking the Potential of the Indian Minerals Sector” in order to systematize the functioning of the Ministry and align it more directly with the vision emanating from the National Mineral Policy. The Strategic plan has identified that the Indian minerals sector holds a huge potential for all stakeholders, including the central government, state government, community and the entire economy. With the right kind of support, the mining sector has the potential to significantly contribute to the GDP and also improve the revenues of royalty
and taxes. The Strategic Plan has identified the six priorities to achieve the objectives. These priorities are (i) expanding resource and reserve base by stepping up exploration and aiding international acquisition of strategic minerals (ii) reducing permit delays to create a more favourable policy environment (iii) setting up core enablers for mining-infrastructure, human capital and technology (iv) ensuring sustainable mining and development (v) creating an information, education and communication plan and (vi) establishing the right governance structure for effective implementation.

**Sustainable Development Framework (SDF)**

1.5 Based on the report (2007) of the High Level Committee constituted by the Planning Commission to review the National Mineral Policy, 1993 as part of the process of bringing in International Standards into the Mining Sector, best practices in environment management, appropriate use of land within a planning framework through a decision making process on the basis of integrated assessment of ecological, environmental, economical and social impact are being incorporated into Mining based activities. The Ministry engaged an expert consultant for creating a Sustainable Development Framework (SDF) for the mining sector. The consultant, taking into consideration that mining should contribute to economic, social and cultural wellbeing of indigenous host populations and local communities by creating stakeholders interest in mining operations for the Project Affected People (PAP), has prepared a document and submitted to the Government. A wider dissemination of the SDF has been undertaken and the SDF document is being finalised. Its final roll-out will be done in April, 2012.

**Amendment of Rule 45 of MCDR 1988**

1.6 The Ministry of Mines has notified on 9th February, 2011 amended Rule 45 in Mineral Conservation and Development Rules, 1988, which stipulates mandatory registration of miners, stockists, traders, exporters, and end-users of minerals, and stringent reporting norms for ensuring end-to-end accounting of the mineral produced. In this system it is mandatory for the miners, traders, exporters, and end-users of the minerals to send a copy of the reports to State Governments also. The State Governments have also been advised to ensure that any automation in the reporting system developed at the State levels should be compliant with the amended Rule 45 of the MCDR. The registration system has already started and the Ministry of Mines is working closely with the IBM to commence the online submission of monthly and annual returns of production to be filed by the mining lessee at the earliest. The work on system of online reporting is in progress and is expected to start by 31st March, 2012 and will be stabilized within three months.
Revision of Rates of Royalty and Dead Rent

1.7 In order to review the royalty rates and dead rent, the Ministry of Mines has constituted a Study Group under the Chairmanship of Additional Secretary (Mines) on 13th September, 2011 regarding revision of royalty rates and rates of dead rent for minerals (other than coal, lignite and sand for stowing) and to make appropriate recommendations to the Government. Apart from other terms and recommendations, the Study Group has been also mandated to recommend revision of rates and in case, if necessary, give an additional conditional recommendation on what should be the royalty rate and the mechanism for computation of royalty rates after taking into account the liabilities on the lease holder as envisaged in the draft MMDR Bill, 2011. The report of the Study Group will be submitted in six months.

Preparations of Reports for XII Five Year Plan

1.8 The 2011-12 is the terminal year of the XI Five Year Plan and, therefore, action has been initiated for formulation of the XII Five Year Plan. In respect of non-coal sector a Working Group on Mineral Exploration and Development (Other than Coal and Lignite) has been formulated in the Ministry of Mines to make recommendations for incorporating in the XII Five Year Plan to the Planning Commission. The Working Group has submitted its report and major long term goals such as Increasing investment in exploration; Improving regulatory systems; Promoting scientific and optimal Mining; Creating Infrastructure; Modernizing exploration and the mining industry; Increasing mineral resources and ensuing raw materials security; Implementing sustainable development framework; Providing direction to science policy and R&D; Enabling techno-economic policy formulation etc. have been proposed.

Mineral Concession System and Transparency

1.9 In the federal structure of India, the State Governments are the owners of minerals located within their respective boundaries. The Central Government is the owner of the minerals underlying the ocean within the territorial waters or the Exclusive Economic Zone of India. The State Governments grant the Mineral Concessions (Reconnaissance Permits (RP), Prospecting Licences (PL) and Mining Leases (ML)) for all the minerals located within the boundary of the State, under the provisions of the Mines and Minerals (Development and Regulation) (MMDR) Act, 1957. Prior approval of the Central Government is required under Section 5 of the Act for grant of RP, PL and ML in respect of Atomic and Metallic Minerals specified in Parts ‘B’ and ‘C’ of the first Schedule to the Act.

1.10 The Ministry of Mines has, in consultation with the State Governments, issued detailed guidelines on 24th June, 2009, in order to bring
about more clarity and transparency in processing the mineral concession proposals under the MMDR Act, 1957 and MCR, 1960. The Ministry, has also, in consultation with the State Governments, framed a Policy on ‘special reasons’ to be adopted by all State Governments, while recommending a mineral concession proposal in favour of a later applicant under Section 11(5) of the Act. Guidelines in this regard have been issued to the State Governments on 9th February, 2010. Besides, the Ministry has issued guidelines on 13th October, 2010 regarding submission of maps by the State Governments along with the proposals.

1.11 The Government of Madhya Pradesh has formulated their Mineral Policy 2010, which includes the ‘Special Reasons’ framed by them for recommending a later applicant in a non-notified area under Section 11(5) of the MMDR Act, 1957. The Ministry has advised them to ensure uniform compliance of the same in all cases. All other State Governments have also been requested vide letter dated 20th October, 2011, to examine their respective State Mineral Policies and incorporate therein suitable ‘Special Reasons’ specific to their respective States.

1.12 The Ministry of Mines had, vide, order dated 4th March, 2009, constituted a Central Coordination-cum-Empowered Committee (CEC) under the Chairpersonship of Secretary (Mines) on monitoring and minimizing delays at various levels in grant of approvals for mineral concession applications. So far Seven meetings of the Committee has been held on 24th July, 2009, 22nd December, 2009, 18th June, 2010, 22nd December, 2010, 3rd May, 2011, 20th September, 2011 and 16th January, 2012, wherein important decisions aimed at minimizing delays in processing of concession applications and improving the overall concession regime were taken. As per the decision taken in the first meeting of the CEC, all mineral-rich State Governments viz. Andhra Pradesh, Chhattisgarh, Gujarat, Goa, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Orissa, Rajasthan and Tamil Nadu have constituted their State-level Committees.

1.13 Keeping in view the need for having more effective coordination as well as for dealing with important matters relating to mineral development and regulation in the country, the Ministry has, vide order dated 20th October, 2011, reconstituted the Committee as “Coordination-cum-Empowered Committee on Mineral Development and Regulation”. Its terms of reference have also been widened to bring within its ambit other important issues like coordination and review of steps for prevention of illegal mining, development and implementation of sustainable development framework etc. Besides the Ministry of Mines, the CEC comprises representatives of the Ministry of Environment and Forests, Home Affairs, Steel, Shipping, Finance (Revenue), Railways, Fertilizers,
Department of Atomic Energy, Directorate General of Civil Aviation (DGCA), Geological Survey of India and Indian Bureau of Mines. Representatives of the State Departments are also co-opted in the Committee. All State Governments have been advised vide letter dated 17th November, 2011 to consider reconstitution of their respective State-level Empowered Committees similarly. The Last meeting of the CEC was held on 16th January, 2012.

1.14 At the instance of the Ministry of Mines, the Federation of Indian Mineral Industries (FIMI) has brought out a compendium titled “Mineral Concession System in India”, which contains useful information on various aspects of mineral concessions, viz. India as a mineral investment destination, mineral legislation and regulation and grant of mineral concessions.

1.15 A Working Group under the Chairmanship of Additional Secretary (Mines) has been set up in the Ministry 20th January, 2011 for developing software for monitoring and expediting forest clearances in respect of mineral concession applications. As per the recommendations of the Working Group, the MoEF has redesigned its software, which is expected to be operationalised shortly.

1.16 The Ministry of Mines is using internet services to bring about more transparency in processing the mineral concession applications. The website of the Ministry (http://mines.gov.in) provides all information on the current status of the mineral concession applications.

Initiatives taken by Geological Survey of India (GSI)

1.17 GSI with its present focus on exploration for concealed and deep seated deposits has initiated a number of baseline geoscientific data generation programmes like National Geomorphological and Lineament Mapping, Hyperspectral Mapping and National Aeromagnetic Mapping. National Geochemical Mapping and Geophysical Mapping are continuing and are proposed to be completed by the end of the XII Plan through outsourcing and GSI’s own resources.

1.18 During the Field Season 2010-12 GSI has made significant augmentation/discoveries in Gold, Molybdenum, Basemetal, Iron Ore and Manganese in the States of Karnataka, Tamil Nadu, Madhya Pradesh, Chhattisgarh and Orissa respectively. GSI has also estimated coal resource of 2641.63 million tonne in the states of West Bengal, Orissa, Jharkhand, Chhattisgarh and Madhya Pradesh and 124.6 million tonne of lignite in Tamilnadu, Rajasthan and West Bengal during 2010-12 (as on 1st April, 2011).

1.19 Information technology is being widely utilized by GSI for monitoring progress of field and project activities, accessing unpublished project reports, publications (Records, memoirs)
Detailed Information Dossiers (DIDs), District Resource Maps, Geological Quadrangular Maps, Case Histories, Photo-gallery etc. The GSI Portal provides structured, logically organized information to different categories of users. GSI Portal received the Silver Award in the “Best Government Portal” Category for National e-Governance Awards 2011 by DARPG. GSI has embarked upon the Phase III of the Portal Project and Online Core Business Integrated System (OCBIS) is the essential part of this initiative.

1.20 In the modernisation drive GSI is in the process of acquiring a new ocean going research vessel for execution of seabed survey and exploration of non-living resources. GSI is, also, engaged in the procurement of a Geotechnical vessel with drilling capabilities. GSI is in the process of installing geophysical instruments onto its ‘Dhruv’ helicopter to carry out low altitude geophysical surveys.

Restructuring of the Geological Survey of India (GSI)

1.21 Restructuring of GSI on basis of the High Power Committee recommendations has gathered momentum. There is a significant improvement in Human Resources (HR) position with induction of S&T personnel at JTS level during the year. A Cabinet note on the “Restructuring of GSI” based on the recommendations of the High Power Committee has been approved by the Cabinet on 25th October, 2011. As a consequence posts of Group ‘A’ & ‘B’ officers in Scientific and Technical streams have been enhanced from 4855 to 6019 and posts of Group ‘A’ & ‘B’ officers of Non-Scientific and Technical Streams have been enhanced from 1710 to 1781. The proposals, as approved are under implementation.

Initiatives taken by Indian Bureau of Mines (IBM)

1.22 For promotion of conservation and scientific development of mineral resources and ensuring protection of mines environment in mining areas, IBM carried out 1,478 Inspection of mines for enforcement of provision of MCDR, 1988 and examination of MP/MS, approved 113 Mining Plans and 208 Schemes of Mining. For up gradation and utilization of low grade and sub-grade ores and minerals, IBM carried out 40 Ore dressing investigations, 31,502 Chemical Analysis, 1,620 Mineralogical studies and one in Plant study. As a part of Consultancy services on charge and promotional basis to mining industry on mining, geological & environmental aspects, IBM completed 4 Technical Consultancy Assignments and 7 Mining Research Assignments and conducted 07 training courses for IBM and Industry personnel. Preparation of 100 multi-mineral maps with forest overlays in respect of Jammu & Kashmir, Himachal Pradesh, Haryana, West Bengal, North-Eastern States, Kerala and Goa are in progress. Updation of National Mineral Inventory (NMI) as on 1st April, 2010 is in progress and work completed for
36 minerals. For dissemination of data on mines and minerals, 10 statistical and technical publications have been released.

Mineral Production / Trade

1.23 Total provisional value of mineral production including minor minerals but excluding atomic minerals during the year 2010-11 and 2011-12 (estimated) was about ₹ 2,12,499 crore and ₹ 2,26,522 crore, respectively. The value of Minerals and Ores exported during the year 2009-10 was ₹ 1,27,831 crore whereas the value of import was ₹ 5,24,830 crore. The provisional value of minerals and ores exported during the year 2010-11 (Provisional) was ₹ 1,65,080 crore, whereas the value of import was ₹ 6,69,010 crore.

National Aluminum Company Limited (NALCO)

1.24 NALCO on 14th January, 2011 signed an MoU with Indian Rare Earths Ltd (IREL), a PSU under Department of Atomic Energy, for making value-added products from beach sand minerals, which would, subsequently, be used for making titanium and allied products. The project is estimated to cost ₹ 400 crore and is planned to be set up at Chhatrapur in Ganjam, district of Odisha. Another MoU was, also, signed in Jakarta on 4th October, 2011 with Government of East Kalimantan in presence of Hon’ble Minister of Commerce and Industry, Government of India to set up a Smelter & Power Project.

1.25 NALCO has approved the capital restructuring of equity by splitting the share of ₹ 10 into two shares of ₹ 5 each. The Board has, also, decided for 1:1 bonus share, i.e. one bonus share for each share held, in its board Meeting held on 31st January 2011.

1.26 Approval of Mining Lease of the ₹ 338 crore Utkal-E Coal Mine project was received from Ministry of Coal, in June 2011.

1.27 NALCO’s 2nd phase Expansion was completed in all respect with the commissioning of Alumina Refinery project in June, 2011. Other units, viz., Smelter and Captive Power Plant (CPP) were commissioned in December, 2009 and August, 2010, respectively.

1.28 Smelter Plant at Angul started production of another variety of rolled product named as chequered sheet with thickness ranging from 0.60mm to 3.0 mm. The new product has a high demand in automobile industry, vehicle manufacturing and industrial flooring. The first consignment was flagged off on 17th October, 2011.

1.29 NALCO in May, 2011 approved the Investment proposal and award of work for establishing 50 MW wind Power Plant in Andhra Pradesh at an investment ₹ 330 crore. The contract was awarded in June, 2011 and the project is scheduled for completion in February, 2012.

1.30 The mining lease of Panchpatmali South Block was renewed for another 20 years with the receipt of Stage-II forest
clearance on 20th July, 2011. The original lease period had expired after 30 years of mining.

1.31 Against global bid, NALCO has been shortlisted as the only successful bidder for the Mines & Refinery project in Gujarat. The project is scheduled to start in 2012.

1.32 The 5th Long Term Wage Settlement of NALCO employees were signed on 5th September, 2011 for a period of ten years, with five Recognized Unions.

1.33 In financial year 2011-12, NALCO has earned profit after tax, for the half year ended September, 2011 was ₹ 516 crore, compared to ₹ 508 crore for same period last year.

Awards:

• NALCO bagged the CSR Award for Best Practices’ under the Global HR Excellence, category at the World HR Congress held in Mumbai from 10th to 12th Feb, 2011. The award was received by from Secretary to Govt.of India, Department of Public Enterprise.

• Panchpatmali Bauxite Mines was awarded the 1st prize for Reclamation and Rehabilitation at the 13th Mines Environment & Mineral Conservation week 2010-11, held under the aegis of Indian Bureau of Mines, Bhubaneswar region.

• NALCO bagged EEPC (Eastern Region)’s Gold Trophy, as Top Exporter in the Large Enterprise Category, for its outstanding export performance during the year 2008-09 on 25th Feb, 2011.

• NALCO received the PSE Excellence Award 2011, in the Maharatna nad Navratna category, for Corporate Social Responsibility and Responsiveness, instituted by the Department of Public Enterprises, Govt of India and Indian Chamber of Commerce.

• NALCO Bagged the Top Export Award of CAPEXIL, for its outstanding export performance during the year 2010-11.

• Bagged the Best Exporters Award for Directorate of Export Promotion and Marketing, Govt. of Odisha for outstanding export of Alumina and Aluminium for the year 2009-10. The award was received in a function held on 3rd September, 2011 at Bhubaneswar.

• Smelter Plant has bagged the predetermined National Energy Conservation Award for the year, 2011.

Hindustan Copper Limited (HCL)

1.34 HCL has earned Profit before tax of ₹ 335.21 crore for the financial year 2010-11 which is highest ever since its inception and has become Miniratna (Category - 1) and is a zero debt Company as on date.
1.35 The Company has paid ₹ 92.14 crore as dividend to Government of India for the year 2010-11, which is historically the highest dividend payout by the Company.

1.36 Ore Production in 2010-11 at 3.6 million tonne is best in last 12 years.

1.37 The Company has awarded five projects valuing ₹ 1810.0 crore. Execution of one project has started and remaining projects will commence in the last quarter of current financial year.

1.38 Tri-partite agreement of wage settlement was signed by the Management of HCL and Recognized union in the presence of Chief Labour Commissioner.

1.39 Implemented Enterprise Resource Planning (ERP) Oracle e-Biz Suite R12 solution integrating all functional areas for faster information flow and efficient decision making and functions have been stabilized.

1.40 The Company has paid ₹ 92.14 crore as dividend to Government of India for the year 2010-11.

1.35 The Company has paid ₹ 92.14 crore as dividend to Government of India for the year 2010-11, which is historically the highest dividend payout by the Company.

1.36 Ore Production in 2010-11 at 3.6 million tonne is best in last 12 years.

1.37 The Company has awarded five projects valuing ₹ 1810.0 crore. Execution of one project has started and remaining projects will commence in the last quarter of current financial year.

1.38 Tri-partite agreement of wage settlement was signed by the Management of HCL and Recognized union in the presence of Chief Labour Commissioner.

1.39 Implemented Enterprise Resource Planning (ERP) Oracle e-Biz Suite R12 solution integrating all functional areas for faster information flow and efficient decision making and functions have been stabilized.

1.40 The Company has paid ₹ 92.14 crore as dividend to Government of India for the year 2010-11.

1.42 The performance in developmental mining was 7844 m which is 106% of 7402 m achieved during the same period of previous year.

1.43 The performance in gross revenue is ₹14378 lakh which is 128% of the same period of the previous year. The Gross margin stood at ₹3059 lakh and the company earned a net profit (before tax) is ₹1540 lakh. Both these achievements are 155% as compared with the corresponding period of previous year.

1.44 A total of 34 work orders valued at ₹4157 lakh were received from various clients such as M/s. SAIL for exploration of iron ore, M/s. MOIL for exploration of manganese ore, M/s. AMD for exploratory drilling work, M/s. UCIL for developmental mining work and other agencies.

1.45 The MoU composite score for the year 2010-11 was 2.42 and company categorized under the “Very Good” category on the basis of audited data.

1.46 MECL has been conferred with “Turn around CPSE Award 2010” by Board for Reconstruction of Public Sector Enterprises, Department of Public Enterprises, Govt. of India, during March 2011.

1.47 Training on JORC Code: MECL has identified training on Joint Ore Reserves Committee (JORC), an Australian code for reporting of exploration results, mineral resources & ore reserves as a thrust area along with
identification/registration of “Competent Person”. As such, MECL has finalized the names of five officials and three officers have been imparted training on JORC code at Snowden Institute, Australia.

**Initiatives taken for assessing and exploiting the Mineral wealth in the North-Eastern Region.**

1.48 Ministry of Mines has taken several initiatives through its agencies like Geological Survey of India (GSI), Indian Bureau of Mines (IBM) and Mineral Exploration Corporation Limited (MECL) for assessing and exploiting the mineral wealth of the North Eastern Region (NER).

1.49 A meeting was held at Shillong on 17th June, 2011 under the Chairmanship of Additional Secretary (Mines) to review the progress of ongoing projects in the North Eastern Region, which was attended by representative of Indian Bureau of Mines (IBM), Mineral Exploration Corporation Limited (MECL) and representatives of Directorates of Mining and Geology (DGMs) of Northern Eastern States. In this meeting GSI was advised to utilize 100% funds outlay earmarked for NER and to take more collaborative projects with concerned state Directorate of Geology and Mining (DGMs) for development of natural resources in NER. It was also decided that state DGMs would convene their State Geological Programming Board (SGPB) meeting before the next Central Geological Programming Board (CGPB) meeting. The Central Geological Programming Board in its meeting held on 24th -25th August, 2011 discussed the issues relating to North Eastern Region. GSI has initiated a new scheme for supply of equipments to the North Eastern Region and outlay of ₹ 50 lakh has been kept for such purposes.

**Results Framework Document (RFD)**

1.50 Central Government have adopted a Results Framework System to set goals and quantitatively monitor performance on an outcome basis. Major objectives under Result Framework for 2011-12, of Ministry of Mines, are outlined in Box - 1.

1.51 The Result Framework Document for 2011-12 and achievements upto September, 2011 are available on the website [http://mines.gov.in](http://mines.gov.in)

**Citizen’s / Client Charter of Ministry of Mines**

1.52 Citizen’s / Client Charter of Ministry of Mines for the year 2011-12 is available on the website [http://mines.gov.in](http://mines.gov.in)
### Box-1
**Major Objectives under Results Framework Document (RFD) for 2011-12**

<table>
<thead>
<tr>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Rework legislative framework to bring in transparency, investor confidence, sustainability concepts and better regulation.</td>
</tr>
<tr>
<td>2. Repositioning the Ministry to a “regulatory, techno-economic, scientific and facilitating role”</td>
</tr>
<tr>
<td>3. Improving the functioning of GSI</td>
</tr>
<tr>
<td>4. Improving the functioning of IBM</td>
</tr>
<tr>
<td>5. Effective supervision of mineral concession system</td>
</tr>
<tr>
<td>7. Promoting R&amp;D projects</td>
</tr>
</tbody>
</table>
Ministry in Brief-Role and Organization of the Ministry

MAIN FUNCTIONS

2.1 Ministry of Mines is responsible for survey and exploration of all minerals, other than natural gases, petroleum and atomic minerals; for mining and metallurgy of non-ferrous metals like aluminium, copper, zinc, lead, gold, nickel etc. and for administration of the Mines and Minerals (Regulation and Development) Act, 1957 in respect of all mines and minerals other than coal, natural gas and petroleum. A list of subjects allocated to the Ministry of Mines, Attached Office, Subordinate Office, Public Sector Undertakings and Research Institutions under the administrative control of Ministry of Mines are given below:-

(a) Legislation for regulation of mines and development of minerals within the territory of India, including mines and minerals underlying the ocean within the territorial waters or the continental shelf, or the exclusive economic zone and other maritime zones of India as may be specified, from time to time by or under any law made by Parliament.

(b) Regulation of mines and development of minerals other than Coal, Lignite and Sand for stowing and any other mineral declared as prescribed substances for the purpose of the Atomic Energy Act, 1962 (33 of 1962) under the control of the Union as declared by law, including questions concerning regulation and development of minerals in various. States and the matters connected therewith or incidental thereto.

(c) All other metals and minerals not specifically allotted to any other Ministry/Department, such as Aluminium, Zinc, Copper, Gold, Diamonds, Lead and Nickel.

(d) Planning, development and Control of, and assistance to, all industries dealt with by the Ministry.

(e) Administration and Management of Geological Survey of India.

(f) Administration and Management of Indian Bureau of Mines

(g) Metallurgical Grade Silicon.

Attached Office/ Subordinate Office

2.2 Geological Survey of India (Head Quarters, Kolkata) is an Attached Office and Indian Bureau of Mines (Head Quarters, Nagpur) is a Subordinate Office of the Ministry.

Public Sector Undertakings

2.3 There are three Public Sector Undertakings of Ministry of Mines, namely:-
• National Aluminium Company Limited (NALCO), Bhubaneswar;
• Hindustan Copper Limited (HCL), Kolkata;
• Mineral Exploration Corporation Limited (MECL), Nagpur;

**Autonomous Bodies**

2.4 There are three Research Institutions which are the Autonomous Bodies of this Ministry:-

• National Institute of Rock Mechanics, (NIRM), Kolar Gold Fields (Karnataka),
• National Institute of Miners’ Health (NIMH), Nagpur,
• Jawaharlal Nehru Aluminium Research Development and Design Centre (JNARDDC) Nagpur.

2.5 In addition to the above, two registered Societies, namely, the Non-ferrous Materials Technology Development Centre, Hyderabad (NFTDC) and Centre for Techno-Economic Policy Option New Delhi (C-Tempo) both are non-grant institutions within the administrative purview of Ministry of Mines.

**Organisational Structure**

2.6 The Secretariat of Ministry of Mines is headed by the Secretary having other officers: an Additional Secretary, three Joint Secretaries, one Economic Advisor, one Joint Secretary & Financial Adviser common for Ministry of Coal, Ministry of Mines & Ministry of Youth Affairs & Sports, nine Directors / Deputy Secretaries, five Under Secretaries, one Senior Principal Private Secretary, three Principal Private Secretaries, one Junior Scientific Officer, twenty-five Section Officers, Twelve Private Secretaries, one Assistant Librarian and Information Officer in addition to a Joint Director and Assistant Director each for Official Language. Besides this, the Ministry has one Development Officer. The total number of sanctioned posts for the Secretariat of the Ministry of Mines is 66 Gazetted and 163 for Non-Gazetted. The sanctioned strength and present incumbency of officers / officials in Secretariat proper of Ministry of Mines as on 9th March, 2012 is given at **Table – 2.1.**

<table>
<thead>
<tr>
<th>Group</th>
<th>Sanctioned Strength</th>
<th>Total Number of Present incumbents (including General)</th>
<th>Number of SC/ST/OBC/Minority/Women out of Present incumbents</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>SC</td>
</tr>
<tr>
<td>Group-A Gazetted</td>
<td>27</td>
<td>23</td>
<td>2</td>
</tr>
<tr>
<td>Group-B Gazetted</td>
<td>39</td>
<td>29</td>
<td>2</td>
</tr>
<tr>
<td>Group-B Non-Gazetted</td>
<td>61</td>
<td>50</td>
<td>4</td>
</tr>
<tr>
<td>Group-C</td>
<td>102</td>
<td>79</td>
<td>22</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>229</strong></td>
<td><strong>181</strong></td>
<td><strong>30</strong></td>
</tr>
</tbody>
</table>
2.7 In addition to above, 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. Accordingly, the Organization Chart of the Ministry is given at Annexure-2.1.

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

IT Support by NIC at Ministry of Mines:-

2.9 National Informatics Centre (NIC) of the Department of Information Technology is providing network backbone and e-Governance support to the Ministry of Mines. The following are the IT Services that NIC is providing to the Ministry of Mines.

Management Information Systems (MTS)

2.10 Ministry of Mines with the help of National Informatics Centre (NIC) is implementing various decision support system required for better planning, monitoring and decision making. To make the information available on a single window, related to various areas of the day-to-day functioning of the Ministry, an intranet based web portal for the Ministry of Mines has been developed. The key driver for this intranet based web site is to reduce the Ministry’s workload and increase overall efficiency by promoting ‘self service’. The computerization has been done in the area of Approvals of Prospecting Licenses & Mining Leases, File & Receipt tracking, Revision Applications, Payroll and Public Grievances. The various Applications which are operational in the Ministry are as follows:

- Mineral Concession Approval System
- Revision Application System
- FTS (File Tracking System)
- IntraMines – An intranet based website of Ministry of Mines
- Composite Payroll System
- Network Call & Asset Management System
- Public Grievance Monitoring System
- E-Notice Board
- ACC Vacancy Monitoring System
- Right to Information (RTI) System

Mining Tenement System (MTS)

2.11 The MTS has been envisaged by the Ministry to automate the various processes associated with the mineral concession regime. This would not only give an impetus to the decision making process but is also expected to meet the ends of transparency and openness. It is envisaged that MTS will not only enable online filing of applications but it will also be possible to identify online the areas for various types of mineral concessions. This would involve integration of web based technology
services with Geographical Information System (GIS), so that information could be shown spatially in the form of maps. IBM has been nominated by the Ministry as the Nodal Implementing Agency for the project.

2.12 The project for preparation of DPR has been formulated and the consultant for DPR preparation was appointed in May 2011. The inception report covering As-is-study of Ministry and IBM is complete and approved by the Ministry. Processes at four States (Chhattisgarh, Gujarat, Karnataka and Rajasthan) have been studied and the As-is reports for these states have been prepared and circulated to IBM and respective States. IBM and States feedback is yet to come on these studies. NIC is presently working on the To-be processes.

2.13 Website of Ministry of Mines: (http://mines.gov.in) - The Web site has been created which provides comprehensive information on various subjects, like, Acts & Rules and working of the Ministry, Right to Information Act, National Mineral Policy, Information about the Indian Mineral Sectors, latest status of the Revision Petitions & PL/ML Cases, latest status of the Public Grievances Cases, Annual Report of the Ministry and also provides links to its PSUs and Offices.

Local Area Network (LAN):

2.14 LAN has been established in the Ministry, which interconnects various officers/staff in the Ministry. At present, approximately One hundred sixty users have been connected to the LAN of the Ministry of Mines.

Annual Plan 2012-13

2.15 The Organization-wise distribution of Outlay for Annual Plan 2011-12 and proposed outlay for 2012-13 showing Internal Resources (IR), Extra Budgetary Resources (EBR), Gross Budget Support (GBS), Net Budget Support (NBS), North Eastern Region (NER) and Tribal Sub Plan (TSP) is given at the Table 2.2.
<table>
<thead>
<tr>
<th>S. No.</th>
<th>Schemes / Programmes</th>
<th>ANNUAL PLAN 2011-12</th>
<th>ANNUAL PLAN 2012-13</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>BUDGET ESTIMATE</td>
<td>BUDGET ESTIMATE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Plan outlay</td>
<td>Plan outlay</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Outlay earmarked</td>
<td>Outlay earmarked</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Outlay</td>
<td>IR</td>
</tr>
<tr>
<td>1</td>
<td>NALCO 1057.00</td>
<td>1057.00</td>
<td>0.00</td>
</tr>
<tr>
<td>2</td>
<td>HCL 297.00</td>
<td>297.00</td>
<td>0.00</td>
</tr>
<tr>
<td>3</td>
<td>MECL</td>
<td>8.00</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>- Promotional</td>
<td>9.00</td>
<td>0.00</td>
</tr>
<tr>
<td>4</td>
<td>GSI 181.00</td>
<td>181.00</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>* - Construction  -GSI</td>
<td>5.00</td>
<td>0.00</td>
</tr>
<tr>
<td>5</td>
<td>IBM 22.00</td>
<td>22.00</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>* - Construction  -IBM</td>
<td>1.00</td>
<td>0.00</td>
</tr>
<tr>
<td>6</td>
<td>SGT 9.42</td>
<td>9.42</td>
<td>5.95</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>1589.42</td>
<td>1368.95</td>
</tr>
</tbody>
</table>

** Proposed, * The provision is in Demands for Grants of Ministry of Urban Development GBS in respect of loss making PSUs as well as others who have no activities in NER and Sikkim are exempted from earmarking of 10% by the Planning Commission. 2% will be spent for programmes / schemes relating to IT. ** 4% of provision for GSI and IBM have been earmarked for TSP as per Planning Commission Order.
National Mineral Scenario

3.1 Minerals are valuable natural resources being finite and non-renewable. They constitute the vital raw materials for many basic industries and are a major resource for development. The history of mineral extraction in India dates back to the days of the Harappan civilization. The wide availability of the minerals in the form of abundant rich reserves made it very conducive for the growth and development of the mining sector in India.

3.2 The country is endowed with huge resources of many metallic and non-metallic minerals. Mining sector is an important segment of the Indian economy. Since independence, there has been a pronounced growth in the mineral production both in terms of quantity and value. India produces as many as 87 minerals, which includes 4 fuel, 10 metallic, 47 non-metallic, 3 atomic and 23 minor minerals (including building and other materials).

Mineral Production

3.3 Based on the overall trend so far the index of mineral production (base 2004-05) for the year 2011-12 is estimated to be 130.38 as compared to 131.36 for 2010-11 showing a negative growth of 0.75%. The decline in production is due to the restriction on exports, temporary discontinuance of mining for want of environmental clearance etc. The trend of index of mineral production for the last five years is depicted in Figure 3.1.

3.4 The total value of mineral production (excluding atomic minerals) during 2011-12 has been estimated at ₹210334.55 crore, which shows a decrease of about 1.02% over that of the previous year. The decline in value of mineral production is due to the restriction on exports, temporary discontinuance of mining for want of environmental clearance etc. During 2011-12, estimated value for fuel minerals account for ₹143498.21 crore or 68.22%, metallic minerals, ₹41954.50 crore or 19.94% of the total value and non-metallic minerals including minor minerals ₹24881.84 crore or 11.83% of the total value. Information on production and value of selected minerals from 2007-08 to 2011-12 is given in Annexure 3.1. The details of Export and Import of Minerals during the period 2006-07 to 2010-11 is given at Annexure 3.2 and Annexure 3.3. The trend of value of mineral production for last five years is depicted in Figure 3.2. The value of Minerals by groups for the last five years is given in Figure 3.3.
Figure 3.1
Index of mineral production (Base 1993-94 = 100)

Figure 3.2
Trends in Value of Mineral Production, Exports & Imports

Figure 3.3
Value of Minerals Production (by groups)
PRICE TREND

3.5 The Office of the Economic Advisor, Ministry of Commerce and Industry has, already, shifted the base year from 1993-94 to 2004-05. The Wholesale Price Index (WPI) for minerals (base 2004-05=100) stood at 310.5 in November, 2011 and the corresponding index was 263.2 for November, 2010. The minerals included in the wholesale price index are bauxite, chromite, iron ore, copper ore, zinc concentrate, manganese ore, barytes, dolomite, fireclay, gypsum, kaolin, limestone, magnesite, phosphorite, graphite and sillimanite. The Wholesale Price Index (WPI) for metallic minerals was 385.8 in November, 2011 as compared to 394.4 in November, 2010 and that of other minerals was 165.7 in November, 2011 as compared to 162.8 in November, 2010.

The WPI for Coal stood at 184.6 in November, 2011 as compared to 163.0 in November 2010. The wholesale price index of mineral oils stood at 188.9 in November, 2011 and it was 158.1 in November, 2010.

GROSS DOMESTIC PRODUCT FROM MINING & QUARRYING SECTOR

3.6 The Gross Domestic Product (GDP) accrued from mining and quarrying sector at 2004-05 prices is estimated by Central Statistical Office (CSO). The advance estimates of GDP (at 2004-05 prices) for the first two quarters of the year 2011-12, indicated that the mining and quarrying sector accounted for about 2.10% of GDP. The contribution of mining and quarrying sector to GDP for the year 2011-12 is estimated at ₹ 51606 crore. This indicated a decline of 0.5% over that in the previous year. Similarly, the advance estimates of GDP (at current prices) for the first two quarter of the year 2011-12, indicated that the mining and quarrying sector accounted for about 2.63% GDP. The contribution of mining and quarrying sector to GDP for the first two quarter the year 2011-12 estimated at ₹ 102663 crore indicated an increase of 14.1% over that in the previous year.

Mining

3.7 Indian mining industry is characterized by a large number of small operational mines. The number of mines which reported mineral production [excluding minor minerals, petroleum (crude), natural gas and atomic minerals] in India was 2076 in 2011-12 as against 2355 in the previous year. Out of 2076 reporting mines, 354 were located in Andhra Pradesh followed by Gujarat (308), Rajasthan (241), Madhya Pradesh (225), Karnataka (180), Tamil Nadu (156), Odisha (119), Jharkhand (106), Chhattisgarh (99), Maharashtra (86) and Goa (70). These 11 States together accounted for 93.64% of total number of mines in the country in the year 2011-12. The numbers of reporting mines are given at Table 3.1. Area wise distribution of Mining Leases all over India pertaining to all Minerals excluding fuel, atomic and minor Minerals is given at Table 3.2 and distribution of Mines by size (Major mineral only excluding Coal) State wise is given at Annexure 3.4.
## Table 3.1
Number of Reporting Mines

<table>
<thead>
<tr>
<th>Sector</th>
<th>2009-10(R)</th>
<th>2010-11(P)</th>
<th>2011-12(P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal (including Lignite)</td>
<td>560</td>
<td>573</td>
<td>573</td>
</tr>
<tr>
<td>Metallic Minerals</td>
<td>701</td>
<td>687</td>
<td>553</td>
</tr>
<tr>
<td>Non-Metallic Minerals</td>
<td>1779</td>
<td>1668</td>
<td>1523</td>
</tr>
<tr>
<td><strong>All Minerals Total</strong></td>
<td><strong>3040</strong></td>
<td><strong>2928</strong></td>
<td><strong>2649</strong></td>
</tr>
</tbody>
</table>

*Excluding atomic minerals, petroleum (crude), natural gas (utilized) and minor minerals.

## Table 3.2
Area wise Distribution of Mining Leases* (Frequency in Hect.) as on 31st March, 2010 (All India)

<table>
<thead>
<tr>
<th>Frequency Group (Area in Hect.)</th>
<th>Number of Mining Leases</th>
<th>Percent of Total Leases</th>
<th>Area in '000 Hects.</th>
<th>Percent of Total Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 10</td>
<td>6339</td>
<td>60</td>
<td>25</td>
<td>4</td>
</tr>
<tr>
<td>10 - 20</td>
<td>1009</td>
<td>10</td>
<td>15</td>
<td>3</td>
</tr>
<tr>
<td>20 - 50</td>
<td>1334</td>
<td>13</td>
<td>44</td>
<td>9</td>
</tr>
<tr>
<td>50 - 100</td>
<td>890</td>
<td>8</td>
<td>66</td>
<td>13</td>
</tr>
<tr>
<td>100 - 200</td>
<td>436</td>
<td>4</td>
<td>60</td>
<td>12</td>
</tr>
<tr>
<td>200 - 500</td>
<td>281</td>
<td>3</td>
<td>86</td>
<td>17</td>
</tr>
<tr>
<td>Above 500</td>
<td>199</td>
<td>2</td>
<td>211</td>
<td>42</td>
</tr>
<tr>
<td><strong>All Groups Total</strong></td>
<td><strong>10488</strong></td>
<td><strong>100</strong></td>
<td><strong>507</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

* Excluding Fuel, Atomic & Minor Minerals

3.8 The number of Underground Mines in operation Mineral wise (excluding fuel, atomic and minor minerals) is at Table 3.3.

## Table 3.3

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Cat. A</th>
<th>Cat. B</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apatite</td>
<td>-</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Asbestos</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Ball Clay</td>
<td>-</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Chalk</td>
<td>-</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Chromite</td>
<td>5</td>
<td>-</td>
<td>5</td>
</tr>
<tr>
<td>Copper Ore</td>
<td>3</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>Gold</td>
<td>3</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Lead &amp; Zinc</td>
<td>5</td>
<td>-</td>
<td>5</td>
</tr>
<tr>
<td>Manganese</td>
<td>8</td>
<td>5</td>
<td>13</td>
</tr>
<tr>
<td>Mica</td>
<td>3</td>
<td>22</td>
<td>25</td>
</tr>
<tr>
<td>Rock salt</td>
<td>-</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Steatite</td>
<td>2</td>
<td>19</td>
<td>21</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>30</strong></td>
<td><strong>53</strong></td>
<td><strong>83</strong></td>
</tr>
</tbody>
</table>

3.9 During the year 2011-12, mineral production was reported from 32 States/Union. Territories (actual reporting of MCDR & Fuel minerals from 22 States and estimation of minor minerals for all 32 States/Union Territories) of which the bulk of value of mineral production of about 91.41% was confined to 11 States (including offshore areas) only. Offshore areas are in leading position, in terms of value of mineral production in the country and had the share of 25.79% in the national output. Next in order was Odisha with a share of 12.02% followed by Chhattisgarh (9.15%), Rajasthan (9.01%), Andhra Pradesh (6.99%), Gujarat (6.83%), Jharkhand (5.86%), Madhya Pradesh (4.69%), Assam (4.63%), Goa (3.30%) and Karnataka.
(3.13%) in the total value of mineral production. Remaining 22 States and Union Territories having individual share of less than 3% altogether accounted for 8.59% of total value during the year under review. The contribution of States/Regions in the value of mineral production during 2011-12 is pictorially shown in Figure 3.4.

3.10 State-wise analysis revealed that during the year 2011-12, the value of mineral production has shown a mixed trend as compared to that in the previous year. The States, which have indicated an increase in the value of mineral production, are Chhattisgarh (36.23%), Odisha (12.07%), West Bengal (11.37%), Gujarat (6.7%), Himachal Pradesh (5.30), Rajasthan (3.91%), Jammu & Kashmir (1.10%), Bihar (1.02%), Kerala (0.89%). However, some of the principal mineral producing States revealed decrease in value of mineral production and those includes Meghalaya (71.54%), Jharkhand (24.85%), Arunachal Pradesh (22.68%), Maharashtra (19.25%), Madhya Pradesh (12.08%), Andhra Pradesh (11.37%), Tamil Nadu (9.29%), Tripura (8.46%), Goa (6.30%), Karnataka (5.31%), Uttar Pradesh (3.82%) and Uttarakhand 2.58%. The all India Reserves and Resources of various minerals as on 1st April, 2010, as per UNFC System, is given in at Annexure 3.5.

3.11 During the year 2010-11, the Public Sector continued to play a dominant role in mineral production accounting for 66.51% or ₹128271 crore in the total value. Small mines, which were mostly in the private sector, continued to be operated manually either as propriety or partnership ventures. The minerals which were wholly mined/recovered by the public/joint sector in 2010-11 were Copper ore and concentrate, Diamond, Dunite, Fluorite (graded) & concentrate Phosphorite/Rock Phosphate, Rock salt, Selenite and Sulphur. By and large, almost the entire production of Sand (others), Lignite, Gold (primary and secondary of indigenous origin) and Gypsum was from Public Sector. In 2010-11, the Public Sector accounted for sizeable 91% production of coal, 81.78 of Tin concentrate, 74.33% of petroleum(crude), 68.79% of Kyanite and 62.34% of Magnesite.

3.12 India’s ranking in 2009 as compared to world production was second in barytes, chromite and talc/steatite/pyrophyllite, third in coal & lignite and steel (crude), fourth in iron ore and kyanite/andalusite/sillimanite, fifth in manganese ore and zinc slab, sixth in bauxite, and seventh in aluminium.
The statistics on indigenous and world production of principal minerals and metals are given in at Annexure 3.6.

Self-Reliance in Minerals & Mineral Based Products

3.13 India continued to be wholly or largely self-sufficient in minerals which constitute primary mineral raw materials to industries, such as, thermal power generation, iron & steel, ferro-alloys, aluminium, cement, various types of refractories, china clay-based ceramics, glass, chemicals like caustic soda, soda ash, calcium carbide, titania white pigment, etc. India is, by and large, self-sufficient in coal (with the exception of very low ash coking coal required by the steel plants) and lignite among mineral fuels; bauxite, chromite, iron and manganese ores, ilmenite and rutile among metallic minerals; and almost all the industrial minerals with the exception of chrysotile asbestos, borax, fluorite, kyanite, potash, rock phosphate and elemental sulphur. Despite high degree of self-sufficiency, some quantities of flaky and amorphous graphite of high fixed carbon, kaolin and ballclay for special applications, very low silica limestone, dead-burnt magnesite and sea water magnesia, battery grade manganese dioxide, etc. were imported to meet the demand for either blending with locally available mineral raw materials and/or for manufacturing special qualities of mineral-based products. To meet the increasing demand of uncut diamonds, emerald and other precious and semiprecious stones by the domestic cutting and polishing industry, India continued to depend on imports of raw uncut stones for their value-added re-exports. The degree of self-sufficiency in respect of various principal minerals and metals/ferro-alloys in 2009-10 is given in at Annexure 3.7.

PRODUCTION TRENDS

Metallic Minerals

3.14 The value of metallic minerals in 2010-11 at ₹ 45156 crore increased by about 42% over the previous year. Among the principal metallic minerals, iron ore contributed ₹ 37534.34 crore or 83.12%, Zinc concentrate ₹ 1763.39 crore or 3.91%, manganese ore ₹ 1369.58 crore or 3.04%, chromite ₹ 2295.57 crore or 5.08%, Bauxite ₹ 473.75 crore or 1.05%, copper (concentrate) ₹ 546.93 crore or 1.21%, Silver ₹ 543.77 or 1.20%, Gold ₹ 331.39 crore or 0.95%, while the remaining was shared by Lead and tin concentrates.

The production of iron ore at about 207.99 million tonnes in 2010-11 registered a decrease of 4.83% over the previous year. About 4.83% of the total production was shared by Public Sector Companies like SAIL (including IISCO), NMDC, etc. The share of Private Sector was 72% which included Tata Steel (formerly TISCO). Almost the entire production of iron ore (97%) accrued from Andhra Pradesh, Chhattisgarh, Goa and Jharkhand during the year. The remaining 3% production was reported...
from Karnataka, Odisha, Madhya Pradesh and Maharashtra.

The production of copper concentrate an 136.86 thousand tonnes in 2010-11 was increased by about 9.86% as compared to the previous year. Average metal content in copper concentrate was 23.16% Cu. The production of chromite at 4.26 million tonnes in 2010-11 increased by 24.42% as compared to the previous year. Odisha reported almost entire output of chromite (99%) in the country. A nominal production was reported from Karnataka. Mining of chromite was mostly dominated by private sector producers; viz, Tata Steel (formerly TISCO), IMFAL, Balasore Alloys Ltd., Jindal Strips Private Ltd. and FACOR having their own plants. They jointly accounted for 82% of total production during 2010-11. Three Public Sector Companies; viz, Odisha Mining Corporation (OMC), Mysore Mineral Ltd. (MML) and Industrial Development Corp. of Odisha Ltd. (IDCOL) together reported 18% of the total production in 2010-11. The production of manganese ore at 2.88 million tonnes in 2010-11 increased by about 15.61% compared to that in the previous year. MOIL continued to be the largest producer of manganese ore with a share of 38% of the total production in 2010-11 followed by Tata Steel (11%), SIMIOR (9%), OMM (6%), and GMDCL 6%. Of the total production of manganese ore in 2010-11, Madhya Pradesh contributed 25%, Odisha contributed 23%, Maharashtra 22%, Karnataka 14% and Andhra Pradesh 10%. The remaining 7% was jointly shared by Goa, Gujarat, Rajasthan and Jharkhand.

The production of primary gold at 2239 kg (excluding by-product gold recovery from imported concentrates) in 2010-11 registered increase of about 7.44% as compared to the previous year. Karnataka was the leading producer of gold accounting for 99% of the total production. The remaining production was reported from Jharkhand. The production of bauxite at 12.64 million tonnes in 2010-11 decreased by 10.50% compared to the previous year. Five major companies, namely NALCO, HINDALCO, BALCO, Ashapura Minechem Ltd. and Gujarat Mineral Development Corporation Ltd. dominated the total mining activities of bauxite of the country in 2010-11. Odisha accounted for 38% of the total output of bauxite during 2010-11 followed by Maharashtra 17%, Chhattisgarh 17%, Jharkhand 14% and Gujarat 7%.

During the year 2010-11, the production of lead concentrate at 145 thousand tonnes increased by 8.3% and that of zinc concentrate at 1420 thousand tonnes showed an increase of 10.96% over the previous year. Average metal content in lead concentrate was 57.46% Pb and that in zinc concentrate was 51.16% Zn. Rajasthan accounted for the entire production of lead concentrate and zinc concentrate during the year 2010-11.

Non-Metallic Minerals

3.15 The value of production of non-metallic minerals at ₹ 4892.19 crore during 2010-11 increased by 4.75% as compared to the previous year.
Limestone retained its leading position by contributing 65.4% of the total value of non-metallic minerals in the year 2010-11. The other non-metallic minerals in the order of importance were phosphorite/rock phosphate (11.3%), barytes (5.4%), dolomite (3.07%), gypsum (2.67%), garnet (abrasive) (2.45%), talc/soapstone/steatite (1.21%), natural kaolin (1.03%), sillimanite (0.87%) and Silica Sand (0.70%). The remaining was from other non-metallic minerals.

The production of limestone was at 238 million tonnes in the year 2010-11 increased by 2.07%, as compared to that in the previous year. Limestone is widely produced in India. As much as, 87% of the total output in the year 2010-11 was contributed by seven principal States; viz, Andhra Pradesh (22%), Rajasthan (18%), Madhya Pradesh (13%), Gujarat (9%), and Tamil Nadu, Chhattisgarh and Karnataka (8% each). The remaining 14% of the total production was shared by other limestone producing States. About 54% of total production was reported by principal producers, namely, Ultra Tech Cement Limited (17%), Ambuja Cement (8%), ACC Limited (7%), Jaiprakash Associates Limited (5%), Shri Cement Limited & The India Cement Limited (4% each), Kesoram Cement Limited, Binani Cement Limited and Madras Cements Limited (3% each).

The production of phosphorite/rock phosphate at 215 thousand tonnes increased by 34.05% in the year 2010-11 as compared to the previous year. The entire production was from Public Sector. Jhamarkotra mine of Rajasthan State Mines & Minerals Ltd. (RSMML), alone accounted for 94% of the total production in India and the entire production of Rajasthan during the year 2010-11. Madhya Pradesh contributed the remaining 6% of the production. The production of dolomite at 5065 thousand tonnes in 2010-11 registered 14.33% decrease as compared to the preceding year. Steel Authority of India Ltd. is the major producer of dolomite accounting 24% of total production followed by the Bisra Stonelime Co. Ltd. 12%, Rastriya Ispat Nigam Ltd. 10%, Tata Steel 9%, South West Mining 4% and Manish Singh 3% during 2010-11. Andhra Pradesh (21%), Chhattisgarh (27%), and Odisha (22%) were the principal producing States of dolomite. The remaining 30% was contributed by Seven States during the year, namely, Gujarat, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Uttarakhand and Rajasthan.

The production of kaolin in 2010-11 was at 2522 thousand tonnes decreased by 9.87%, as compared to that in the previous year. Nearly, 50% of total output of kaolin in 2010-11 was reported from Gujarat followed by Kerala (27%) and by Rajasthan (17%). Production of gypsum at 4.35 million tonnes in 2010-11, registered a increase of 28.97% as compared to the previous year. By and large, the entire production of gypsum was reported from Rajasthan (99%). The remaining 1% was from Jammu & Kashmir and Gujarat. Two Public Sector Companies, namely,
RSMML and Fertilizer Corporation of India Ltd. accounted for almost the entire production. The production of magnesite was at 230 thousand tonnes during 2010-11 decreased by 23.69% as compared to the previous year. The production of talc/soapstone/steatite in the year 2010-11 was at 896 thousand tonnes increased by about 2.2% over the previous year. Rajasthan, the principal State accounted for 74% of the total production in 2010-11. Five principal producers in Rajasthan; namely, Associated Soapstone Distributing Co. (P) Ltd. (30%), Udaipur Mineral Development Syndicate (P) Ltd. (19%), Rajasthan Mineral and Company (4%), Katiyar Mining and Industrial Corporation (4%) and Nalwaya Mineral Industry Pvt. Ltd. (4%) together accounted for 61% of the total production of talc/soapstone/steatite in the year 2010-11.

**Minor Minerals**

3.16 The value of production of minor minerals was estimated at `19623.91 crore in the year 2010-11. Andhra Pradesh with share of 38.5% in the value of minor minerals produced in the country occupied the top position. Rajasthan was at second place and had a share of 23.4% in the value of minor minerals. Next in the order was Uttar Pradesh with a share of 14%, Madhya Pradesh 8.7%, Kerala 4.6%, Gujarat 3.7%, Maharashtra 1.6% and Chattisgarh 1.3%. The contribution of remaining States and UTs was less than one percent each.

Mineral-wise analysis revealed that Road metals had the largest share of 24.6% to the value of minor minerals followed by Building Stone 23.8%, Brick-earth 12.4%, Ordinary Sand 11.2%, Marble 5.9%, Gravel 5.1%, Quartzite & Sand Stone 4.2%, Lime Stone 3.9%, Murrum 2.8, Kankar 1.9% and Ordinary Earth 1.7%. The individual share of remaining minerals was less than 1.0% which together contributed 2.5% of value of minor minerals. The share of minor minerals in the value of mineral production was estimated at Rs 19623.91 crore for 2009-10 and 2010-11.

**State-wise Mineral Scenario**

3.17 During the year 2010-11, mineral production was reported from 32 States/Union Territories of which the bulk of value of mineral production of about 90.03% was confined to 11 States (including offshore areas) only. Offshore areas continued to be in leading position, in terms of value of mineral production in the country and had the share of 25.64% in the national output. Next in order was Odisha with a share of 10.62% followed by Rajasthan (8.58%), Andhra Pradesh (7.81%), Jharkhand (7.72%), Chhattisgarh (6.65%), Gujarat (6.33%), Madhya Pradesh (5.28%), Assam (4.64%), Goa (3.49%) and Karnataka (3.27%) and in the total value of mineral production. Remaining 21 States/Union Territories having individual share of 3% or less than 3% all together accounted for 9.97% of total value during the year under review.
3.18 State-wise analysis revealed that during the year 2010-11, the value of mineral production in most of the mineral producing States have shown a mixed trend as compared to that in the previous year. The States which have indicated an increase in the value of mineral production are Chhattisgarh (41.94%), Himachal Pradesh (41.81%), Bihar (32.77%), Odisha (31.64%), Karnataka (26.20%), Uttar Pradesh (9.95%) and Tripura (8.36%) during the year under review. However, some of the principal mineral producing States revealed decrease in value of mineral production and some of those includes Jammu & Kashmir (33.67%), Kerala (11.25%), Arunachal Pradesh (7.19%), Andhra Pradesh (6.52%), West Bengal (6.35%), Maharashtra (2.82%) and Assam 1.42%.

SCENARIO OF MINERAL RICH STATES

3.19 The review of Mineral rich States of India is given in the subsequent paragraphs.

1. ANDHRA PRADESH

Mineral Resources

Andhra Pradesh is the leading producer of chrysotile asbestos, barytes, mica, felspar, vermiculite, quartz, laterite, silica sand, dolomite and limestone. State accounts for 94% barytes, 78% Kyanite, 61% ball clay, 70% corundum, 6% diamond, 42% calcite, 41% mica, 26% garnet, 23% ilmenite, 20% limestone and 15% dolomite resources of the country. State is endowed with the internationally known black, pink, blue and multicoloured varieties of granites. Krishna-Godavari basin areas of the State have emerged as new promising areas for hydrocarbons-specially natural gas. Important minerals occurring in the State are apatite in Visakhapatnam district; asbestos in Cuddapah district; ball clay in West Godavari district; barytes in Anantapur, Cuddapah, Khammam, Krishna, Kurnool, Nellore and Prakasam districts; calcite in Anantapur, Cuddapah, Kurnool and Visakhapatnam districts; china clay in Adilabad, Anantapur, Chittoor, Cuddapah, East Godavari, West Godavari, Guntur, Kurnool, Mahaboobnagar, Nalgonda, Nellore, Rangareddy, Visakhapatnam and Warangal districts; coal in Adilabad, East and West Godavari, Karimnagar, Khammam and Warangal districts; corundum in Anantapur and Khammam districts; dolomite in Anantapur, Cuddapah Khammam, Kurnool and Warangal districts; felspar in Anantapur, Cuddapah West Godavari, Hyderabad, Khammam, Mahaboobnagar, Medak, Nalgonda, Nellore, Rangareddy and Vizianagaram districts; fireclay in Adilabad, Chittoor, Cuddapah, East Godavari, West Godavari, Kurnool, Nalgonda and Srikakulam districts; garnet in East Godavari, Khammam and Nellore districts; granite in Anantapur, Chittoor, Cuddapah, East Godavari, West Godavari, Kurnool, Nalgonda and Srikakulam districts; iron ore (hematite) in Anantapur, Cuddapah, Guntur, Khammam, Krishna,
Kurnool Nellore & Prakasam districts; iron ore (magnetite) in Adilabad, Prakasam and Warangal districts; lead-zinc in Cuddapah, Guntur and Prakasam districts; limestone in Adilabad, Anantapur, Cuddapah, East Godavari, West Godavari, Guntur, Hyderabad, Karimnagar, Krishna, Kurnool, Mahaboobnagar, Nalgonda, Nellore, Rangareddy, Srikakulam, Visakhapatnam and Vizianagaram districts; manganese ore in Adilabad, Srikakulam and Vizianagaram districts; mica in Khammam and Nellore districts; ochre in Anantapur Cuddapah, West Godavari, Guntur, Kurnool and Visakhapatnam districts; pyrophyllite in Anantapur Chittoor & Cuddapah districts; quartz/silica sand in Anantapur, Chittoor, Cuddapah, West Godavari, Guntur, Hyderabad, Khammam, Krishna, Kurnool, Mahaboobnagar, Medak, Nalgonda, Nellore, Prakasam, Rangareddy, Srikakulam, Visakhapatnam, Vizianagaram and Warangal districts; quartzite in Chittoor, cuddapah Kurnool, Srikakulam, Visakhapatnam and Vizianagaram districts; steatite in Anantapur, Chittoor, Cuddapah, Khammam and Kurnool districts and vermiculite in Nellore and Visakhapatnam districts. Petroleum and natural gas deposits of importance are located in the onshore and offshore areas of Krishna-Godavari basin of the State. Other minerals that occur in the State are bauxite in East Godavari and Visakhapatnam districts; chromite in Khammam and Krishna districts; copper in Guntur, Khammam, Kurnool and Prakasam districts; diamond in Anantapur, Krishna and Kurnool districts; fuller’s earth in Medak and Rangareddy districts; gold in Anantapur, Chittoor and Kurnool districts; graphite in East Godavari, West Godavari, Khammam, Srikakulam, Visakhapatnam and Vizianagaram districts; gypsum in Guntur, Nellore and Prakasam districts; kyanite in Khammam, Nellore and Prakasam districts; magnesite in Cuddapah district; marble in Khammam district; pyrite in Kurnool district; sillimanite in Srikakulam & West Godavari districts; silver in Guntur district; titanium minerals in East Godavari, Krishna, Nellore, Srikakulam and Visakhapatnam districts; and tungsten in East Godavari district.

Production

The value of mineral production in Andhra Pradesh at ₹ 16587.51 crore in 2010-11 was less by about 6.52% as compared to that in the previous year. Almost all important minerals are produced in Andhra Pradesh. The principal minerals produced in the State were coal, natural gas (utilised), iron ore, limestone, petroleum (crude), barytes and which together accounted for 53.32% of total value of mineral production in the State during the year 2010-11. Coal alone contributed 41.35% of the total value of mineral production in the State.

Andhra Pradesh claims the Third position among the States in the country with a contribution of 7.81% to the total value of the mineral production. The share of Andhra Pradesh in the production of
principal minerals was barytes 99.74%, mica (crude) 98.75%, felspar 43.33%, vermiculite 90.20%, quartz 43.27%, laterite 54.46%, silica sand 36.74%, dolomite 21.17%, clay (others) 12.67%, Sand (others) 87.31% and apatite 67.23 % in the country.

Among the important minerals produced in the State, output of manganese ore increased by 8.54% and petroleum (crude) by 0.33%. In the same manner, increase was observed in coal 1.80% barytes 8.44%, asbestos 6.17%, ball clay 26.72, garnet 21.85%, laterite 5.77%, ocher 3.30% and vermiculite 97.68 %. However, the production iron ore decreased by 77.0%, kaolin 89.14shale by 14.87%, steatite by 23.0% natural gas by 6.49%, lime kankar by 21.15%, fireclay by 9.67 and dolomite by 32.02%.

The production value of minor minerals was estimated at ₹ 7550.0 crore for the year 2010-11. The number of reporting mines in the State was 427 in 2010-11, as compared to 456 in the previous year. The index of mineral production in Andhra Pradesh (base 1993-94=100) was 309.88 in 2010-11, as against 293.54 in the previous year.

2. CHHATTISGARH

Mineral Resources

Chhattisgarh is the sole producer of tin concentrates and is one of the leading producers of coal, dolomite and iron ore. State accounts for about 36% tin ore, 4% diamond, 18% iron ore (hematite), 17% coal and 11% dolomite resources of the country. Important mineral occurrences of the State are bauxite in Bastar, Bilaspur, Dantewada, Jashpur, Kanker, Kawardha (Kabirdham), Korba, Raigarh and Sarguja districts; china clay in Durg and Rajnandgaon districts; coal in Koria, Korba, Raigarh and Sarguja districts; dolomite in Bastar, Bilaspur, Durg, Janjgir - Champa, Raigarh and Raipur districts; iron ore (hematite) in Bastar district, Bajuladla deposit in Dantewada district, Chhote Dongar deposit in Kanker district, Rowghat, Chhargaon, Metabodeli and Hahaladdi deposits in Rajnandgaon district, Boria Tibbu deposits in Dalli-Rajhara area, Durg district. Bajuladila-Rowghat hill ranges in the State are considered to be one of the biggest iron ore fields in India. Limestone occurs in Bastar, Bilaspur, Durg, Janjgir-Champa, Kawardha (Kabirdham), Raigarh, Raipur and Rajnandgaon districts; quartzite in Durg, Raipur, Rajnandgaon and Raigarh districts; and talc/steatite in Durg district. Other minerals occurring in the State are corundum in Dantewada district; diamond and other gemstones in Raipur, Mahasamund and Dhamtari districts; gold in Raipur, Jashpur, Kanker and Mahasamund districts; fire clay in Bilaspur, Raigarh and Rajnandgaon districts; fluorite in Rajnandgaon district; garnet and marble in Bastar district; emerald and gold in Raipur district; granite in Bastar, Kanker and Raipur districts; quartz/silica sand in Durg, Raigarh, Raipur and Rajnandgaon districts; and tin in Bastar and Dantewada districts.
Production

The value of mineral production in Chhattisgarh at ₹ 14133.87 crore in 2010-11, got increased by 41.96%, as compared to that in the previous year. The State is ranked fifth in the country and accounted for 6.65% of the total value of the production. The important minerals produced in the State in the year 2010-11 were coal, iron ore, bauxite, dolomite and limestone which together accounted for about 98.13% of the entire value of mineral production in the State. Chhattisgarh was the sole producer of tin concentrate. The State was the leading producer of coal with a share of 21.30% and that of iron ore was 14.01% in the country. During the year 2010-11, the production of coal increased by 3.50%, bauxite by 25.07% and limestone by 25.96 %. There was a decrease in production of quartzite by 100 %.

The production value of minor minerals was estimated at ₹ 261.19 crore for the year 2010-11. The number of reporting mines in Chhattisgarh was 151 in 2010-11 as against 152 in the previous year. The index of mineral production in Chhattisgarh (base 1993-94=100) was 264.33 in the year 2010-11 as against 250.7 in the previous year.

3. GOA

Mineral Resources

Goa is well known for its iron and manganese ores. Bauxite and laterite are the other minerals produced in the State. Iron and manganese ore belts extend from South-East to North-West of the State. Important iron ore deposits are located in Bicholim, Sanguem and Satari talukas. Manganese ores are associated with iron ores and occur as pockets of various sizes in a form of concretionary pebbles in shales. Important manganese ore deposits are confined to the Southern and South-Eastern parts of Sanguem taluka. Bauxite occurs in North & South Goa.

Production

The value of mineral production in Goa in 2010-11 got increased by 32.67% as compared to the previous year and was at ₹ 7409.82 crore. About 99.90% of the total value of mineral production in Goa was contributed by iron ore. Production of bauxite and minor minerals was also reported from the State in the year 2010-11. During the year under review, production of bauxite increased by more than three times and production of iron ore decrease by 3.71% and manganese ore by 23.38 % over the previous year.

The production value of minor minerals was estimated at ₹ 5.73 crore for the year 2010-11. There were 75 reporting mines in both the years. The index of mineral production in Goa (base 1993-94=100) was 257.56 in the year 2010-11 as against 267.33 in the previous year.

4. GUJARAT

Mineral Resources

Gujarat is the sole producer of agate, chalk, and perlite and is leading producer of fluorite (concentrate), fireclay, silica
sand, lignite, laterite, petroleum and natural gas and bauxite in the country. State is the sole holder of country’s resources of perlite, 66% of fluorite, 28% of diatomite, 18% of bentonite and 12% of wollastonite.

Important mineral occurrences in the State are agate found in Deccan Trap flows in Bharuch district; bauxite in Amreli, Bhavnagar, Jamnagar, Junagadh, Kheda, Kachchh, Porbander, Sabarkantha and Valsad districts; ball clay in Kachchh district; bentonite in Amreli, Bhavnagar, Jamnagar, Kachchh and Sabarkantha district; china clay in Amreli, Banaskantha, Bhavnagar, Jamnagar, Junagadh, Kachchh, Mehsana and Sabarkantha districts; chalk in Porbandar district; diatomite in Bhavnagar district; dolomite in Bhavnagar and Vadodara districts; fireclay in Bharuch, Kachchh, Mehsana, Rajkot, Sabarkantha, Surat and Surendranagar districts; fluorite in Vadodara and Bharuch districts; fuller’s earth in Bhavnagar and Kachchh districts; gypsum in Bhavnagar, Jamnagar, Junagadh, Kachchh and Surendranagar districts; lignite in Bharuch, Bhavnagar, Kachchh and Surat districts; limestone in Amreli, Junagadh, Kheda, Kachchh, Panchmahals, Porbandar, Rajkot, Sabarkantha, Surat, Vadodara and Valsad districts; ochre in, Bhavnagar, Kachchh and Patan districts; perlite in Rajkot district; petroleum and natural gas in oil fields of Ankaleshwar, Kalol, Navgam, Balol and Cambay in Cambay onshore and offshore basins; quartz/silica sand in Bharuch, Bhavnagar, Dahod, Kheda, Kachchh, Panchmahals, Rajkot, Sabarkantha, Surat, Surendranagar, Vadodara and Valsad districts; and steatite in Sabarkantha district. Other minerals that occur in the State are apatite and rock phosphate in Panchmahals district; calcite in Amreli and Bharuch districts; copper ore in Banaskantha district; granite in Banaskantha, Mehesana and Sabarkantha districts; graphite in Panchmahals district; lead-zinc and marble in Banaskantha and Vadodara districts; manganese ore in Panchmahals and Vadodara districts; vermiculite in Vadodara district; and wollastonite in Banaskantha district.

Production

The value of mineral production in Gujarat in 2010-11 at ₹ 12731.07 crore, recorded about 0.55% increase as compared to that in the previous year. The State was ranked sixth in the country and accounted for about 6.33% of the total value of mineral production in India during the year. Gujarat was the sole producer of agate, chalk and fluorite (concentrate) and the leading producer of Kaolin, Marl, and silica sand in the country.

The State was also the second largest producer of lignite and petroleum (crude) in the country during the year 2010-11. Production of ochre by more than four times, manganese ore by more than three times, silica sand by more than double and that of lignite 24.49% , agate 72.73, laterite 26.89, %. The most of
the minerals reporting fall in production during 2010-11 like bauxite 66.0, ball clay by 35.5%, clay (others) by 55.92% dolomite by 75.6% and fireclay by 64.35%. Fall in production was due to less plant requirement, shortage of labour etc.

The production value of minor minerals was estimated at ₹ 725.67 crore for the year 2010-11. The number of reporting mines in the State was 412 in 2010-11 as compared to 446 in the previous year. The index of mineral production in Gujarat (base 1993-94=100) was 111.19 in the year 2010-11 as against 112.78 in the previous year.

5. JHARKHAND
Mineral Resources
Jharkhand carved out of Bihar in November, 2000 is one of the leading mineral producing States. It is one of the leading producers of coal, kyanite, gold, silver, bauxite and felspar. Uranium ore is being mined and processed by Uranium Corporation of India Ltd. (UCIL) for use as fuel in the country’s nuclear power reactors through four underground mines, an opencast mine, two processing plants and a by-product recovery plant, all in East Singhbhum district. Jharkhand accounts for about 36% rock phosphate, 29% coal, 29% iron ore (hematite), 30% apatite, 22% andalusite, 18% copper ore and 5% silver ore resources of the country.

Important minerals occurring in the State are bauxite in Dumka, Gumla, Latehar, Lohardaga and Palamau districts; china clay in Dumka, Hazaribagh, Lohardaga, East & West Singhbhum, Sahebganj and Ranchi districts; coal in Bokaro, Deoghar, Dhanbad, Giridih, Godda, Hazaribagh, Palamau, Pakur, and Ranchi districts; copper in Hazaribagh and East Singhbhum districts; dolomite in Garhwa and Palamau districts; felspar in Deoghar, Dhanbad, Dumka, Giridih, Hazaribagh, Jamtara, Koderma, Latehar Palamau and Ranchi districts; fireclay in Dhanbad, Dumka, Giridih, Godda, Hazaribagh, Palamau, Ranchi and West Singhbhum districts; gold in East Singhbhum district; graphite in Palamau district; iron ore (hematite) in West Singhbhum district; iron ore (magnetite) in Gumla, Hazaribagh, Latehar, Palamau and East Singhbhum districts; kyanite in East Singhbhum, Saraikela, Kharaswan, districts; limestone in Bokaro, Dhanbad, Garhwa, Giridih, Hazaribagh, Palamau, Ranchi, East & West Singhbhum districts; manganese ore in East Singhbhum district; mica in Giridih and Koderma districts; ochre in West Singhbhum district; dunite/ pyroxenite in East Singhbhum district; quartz/silica sand in Deoghar, Dhanbad, Dumka, Giridih, Godda, Hazaribagh, Koderma, Palamau, Ranchi, Sahebganj, East & West Singhbhum districts; and quartzite in East & West Singhbhum districts.

Other minerals that occur in the State are in Garwah district; andalusite and rock phosphate in Palamau district; apatite, chromite, cobalt, nickel, gold and silver in East Singhbhum district;
asbestos in East & West Singhbhum districts; barytes in Palamau and East Singhbhum districts; bentonite in Pakur and Sahebganj districts; garnet in Hazaribagh district; granite in Deoghar, Dhanbad, Dumka, Giridih, Godda, Gumla, Hazaribagh, Koderma, Lohardaga, Palamau, Ranchi and East Singhbhum districts; sillimanite in Hazaribagh district; talc/steatite in Giridih, Palamau, East & West Singhbhum districts; titanium minerals in Ranchi and East Singhbhum districts; and vermiculite in Giridih and Hazaribagh districts.

Production

The value of mineral production in Jharkhand during the year 2010-11 at ` 16402.08 crore got increased by about 6.35 % over the previous year. The State claiming fourth position in the country accounted for 7.72% of the total value of mineral production during 2010-11. Jharkhand was the leading producer of kyanite and second leading producer of graphite in the country. The state was third leading producer of felspar during the year. Coal, the principal mineral produced in the State contributed 88.58% of the total value of mineral production in the State. The other principal minerals produced in the State were iron ore, bauxite, pyroxenite, quartzite and copper concentrate.

Among the important minerals, production of coal increased by 3.39%, iron ore 2.78%, fireclay by 66.71%, bauxite by 9.41%, Graphite 66.71% and quartzite by 129.65% during the year 2010-11 as compared to the previous year. However, the output of manganese ore declined by 85.56%, limestone by 9.72%, laterite by 76%, gold ore by 20.36%, Silica Sand by 6.94% and kyanite by 19.75% owing to disruptions by naxal outfits and less market demand.

The production value of minor minerals was estimated at ` 40.14 crore. The number of reporting mines in Jharkhand during 2010-11 was 291 as against 299 during previous year. The index of mineral production in Jharkhand (Base1993-94=100) was 148.45 in 2010-11 as compared to 143.82 in the previous year.

6. KARNATAKA

Mineral Resources

Karnataka has the distinction of being the main gold producing State in the country. The State is the sole producer of felsite and leading producer of iron ore, chromite and dunite. Karnataka hosts country’s 78% vanadium ore, 73% iron ore (magnetite), 42% tungsten ore, 37% asbestos, 34% titaniferous magnetite, 30% limestone, 25% granite, 22% manganese ore, 14% corundum, 17% dunite, 17% gold (primary), 13% kyanite and 12% iron ore (hematite) resources. The important minerals occurring in the State are bauxite in Belgaum, Chickballapura Chickmagalur, Uttar and Dakshin Kannad & Udupi districts; china clay in Bangalore, Belgaum, Bellary, Bidar, Chickmagalur, Dharwad, Gadag, Hassan, Haveri, Kolar, Uttar and Dakshin Kannad, Shimoga
and Tumkur districts; chromite in Chikmangalur, Hassan and Mysore districts; dolomite in Bagalkot, Belgaum, Bijapur, Chitradurga, Mysore, Uttar Kannad and Tumkur districts; dunite/pyroxenite in Chikmagalur, Hassan and Mysore districts; felspar in Bangalore, Belgaum, Chitradurga, Hassan and Raichur districts; fireclay in Bangalore, Chitradurga, Dharwad, Hassan, Kolar, Shimoga and Tumkur districts; gold in Chitradurga, Dharwad, Gulbarga, Hassan, Haveri, Kolar, Raichur and Tumkur districts; iron ore (hematite) in Bagalkot, Bellary, Chikmagalur, Chitradurga, Davangere Dharwad, Gadap, Hareri Uttar Kannad, Shimoga and Tumkur districts; iron ore (magnetite) in Chikmagalur, Hassan, Uttar and Dakshin Kannad and Shimoga districts; kyanite in Chikmagalur, Chitradurga, Coorg, Mandya, Mysore, Shimoga and Dakshin Kannad districts; limestone in Bagalkot, Belgaum, Bellary, Bijapur, Chikmagalur, Chitradurga, Davangere, Gadag, Gulbarga, Hassan, Mysore, Uttar and Dakshin Kannad, Shimoga, Tumkur and Udupi districts; magnesite in Coorg, Mandya and Mysore districts; manganese ore in Belgaum, Bellary, Chikmagalur, Chitradurga, Davangere, Gadag Uttar Kannad, Shimoga and Tumkur districts; ochre in Bellary, Bidar and Kolar districts; quartz/silica sand in Bagalkot, Bangalore, Belgaum, Bellary, Chikmagalur, Chitradurga, Davangere, Dharwad, Gulbarga, Hassan, Haveri, Kolar, Koppal, Mandya, Mysore, Uttar & Dakshin Kannad, Raichur, Shimoga, Tumkur and Udupi districts; and steatite in Bellary, Chikmagalur, Chitradurga, Hassan, Mandya, Mysore, Raichur and Tumkur districts.

Other minerals that occur in the State are asbestos in Chikmagalur, Hassan, Mandya, Mysore and Shimoga districts; barytes and pyrite in Chitradurga district; calcite in Belgaum, Bijapur and Mysore districts; copper in Chikmagalur, Chitradurga, Gulbarga, Hassan, Uttar Kannad, Raichur and Shimoga districts; corundum in Bangalore, Bellary, Chitradurga, Coorg, Hassan, Mandya, Mysore and Tumkur districts; fuller’s earth in Belgaum and Gulbarga districts; granite in Bagalkot, Belgaum, Bellary, Bijapur, Chamrajnagar, Gulbarga, Hassan, Kolar, Koppal, Uttar Kannad, Raichur and Tumkur districts; graphite in Kolar and Mysore districts; gypsum in Gulbarga district; molybdenum in Kolar and Raichur districts; nickel in Uttar Kannad district; sillimanite in Hassan, Mysore and Dakshin Kannad districts; silver in Chitradurga and Raichur districts; titanium minerals in Hassan, Uttar Kannad and Shimoga districts; tungsten in Gadag, Kolar and Raichur districts; vanadium in Hassan, Uttar Kannad and Shimoga districts; and vermiculite in Hassan, Mandya and Mysore districts.

Production

The value of mineral production in Karnataka during the year 2010-11 at ₹ 6941.71 crore got increased by 26.20 % over the previous year. Iron ore, gold, manganese ore and limestone being
the important minerals produced in the State together accounted for about 99.42% of the total value of mineral production during the year. Karnataka was the major producer of gold with a share of 99.40% and the major producer of limeshell with a share of 38.1%, dunite (10.6%), shale (18.5%) and Iron Ore(18.21%) of total production in the country. Among the important minerals, production of gold ore increased by 41.08%, chromite by 30.97%, Limestone by 3.28%, magnesite by 8.34%, quartzite by 50.60% and fireclay by 121.35%. The production of felspar declined by 66.97%, bauxite by 46.87%, quartz by 96.36%, shale by 40.28%, laterite by 35.93% and dunite by 94.72 %. Decline in production was also noticed in kaolin 49.93% and silver 10.43%.

The production value of minor minerals was estimated at ₹ 17.99 crore for the year 2010-11. The number of reporting mines in Karnataka was 238 in 2010-11 as against 233 in the previous year. The index of mineral production in Karnataka (Base 1993-94=100) was 264.02 in the year 2010-11 as compared to 289.21 in the previous year.

7. MADHYA PRADESH
Mineral Resources
Madhya Pradesh is the only diamond producing State and is the leading producer of copper concentrate, pyrophyllite and diaspore. State hosts country’s 63% diaspore, 41% molybdenum ore, 56% pyrophyllite, 90% diamond, 24% copper ore, 17% rock phosphate, 13% manganese ore 16% fireclay and 7% ochre resources. Important mineral occurrences in the State are bauxite in Anuppur Balaghat, Guna, Jabalpur, Katni, Mandla, Rewa, Satna, Shahdol Shivpuri, Sidhi & Vidisha districts; calcite in Badwani, Jhabua and Khargone districts; china clay in Betul, Chhatarpur, Chhindwara, Gwalior, Hoshangabad, Jabalpur, Katni, Khargone, Narsinghpur, Raisen, Satna, Shahdol and Sidhi districts; copper in Balaghat, Betul and Jabalpur districts; coal in Betul, Shahdol and Sidhi districts; diamond in Chhatarpur & Panna district; diaspore & pyrophyllite in Chhatarpur, Sagar, Shivpuri and Tikamgarh districts; dolomite in Balaghat, Chhatarpur, Chhindwara, Damoh, Dewas, Harda, Hoshangabad, Jabalpur, Jhabua, Katni, Mandla, Narsinghpur, Sagar and Seoni districts; fireclay in Betul, Chhindwara, Jabalpur, Katni, Narsinghpur, Panna, Sagar, Shahdol and Sidhi districts; iron ore (hematite) in Betul, Gwalior, Jabalpur and Katni districts; limestone in Balaghat, Chhindwara, Damoh, Dhar, Hoshangabad, Jabalpur, Jhabua, Khargone, Katni, Mandsaur, Morena, Narsinghpur, Rewa, Sagar, Satna, Sehore, Shahdol and Sidhi districts; manganese ore in Balaghat, Chhindwara, Jabalpur and Jhabua districts; ochre in Dhar, Gwalior, Jabalpur, Katni, Mandla, Rewa, Satna, Shahdol and Umaria districts; quartz/silica sand in Balaghat, Dewas, Dhar, Jabalpur, Khandwa, Khargone, Morena, Rewa and Shahdol districts; talc/steatite/soapstone in Dhar, Jabalpur, Jhabua, Katni, Narsinghpur and
Sagar districts; and vermiculite in Jhabua district.

Other minerals that occur in the State are calcareous shales (used in slate pencil) in Mandsaur district; barites in Dewas, Dhar, Shivpuri, Sidhi and Tikamgarh districts; felspar in Jabalpur and Shahdol districts; fuller’s earth in Mandla district; gold in Jabalpur and Sidhi districts; granite in Betul, Chhattarpur, Chhindwara, Datia, Jhabua, Panna, Seoni and Shivpuri districts; graphite in Betul and Sidhi districts; gypsum in Shahdol district; lead-zinc in Betul district; molybdenum in Balaghat district; potash in Panna district; quartzite in Sehore district; rock phosphate in Chhatarpur, Jhabua and Sagar districts; and sillimanite in Sidhi district.

Production

The value of mineral production in Madhya Pradesh at ₹ 11225.04 crore in the year 2010-11 got increased by about 0.66 % as compared to the previous year. Madhya Pradesh contributed 5.28% to the total value of mineral production and was Seventh among States in the country. The State was the sole producer of diamond in the country. The State was the leading producer of pyrophyllite with a share of 87.70%, copper concentrates 57.60% Manganese ore(25.1%), and clay (others) (54.6%) in the national output of respective minerals. Madhya Pradesh was, also, the major producer of shale (19.8%), Diaspore (44.60%) and phosphorite 6.20 %. During 2010-11, the production of manganese ore increased by 18.93%, Shale 8.05%, Copper concentrate 21.36%, iron ore 64.93% and clay (others) by 37.26 %. However, downward trend in production was shown in bauxite by 44.57%, phosphorite by 37.15%, dolomite by 12.26, kaolin by 66.54% laterite by 46.08, ocher by 24.86 and shale by 6.10 %.

The production value of minor minerals was estimated at ₹ 1702.58 crore for the year 2010-11. The number of reporting mines in Madhya Pradesh was 295 in 2010-11 as against 287 in the previous year. The index of mineral production in Madhya Pradesh (base 1993-94=100) was 216.74 in 2010-11 as against 219.99 in the previous year.

8. MAHARASHTRA

Mineral Resources

Maharashtra is the sole producer of corundum and is the second largest producer of manganese ore after Odisha. The principal mineral-bearing belts in Maharashtra are Vidarbha area in the East and Konkan area in the West. Important mineral occurrences are bauxite in Kolhapur, Raigad, Ratnagiri, Satara, Sindhudurg and Thane districts; china clay in Amravati, Bhandara, Chandrapur, Nagpur, Sindhudurg and Thane districts; chromite in Bhandara, Chandrapur, Nagpur and Sindhudurg districts; coal in Nagpur, Chandrapur and Yavatmal districts; dolomite in Chandrapur, Nagpur and Yavatmal districts; fireclay in Amravati, Chandrapur, Nagpur and
MINERAL AND METAL SCENARIO

Ratnagiri districts; fluorite and Shale in Chandrapur district; iron ore (hematite) in Chandrapur, Gadchiroli and Sindhudurg districts; iron ore (magnetite) in Gondia district; kyanite in Bhandara and Nagpur districts; laterite in Kolhapur district; limestone in Ahmednagar, Chandrapur, Dhule, Gadchiroli, Nagpur, Nanded, Sangli and Yavatmal districts; manganese ore in Bhandara and Nagpur districts; corundum, pyrophyllite and sillimanite in Bhandara and Chandrapur districts; quartz and silica sand in Bhandara, Gadchiroli, Gondia, Kolhapur, Nagpur, Ratnagiri and Sindhudurg districts and quartzite in Bhandara, Gadchiroli, Gondia and Nagpur districts.

Other minerals that occur in the State are barytes in Chandrapur and Gadchiroli districts; copper in Bhandara, Chandrapur, Gadchiroli and Nagpur districts; felspar in Sindhudurg district; gold in Bhandara and Nagpur districts; granite in Bhandra, Chandrapur, Dhule, Gadchiroli, Nagpur, Nanded, Nasik, Sindhudurg and Thane districts; graphite in Sindhudurg district; lead-zinc in Nagpur district; marble in Bhandara and Nagpur districts; ochre and tungsten in Nagpur district; silver and vanadium in Bhandara district; steatite in Bhandara, Ratnagiri and Sindhudurg districts; and titanium minerals in Gondia and Ratnagiri districts.

Production

The value of mineral production in Maharashtra during the year 2010-11 at ₹ 5917.29 crore got decreased by 2.82% as compared to that in the previous year. Maharashtra accounted for about 2.78% of the total value of mineral production in the country during the year under review. It was the major producer of fluorite (graded) in the country during the year 2010-11. The State was the major producer of manganese ore and kyanite accounting for 21.63% and 36.31% respectively of total production of the mineral in the country. Among other important minerals, the State reported higher production during the year 2010-11 in respect of Kyanite by 88%, iron ore by 431.10% manganese ore by 1.56% and bauxite by 7.5 % and fall in production was reported in respect of fireclay by 54.57%, fluorite by 48.25% and sillimanite by 62.07 %. During the year under review no production of chromite, corundum and lateite was reported.

The value of production of minor minerals was estimated at ₹ 317.31 crore for the year 2010-11. The number of reporting mines was 157 in the year 2010-11 as against 158 in the previous year. The index of mineral production in Maharashtra (base 1993-94 = 100) in 2010-11 was 193.3, as against 200.09 in the previous year.

9. ODISHA

Mineral Resources

Odisha is the leading producer of chromite, graphite, bauxite, manganese ore, iron ore, sillimanite, quartzite, pyroxenite and dolomite. The State hosts country’s sole resources of ruby
and platinum group of metals 86%. It accounts for country’s 93% chromite, 92% nickel ore, 69% cobalt ore, 52% bauxite, 51% titaniferous magnetite, 44% manganese ore, 40% limestone, 22% pyrophyllite, 33% iron ore (hematite), 20% each mica & sillimanite, 25% each fireclay and garnet, 24% coal, 5% zircon and 20% vanadium ore resources.

Important minerals that occur in the State are bauxite in Bolangir, Kalahandi, Kandhamal, Keonjhar, Koraput, Malkangiri Roygada and Sundergarh districts; china clay in Barghar, Boudh, Bolangir, Keonjhar, Mayurbhanj, Sambalpur and Sundergarh districts; chromite in Balasore, Dhenkanal, Jajpur and Keonjhar districts. Chromite deposits of Sukinda and Nuasahi ultramafic belt constitute 95% of the country’s chromite resources. Coal occurs in IB river Valley coalfield, Sambalpur district and Talcher coalfield, Dhenkanal district; dolomite in Barghar, Keonjhar, Koraput, Sambalpur and Sundergarh districts; dunite/pyroxenite in Keonjhar district; fireclay in Angul, Bhubaneswar, Cuttack, Dhenkanal, Jharsuguda, Khurda, Puri, Sambalpur and Sundergarh districts; garnet in Ganjam and Sambalpur districts; graphite in Barghar, Boudh, Bolangir, Kalahandi, Kandhamal, Koraput, Nuapada and Rayagada districts; iron ore (hematite) in Dhenkanal, Jajpur, Keonjhar, Koraput, Mayurbhanj, Sambalpur and Sundergarh districts; iron ore (magnetite) in Keonjhar and Mayurbhanj districts; limestone in Barghar, Kalinga, Koraput, Malkangiri, Nuapada, Sambalpur and Sundergarh districts; manganese ore in Bolangir, Keonjhar, Koraput, Mayurbhanj, Sambalpur and Sundergarh districts; pyrophyllite in Keonjhar district; quartz/silica sand in Boudh, Bolangir, Kalahandi, Mayur bhang, Ragada, Sambalpur and Sundergarh districts; quartzite in Bolangir, Dhenkanal, Jajpur, Keonjhar, Jharsuguda, Mayurbhanj, Sambalpur and Sundergarh districts; sillimanite in Ganjam and Sambalpur districts; talc/steatite in Keonjhar, Mayurbhanj and Sambalpur districts; titanium minerals in Dhenkanal, Ganjam, Jajpur and Mayurbhanj districts; and zircon in Ganjam district.

Other minerals that occur in the State are Asbestos in Keonjhar district; cobalt in Jajpur district; copper in Mayurbhanj and Sambalpur districts; granite in Angul, Boudh, Bolangir, Cuttack, Deogarh, Dhenkanal, Ganjam, Keonjhar, Khurda, Koraput, Mayurbhanj, Nuapada, Rayagada and Sambalpur districts; lead in Sargipalli area, Sundergarh district; Mica in Sonepur district; and nickel in Jajpur, Keonjhar and Mayurbhanj districts. Occurrences of ruby and emerald are reported from Bolangir and Kalahandi districts, respectively. Platinum Group of Metals occur in Keonjhar district; silver in Sundergarh district; tin in Koraput and Malkangiri districts; and vanadiferous magnetite occurs in Balasore and Mayurbhanj districts.

Production

The value of mineral production in Odisha increased by 31.64% in the
year 2010-11 over the previous year and was at ₹ 22567.67 crore. The State contributed 10.62% of the total value of mineral production and claims first position among the States in the country during the year under review. The important minerals produced in Odisha were coal, bauxite, chromite, iron ore, manganese ore and limestone which together accounted for about 99% of the total value of mineral production in the year 2010-11.

Odisha was the leading producer of chromite with a share of 99.80%, pyroxenite (77.13%), bauxite (38.42%), sillimanite (37.53%), manganese ore (22.62), dolomite (22.45%) and coal (19.23%) in the total production of respective mineral in India during the year 2010-11. The State was also the major producer of graphite with a share of 17.54% in the total production in the country.

Of the important minerals, production of chromite increased by 24.41%, manganese ore by 7.66%, garnet by 66.71%, sillimanite by 26.73% and limestone by 27.20% in the year 2010-11 as compared to that in the previous year. On the other hand, decrease in production was reported for iron ore by 5.62%, dolomite by 13.62%, graphite by 56.27%, kaoline by 38.37%, pyroxenite by 19.27% and quartzite by 84.58% during the year under review. No production of fireclay, iolite, pyrophilite, quartz and silica sand was reported during the year.

The production value of minor minerals was estimated at ₹ 85.68 crore for the year 2010-11. The number of reporting mines in the year 2010-11 was 173 as against 221 in the previous year. The index of mineral production in Odisha (base 1993-94 = 100) was 445.39 in 2010-11 as against 438.27 in the previous year.

10. RAJASTHAN

Mineral Resources

Rajasthan is the sole producer of jasper, lead & zinc concentrate and wollastonite. Rajasthan was the sole producer of garnet (gem) till 2004-05. Almost entire production of calcite and natural gypsum in the country comes from Rajasthan. State is a major producer of asbestos, copper concentrate, ochre, phosphorite/rock phosphate, silver, steatite, ball clay, fluorite and felspar. The State is also an important producer of marble having various shades. Makrana area is world famous centre for marble mining.

Country’s more than 88% resources of wollastonite, lead & zinc ore (89%) and potash (94%) are located in Rajasthan. State has a main share in the total resources of silver ore (87%), gypsum (82%), bentonite (80%), fuller’s earth (74%), diatomite (72%), ochre (81%), marble (63%), felspar (66%), calcite (50%), mica (21%), talc/steatite/soapstone (50%), asbestos (61%), copper ore (50%), ball clay (38%), rock phosphate (30%), tungsten (27%), fluorite (29%), granite (23%), gold (primary) (17%) and china clay
Important minerals occurring in the State are asbestos (amphibole) in Ajmer, Bhilwara, Dungarpur, Pali, Rajsamand and Udaipur districts; ball clay in Bikaner, Nagaur and Pali districts; barytes in Alwar, Bharatpur, Bhilwara, Bundi, Chittorgarh, Jalore, Pali, Rajsamand, Sikar and Udaipur districts; calcite in Ajmer, Alwar, Bhilwara, Jaipur, Jhunjhunu, Pali, Sikar, Sirohi and Udaipur districts; china clay in Ajmer, Barmer, Bharatpur, Bhilwara, Bikaner, Bundi, Chittorgarh, Dausa, Jaipur, Jaisalmer, Jhunjhunu, Kota, Nagaur, Pali, Sawai Madhopur and Udaipur districts; and copper in Khetri belt in Jhunjhunu district and Dariba in Alwar district. Deposits of copper are also reported to occur in Ajmer, Bharatpur, Bhilwara, Bundi, Chittorgarh, Dungarpur, Jaipur, Pali, Rajsamand, Sikar, Sirohi and Udaipur districts. Dolomite occur in Ajmer, Alwar, Bhilwara, Chittorgarh, Dausa, Jaipur, Jaisalmer, Jhunjhunu, Jodhpur, Rajsamand, Sikar and Udaipur districts; feldspar in Ajmer, Alwar, Bharatpur, Bhilwara, Jaipur, Pali, Rajsamand, Sikar Tonk & Udaipur districts; fireclay in Alwar, Barmer, Bharatpur, Bikaner, Jaisalmer, Jhunjhunu and Sawai Madhopur districts; fluor spar in Ajmer, Dungarpur, Jalore, Jhunjhunu, Sikar, Sirohi and Udaipur districts; garnet in Ajmer, Bhilwara, Jaipur, Jhunjhunu, Sikar and Tonk districts; gypsum in Barmer, Bikaner, Churu, Sri Ganganagar, Hanumangarh, Jaisalmer, Jalore, Nagaur and Pali districts; iron ore (hematite) in Alwar, Dausa, Jaipur, Jhunjhunu, Sikar and Udaipur districts; iron ore (magnetite) in Bhilwara, Jhunjhunu and Sikar districts; lead-zinc in Zawar in Udaipur district, Bamnia Kalan, Rajpura-Dariba in Rajsamand and Rampura/Agucha in Bhilwara district. Lead-zinc occurrences are also reported from Ajmer, Chittorgarh, Pali and Sirohi districts. Lignite deposits occur in Barmer, Bikaner, Jaisalmer and Nagaur districts. Flux grade limestone occurs in Jodhpur and Nagaur districts and chemical grade limestone in Jodhpur, Nagaur and Alwar districts. Cement grade deposits of limestone are widespread and occur in Ajmer, Alwar, Banswara, Bhilwara, Bikaner, Bundi, Chittorgarh, Churu, Dungarpur, Jaipur, Jaisalmer, Jhunjhunu, Kota, Nagaur, Pali, Sawai Madhopur, Sikar, Sirohi and Udaipur districts. Magnesite occurs in Ajmer, Dungarpur, Pali and Udaipur districts; marble in Ajmer, Banswara, Bhilwara, Bundi, Chittorgarh, Dungarpur, Jaipur, Nagaur, Sikar, Sirohi and Udaipur districts; mica in Ajmer, Bhilwara, Rajsamand & Tonk district; ochre in Baran Bharatpur, Bhilwara, Bikaner, Chittorgarh, Jaipur, Sawai Madhopur and Udaipur districts; pyrite in Sikar district; pyrophyllite in Alwar, Bhilwara Jhunjhunu, Rajsamand and Udaipur districts; quartz/silica sand in Ajmer, Alwar, Bharatpur, Bhilwara, Bikaner, Bundi, Dausa, Jaipur, Jaisalmer, Jhunjhunu, Jodhpur, Kota, Pali, Rajsamand, Sawai Madhopur, Sikar, Sirohi, Tonk and Udaipur districts; quartzite in Ajmer, Alwar, Jhunjhunu and Sawai Madhopur districts; rock phosphate in Alwar, Banswara, Jaipur, Jaisalmer and Udaipur districts; talc/
steatite/soapstone in Ajmer, Alwar, Banswara, Bharatpur, Bhilwara, Chittorgarh, Dausa, Dungarpur, Jaipur, Jhunjhunu, Karauli, Pali, Rajsamand, Sawai Madhopur, Sirohi, Tonk and Udaipur districts; vermiculite in Ajmer and Barmer districts; and wollastonite in Ajmer, Dungarpur, Pali, Sirohi and Udaipur districts.

Other important minerals that occur in the State are apatite in Udaipur and Sikar districts; bauxite in Kota district; bentonite in Barmer, Jaisalmer and Jhalawar districts; corundum in Tonk district; diatomite in Barmer and Jaisalmer districts; emerald in Ajmer and Rajsamand districts; fuller’s earth in Barmer, Bikaner, Jaisalmer and Jodhpur districts; gold in Banswara and Sirohi districts; granite in Ajmer, Alwar, Banswara, Barmer, Bhilwara, Chittorgarh, Jaipur, Jaisalmer, Jalore, Jhunjhunu, Jodhpur, Pali, Rajsamand, Sawai Madhopur, Sikar, Sirohi, Tonk and Udaipur districts; graphite in Ajmer, Alwar and Banswara districts; kyanite and sillimanite in Udaipur district; manganese ore in Banswara and Udaipur districts; potash in Jaisalmer and Nagaur districts; silver in Ajmer, Bhilwara, Jhunjhunu, Rajsamand and Udaipur districts; tungsten at Degana in Nagaur district. Tungsten deposits are also reported to occur in Sirohi district.

Production

The value of mineral production in Rajasthan during the year 2010-11 at ₹ 18241.38 crore, got increased by 208.78% as compared to the previous year. Its share to the total value of mineral production in the country in the year 2010-11 was about 8.58%. The State produces almost all varieties of minerals in the country. Rajasthan was the sole producer of lead concentrate, zinc concentrate, calcite, selenite and wollastonite. Almost the entire production of silver, Ochre, steatite and gypsum, in the country was reported from the State. Besides, Rajasthan was the major producer of copper concentrate accounting for 33.36%, ochre 93.60%, phosphorite / rock phosphate 93.8%, silver 99.70%, talc/soapstone/steatite 74.20%, ball clay 69.50%, fireclay 66.70%, felspar 50.80%, mica (w/s) 20.7%, limestone 18.3%, and quartz 25.1% of the total production in the country. Production of petroleum (crude),fluorite and mica (crude) increased by manifold and that of iron ore and manganese ore by double during the year under review. Increase in production was also reported for Natural Gas(ut.) 59.41%, lignite by 16.24%, phosphorite by 44.90%, fireclay by 53.98%, siver by 6.88%, wollastonite by 37.93% and gypsum by 29.12% , as compared to that in the previous year. Production of selenite declined by 53.91%, silica sand 53.91%, quartz 25.85%, auarzite 24.42%, ocher 7.25%, limestone 7.74%, kaolin 6.37%, clay (others) 95.19% and calcite by 20.16 % during the year under review.

The value of production of minor minerals was estimated at ₹ 4586.17 crore for the year 2010-11. The number
of reporting mines in Rajasthan was 269 in the year 2010-11, as against 289 in previous year. The index of mineral production in Rajasthan (base 1993 - 94 = 100) was 275.67 in 2010-11 as against 247.18 in the previous year.

11. TAMILNADU

Mineral Resources

Tamil Nadu is leading producer of garnet (abrasive), graphite, lignite, magnesite, lime kankar and dunite. State accounts for country’s 80% lignite, 74% vermiculite, 63% dunite, 65% rutile, 52% molybdenum, 49% garnet, 32% ilmenite and 27% sillimanite resources. Important minerals occurring in the State are bauxite in Dindigul, Namakkal, Nilgiri and Salem districts; dunite/pyroxenite in Salem district; felspar in Coimbatore, Dindigul, Erode, Kanchipuram, Karur, Namakkal, Salem and Tiruchirapalli districts; fireclay in Cuddalore, Kanchipuram, Perambalur, Pudukottai, Sivaganga, Thiruvallur, Tiruchirapalli, Vellore and Villupuram districts; garnet in Chidambram, Kanyakumari, Thanjavur, Tirunelveli and Kottabomman districts; granite in Dharmapuri, Erode, Kanchipuram, Madurai, N. Arcot & Ambedkar, P. Muthuramalingam, Salem, Thiruvannamalai, Tiruchirappalli, Tirunelveli, Vellore and Villupuram districts; graphite in Madurai, Ramanathapuram, Shriganga and Vellore districts and gypsum in Coimbatore, Perambalur, Ramanathapuram, Tiruchirappalli Tirunelveli, Tuticorin and Virudhunagar districts. Lignite deposits are located in Cuddalore Ariyalur, Thanjavur, Thiruvarur, Nagapattinam and Ramanathapuram districts; limestone in Coimbatore, Cuddalore, Dindigul, Kanchipuram, Karur, Madurai, Nagapattinam, Namakkal, Perambalur, Salem, Thiruvallur, Tiruchirappalli, Tirunelveli, Vellore, Villupuram and Virudhunagar districts; magnesite in Coimbatore, Dharmapuri, Karur, Namakkal, Nilgiri, Salem, Tiruchirappalli, Tirunelveli and Vellore districts; quartz/silica sand in Chengai-Anna, Chennai, Coimbatore, Cuddalore, Dharmapuri, Dindigul, Erode, Kanchipuram, Karur, Madurai, Namakkal, Periyar, Perambalur, Salem, Thiruvallur, Thiruvarur, Nagapattinam, Tiruchirapalli, Villupuram, Virudhunagar and Vellore districts; steatite in Coimbatore, Salem, Tiruchirappalli and Vellore districts; titanium minerals in Kanyakumari, Nagapattinam, Ramanathapuram, Thiruvarur, Tirunelveli and Tuticorin districts; vermiculite in Dharmapuri, Tiruchirappalli and Vellore districts and zircon in Kanyakumari district.

Other minerals that occur in the State are apatite in Dharmapuri and Vellore districts; barytes in Erode, Madurai, Perambalur, Tirunelveli and Vellore districts; bentonite in Chengai-Anna district; calcite in Salem district; china clay in Cuddalore, Dharmapuri, Kanchipuram, Nilgiri, Sivaganga, Thiruvallur, Tiruvannamalai, Tiruchirappalli and Villupuram districts; chromite in Coimbatore and Salem districts; copper, lead-zinc and silver in
Villupuram district; corundum and gold in Dharmapuri district; dolomite in Salem and Tirunelveli districts; emerald in Coimbatore district; iron ore (magnetite) in Dharmapuri, Erode, Namakkal, Nilgiri, Salem, Thiruvannamalai, Tiruchirappalli and Villupuram districts; kyanite in Kanyakumari and Tirunelveli districts; molybdenum in Dharmapuri, Dindigul and Vellore districts; pyrite in Vellore district; sillimanite in Kanyakumari, Karur and Tirunelveli districts; tungsten in Madurai and Dindigul districts; and wollastonite in Dharmapuri and Tirunelveli districts.

Production

The value of mineral production in Tamil Nadu at ₹ 4522.49 crore in the year 2010-11 increased by 1.47% as compared to that in the previous year. The States contributed 2.13% in the total value of mineral production in the country during the year under review. The principal minerals produced in the State were lignite, petroleum (crude), natural gas (utilised), garnet and limestone which together accounted for 97.76%, of the value of the minerals produced in the State in the year 2010-11. The State was the major producer of garnet (abrasive) 91.72%, graphite (rom) 43.63%, lignite 61.47%, magnesite 71.72%, lime kankar 99.84% and dunite 89.40% in national production of respective minerals. During the year under review, production of bauxite and feldspar increased manifold as compared to previous year. Increase in production was also reported for lignite by 3.61%, fireclay 15.91%, steatite 29.50% and silica sand 19.57 %. On the other hand, production of petroleum (crude decreased by 2.09%, natural gas (utilised) 6.03%, graphite(rom) 3.13% and ball clay 31.29%.

The production value of minor minerals was estimated at ₹ 59.07 crore for the year 2010-11. The number of reporting mines was 179 in the year 2010-11 as against 175 in the previous year. The index of mineral production in Tamil Nadu (base 1993 - 94 = 100) was 201.67 in the year 2010-11 as against 204.2 in the previous year.

Aluminium

3.20 Aluminium is the most abundant metal in the earth's crust. It ranks second, next only to steel, in terms of volumes used due to its versatility, which stems from its excellent and diverse range of physical, chemical and mechanical properties. Aluminium, which is only one-third the weight of steel is highly resistant to most forms of corrosion, is non-magnetic, non-
combustible, is non-toxic and impervious (hence used in the food and packaging industries) and is also a superb conductor of electricity. Other valuable properties include high reflectivity and rapid heat dissipation. The metal is malleable and easily worked by the common manufacturing and shaping processes.

2. Use of aluminium metal are as follows:-

- In construction- windows, doors, cladding, weather-proofing, light constructions such as conservatories and canopies.
- In transport- auto, aerospace, rail and marine industries.
- Packaging- protection, storage and preparation for food and drinks.
- Electrical uses- overhead conductors and underground power-lines and power cables.
- Water treatment and medicine- antacid to combat gastric upsets, anti-perspirants.
- Machineries and Equipments.
- Castings- Automobile components etc.
- Utensils.

3.21 In India the electrical sector is the largest consumer of aluminium. Bulk of the Aluminium usage is in overhead conductors and power cables used in generation, transmission and distribution of electricity. Aluminium is used in switchboards, coil windings, capacitors, and many other applications as well.

3.22 The global aluminium production which was 41.93 million tonnes in 2010 increased to 45.54 million tonnes in 2011, as per CRU Monitor-Aluminium. The Global aluminium production is forecast to increase by about 8.23% i.e. to 49.28 million tonnes in 2012. The world aluminium consumption in 2010 and 2011 was 40.96 million tonnes and 44.88 million tonnes respectively. India produced 15.25 lakh tonnes aluminium in 2009-10 and 16.29 lakh tonnes in 2010-11 which approximately was about 3.6% of world production.

3.23 India is endowed with rich bauxite reserve of 2300 million tonnes (approx. 6.76% of the world total) and ranks 5th in the world bauxite reserve base. The primary aluminium industry in India consists of three producers viz. National Aluminium Company Limited (NALCO), HINDALCO Industries Limited and The Vedanta Group comprising Bharat Aluminium Company Limited (BALCO), Madras Aluminium Company Limited (MALCO) and Vedanta Aluminium Limited (VAL). Vedanta Aluminium Limited (VAL) started its operations in April, 2008 and MALCO closed its operations since December, 2008. Out of these Companies, only NALCO is in the Public Sector. The production of aluminium by primary aluminium producers in the years 2009-10 to 2011-12 ( upto December, 2011) is given at Table 3.4 and Sales figures of Aluminium in the years 2009-10 to 2011-12 ( upto December, 2011) is given at Table 3.5.
3.24 The price of aluminium fixed by the primary producers is generally aligned to the London Metal Exchange (LME) prices. During financial year 2010-11, the average LME Aluminium price was USD 2257.34 per MT which was around 21% higher than the average LME aluminium price of USD 1865.71 per MT during 2009-10. During 2011-12 (upto December, 2011), the LME aluminium prices fell from a high of USD 2772 during April, 2011 to USD 1945 during December, 2011 and the average LME price during this period is USD 2364.35 per MT. Analysts cited the eurozone crisis and China’s economic slowdown having impact on demand growth and weakening aluminium prices that have declined below many producers break-even level. However, downside potential is likely to remain limited because even at current price level, over 30% of world producers are operating at a cost level above the LME price with 70% of these producers based in China.

3.25 Downward movement of aluminium prices increased inflow of metal into LME warehouses and stocks rose from 4.6 million tonnes during April, 2011 to 4.9 million tonnes at the end of December, 2011.

3.26 A deteriorating demand outlook and suppressed market sentiment in Europe during 2012 due to unresolved debt crisis in Europe are likely to put pressure on aluminium prices over the next few months. Until the uncertainty in Europe eases, steady upward movement in price is not expected. This is expected to force additional metal from off-warrant holdings into LME warehouses, placing further pressure on metal prices. Analysts have forecast an average LME Aluminium prices during 2012 to be in the range of USD 2200 to USD 2300 per tonne.

**COPPER INDUSTRY IN INDIA**

3.27 Copper is a very important element and the oldest known
commodity in the world that directly affects the world’s economy. Copper is a malleable and ductile metallic element that is an excellent conductor of heat and electricity as well as being corrosion resistant and antimicrobial. It is found in sulfide deposits (as chalcocite, bornite, chalcocite, covellite), in carbonate deposits (as azurite and malachite), in silicate deposits (as chrysocolla and diopside) and as pure “native” copper. Archaeological evidence demonstrates that copper was one of the first metals used by humans and was used at least 10,000 years ago for items such as coins and ornaments in western Asia. Regardless of competition from substitutes like iron, aluminum, plastic & fibre, copper’s chemical, physical and aesthetic properties make it a material of choice in a wide range of domestic, industrial and high technology applications. Copper is a critical metal being used in areas such as defence, space programme, railways, power cables, mint, electronics & communications, auto ancillaries etc.

3.28 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. Indian Copper ores have low grade and large scale mechanization 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 characterized by high energy consumption because of low scale of operations and minimal automation.

3.29 Till 1997, the only producer of primary refined copper was Hindustan Copper Limited (HCL), a public sector enterprise under the Ministry 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. However, the scenario has changed drastically after coming of the other two primary producers of Copper in private sector namely M/s Hindalco Ind. Ltd. (Unit: Birla Copper) and M/s. Sterlite Industries (I) Ltd. Their present annual capacities are 5,00,000 MT and 4,00,000 MT of refined copper respectively. The plants of M/s Hindalco Ind. Ltd. (Unit: Birla Copper) and M/s Sterlite Industries (I) Ltd. are based on imported copper concentrate. Besides, another private player viz. M/s Jagadia Copper Ltd. (formerly SWIL Ltd.) had started operating its plant based on secondary route. Continuous Cast Rod (CCR) plants of M/s TDT and M/s Finolex are based on imported cathode. The capacity for production of primary copper in India has risen from a mere 47,500 tonnes per year till 1997 to 9,49,500 tonnes at present which excludes 50,000 tonnes from secondary route by M/s.
Jagadia Copper Ltd. (which is not in operation currently), with the result that India is now a net exporter of refined copper. HCL enhanced its refined copper capacity to 49,500 tonnes in 2008.

3.30 The details of production of major players in copper industry during 2011-12 (upto December, 2011) are given in Table 3.6.

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Commodity</th>
<th>Unit of Prodn.</th>
<th>No. of Factories</th>
<th>Installed Capacity</th>
<th>Production during 2011-12 (upto Dec, 2011)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cathode</td>
<td>tonnes</td>
<td>2</td>
<td>49,500</td>
<td>13,103</td>
</tr>
<tr>
<td></td>
<td>a) HCL</td>
<td>tonnes</td>
<td>1</td>
<td>4,00,000</td>
<td>2,45,494</td>
</tr>
<tr>
<td></td>
<td>b) Sterlite Industries (I) Ltd.</td>
<td>tonnes</td>
<td>1</td>
<td>5,00,000</td>
<td>2,35,528</td>
</tr>
<tr>
<td></td>
<td>c) Hindalco Ind. Ltd. (Unit: Birla Copper)</td>
<td>tonnes</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>9,49,500</td>
<td>4,94,125</td>
</tr>
</tbody>
</table>

### PRICE OF COPPER

3.31 The domestic price of copper is linked to London Metal Exchange (LME) price. The LME Cash Settlement Price (CSP) is the basis on which prices of copper products are declared by domestic producers.

3.32 Customs duty on imported copper had been reduced in phases from 35% in 2002-03 to 5% at present leading to a steep reduction in price, which, in turn, affected the profitability of domestic copper manufacturers. HCL is the only Company having captive mines, whereas private producers have to depend on import of copper concentrate to operate their smelter & refining plants, and their profitability is strongly dependent on the international variation in Treatment Charges and Refining Charges.

3.33 The year wise average LME price per tonne of copper is shown in the Table 3.7.

<table>
<thead>
<tr>
<th>YEAR</th>
<th>Average LME price of Copper (US $ per ton)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995-96</td>
<td>2844</td>
</tr>
<tr>
<td>1996-97</td>
<td>2257</td>
</tr>
<tr>
<td>1997-98</td>
<td>2096</td>
</tr>
<tr>
<td>1998-99</td>
<td>1581</td>
</tr>
<tr>
<td>1999-2000</td>
<td>1670</td>
</tr>
<tr>
<td>2000-2001</td>
<td>1806</td>
</tr>
<tr>
<td>2001-2002</td>
<td>1527</td>
</tr>
<tr>
<td>2002-2003</td>
<td>1586</td>
</tr>
<tr>
<td>2003-2004</td>
<td>2046</td>
</tr>
<tr>
<td>2004-2005</td>
<td>3000</td>
</tr>
<tr>
<td>2005-2006</td>
<td>4097</td>
</tr>
<tr>
<td>2006-2007</td>
<td>6970</td>
</tr>
</tbody>
</table>
MINERAL AND METAL SCENARIO

<table>
<thead>
<tr>
<th>Year</th>
<th>Copper Production (in tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007-08</td>
<td>7584</td>
</tr>
<tr>
<td>2008-09</td>
<td>5864</td>
</tr>
<tr>
<td>2009-10</td>
<td>6101</td>
</tr>
<tr>
<td>2010-11</td>
<td>8140</td>
</tr>
<tr>
<td>2011-12</td>
<td>8544</td>
</tr>
</tbody>
</table>

TRENDS IN COPPER CONSUMPTION

3.34 Copper consumption in a country is an indicator of its level of economic development. Per capita consumption in India is in the order of 0.50 Kg as compared to 10 Kg in developed nations.

3.35 Per capita consumption of copper of China and other European countries are given below:

- China - 5.4 kg/person
- Germany - 13.6 kg/person
- Italy - 8.9 kg/person
- Russia - 3.3 kg/person
- USA - 5.5 kg/person

Source: ICSG

3.36 The known mineral resources for copper within the country are few with low grades of copper with the average metal content being in the region of a mere 1% and the precious metal content being very low. HCL has access to over two-thirds of the copper ore reserves in India. IMC-SRGC has reviewed and classified HCL’s mineral reserves and resources in accordance with the Australian Joint Ore Reserves Committee (JORC)’s Code. As per the assessment, HCL has estimated reserves of approx. 411.53 million tonnes of copper ore, with an average of 1.05% copper content as on 1st April, 2010.

3.37 As per the data of Indian Copper Development Centre (ICDC), during 2009-10 and 2010-11, total domestic refined copper usage was approximately 548,924 tonnes and 560,836 tonnes respectively, whereas, total world refined copper usage was 18,108,000 tonnes in 2009 and 19,386,000 tonnes (provisional) in 2010. International Copper Study Group (ICSG) expects world apparent refined usage in the year 2011 to grow by only 1.5% from that in 2010 to 19.7 million tonnes. For the year 2012, world usage is expected to grow by 3.6% mainly supported by a growth of 6% in China as the rest of the world is expected to grow by only 2%. However, the production and consumption of refined copper in 2011-12 would depend on the growth of the economy and LME price.

3.38 Electrical, Electronics and Telecommunications sectors account for nearly 52% of copper usage in India. The demand again is primarily from the telecom, power and infrastructural sectors. There has been substantial reduction in demand of copper in telecom sector with increased application of Fibre optic cables and fast penetration of wireless communication through cell phones, Wireless in Local Loop and Direct to Home (DTH) Telecasting.

3.39 In the household wiring sector, despite many advantages of using copper...
conductors, aluminum conductors are widely used. The trend, however, has started reversing and increased usage of copper in this sector is perceptible. But unfortunately, in place of cables and wirings made from high grade electrolytic tough pitch copper, applications are mostly of cables and wirings made from “Scrap recycled” (commercial copper) resulting to substantial electrical energy loss to the country without counting indirect losses and other costs due to failure of these wirings. Usage of copper in building construction, as prevalent in Western World, is slowly making inroads into the country, mainly in metro cities and industrial projects.

The projection of refined production capacities of major Asian counties upto year 2015 is given below:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>5.23</td>
<td>6.07</td>
<td>6.50</td>
<td>6.99</td>
<td>7.09</td>
</tr>
<tr>
<td>India</td>
<td>0.99</td>
<td>0.99</td>
<td>1.41</td>
<td>1.41</td>
<td>1.41</td>
</tr>
<tr>
<td>Iran</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
<td>0.27</td>
<td>0.70</td>
</tr>
<tr>
<td>Japan</td>
<td>1.71</td>
<td>1.71</td>
<td>1.71</td>
<td>1.71</td>
<td>1.71</td>
</tr>
<tr>
<td>Kazakhstan</td>
<td>0.52</td>
<td>0.59</td>
<td>0.60</td>
<td>0.62</td>
<td>0.62</td>
</tr>
<tr>
<td>Korea Republic</td>
<td>0.60</td>
<td>0.60</td>
<td>0.60</td>
<td>0.60</td>
<td>0.60</td>
</tr>
<tr>
<td>Philippines</td>
<td>0.21</td>
<td>0.21</td>
<td>0.21</td>
<td>0.21</td>
<td>0.21</td>
</tr>
</tbody>
</table>

Source :- ICSG

3.40 Projection for LME for copper, Tc/Rc rates and Marketing trends in the world are given below:

Long terms LME copper price and Tc/Rc charges are projected by different commodity forecasters of the world periodically based on market trends and assumption for the future. The data of the forecast also is not consistent among all the firms and vary across for all the years.

3.41 International Copper Study Group (ICSG), a intergovernmental organization based at Lisbon, regularly projects a forecast of the world’s supply demand of copper based on the inputs received from all the countries. The projections of ICSG shared its last meeting held on September,2011 is given below:

(a) According to preliminary ICSG data, global growth in copper demand for 2011 is expected to exceed global growth in copper production, and a production deficit of about 200,000 metric tonnes of refined copper is projected for the full year. For the year 2012, ICSG data projections indicate a deficit of about 250,000 tonnes as supply growth will continue to lag behind demand growth. By 2013, however, increased production and lower growth in demand are expected to yield a nearly balanced market.

(b) In developing its projections, the International Copper Study Group recognized that numerous factors including a world economic slow down, European Union sovereign debt issues, political disturbances in the Middle East and North Africa, and market price volatility create significant uncertainty, and that the global market balances could vary from those projected. In the first half of 2011, operational problems, lower head grades, adverse
weather conditions and labor unrest combined to constrain mine output and production for 2011 is now anticipated to grow by only 0.7%.

(c) Capacity utilization rates for the year 2011 are expected to be around 79%, 1% lower than in 2010. Although producers anticipate a strong growth of 9% [1.5 million metric tons (Mt)] in 2012 (mainly due to higher capacity utilization at existing mines as few new projects are expected to start), it is expected that the actual increase will be significantly lower as production disruptions, which have become the norm in recent years, continue.

(d) World refined copper production for the year 2012 (adjusted for production disruptions) is therefore projected to increase by only about 3.4% to 20.1 Mt from 19.5 Mt in 2011. Secondary refined production (from scrap), which is anticipated to increase by around 10% in 2011, is expected to grow by only 5% in 2012.

(e) ICSG expects world apparent refined usage in the year 2011 to grow by only 1.5% from that in 2010 to 19.7 Mt. The 0.7% growth rate of the first half of 2011 is anticipated to improve to 2.3% in the second half owing to an expected recovery in China apparent usage.

<table>
<thead>
<tr>
<th>Particulars</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>World Mine Production (Million tonne)</td>
<td>15.97</td>
<td>16.09</td>
<td>17.60</td>
<td>18.86</td>
</tr>
<tr>
<td>Refined Production (Million tonne)</td>
<td>19.03</td>
<td>19.69</td>
<td>20.85</td>
<td>21.78</td>
</tr>
<tr>
<td>Consumption (Million tonne)</td>
<td>18.83</td>
<td>19.71</td>
<td>20.45</td>
<td>21.30</td>
</tr>
<tr>
<td>Refined balance</td>
<td>1.99</td>
<td>-2.20</td>
<td>-3.0</td>
<td>-0.12</td>
</tr>
</tbody>
</table>

3.42 Projection for mining and making the lower grading minerable.

The Company at its Malanjkhand unit has large reserves of low grade sulphide copper ore. The estimated reserve of low grade is around 80.0 million tonne with an average grade of 0.3%. Due to limited capacity of concentrator plant at Malanjkhand, the milling of large quantity of low grade of ore is constraint. However, the Company is looking for appropriate technology for liquidation of above low grade.

In the year 2008-09, HCL had collaborated with Institute of Minerals & Materials Technology (IMMT), Bhubneshwar to develop bacterial leaching technique at MCP to treat low grade ore. However, experimental trials of the technique were not successful for commercialization.

Lead & Zinc

3.43 As per the data made available by the Indian Bureau of Mines (IBM), the production of zinc is more than its consumption in the country. However,
there appears to be shortage of lead in the country as its production is less than its consumption. During the year 2010-11(P), the production of primary lead was 57294 tonnes and that of zinc metal was 740402 tonnes. As against this, the apparent consumption of lead was 181526 tonnes and that of zinc was 545342 tonnes in 2010-11(P). The exact details of demand and supply of lead and zinc are not maintained as Lead and Zinc are freely importable as per the import policy of the Government. Data relating to export/import of lead and zinc and the data regarding apparent consumption/production of lead and zinc for the years 2008-09, 2009-10 and 2010-11 (provisional) is shown at Table 3.8 and Table 3.9.

<table>
<thead>
<tr>
<th>Table 3.8</th>
<th>Production Imports/Exports and Apparent consumption of Lead (2008-09 to 2011-12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>2008-09</td>
</tr>
<tr>
<td>-----------</td>
<td>---------</td>
</tr>
<tr>
<td>Total produvtion Lead (primary)</td>
<td>60323</td>
</tr>
<tr>
<td>Total imports*</td>
<td>209455</td>
</tr>
<tr>
<td>Total exports*</td>
<td>12566</td>
</tr>
<tr>
<td>Apparent consumption</td>
<td>257212</td>
</tr>
</tbody>
</table>

* Lead and alloys & scrap (Apparent Consumption = Production + Imports - Exports)
NA: Not available

<table>
<thead>
<tr>
<th>Table 3.9</th>
<th>Production Imports/Exports and Apparent consumption of Lead (2008-09 to 2011-12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>2008-09</td>
</tr>
<tr>
<td>-----------</td>
<td>---------</td>
</tr>
<tr>
<td>Total produvtion Zinc (ingots)</td>
<td>579091</td>
</tr>
<tr>
<td>Total imports* *</td>
<td>94694</td>
</tr>
<tr>
<td>Total exports* *</td>
<td>209434</td>
</tr>
<tr>
<td>Apparent consumption</td>
<td>464351</td>
</tr>
</tbody>
</table>

* *Zinc and alloys & scrap (Apparent Consumption = Production + Imports - Exports)
NA: Not available

**Rare Earth Elements**

3.44 There are 17 Rare Earth elements (REEs), 15 within the chemical group called lanthanides, plus yttrium and scandium. The lanthanides consist of the following: lanthanum,
cerium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, and lutetium. Rare earths are not rare in the sense of their abundance, but have earned this descriptive because they are rarely concentrated enough for an easy recovery from their ores.

3.45 Rare earths are characterized by high density, high melting point, high conductivity and high thermal conductance. These unique properties make them indispensable for a variety of emerging and critical technology applications relevant to India’s energy security. i.e. clean energy technology, defense and civilian application etc.

3.46 Given the concerns over China’s flexing of its muscle on the international stage by restricting Rare Earth exports, a wave of Mining projects are reviewed worldwide to tap sizable deposits of Rare Earth. Lyna Corporation’s new mining operation in Australia and Molycop’s plan to restart Mothballed Mountain Pass Mines is a step in this direction. It has also encouraged further exploration and spurring more recycling of Rare Earths.

SUPPLY AND DEMAND

3.47 The demand for rare earths has grown enormously in recent times as they have become essential for many new technologies. The demand shows no signs of abating. In 2015 the world’s industries are forecast to consume an estimated 185,000 tonnes of rare earths, 50% more than the total for 2010. It is felt that the discovery of new deposits will not be able to meet the increase in demand as the time lag involved in exploration of new deposits and their eventual production will be about 10 years.

3.48 As regards the available resources of REE, China has 48% of the world’s reserves; the United States has 13%. Russia, Australia, and Canada have substantial deposits as well. Recently, it is discovered that Afghanistan may have large deposits of rare earth metals, occurring on the south bank of the Helmand River in southern Afghanistan.

INDIAN SCENARIO

3.49 In India, monazite is the principal source of rare earths, which is a prescribed substance as per the notification under the Atomic Energy Act, 1962. Indian Rare Earths Limited (IREL) has been the sole producer of RE compounds in the country. The recovery of Rare Earth Elements from Monazite has been restricted due to its high thorium content.

3.50 AMD has been carrying out its resource evaluation of Monazite for over five decades. It occurs in association with other heavy minerals, such as ilmenite, rutile, zircon, etc. in concentrations of 0.4 - 4.3% of total heavies in the beach and inland placer deposits of the country. The resource estimates of monazite in the beach...
and inland placer deposits have been enhanced from 7.90 million tonnes in 2002 to 10.21 million tonnes in 2005.

3.51 The state wise resources of Monazite are given at Table 3.10.

Table 3.10
Resources of Monazite
(In million tonnes)

<table>
<thead>
<tr>
<th>State</th>
<th>Resources (In million tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andhra Pradesh</td>
<td>3.73</td>
</tr>
<tr>
<td>Bihar</td>
<td>0.22</td>
</tr>
<tr>
<td>Kerala</td>
<td>1.37</td>
</tr>
<tr>
<td>Odisha</td>
<td>1.82</td>
</tr>
<tr>
<td>Tamil Nadu</td>
<td>1.85</td>
</tr>
<tr>
<td>West Bengal</td>
<td>1.22</td>
</tr>
<tr>
<td><strong>All India</strong></td>
<td><strong>10.21</strong>*</td>
</tr>
</tbody>
</table>

*Source: Department of Atomic Energy, Mumbai.*

Keeping this in view and increasing demand of these metals for high tech applications, Ministry of Mines has stressed the need to incentivize exploration & process R&D for creating indigenous production capacities. To achieve this, a high level Steering Committee has been constituted to look into the current availability of Rare Earth and to suggest short medium and long term strategies for exploration, production, and processing of RE, to ensure long term availability of the raw material.

3.52 Indian Rare Earths Limited (IREL) which has stopped production of Rare Earth Elements (REE) in wake of cheaper competition from China, plans to restart the production of REE (2250 tonne per year) by the last qtr of 2012 from its plant located at Odisha & Kochi. There is a need for concerted efforts both by GSI and AMD to explore the primary source of Rare Earth Elements. GSI plans to give high priority to the exploration of primary sources of REE during the 12th Five year plan.
4.1 In pursuance of the reforms initiated by the Government of India in July, 1991 in fiscal, industrial and trade regimes, the National Mineral Policy was announced in March, 1993. The National Mineral Policy recognized the need for encouraging private investment including Foreign Direct Investment (FDI), and for attracting state-of-art technology in the mineral sector. The policy stressed that the Central Government, in consultation with the State Governments, shall continue to formulate legal measures for the regulation of mines and the development of mineral resources to ensure basic uniformity in mineral administration so that the development of mineral resources keeps pace, and is in consonance with the national policy goals.

Need for Review of National Mineral Policy of 1993

4.2 Mining is a three-stage operation, involving regional exploration, detailed exploration, and actual mining. Regional exploration is mainly a survey activity to identify areas bearing mineral deposits. Detailed exploration is a little more invasive and can involve close spaced drilling (depending on the mineral) and substantial testing to establish commercially exploitable ore bodies. Mining projects, therefore, have a long gestation period requiring large investments in exploration and other development activities before commercial production can begin, and are thus considered as a high risk venture for the reason that a prospector’s investment may or may not result in finds of commercially exploitable deposits. In India, investment has been lacking in such high-risk ventures and the exploration done by Geological Survey of India (GSI) continues to be the main basis for investment in mining.

4.3 The growing global demand for metals and minerals has been continuously pushing up both domestic and international prices of minerals. Moreover, the country’s accelerated growth rate warranted a rapid development of the mining sector because most of the basic industries in the manufacturing sector are dependent on assured ore supply. Similarly, the world mineral scenario had changed significantly, and in today’s globalised economy, it was noticeable that investments in mining and exploration flow into such countries where apart from existence of mineral potential the regulatory regime is also investor friendly. Realizing this fact, many developing countries had significantly reoriented their
mining laws and policies to attract global investment.

4.4 The slow pace of Foreign Direct Investments (FDI) in the mining sector even five years after the liberalization of the investment regime with the enunciation of the National Mineral Policy 1993, the lack of enthusiasm for investment in prospecting shown by the domestic private sector, and the limited budget with public sector agencies such as GSI, MECL, and other state and central agencies for undertaking promotional exploration had meant that the sector was unable to contribute to growth of the Gross Domestic Product (GDP) of the country to an optimal extent.

4.5 During the Mid-term Appraisal of the 10th Plan in the Planning Commission, it was observed that the 1993 Policy had not been able to achieve the aim of encouraging the flow of private investment and introduction of high end technology for exploration and mining because of procedural delays, etc. A High Level Committee under the Chairmanship of Shri Anwarul Hoda was therefore constituted on 14th September, 2005 by the Planning Commission to review the existing policy and make recommendations for possible amendments to the Mines and Minerals (Development and Regulation) Act, 1957 to give a fillip to private investment in the mining sector. Based on recommendations of Hoda Committee, the National Mineral Policy, 2008 was announced by the Government of India in March, 2008. The National Mineral Policy, 2008 (NMP) endeavors to attract technology and fresh investment through specific measures.

**National Mineral Policy 2008**

4.6 The new NMP enunciates measures like assured right to next stage mineral concession, transferability of mineral concessions and transparency in allotment of concessions, in order to reduce delays which are seen as impediments to investment and technology flows in the mining sector in India. The Mining Policy also seeks to develop a Sustainable Development Framework for optimum utilisation of the country’s natural mineral resources for the industrial growth in the country and at the same time improving the life of people living in the mining areas, which are generally located in the backward and tribal regions of the country.

4.7 Other features of the National Mineral Policy 2008, inter alia, are:-

(a) NMP recognizes that minerals are valuable natural resources being the vital raw material for infrastructure, capital goods and basic industries and development of the extraction and management of minerals has to be integrated into the overall strategy of the country’s economic development.

(b) The exploitation of minerals has to be guided by long-term national goals and perspectives which are dynamic and responsive to the changing global economic scenario.
(c) The NMP, also, recognizes that the country is blessed with ample resources of a number of minerals and has the geological environment for many others being a part of the ancient Gondwanaland, which includes parts of Australia, South Africa, and Latin America.

(d) NMP lays out that the guiding strategy for development of any mineral should naturally keep in view its ultimate end uses in terms of demand and supply in the short, medium and long terms and this would be market oriented. However, a disaggregated approach in respect of each mineral will be adopted and a mineral specific strategy will be developed to maximise gains from the comparative advantage which the country enjoys and mineral development will be prioritized in terms of import substitution, value addition and export, in that order.

(e) Conservation of minerals shall be construed not in the restrictive sense of abstinence from consumption or preservation for use in the distant future but as a positive concept leading to augmentation of reserve base through improvement in mining methods, beneficiation and utilisation of low grade ore and rejects and recovery of associated minerals.

IMPLEMENTATION OF THE NATIONAL MINERAL POLICY- INITIATIVES TAKEN SO FAR

Amendment to Act and Rules

4.8 The new Policy states that the Central Government in consultation with State Governments shall formulate legal measures necessary for giving effect to new National Mineral Policy, 2008, to ensure basic uniformity in mineral administration across the country, to ensure that the development of mineral resources keeps pace, and is in consonance with the national goals. Some of the important areas of focus in the new National Mineral Policy, inter-alia, are:

(i) Ushering in greater liberalization and private sector involvement, and to widen the scope of the regulatory framework of the Government in the mining sector by shifting the focus from conventional areas of managing the mineral concession systems to new areas of regulating the mineral sector holistically through addressing issues of simplification, transparency and sectoral best practices in order to attract capital and technology in the sector from new sources.

(ii) Developing partnerships with stakeholders including State Government, Mineral and mineral based industries and various
Ministries / Departments of the Central Government concerned, for development and conservation of mineral resources and formulation of strategy to ensure raw materials security. The policy also seeks to deepen the scope of the developmental framework by mandating better management of resources and enhancing the Research and Development impetus as also develop the Human Resources in the sector.

(iii) Ensuring that the interests of host populations and other vulnerable sections are fully protected and stakeholder interests are developed, and the benefit of the economic activity in the mining sector flows equitably to the stakeholders. Since a large proportion of the mineral wealth is situated in areas under forest cover, inhabited by tribal or underprivileged communities, and of late, socio-economic issues of tribal and remote communities which, inter-alia, include perceptions about displacement, control of area by outsiders, economic isolation, environmental degradation and loss of livelihood and habitat, have come into focus, articulated through various means as constituting alienation and loss of identity, there is a felt need to incorporate provisions in the mining legislation enabling institutional mechanisms for involvement of the local people, especially the tribal and underprivileged communities, in the development of mineral resources through sharing of benefits of mining and creation of stakeholder rights.

4.9 The Ministry of Mines has prepared a new draft Mines and Minerals (Development and Regulation) Bill, 2011 in line with the Mineral Policy, after due consultations with all the stakeholders including State Governments, industries and concerned Ministries / Departments of Central Government, and representatives of civil society groups concerned with environmental/societal impact. The draft Mines and Minerals (Development and Regulation) Bill, was circulated to all the stakeholders in July, 2009, for comments. Subsequently, follow up meetings and workshops were held with the various stakeholders on 11th August 2009, 17th August 2009, 20th August 2009, 3rd September 2009, 9th October 2009 (Workshop), 10th October 2009 (Workshop), 14th October 2009, 20th January 2010 and 20th April 2010. The successive versions of the draft Act was also circulated / uploaded on the website of the Ministry for obtaining the comments of the stakeholders on 5th August 2009, 17th September 2009, 17th November 2009, 8th January 2010, 31st March 2010 and 3rd June 2010.

4.10 Subsequently, the draft Mines and Minerals (Development and Regulation) Bill, duly vetted by the Ministry of Law and Justice was referred to a Group
of Ministers headed by Shri Pranab Mukherjee, Hon’ble Finance Minister. The Group of Ministers held detailed deliberations in a series of meetings on the draft Bill and finally recommended to the Cabinet, which approved the draft Mines and Minerals (Development and Regulation) Bill 2011 on 30th September, 2011. The draft Mines and Minerals (Development and Regulation) Bill, 2011 has, since, been introduced in the Lok Sabha on 12th December, 2011 and referred to the Standing Committee on Coal and Steel on 5th January, 2012. The recommendations of the Standing Committee on Coal and Steel are awaited.

Strengthening of Geological Survey of India

4.11 The Mineral Policy states that in order to effectively regulate the mineral sector through enforcement of mining plans for adoption of proper mining methods and optimum utilization of minerals, the Geological Survey of India (GSI), the India Bureau of Mines (IBM) and the State Directorates of Mining & Geology will be strengthened with manpower, equipment and skill sets upgraded to the level of state-of-art. The Policy, further, states that these Government agencies will expend public funds primarily in areas where private sector investments are not forthcoming despite the desirability of programs due to reasons such as high uncertainties.

4.12 The Ministry had constituted a High Powered Committee (HPC) to suggest measures to strengthen the GSI. The HPC had submitted its report on 31st March, 2009 with a number of recommendations including on issues of training and capacity building. The recommendations are being implemented in a phased manner. HPC has envisioned to make GSI a world class Survey Organization. To achieve these, HPC has proposed rightsizing of the GSI apart from providing technological inputs. An Implementation Committee has been set up to go into the details for implementation and for further follow up its recommendations. Out of the 74 major recommendations, 56 recommendations have been implemented and another 16 recommendations have been partially implemented and 2 are yet to be implemented.

Strengthening of Indian Bureau of Mines

4.13 A committee has been constituted in the Ministry of Mines for reviewing and restructuring of functions and role of Indian Bureau of Mines (IBM) in terms of the Policy directions given in the National Mineral Policy, 2008. The Committee has prepared a draft report which has been put up on the website of the Ministry for inviting comments of the stakeholders.

4.14 Separately, the IBM had obtained administrative clearance to fill up 86 scientific and technical previewed posts in various groups. Of these 29 posts have been filled up. The remaining posts are at various stages of being filled up.
Strengthening of State Directorate of Mining and Geology

4.15 Keeping in view the increase in royalty revenues to the State Governments subsequent to revision of royalty rates in August 2009, the State Governments have been requested to prepare Action Plan for strengthening of the State Directorate of Mining and Geology in line with the recommendation of the National Mineral Policy. This item is regularly reviewed in the meeting of Central Coordination-cum-Empowered Committee meetings in the Ministry of Mines where the State Governments, also, participate.

Mining Tenement & Registry System

4.16 The Policy lays down that a national inventory of mineral resources will be based on a comprehensive and updated exploration data, and further that in coordination with Geological Survey of India, the Indian Bureau of Mines will maintain a database in digitized form comprising both a Resource Inventory and a Tenement Registry in accordance with the latest version of the UNFC system. The Tenement Registry will give information on both Leasehold Areas as well as Freehold Areas classified in terms of green field, brown field and relinquished areas including areas given up by the GSI and other reconnaissance permit/prospecting licence holders. It is envisaged in the Policy that the digitized data would be maintained online giving instant access to prospective investors on what is available for reconnaissance, prospecting and mining. Summaries of work done by public agencies will be kept in the form of meta-data in the public domain and detailed reports will be made available to interested investors on cost recovery basis.

4.17 In order to introduce such a system, the Ministry of Mines has started work on a Mining Tenement System, in consultation with the concerned Ministries/Departments of the Central Government and State Government. A pilot project for Durg and Bellary District has been developed and successfully demonstrated.
4.18 In respect of Registry component of the project, M/s Ernst & Young have been commissioned to prepare a Detailed Project Report (DPR). Based on the DPR, the Ministry will initiate the next stage of ‘Request for Proposal’ (RFP) for selecting appropriate vendor for Software Development. Initial trials of software are likely to be conducted in the year 2013-14.

Forest & Environment Issues

4.19 The policy lays down creation of a framework for sustainable development which will be designed to take care of bio diversity issues and to ensure that mining activity takes place along with suitable measures for restoration of the ecological balance. Special care will be taken to protect the interest of host and indigenous (tribal) populations through developing models of stakeholder interest based on international best practice. Project affected persons will be protected through comprehensive relief and rehabilitation packages in line with the National Rehabilitation and Resettlement Policy.

4.20 The matter has been raised with the Ministry of Environment and Forests in the light of the new Mineral Policy, expressing the readiness of the Ministry to strengthen the IBM in order to ensure that the provisions of the Policy and statutory requirements in Forests and Environment Legislation are fulfilled in letter and spirit. At present, the Ministry of Environment and Forests (MoEF), under section 10 of Environment Protection Act have authorized the officers of IBM (CCOM, COM, RCOM, and DCOM) to collect samples, analyse the same and report to MoEF.

4.21 The Hoda Committee, set up to review the National Mineral Policy, held that one of the challenges facing the Indian Mining sector to develop in a sustainable manner would be to identify the appropriate use of land within a Land Planning framework through a democratic decision making process on the basis of integrated assessment of ecological environmental economical and social impact. The Committee also held that mining should contribute to economic, social and cultural well-being of indigenous host populations and local communities by creating stakeholder interest in mining operations for the Project affected Persons (PAP). The Committee recommended development of a Sustainable Development Framework specially tailored to Indian context.

4.22 Accordingly, in terms of National Mineral Policy, 2008, the Ministry of Mines engaged M/s ERM India Private Limited, Gurgaon as Consultant for preparation of Sustainable Development Framework (SDF) for the Indian Mining Sector in terms of Rule 163 of General Financial Rules, 2005. The Consultant has since then prepared a draft Sustainable Development Framework (SDF) document after taking into consideration the fact that mining should contribute to economic, social and cultural well being of indigenous host populations and local
communities through a consultation process enabling inclusive growth and ensuring stakeholders interests in mining operations for the project affected people (PAP). The draft SDF has been finalized in the Ministry, and the Ministry is now undertaking a process of wider consultation and dissemination of the SDF document with the stakeholders before its final roll-out.

Geological Programming Board

4.23 Coordination of the regional exploration work by government agencies is at present being done by the Central Geological Programming Board of the GSI. The disaggregated projects are generally discussed in the State Level Committees and other technical forums before being incorporated into the annual programme. The National Mineral Policy 2008 (NMP) required that the existing arrangement shall be revamped to ensure that projects and programmes are prioritized in line with the national policy goals and are chalked out after taking into account the exploration work undertaken by the private sector.

4.24 The Central Geological Programming Board has, since, been revamped and the Board will meet at least twice a year as part of the process to strengthen the linkage between the Central Geological Programming Board and the State Geological Programming Boards. The CGPB has held its latest meetings on 2nd and 3rd February, 2012. Accordingly, it is expected that the Central Board will effectively articulate the policy and programmatic requirements in a technically feasible and scientifically desirable manner, so that projects and programmes are prioritized in line with national policy goals and take into account and facilitate the exploration work of the private sector.

Enforcement of Data Filing by Concession Holders

4.25 As per the National Mineral Policy data filing requirements will be rigorously applied and all concession holders will be subjected to detailed monitoring in this regard. The lock-in arrangements will be assured and released data will be integrated with the data generated by the state agencies and made available to other prospectors.

4.26 GSI and IBM have been instructed to closely monitor data filing requirements, particularly among Reconnaissance Permit (RP) holders. The matter is a regular item of review in the Central and State Geological Programming Boards.

4.27 GSI has been entrusted with the responsibility of maintaining data base of all the RP reports by RP holders as per Rule 7 of MCR, 1960. The RP reports are being sent to GSI by RP holders from the year 2005 onwards. To streamline the data filing system and for authentication of reports, the work of preparation of database of the submitted final RP reports has been initiated.
4.28 Similarly, the IBM has been directed to review the data filing by prospecting licence holders, and prepare a list of prospecting reports which could be put in the public domain after the mandatory lock in period is over.

Re-assessment of Threshold Values of Important Minerals

4.29 As per the National Mineral Policy, 2008, minerals being a valuable resource, the extraction of mineral resources located through exploration and prospecting has to be maximised through scientific methods of mining, beneficiation and economic utilization and zero waste mining will be the national goal and mining technology will be upgraded to ensure extraction and utilisation of the entire run-of-mines.

4.30 In the interest of systematic development of mineral deposits and conservation of minerals, Controller General, IBM issued directives under Rule 54 of MCDR, 1988, notifying threshold value of minerals for general information and immediate compliance by the mine owners. Subsequently, circulars highlighting the procedure to be followed for exploration within the leaseholds in respect of which the threshold values have been significantly changed i.e. for iron ore, chromite, bauxite, limestone & dolomite, wollastonite and magnesite were also issued for reassessing the reserves / resources.

4.31 In respect of lease areas the Ministry of Mines has issued a direction to all the State Governments on 23rd December, 2010 to impose a special condition under Rule 27(3) of Mineral Concession Rules, 1960, in the mining leases, making it mandatory for all the mining lease holders to ensure time-bound prospecting of the mining lease area in accordance with the UNFC standards, as per revised threshold values.

Mine Development and Mineral Conservation

4.32 The National Mineral Policy lays down that the mine development and mineral conservation as governed by the Rules and Regulations will be on sound scientific basis, with the regulatory agencies, viz. IBM and the State Directorates, closely interacting with R&D organisation, and scientific and professional bodies to ensure optimal Mining Plans. The NMP further states that conditions of mining leases regarding size, shape, disposition with reference to geological boundaries and other mining conditions shall be such as to favourably predispose the leased areas to systematic and complete extraction of minerals. To this effect the regulatory agencies, namely, the Indian Bureau of Mines and the State Directorates will be suitably strengthened through capacity building measures. The Implementation Committee has directed the IBM to prepare detailed guidelines for mine closure, best practices, and the actual
process of obtaining approval from the IBM for the Mine closure plan, detailing the socio-economic aspect of mine closure, long-term impact, costs involved, etc. The same has been incorporated in the draft IBM Restructuring Report which is available on IBM website.

Coordination-cum-Empowered Committee

4.33 A Central Coordination-cum-Empowered Committee (CEC) was constituted in the Ministry of Mines on 4.3.2009 under the chairmanship of Secretary (Mines) to monitor and minimize delays in grant of approvals for mineral concessions. The Committee consists of the Central Ministries / Departments concerned and the Secretaries in charge of Mining & Geology in the States and meets once in 3 months.

4.34 Considering the need for having more effective coordination among the Central Ministries / Departments and the State Governments for grant of mineral concessions as well as for dealing with other important matters relating to mineral development and regulation in the country, the Ministry has reconstituted the CEC as “Coordination-cum-Empowered Committee on Mineral Development and Regulation” on 20th December, 2011. The terms of Reference (TOR) have, also, been broadened so as to bring within its ambit other important matters, viz. Sustainable Development Framework, Coordination/review of steps for prevention of illegal mining, issues arising out of the National Mineral Policy, and legislation governing mineral development etc. All State Governments have also been requested to review the composition and TOR of their State Empowered Committees, and effect suitable changes therein.

4.35 So far Seven meetings of the Central Coordination-cum-Empowened Committee have been held on 24th July, 2009, 22nd December, 2009, 18th June, 2010, 22nd December, 2010, 3rd May, 2011, 20th September, 2011, and 16th January, 2012, wherein important decision aimed at minimizing delays for processing of mineral concession applications at various levels; finding ways to deal with issues facing the mineral sector; and improving the overall mineral concession regime were taken which are being regularly followed up by the Ministry with the State Governments and other offices / agencies concerned.

4.36 Measures to Control Illegal Mining:-

- Railways have instituted a mechanism to allow transportation of iron ore only against permits issued rake-wise and verified by State Government, apart from taking measures to fence and set up check post at the railway sidings.
- Customs Department has issued instructions to all its field units to share information on ore export with State Governments.
- Ministry of Shipping has issued a direction to all major Ports to
streamline the verification procedures for movement of consignment by road and rail to Ports for exports.

- All State Governments have been requested to computerize the system for collection of royalty and issue of transport permits on similar basis as the Online Royalty Pass System implemented by (n) Code Solutions, a Division of Gujarat Narmada Valley Fertilizers Company (GNFC) Ltd.

- All State Governments have also been requested to include representatives of Railways, Customs, Ports and in case of iron ore producing States, representative of Ministry of Steel in the State Coordination-cum-Empowered Committees set up in the State, for better monitoring of the transportation and export of ore.

- All State Governments have, further, been asked to send list of mineral concession cases pending with Ministry of Environment and Forests for clearances to reduce delays.

- All State Governments have been asked to impose the special condition under Rule 27(3) of Mineral Concession Rules, 1960, for ensuring that all the mining lease holders assess the resources in their leases in a time bound manner as per the UNFC.

- The State Governments have also been requested to be more actively engaged in improving the quality of mineral administration, by taking the following steps:- (a) Increasing personnel at railway sidings;

(b) Removal of restrictions on loading of ores in sidings not used optimally;

(c) Improving security features of the transit passes (for this purpose, the system of a single permit per rake would need to be implemented);

(d) Take action against overloading of trucks which is a substantial factor in royalty evasion besides being responsible for deteriorating road quality in mining areas and increasing transport inefficiency;

(e) Putting in place in-motion weigh-bridges and modernization of checkgates;

(f) Registration of loading contractors and transporters;

(g) Better enforcement through intelligence sharing, enforcement squads, joint inspection, mining cell in police organization etc.

(h) Ministry of Mines has further directed all the State Governments to start the process of registration of end users, constitution of Special Cell in State Police, use of satellite imagery to track down illegal mining, hologram-marking / bar-coding of transport permit, etc.

(i) The State Governments are also planning to set up special camp at sites and deployment of additional police personnel in the areas where there have been complaints about illegal mining.
4.37 Separately, the Central Government through the Indian Bureau of Mines (IBM) has constituted Special Task Force for inspection of mines in endemic areas by taking the help of satellite imageries. As on 1st December, 2011, the Special Task Force has conducted inspections in a total of 454 mines in the States of Goa, Madhya Pradesh, Maharashtra, Chattisgarh, Jharkhand, Orissa, Karnataka, Andhra Pradesh, and Gujarat. While IBM had suspended 155 mines after the inspection, suspension has been revoked after compliance of the rules in case of 97 mines. IBM has further, recommended termination of 8 leases to the State Governments.

4.38 The Mineral Conservation and Development Rules, 1988 (MCDR) provides for measures to ensure scientific management of the mining process. Rule 45 of the MCDR provides for the mining companies to provide periodic reports on the extraction and disposal of the mined material. Keeping in view the need to improve the monitoring of the production, movement and sale of ore, Rule 45 of MCDR has been extensively amended on 9th February, 2011 to provide for an end-to-end accounting of all ore produced, from the source (mine) to sink (end-use plant or export). The amended Rule now makes it mandatory for all miners, traders, stockists, exporters and end-users of minerals to register and report on the production, trade and utilization of minerals to the State Government and Indian Bureau of Mines. Online registration of mining lease holders, traders, exporters, stockist and end-users has already commenced. The online reporting systems are likely to be in place by March 2012 and made functional by September 2012. This would facilitate end-to-end national scale accounting of all minerals produced in the country from the pit head to its end-use, reducing the scope for illegal mining, royalty evasion etc. and attendant corruption in inspection of mines, and in issue of transportation permits.

4.39 Shri Justice M.B. Shah, Commission of Inquiry

Central Government has appointed a Commission of Inquiry consisting of Shri Justice M.B. Shah, Retd. Judge of the Supreme Court of India, vide Notification 22nd November, 2010 to enquire into the large scale mining of iron ore and manganese ore without lawful authority in several states. The terms of reference of the Commission are as follows:

(i) to inquire into and determine the nature and extent of mining and trade and transportation, done illegally or without lawful authority, of iron ore and manganese ore, and the losses therefrom; and to identify, as far as possible, the persons, firms, companies and others that are engaged in such mining, trade and transportation of iron ore and manganese ore, done
illegally or without lawful authority;

(ii) to inquire into and determine the extent to which the management, regulatory and monitoring systems have failed to deter, prevent, detect and punish offences relating to mining, storage, transportation, trade and export of such ore, done illegally or without lawful authority, and the persons responsible for the same;

(iii) to inquire into the tampering of official records, including records relating to land and boundaries, to facilitate illegal mining and identify, as far as possible, the persons responsible for such tampering; and

(iv) to inquire into the overall impact of such mining, trade, transportation and export, done illegally or without lawful authority, in terms of destruction of forest wealth, damage to the environment, prejudice to the livelihood and other rights of tribal people, forest dwellers and other persons in the mined areas, and the financial losses caused to the Central and State Governments.

4.40 The Commission was, also, mandated to submit interim report. Accordingly, Commission of Inquiry has submitted an Interim Report to the Government on 14th July, 2011 recommending, inter alia:

• Amendment in section 24 of the Mines and Minerals (Development and Regulation) Act 1957
• Amendments in Rules 24A of Mineral Concession Rules (MCR), 1960 regarding deemed extension of mining leases, in Rule 26 and Rule 27 of MCR restricting persons convicted for illegal mining from renewal of mining lease and cancellation of mining lease;
• Amendments in field circulars issued by Indian Bureau of Mines for stringent regulation of boundary pillars of mining leases;
• Ban on export of iron ore and manganese ore; and
• Measures to be taken by State Governments for improving regulation by:
  (i) introducing Computerized weigh bridges,
  (ii) installing Check Posts at exit points,
  (iii) proper maintenance of roads and collection of toll tax, and
  (iv) providing adequate staff for regulatory purposes in State.

The Government has considered the recommendation of the Commission of Inquiry and has accepted recommendations pertaining to amendment of Rule 26 and Rule 27 of MCR, restricting persons convicted for illegal mining from renewal of mining lease and cancellation of mining lease, amendments in field circulars issued
by Indian Bureau of Mines for stringent regulation of boundary pillars of mining leases, and measures to be taken by State Governments for introducing computerized weigh bridges, installing Check Posts at exit points, proper maintenance of roads and collection of toll tax, and providing adequate staff for regulatory purposes in State. The Government has commenced suitable action for implementation of the accepted recommendations.
5.1 In the federal structure of India, the State Governments are the owners of minerals located within their respective boundaries. The Central Government is the owner of the minerals underlying the ocean within the territorial waters or the Exclusive Economic Zone of India.

5.2 In this context, the entry at serial No. 23 of List II (State, list) to the Constitution of India states, ‘Regulation of mines and mineral development subject to the provisions of List I with respect to regulation and development under the control of the Union.’

5.3 The entry at serial No. 54 of List I (Central list) to the Constitution of India states, ‘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.’

5.4 In pursuance to the entry at serial No. 54 of List I, the Central Government have framed legislation titled Mines & Minerals (Development and Regulation) (MMDR) Act, 1957 as Central Act No. 67 of 1957.

5.5 The State Governments grant the mineral concessions for all the minerals located within the boundary of the State, under the provisions of the MMDR Act, 1957, and Mineral Concession Rules (MCR), 1960 framed thereunder. Under the provisions of the MMDR Act, 1957 and MCR, 1960, prior approval of the Central Government is required in the following cases:

- Granting areas under reconnaissance permit prospecting licence and mining lease to a person in excess of limits prescribed under Section 6(1)(a)(a), 6(1)(a) and Section 6(1)(b) respectively of the Act.
- Imposing special condition(s) in mining lease under Rule 27(3), in prospecting licence under Rule 14(3) and in reconnaissance permit under Rule 7(3) of Mineral Concession Rules, 1960 over and above the conditions prescribed in MCR, 1960.
- Granting mineral concession in an area previously reserved by the Government, or previously held under a mineral concession, without first notifying the same by relaxing the provisions of Rule 59(1) of MCR, 1960 under Rule 59(2).
- Revision of any order made by State
Government with respect to any mineral except a minor mineral.

- Relaxation of Rules in special cases under Section 31 of the Act, keeping in view the interest of mineral development.

**Status of Mineral Concessions**

5.6 There are three kinds of mineral concessions, viz Reconnaissance Permit (RP), Prospecting License (PL) and Mining Lease (ML).

5.7 RP is granted for preliminary prospecting of a mineral through regional, aerial, geophysical or geochemical surveys and geological mapping. The RP for any mineral or prescribed group of associated minerals is granted for 3 years and for a maximum area of 5,000 sq. kms, to be relinquished progressively. After 2 years, the area should be reduced to 1,000 sq. kms or 50% of the area granted, whichever is less. At the end of 3 years, area held under an RP should be reduced to 25 sq kms. In a State, a person can be granted a maximum area of 10,000 sq. kms under RP subject to the condition that area in a single RP does not exceed 5000 sq. kms. A RP holder has preferential right to obtain PL(s) in the area concerned under Section 11 (1) of the Act.

5.8 PL is granted for undertaking operations for the purpose of exploring, locating or proving mineral deposit. A PL for any mineral or prescribed group of associated minerals is granted for a maximum period of 3 years. A PL can be renewed in such a manner that the total period for which a PL is granted does not exceed 5 years. In a State, a person can be granted a maximum area of 25 sq. kms in one or more PLs, but if the Central Government is of the opinion that in the interest of development of any mineral it is necessary to do so, the maximum area limit can be relaxed. A PL holder has preferential right to obtain ML in the area concerned under Section 11 (1) of the Act.

5.9 ML is granted for undertaking operations for winning any mineral. A ML for any mineral or prescribed group of associated minerals is granted for a minimum period of 20 years and a maximum period of 30 years. A ML can be renewed for periods not exceeding 20 years each. In a State, a person can be granted a maximum area of 10 sq. kms in one or more MLs, but if the Central Government is of the opinion that in the interest of development of any mineral it is necessary to do so, the maximum area limit can be relaxed.

5.10 The position regarding RP/PL/ML proposals disposed of by the Ministry of Mines during the year 2011-12 is given at Annexures 5.1, 5.2 and 5.3.

**Major initiatives taken by the Ministry for making the Mineral Concession System efficient and transparent.**

5.11 The Ministry of Mines has constituted a Central Coordination-cum-Empowered Committee (CEC) under the Chairpersonship of Secretary (Mines) to monitor and minimize delays at various
levels in grant of approvals for mineral concession applications. The CEC meets quarterly, and has so far held seven meetings - on 24th July, 2009, 22nd December, 2009, 18th June, 2010, 22nd December, 2010, 3rd May, 2011, 20th September, 2011 and 16th January, 2012, wherein important decisions aimed at minimizing delays in processing of mineral concession applications at various levels and bringing about efficiency and transparency in the overall mineral concession regime were taken.

5.12. One of the main decisions taken by the CEC in its first meeting that has reiterated in the subsequent meetings, was that a State level Coordination-cum-Empowered Committee (SEC) would be constituted in each State under the chairmanship of Chief Secretary or Additional Chief Secretary/Principal Secretary of the Mining/Industries Department with representation from all concerned Departments/institutions. As per the information received by the Ministry, all mineral-rich States, viz. Andhra Pradesh, Chhattisgarh, Gujarat, Goa, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Odisha, Rajasthan and Tamil Nadu have constituted their respective SECs.

5.13 Keeping in view the need for having more effective coordination among the Central Ministries/Departments and the State Governments for grant of mineral concessions as well as for dealing with various important matters relating to mineral development and regulation in the country, the CEC has been reconstituted as “Coordination-cum-Empowered Committee on Mineral Development and Regulation” on 20th October, 2011. The CEC, now, comprises senior officers of the Ministries of Mines, Environment and Forests, Home Affairs, Steel, Railways, Finance, Shipping, Fertilizers, Department of Atomic Energy, Directorate General of Civil Aviation (DGCA), Geological Survey of India (GSI), Indian Bureau of Mines (IBM). Representatives of State Governments are invited to the meetings of the CEC as special invitees. The Terms of Reference (TOR) of the CEC have also been broadened so as to bring within its ambit other important matters viz. Sustainable Development Framework, Coordination/review of steps for prevention of illegal mining, issues arising out of the National Mineral Policy and legislation governing mineral development etc. Secretary (Mines) has, vide his D.O. letter dated 17th November, 2011, requested all Chief Secretaries, to review the composition and terms of reference of their respective SECs accordingly.

5.14 The Ministry of Mines has, in consultation with the State Governments, issued detailed guidelines on 24th June, 2009, in order to bring more clarity in processing the mineral concession proposals under the Mines and Minerals (Development & Regulation) Act, 1957 and Mineral Concession Rules, 1960. The guidelines also seek to ensure application of uniform criteria and transparent principles by the State Governments.
while examining and recommending proposals to the Central Government.

5.15 Based on an analysis of the cases falling under section 11 (5) of the Act, as well as the consultations with the State Governments in the meeting of the CEC held on 22nd December, 2009, the Ministry of Mines has framed a Policy on ‘special reasons’ to be adopted and applied by all State Governments while recommending a mineral concession proposal in favour of a later applicant under Section 11(5) of the Act. Guidelines in this regard have been issued to the State Governments on 9th February, 2010.

5.16 In the context of its responsibility to dispose of the mineral concession proposals within a reasonable time, the Ministry of Mines has issued guidelines on 29th July, 2010 regarding return of cases to the State Governments wherein there has been no response to the Ministry’s queries for over six months. Besides, in order to ensure that the areas recommended by the State Governments for mineral concessions are clearly demarcated, the Ministry has issued comprehensive guidelines on 13th October, 2010 regarding submission of maps by the State Governments along with the proposals. These guidelines are available on the Ministry’s website (http://mines.gov.in).

5.17 A Working Group under the Chairmanship of Additional Secretary (Mines) was set up in the Ministry of Mines on 20th January, 2011, for developing software for monitoring and expediting forest clearances in respect of mineral concession applications. The Working Group held a series of meetings and deliberations. As per the deliberations, the Ministry of Environment & Forests has redesigned and operationalised its software in January, 2012.

5.18 The Ministry has taken an initiative to process all mineral concession proposals within one month of their receipt in the Ministry by way of their preliminary scrutiny, in order to ensure that the documents/information submitted along with the proposals are as per the requirements under the provisions of the MMDR Act, 1957 and Rules and guidelines framed thereunder.

5.19 The Ministry of Mines is using internet services to bring about more accessibility and transparency in processing the mineral concession applications recommended by the State Governments. The website of the Ministry (www.mines.nic.in) provides all information on the current status of the mineral concession applications.

**Government of Madhya Pradesh’s Policy on ‘Special Reasons’**

5.20 The Government of Madhya Pradesh has, in its State Mineral Policy 2010, framed ‘special reasons’ for recommending a mineral concession proposal in favour of a later applicant in a non-notified area. The Ministry has taken due note of the ‘special reasons’ framed by the State Government, and written to them vide letter dated 20th October, 2011, for ensuring that the said ‘special reasons’ are applied in a
uniform, consistent and transparent manner in all cases. The State Government has also been requested that while invoking section 11 (5), it should clearly state under which clause of the ‘special reasons’ a proposal is covered. With regard to the section 11(5) cases presently pending with the State Government or with the Central Government, the State Government has been asked to inform in each case as to how the proposal is covered under the said ‘Special Reasons’ framed by the State Government and indicate the relevant clause of the ‘Special Reasons’ in each case separately.

5.21 The Ministry has, also, requested all other States on 20th October, 2011 to examine their own State Minerals Policies and incorporate therein suitable ‘special reasons’ specific to their respective States, for invoking the provisions of Section 11(5) of the MMDR Act.

5.22 The Ministry in the process of revising guidelines dated 9th February, 2010, on ‘special reasons’ to be invoked by the State Governments while recommending a later applicant in a non-notified area. The said guidelines have a component of ‘Memorandum of Understanding (MoU) cases’ as one of the ‘special reasons’. In the light of Hon’ble Supreme Court’s Order dated 13th September, 2010 in the matter of Sandur Manganese and Iron Ores Ltd. vs. the State of Karnataka and others, the Ministry is in dialogue with the Department of Legal Affairs on the question of retaining the MoU component in the guidelines.

Revisions Application Disposal

5.23 New Revision software for monitoring Revisions Applications filed under Section 30 of Mines and Mineral (Development and Regulations) MMDR Act, 1957 has been made fully operational. During the year (upto 15th December, 2011), 773 Applications challenging the State Governments orders were disposed of.

Playground on Reclaimed Mining Area
(Source IBM)
Legal Provisions

6.1 Under the provisions of Section 9(3) of the MMDR Act, 1957, the Central Government may, by notification in the Official Gazette, amend the Second Schedule, so as to enhance or reduce the rate at which royalty shall be payable in respect of any minerals with effect from such date as may be specified in the Notification, provided that the Central Government shall not enhance the rate of royalty in respect of any minerals more than once during any period of three years. Similarly under Section 9A(2) of the Act, the Central Government may, by notification in the official Gazette, amend the Third Schedule so as to enhance or reduce the rate at which the dead rent shall be payable in respect of any area covered by mining lease and such enhancement or reduction shall take effect from such date as may be specified in the notification, provided that the Central Government shall not enhance the rate of the dead rent in respect of any such area more than once during any period of three years.

Revision of rates of royalty and dead rent in respect of major minerals (non-coal minerals)

6.2 As a result of the revision of royalty rates vide Notification dated 13th August, 2009, and issue of revised guidelines for calculation of royalty, the royalty collection for major minerals in the country has increased from ₹ 2319.21 crore in 2008-09 to ₹ 4469.75 crore in 2009-2010, and to ₹ 7279.49 crore in 2010-11. Till December 2011, the total royalty collection stood at ₹ 5828.84. State-wise increase in the royalty collections from 2009-10 till December 2011 is given at Table 6.1.

<table>
<thead>
<tr>
<th>State</th>
<th>Royalty 2009-10</th>
<th>Royalty 2010-11 (P)</th>
<th>April 2011 to Dec., 2011(P)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andhra Pradesh</td>
<td>370.38</td>
<td>381.92</td>
<td>245.73</td>
</tr>
<tr>
<td>Assam</td>
<td>0.94</td>
<td>0.73</td>
<td>0.67</td>
</tr>
<tr>
<td>Bihar</td>
<td>NA</td>
<td>NA</td>
<td>0.46</td>
</tr>
<tr>
<td>Chhattisgarh</td>
<td>474.39</td>
<td>1196.55</td>
<td>757.90</td>
</tr>
<tr>
<td>Gujarat</td>
<td>192.90</td>
<td>193.89</td>
<td>258.74</td>
</tr>
<tr>
<td>Goa</td>
<td>285.91</td>
<td>959.12</td>
<td>352.05</td>
</tr>
<tr>
<td>Himachal Pradesh</td>
<td>47.98</td>
<td>NA</td>
<td>43.62</td>
</tr>
<tr>
<td>Jammu and Kashmir</td>
<td>NA</td>
<td>NA</td>
<td>1.03</td>
</tr>
<tr>
<td>Jharkhand</td>
<td>202.33</td>
<td>440.24</td>
<td>348.88</td>
</tr>
<tr>
<td>Karnataka</td>
<td>430.10</td>
<td>708.44</td>
<td>288.01</td>
</tr>
<tr>
<td>Kerala</td>
<td>8.81</td>
<td>9.42</td>
<td>2.85</td>
</tr>
</tbody>
</table>
### Study Group on Revision of Rates of Royalty and Dead Rent

6.3 In order to review the royalty rates and dead rent, the Ministry of Mines has constituted a Study Group under the Chairmanship of Additional Secretary (Mines) for revision of royalty rates and rates of dead rent for minerals (other than coal, lignite and sand for stowing) on 13th September, 2011 and to make appropriate recommendations to the Government. Other members of the Study Group are Ministries of Finance, Coal, Steel, Department and Atomic Energy, Indian Bureau of Mines (IBM), State Governments of Jharkhand, Karnataka, Odisha, Chhattisgarh, and Rajasthan, Representatives from FIMI, FICCI, ASSOCHAM and Confederation of Indian Industry. The report of the Study Group is likely to be submitted in six months.

6.4 Terms of reference of the Study Group set up in the Ministry, includes:-

- To review the existing rates of royalty in minerals (other than coal, lignite and sand for stowing) given in Second Schedule to the Mines and Minerals (Development and Regulation) Act, 1957 and to recommend revision of rates and in case, if necessary, give an additional conditional recommendation on what should be the royalty rate and the mechanism for computation of royalty rates after taking into account the liabilities on the lease holder as envisaged in the draft MMDR Bill, 2011, in the event the Parliament approves the new draft Bill.
- to consider the feasibility of allowing incentivized royalty rates for base metals, noble metals, REE and precious stones to encourage exploration;
- to suggest incentivized royalty rates on ad-valorem basis for beneficiated or concentrated ore;
- to consider and recommend policies relevant to mineral development and administration of royalty regime;
- to suggest appropriate revision in the existing rates of dead rent given in the Third Schedule to the Mines and Minerals (Development and Regulation) Act, 1957.

The Study Group has commenced its discussions/debates.

6.5 The IBM has, separately, set up

<table>
<thead>
<tr>
<th>State</th>
<th>2011</th>
<th>2010</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Madhya Pradesh</td>
<td>351.45</td>
<td>324.55</td>
<td>142.72</td>
</tr>
<tr>
<td>Maharashtra</td>
<td>84.85</td>
<td>132.70</td>
<td>151.14</td>
</tr>
<tr>
<td>Meghalaya</td>
<td>7.26</td>
<td>13.09</td>
<td>6.72</td>
</tr>
<tr>
<td>Odisha</td>
<td>894.44</td>
<td>1598.05</td>
<td>2365.43</td>
</tr>
<tr>
<td>Rajasthan</td>
<td>987.45</td>
<td>1182.23</td>
<td>774.89</td>
</tr>
<tr>
<td>Tamilnadu</td>
<td>130.56</td>
<td>138.56</td>
<td>87.02</td>
</tr>
<tr>
<td>Uttar Pradesh</td>
<td>NA</td>
<td>NA</td>
<td>0.20</td>
</tr>
<tr>
<td>Uttarakhand</td>
<td>NA</td>
<td>NA</td>
<td>0.64</td>
</tr>
<tr>
<td>West Bengal</td>
<td>NA</td>
<td>NA</td>
<td>0.14</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>4469.75</strong></td>
<td><strong>7279.49</strong></td>
<td><strong>5828.84</strong></td>
</tr>
</tbody>
</table>

*This information is based on the royalty paid as reported in the monthly returns submitted under MCDR 1988. This includes rent if any paid during the period. Further, subsequent refund, if any, by the concerned State Government may not be reflected in the data.*
a Monitoring Committee in the IBM to monitor the accuracy of reporting of the grade wise production, pit mouth value (PMV) and sale value of minerals by the lessees in the monthly and annual returns as required under Mineral Conservation and Development Rules, 1988. Suitable audit mechanism are being put in place to ensure data integrity and validity.

6.6 Existing royalty rates for some important industrial use minerals is given at Annexure 6.1.
FOREIGN TRADE IN MINING SECTOR

Export and Imports

7.1 The provisional value of export of ores and minerals during the year 2010-11 was ₹ 1,65,080 crore. Diamond (mostly cut) was the principal item of export during 2010-11, which accounted for 71.26 %, followed by iron ore with a contribution of 12.97 %, alumina 5.57% and granite 3.26 %, zinc ores and conc. 1.11 %, Coal ex lignite 0.7 %, Precious and semi precious stones 0.67%, Lead ores and conc. 0.66%, Illmenite 0.58 % Emerald (cut & uncut) 0.23% and Chromite 0.17 % were the other important minerals exported during the year 2010-11. Data on export of ores and minerals during 2006-07 to 2010-11 is presented at Annexure - 3.2.

7.2 The provisional value of import of ores and minerals during 2010-11 was ₹ 6,69,010 crore. Petroleum (crude) was the main constituent of mineral import during 2010-11, which accounted for 63.02 % of the total value of import of ores and minerals followed by diamond (mostly uncut) with 22.82 %, Coal(excluding lignite) 6.21%, Copper ores and concentrate 2.99 %, Natural gas 2.19 %, rock phosphate 0.48 and coke 0.47 % percent. Data on import of ores and minerals during 2006-07 to 2010-11 is presented at Annexure - 3.3.

7.3 Export/Import data of Metals & Alloys during 2006-07 to 2010-11 is given at Annexure - 7.1 and Annexure - 7.2, respectively.

7.4 Sector-wise Despatches of Iron ore for Domestic consumption and Export for the period April-December 2011 is given at Annexure - 7.3.

7.5 India’s Export and Import of iron ore during the year 2009-10 and 2010-11 is given at Annexure - 7.4 and Annexure - 7.5, respectively.

INTERNATIONAL COOPERATION

7.6 In the field of International Cooperation this Ministry is engaged in pursuing co-operation programme with various countries in the geology and mineral resources sector. The key objective is to strengthen the areas of bilateral co-operation with countries where bilateral understanding/agreements already exist, and also to explore the possibility to enter into fresh agreements with countries which are technologically advanced, and to whom India can offer assistance in developing the mineral resources of such countries. Concerted and continued efforts were made to project mining sector of India as an attractive investment destination.
in various international fora for attracting foreign direct investment and facilitating inflow of state-of-the-art technologies. Another objective has been that with an expanding economy India is in increasing need of mineral resources. International interaction also facilitates Indian mining companies to bid and acquire various mining projects as and when floated by mineral rich countries. International co-operation continued to be a thrust area in the Ministry of Mines during the year 2011-12.

HIGHLIGHTS

7.7 A Memorandum of Understanding (MoU) was signed between India and the Ministry of Energy & Mineral Resources, Saskatchewan Province of Canada on 15th March, 2011, for cooperation in the field of Geology and Mineral Resources during the visit of Saskatchewan Premier to India.

7.8 Ministry of Mines has signed a Memorandum of Understanding (MoU) with the Ministry of Energy and Mines of Colombia for cooperation in the field of Geology & Mineral Resources on 4th May, 2011 at Bogota.

7.9 Ministry of Mines entered into a Memorandum of Understanding (MoU) on 4th October, 2011, with the Ministry of Mines, Government of Afghanistan for cooperation in the field of Mineral Resources Development, during the visit of the President of Afghanistan to India.

7.10 Ministry of Mines and Ministry of Energy & Mines, Government of British Columbia Province, Canada signed a Memorandum of Understanding for cooperation in the field of Geology and Mineral Resources on 17th November, 2011, during the visit of the Premier of British Columbia to India.

7.11 Ministry of Mines and Ministry of Mines of the Republic of Mali signed a Memorandum of Understanding for cooperation in the field of Geology and Mineral Resources on 11th January, 2012 during the visit of the President of Mali to India.

7.12 Ministry of Mines participated in PDAC 2011 and put up India Pavilion on 1000 sq. ft. which received the attention of large number of visitors and prospective investors. An ‘India Day’ was also organised on 8th March, 2011, concurrently with PDAC Convention, which showcased India’s mineral wealth and capabilities and potential of the India’s minerals sector as an attractive investment destination.

7.13 Secretary Ministry of Mines led Indian delegation to participate in the PDAC 2012. An India Pavilion on 800 sq. ft. was put up that received attention of large section of visitors and investors. A half-a-day ‘India Day’ followed by reception was also organized on 6th March, 2012, concurrently with PDAC 2012 to showcase India’s mineral wealth and capabilities in the Mining Sector.

7.14 To enhance cooperation with mineral rich Malawi a Joint Working
Group (JWG) on Minerals Resources Development was set up and the first meeting was held on 17th October, 2011.

**MEMORANDUM OF UNDERSTANDING WITH COLOMBIA**

7.15 Colombia is endowed with natural resources of gold, coal, bauxite, copper, iron ore, lead, silver, zinc, nickel, platinum and other industrial minerals. Historically, the country has been recognised as an important producer and leading exporter of emerald. In addition, the country was an important producer of ferronickel and the only producer of platinum in Latin America. India and Colombia have been exploring the possibilities of formalising a bi-lateral cooperation programme in the Minerals sector.

7.16 Ministry of Mines has signed a Memorandum of Understanding (MoU) with the Ministry of Energy and Mines of Colombia for cooperation in the field of Geology & Mineral Resources on 4th May, 2011 at Colombia Capital Bogota. Shri Dinsha Patel, Minister of State for Mines (Independent Charge) signed the MoU on behalf of Government of India. Mr. Carlos Rodado Noriega, Minister of Mines and Energy signed the MoU on behalf of Government of Colombia. A Joint Working Group will be set up implement and monitor the co-operation programmes under the MoU. The MoU will also facilitate transfer of technology in mining and beneficiation plants and devise exchange programme at Government level involving training of personnel and exchange of information by counterpart agencies. Keeping in view the rich endowments of Colombia and the potential of co-operation and investment, the MoU provide an umbrella framework for co-operation in the field of geology and mineral resources between the two countries. Two meetings of officials have already taken place and a visit of technical team is being sent to conduct field activities in Colombia.

**MEMORANDUM OF UNDERSTANDING WITH AFGHANISTAN**

7.17 The Ministry of Mines, Government of India and the Ministry of Mines, Government of Afghanistan have signed a Memorandum of Understanding (MOU) on Cooperation in the field of Mineral Resources Development on 4th October, 2011, during the visit of Afghanistan President to India. The MoU was signed by Shri Dinsha Patel, Hon’ble Minister of State for Mines (Independent Charge) for the Government of India and H.E Mr. Waheedullah Shahrani, Minister of Mines on behalf of the Afghanistan Government. The signing took place in the presence of Hon’ble Prime Dr. Manmohan Singh and H.E. Mr. Hameed Karzai, President of Afghanistan. A meeting was also held between two countries during visit of H.E Mr. Waheedullah Shahrani, Minister of Mines to India in January’ 2012.
7.18 The Ministry of Mines, Government of India and the Ministry of Energy & Mines, Government of British Columbia Province, Canada have signed a Memorandum of Understanding (MoU) on cooperation in the field of Geology and Mineral Resources on 17th November, 2011, in the presence of Shri Dinsha Patel, Hon’ble Minister of State for Mines (Independent Charge), Government of India and H.E Ms. Christy Clark, Premier of British Columbia Government. Also the first Joint Working Group meetings was held on 12th March, 2012 at Vancouver, Canada to implement and monitor the Cooperation Programme under the MoU.

7.19 The Ministry of Mines, Government of India and the Ministry of Mines of Republic of Mali signed a Memorandum of Understanding (MoU) on cooperation in the field of Geology and Mineral Resources on 11th January, 2012. The MoU was signed during the visit of President of Mali to India. The MoU was signed by the Hon’ble Minister of State for Mines (I/C) Shri Dinsha Patel, on behalf of Government of India and by the the Minister of Foreign Affairs and International Cooperation, Mr. Soumeylou Boubeye Maiga, on behalf of the Mali Government.
7.20 The objectives of the MoU, inter-alia, include ‘Development of geological and mineral resources; Promotion of investment in the area of mining and mining related activities; Encouragement of transfer of technology between the Parties’, etc. The MoU envisages to promote cooperation in the areas of ‘Prospecting, exploration and mining development; Process R & D and beneficiation of ores and minerals; Training of personnel; Organisation of seminars to exchange views on development strategies; Promotion of high-level and experts’ visits to explore the investment opportunities; Exchange of Technical Teams; Development of mineral deposits of Mali by identifying the mineralized areas, through public/private sector; Regular exchange of information related to mineral resources/ reserves, policies, mining laws / regulation and projects identified for cooperation; Promotion of joint ventures in the area of geological studies and development of mineral deposits, including mineral processing.

INDIA AUSTRALIA JOINT WORKING GROUP ON ENERGY & MINERALS

7.21 The 7th Meeting of the India-Australia Joint Working Group on Energy & Minerals was held in Australia on 17-18 May, 2011 at Sydney, Australia. Ministry of Mines is the nodal Ministry from the Indian side for this Working Group. The Protocol signed at the end of the meeting endorsed the activities under the Action Plans on Mining and Minerals, Power, Petroleum and Natural Gas and Coal sectors.

COOPERATION WITH UZBEKISTAN

7.22 The 2nd Meeting of the India-Uzbekistan Joint Working Group on Geology and Mineral Resources was held in New Delhi on 15th September, 2011. A Protocol was signed at the end of the meeting listed the future course of action for furthering the cooperation programme.

JOINT WORKING GROUP WITH MALAWI

7.23 The 1st Meeting of the India-Malawi Joint Working Group on Mineral Resources Development was held in New Delhi on 17th October, 2011 in New Delhi. The Indian side was led by Shri S. Vijay Kumar, the then Secretary in the Ministry of Mines, Government of India, and the Malawi delegation was
led by Mr. Anthony Livuza, Secretary, Ministry of Natural Resources, Energy & Environment, Government of Malawi. A Protocol was signed at the end of the meeting and listed the future course of action for furthering the cooperation programme.

JOINT WORKING GROUP WITH MOZAMBIQUE

7.24 The 1st Meeting of the Joint Working Group in the field of Mineral Resources between India and Mozambique was held on 1st-2nd March, 2012 at Maputo, Mozambique. The meeting agreed and listed the further course of action for furthering the cooperation programme.

JOINT WORKING GROUP WITH SASKATCHEWAN

7.25 The Meeting of the Joint Working Group in the field of Geology and Mineral Resources between India and Saskatchewan Province, Canada was held on 8th-9th March, 2012 at Regina, Canada. The meeting finalized the roadmap for further cooperation programme.

7.26 List of valid MoUs agreements is given at Table 7.1.

Table 7.1

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Country</th>
<th>Date of signing of MoU/ Agreement</th>
<th>Valid Till / Automatic Validity</th>
<th>Meetings held, date, action Points</th>
<th>Action on Part of</th>
<th>Next Step</th>
<th>Stake-holders on the Indian side</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Afghanistan</td>
<td>4.10.2011</td>
<td>3.10.2016 3.10.2021</td>
<td>MoU signed on 4.10.2011 at New Delhi during the visit of President of the Islamic Republic of Afghanistan to India</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Australia</td>
<td>JWG constituted under the JMC. Terms of Reference signed on 10.4.2000</td>
<td>11th meeting of the JWG was held in New Delhi on 15-17 May, 2011.</td>
<td>The Minutes of the meeting have been circulated among stakeholders for follow-up action</td>
<td>Australian side will send the detailed programme for JWG meeting and draft Action Plan for 2011-13.</td>
<td></td>
<td>Ministry of Mines, Ministry of Power, Ministry of Coal, Ministry of New &amp; Renewable Energy, Ministry of Petroleum &amp; Natural Gas.</td>
</tr>
<tr>
<td>3</td>
<td>Western Australia</td>
<td>25.05.2005</td>
<td>24.05.2010 24.05.2015</td>
<td>A one day workshop on “Mine Site Rehabilitation” was organized by Western Australian delegates at Hotel Jai Mahal Palace, Jaipur on 14.03.2008.</td>
<td></td>
<td></td>
<td>Ministry of Mines, Mo/o Environment &amp; Forests and FIMI</td>
</tr>
<tr>
<td></td>
<td>Country</td>
<td>Date from</td>
<td>Date to</td>
<td>Description</td>
<td>Ministry of Mines, GSI, IBM and PSUs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>------------------</td>
<td>----------------</td>
<td>--------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Canada</td>
<td>27.6.2010</td>
<td>26.6.2014</td>
<td>Steering Committee meeting to be held. Response awaited from NR Can.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Ontario Province (Canada)</td>
<td>08.07.2010</td>
<td>07.07.2015</td>
<td>1st JWG meeting held on 27th September, 2010, in Toronto, Canada. 2nd JWG meeting was held in New Delhi on 8th November, 2010. Draft Minutes sent to the Ontario side for approval. 3rd Meeting was held through Video Conferencing on 1.3.2011. Ontario side proposed 4th Meeting through Video conferencing on 11-12 January, 2012. Ministry of Mines requested for postponement.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>British Columbia (Canada)</td>
<td>17.11.2011</td>
<td>16.11.2016 16.11.2021</td>
<td>MoU signed on 17.11.2011 at New Delhi during the visit of Premier of British Columbia to India. First meeting JWG with British Columbia has been held on 12th March, 2012 at Vancouver, Canada.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Saskatchewan Province, Canada</td>
<td>15.03.2011</td>
<td>9th March, 2012</td>
<td>Addendum to MoU for incorporating the JWG Clause has been Signed on 9th March, 2012 at Regina, Saskatchewan. First meeting of JWG held during 8-9 March, 2012 at Regina.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Chile</td>
<td>17.03.2009</td>
<td>16.03.2014 16.03.2019</td>
<td>1st Meeting of JWG held on 2.2.2010.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>China</td>
<td>15.09.2005</td>
<td>14.09.2008</td>
<td>Meeting to Review the MoU was held on 23.7.2010.</td>
<td>Ministry of Mines, GSI, IBM and PSUs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Colombia</td>
<td>04.05.2011</td>
<td>03.05.2016 03.05.2011</td>
<td>Proposal sent for setting up JWG. A high level delegation to visited Colombia to sign the MoU.</td>
<td>Ministry of Mines, GSI, IBM and PSUs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>France</td>
<td>28.10.1987</td>
<td>Validity not specified</td>
<td>20th Meeting of JWG held in April, 2007 in France. The French side is to respond.</td>
<td>Ministry of Mines, GSI, IBM and PSUs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td>Country</td>
<td>Date(s)</td>
<td>Details</td>
<td>Ministry of Mines, GSI, IBM and PSUs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----</td>
<td>-------------</td>
<td>-------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>--------------------------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>Iran</td>
<td>3.11.2010</td>
<td>1st Meeting of the Sub-Group held on 1.10.2009. 2nd Meeting was scheduled for Oct. Secretary (Mines) accepted the invitation of the Iranian side to visit Iran to discuss the issues.</td>
<td>Ministry of Mines, GSI, IBM and PSUs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.11.2015</td>
<td>First Meeting of JWG held on 17.10.2011</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.11.2017</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td>Malawi</td>
<td>11.01.2012</td>
<td>MoU signed on 11.1.2012 at New Delhi during the visit of President of the Republic of Mali to India</td>
<td>Ministry of Mines, GSI, IBM and PSUs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>10.01.2017</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>10.01.2022</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td>Mali</td>
<td>16.09.1996</td>
<td>JWG meeting held on 7-9 June, 2010. 2nd Meeting of the Sub-Group was held on 15.12.2010. Secretary (Mines) chaired a meeting on 5.1.2011 regarding pre-qualification of coal project.</td>
<td>Ministry of Mines, GSI, IBM and PSUs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>15.09.1999</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>15.09.2012</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>15.12.2010</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16.</td>
<td>Mongolia</td>
<td>30.09.2010</td>
<td>MoU signed on 30.09.2010 during the visit of Mozambique President to India. A technical team led by Dir. (T) to visited Mozambique in February, 2011. The 1st Meeting of JWG held on 1-2 March, 2012 at Maputo.</td>
<td>Ministry of Mines, GSI, IBM and PSUs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>29.09.2015</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>29.09.2017</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>30.10.2014</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>30.10.2019</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18.</td>
<td>Mozambique</td>
<td>30.09.2010</td>
<td>Indian Embassy has been requested to follow-up the matter with SEGEMAR.</td>
<td>Geological Survey of India</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>13.10.2012</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>13.10.2015</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19.</td>
<td>Namibia</td>
<td>07.10.1997</td>
<td>MEA has been requested to take up the matter with the High Commission of India, Pretoria.</td>
<td>Ministry of Mines, GSI, IBM and PSUs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>06.10.2002</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>06.10.2007</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.</td>
<td>GSI-SEGEMAR (Argentina)</td>
<td>14.10.2009</td>
<td>Indian Embassy has been requested to follow-up the matter with SEGEMAR.</td>
<td>Geological Survey of India</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>13.10.2012</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>13.10.2015</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21.</td>
<td>South Africa</td>
<td>07.10.1997</td>
<td></td>
<td>Ministry of Mines, GSI, IBM and PSUs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>06.10.2002</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>06.10.2007</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td>Country</td>
<td>Start Date</td>
<td>End Date</td>
<td>Event Description</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----</td>
<td>------------------------</td>
<td>------------</td>
<td>----------</td>
<td>-----------------------------------------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SEMINAR, CONFERENCES & EXHIBITION**

**PDAC Convention 2011 & 2012**

7.27 Ministry of Mines participated in Annual Convention & Trade Show organised by the Prospectors and Developers of Canada, (PDAC) Toronto, Canada (PDAC 2011) and put up 10 booths India Pavilion on 1000 sq. ft. which received the attention of large number of visitors and prospective investors. A half day ‘India Day’ was also organised on 8th March, 2011, concurrently with PDAC Convention, which showcased India’s mineral wealth and capabilities and potential of the India’s minerals sector as an attractive investment destination. The Ministry of Mines participation in PDAC 2012 held from 4th March 2012 to 7th March 2012. India Day was organised on 6th March, 2012.

**WORLD MINING CONGRESS**

7.28 Ministry of Mines participated in the 22nd World Mining Congress and Expo held from 11th to 16th September, 2011 at Istanbul, Turkey. World Mining Congress and Expo organized once in every three years in various countries all over the world. India is a member of the World Mining Congress. The 22nd World Mining Congress was organized under the patronage of Ministry of Energy and Natural Resources of Turkey with the supports of Mining Development Foundation, Chamber of Mining Engineers of Turkey, Miners Association of Turkey, Presidents’ Council of Mining Sector, Turkish Cement Manufacturers’ Association and other private and public mining institutions.

**CHINA MINING 2011**

7.29 The CHINA MINING (Congress & Expo) 2011, 6th to 8th November, 2011, was hosted by the Ministry of Land and Resources, China and the Tianjin Municipal Government, China at Tianjin. It is one of the largest mineral exploration and mining trading platforms, covers the whole value chain, including geological survey, exploration development, mining rights, trading, mining investment and financing, smelting and processing technique and equipment, mining services, etc. Ministry of Mines
participated in the Congress and set up an Exhibition booth at the Expo. The Indian delegation, also, visited mining sites, mineral processing units and mineral laboratories.

**XXIX International Convention on Mining**

7.30 Ministry of Mines participated in the XXIX International Convention on Mining held in Acapulco, Mexico from 26th to 29th October, 2011. The event is the largest mining event held in the South America and attracts mining experts, investors and mineral rich countries from all over the world.

**MINING INDABA 2012**

7.31 The ‘MINING INDABA 2012’ which is one of the largest mining exhibition and conference, was held during 6-8 February, 2012 at Cape Town, South Africa. This annual event of global scale brings together key players in mining technology and services and also firms dealing with key resources like coal, uranium, platinum, iron-ore and hydrocarbons, etc. This event also brings global investors and market leaders in the African continent and Ministers from key departments of South Africa and Sub-Saharan Africa.

7.32 The Ministry of Mines participated and made presentation on the capabilities of the Indian Mining Sector at the Conference. An India Pavilion was, also, set up at the Expo held during the Conference. 25 Indian delegates, representing Ministry of Mines, Ministry of Power, Private and Public Sector Industry attended the Conference.
Geological Survey of India (GSI)

8.1 Geological Survey of India (GSI)
Established in 1851, started its voyage to investigate for and assess coal and other mineral resources of the country with regional level exploration. In the 160 years since its foundation, GSI has continued to grow and diversify into various geoscientific activities, and delivered impeccable contribution in the arena of geosciences. After independence, GSI’s activities in mineral exploration as well as baseline surveys have increased manifold in order to sustain the momentum of national economic development and to meet the increasing demands of various stakeholders. Over the years, it has not only developed into a huge repository of precious geoscientific data applied in various developmental sectors in the country, but has also attained the status of a geo-scientific organisation of international repute. The principal function of GSI relate to creation and updation of national geoscientific data and mineral resource assessment, air-borne and marine surveys and conducting multifarious geo-technical, geo-environmental and natural hazards studies, glaciology, seismotectonics, etc. and to nurture studies on fundamental research. In all the developmental facets of the country including coal, steel, cement, metals/ minerals and power industries, GSI made neat contribution and remained relevant in the national context. Outcome of work of GSI has immense societal value as well as relevant to global perspective adopting state-of-the-art technologies and using methodologies, which are cutting-edge. Functioning and annual programmes of GSI assumes significance in the national perspective since it is directly related to delivering the public good. With its headquarters at Kolkata, GSI has six Regional offices at Lucknow, Jaipur, Nagpur, Hyderabad, Shillong and Kolkata and offices in almost all States of the country. The Geological Survey of India is an attached office to the Ministry of Mines. The Union Cabinet constituted a High Powered Committee (HPC) to thoroughly review the functioning of Geological Survey of India and assess its capacity to meet the emerging challenges taking into account the technological and manpower resources of the organization. The report of the Committee was submitted in March 2009 and approved by the Union Cabinet in October 2011. The revised organizational structure as proposed by HPC has largely been implemented.

8.2 Activity Domain of GSI
The GSI is the prime provider of basic
earth science data to the government, industry and the public, as well as responsive participant in international geoscientific fora. The vibrant steel, coal, metals, cement and power industries, which expanded phenomenally in the post-independence era, bear eloquent testimony to the GSI’s relevance in the national context. Geoscientific work of GSI encompasses practically the entire gamut of earth sciences and thus great responsibilities are bestowed on the organisation. Earth science by its very nature is highly multidisciplinary and has immense societal values. With a view to remain relevant for the cause of the society, mankind, global perspective and its environment, GSI faced challenges of the time to reorient its organizational structure and strengthen its capacity building. In accordance with the HPC recommendations, GSI is executing its programmes through Mission-Region hybrid matrix mode with its five Mission offices and three Support Systems. Activities of GSI function around Five Missions / Seven Schemes and three Support Systems (Table: 8.1).

<table>
<thead>
<tr>
<th>Mission/ Support System</th>
<th>Schemes</th>
<th>Components/Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mission II - Natural Resources Assessment</td>
<td>Mineral Exploration</td>
<td>Exploration for coal (including lignite), Ferrous, Non-Ferrous, Precious and Strategic and Industrial minerals.</td>
</tr>
<tr>
<td>Mission III - Geoinformatics</td>
<td>Information/ Dissemination</td>
<td>Map compilation and publication on various earth science subjects, Information Technology, GSI portal.</td>
</tr>
<tr>
<td>Mission IV - Fundamental &amp; Multidisciplinary Geosciences and Special studies</td>
<td>Specialised Investigation</td>
<td>Geotechnical, environmental, landslide studies, earthquake geology and seismology, glacial, geothermal and desert geological studies.</td>
</tr>
<tr>
<td>Mission V - Training &amp; Capacity building</td>
<td>Human Resource Development</td>
<td>Training</td>
</tr>
<tr>
<td>Policy Support System</td>
<td></td>
<td>Science Policy &amp; Coordination, Planning &amp; Monitoring, CGPB Secretariat, International cooperation, Commercial Operations, Geoscience partnerships</td>
</tr>
</tbody>
</table>
The “Missions” recommended by the HPC are operational and activities and budget of GSI are following the “Mission” concept. GSI’s Field Season programmes of 2009-2010 and 2010-2012 have been executed on Mission-Region Hybrid matrix Figure: 8.1.

8.3 Restructuring of GSI

The Expenditure Reforms Commission (ERC) 2001 had in its report recommended rightsizing the staff strength of GSI from the strength of 16,302 to 9,000. The ERC had also recommended setting up an Expert Committee to suggest a revised charter of functions for GSI, and identify the disciplines/groups where reduction of personnel could be effected. The Expert Committee headed by Shri Arvind Varma, Former Secretary to the Government of India in 2002, recommended a revised charter of functions for GSI, which was adopted by the Government.

The High Powered Committee Report in 2009 has given a new Charter for GSI and has accordingly recommended a substantial increase in the scientific personnel strength of GSI and Union Cabinet has approved the net increase of 713 Group-A posts; 451 Group-B posts and 189 Group-C posts of S&T streams.

The total strength of Scientific and non scientific personnel is projected to rise from 11420 to 12369 over a period of ten years i.e. actually 8.3% increase.

Like Geology stream the other streams Geophysics, Chemistry and Engineering have become ‘organized service’ with the approval of the Cabinet note by the Union Cabinet on 25th October 2011.

As per the recommendation of HPC, and approval of Union Cabinet on 25th October 2011 the revised strength of different S&T cadres in GSI are given at Table 8.2.

<table>
<thead>
<tr>
<th>Streams</th>
<th>Sanctioned posts before HPC</th>
<th>Increased strength with Cabinet approval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geology</td>
<td>2428</td>
<td>272</td>
</tr>
<tr>
<td>Geophysics</td>
<td>410</td>
<td>170</td>
</tr>
<tr>
<td>Chemistry</td>
<td>328</td>
<td>262</td>
</tr>
<tr>
<td>Engineering</td>
<td>90</td>
<td>330</td>
</tr>
<tr>
<td>Survey</td>
<td>2</td>
<td>201</td>
</tr>
<tr>
<td>Drawing</td>
<td>-</td>
<td>362</td>
</tr>
<tr>
<td>Total</td>
<td>3258</td>
<td>1597</td>
</tr>
</tbody>
</table>

(*: Includes Director General Post)

(**: Includes mineral physics and instrumentation)

8.4 Implementation of recommendations of High Powered Committee (HPC), after the approval of “Restructuring of GSI” by Govt. of India:

Background: The Union Cabinet in its meeting on 1st October, 2007 decided to set up a High Powered Committee (HPC) to thoroughly review the functioning of the GSI and assess its capacity to meet the emerging challenges taking into account the organization’s technological

The process to implement HPC recommendation was started in the Ministry in the end of year 2009 and in that direction the first draft note on restructuring of Geological of India was circulated for seeking comments of other ministries/department on 10th December, 2009 and after long Inter Ministerial consultation, the Union Cabinet in its meeting dated 25th October, 2011 approved the “Restructuring of

8.5 Status of implementation in respect of establishment matters as on 30th December, 2011:

- The Union Cabinet has approved “Restructuring of GSI” on 25th October, 2011 and following is approved Govt. of India:-
  
  (a) The total GSI strength was ‘right sized’ with total strength of 12369.
  
  (b) The post created by Cabinet approval will be filled up over a 10-year period to achieve full strength.
  
  (c) The Govt. has approved constitution of Group ‘A’ posts of Geophysics, Chemistry and Engineering of (S&T Streams) GSI into Organized Services.
  
  (d) Exemption for a period of three years of all Science & Technical posts from the purview of Department of Expenditure instructions on posts that remain unfilled for more than one year.

- Finance cells created in each Region with Director Level Officer as In-charge.

- Policy, dated 22nd August, 2011 on “Foreign Deputation by GSI officers” issued.


- Recruitment Rules of Group ‘B’ {Gazetted & Non-Gazetted} and Group ‘C’ for Geology, Geophysics, Chemistry, Survey and Drawing Streams sent to DoPT on 5th December, 2011 for concurrence and approval. As regards Engineering Stream it was sent to DoPT on 22nd December, 2011.

- Recruitment Rules of Group ‘A’ ‘B’ Group ‘C’ for non-S&T and other miscellaneous streams after Cabinet approval is under process and will be sent to DoPT for concurrence after approval.

- GSI training Institute to commence Post PG Diploma Certificate course in Geoinformatics. First course to commence in third week of 21st September, 2011.
Prospective plan for outsourcing of vehicle for field and operational unit for next five years is under finalization.

Circulars regarding Purchase Advisory Committee (PAC) & Technical Advisor Committee (TAC) has been issued by Asset Management & Procurement Division of GSI on 26th August, 2011.

Notification issued by GSI on 29th December, 2011 to give effect Govt. of India approved discipline wise new sanctioned strength of GSI.

GSI issued notification No. 8360A/HPC/ GSI/2011 dated 29th December, 2011 on ‘Manpower strength as approved on Restructuring of GSI, 2011’ and Operation Mechanism in respect of different disciplines’:-

(a) Vision & Charter - Gazette notification issued on 25th May, 2009 and put up on website of Ministry of Mines & Portal of GSI. Wide publicity has been given within and outside GSI.

(b) GSI has been declared as an ‘Attached Office’ on 7th July, 2009 in the Ministry of Mines, upgrading it from ‘Subordinate Office’

(c) GSI has switched over to the Mission-Region mode and the Field Season 2009-2010 and 2010-2012 has been conducted in Mission-Region matrix Mode.

(d) ‘Mission Offices’ have started functioning. Three Support Systems are created.

- Orders for Restructuring of Coal Wing issued on 5th April, 2010.
- Orders for Restructuring of Marine Wing issued on 13th April, 2010.
- Orders for Restructuring of AMSE issued on 13th April, 2010.
- Order on Placement Collegiums was issued on 6th April, 2010.
- Officials of various levels undergone / undergoing training in finance and administration by outside reputed Institutions.
- Framing of transfer policy as per guidelines given by HPC has been done and being implemented.
- Fund allotment on Mission Mode implemented from 1st April, 2010


(f) The following Collegiums, to
manage HRD related issues have been established:

- Collegium for Deployment and redeployment and new postings of officers.
- Collegium for faculty selection in GSITI.
- Collegium for Concept paper on Shipping, Security of GSI Buildings.

In addition the following Collegiums have been established for non-HRD issues:

- Collegium for approving prioritised SOPs.
- Collegium for variance analysis of NGGM samples
- Collegium for reviewing the peer reviewed reports.

The Collegiums were also established for the following issues:

- Collegium for changes in the scheme of Geologists Exam. 2011.
- Collegium for review of Modernisation Report of GSI.
- Collegium for review of DPR submitted by NISG i.r.o. OCBIS
- Collegium for posting in Dir(T)

Meeting to discuss issues regarding change in scheme of Geologists Examination in UPSC with AS(E) on 15th June, 2011.

(h) Finance cells created in each Region with Director Level Officer as In-charge.

(i) Modernization Committee Report has been finalized and approved in 49th CGPB.

(j) Policy, dated 4th August, 2010 on change in Field Season Program period, making it in sync with financial year, issued.

(k) Policy, dated 23rd September, 2010 on Field duration, for different geoscience domains issued and implemented.

(l) Policy, dated 3rd September, 2010 on grant and regulation of Rolling Contingent Advances/Non-Rolling Contingent Advances to field operations issued and implemented.

(m) Policy, dated 22nd August, 2011 on “Foreign Deputation by GSI officers” issued.

(n) Central Geological Programming Board (CGPB) has been revamped and 12 Committees constituted on 12th March 2009. These Committees are fully functional.

(o) Order for establishing Science Policy Coordination, CGPB Secretariat, Commercial Operation (all new) and additional office of DDG (P) at Delhi has been issued by GSI on 29th June, 2009. Quality Management cell has been notified to be located at Delhi. A road map on the functioning of different divisions of DGCO formulated.
(p) GSI has finalized plan to establish a National Drill Core Library at Hyderabad.

(q) Order for dissemination of Geoscientific information gathered by GSI for use by public at large made free of cost and related orders issued on 5th June, 2009. GSI has drawn an action plan for digitizing and uploading the information.

(r) GSI is to develop a special group of Geoinformatic personnel drawn from all the major streams i.e. Geology, Geophysics and Chemistry so that over time GSI has a unique national human resource - order issued vide Letter No. /D-19015/07/IT/OCBIS Director[Technical] 26th April 2011

(s) GSI to invest in cyber-infrastructure, Develop geoscientific data standards and management policies etc- order issued vide letter no. 648/19015/07/IT/2011 dated 25th November, 2011.

(t) Recruitment Rule (RR) of Geology stream as ‘Organized Service’ has been notified as Gazette Notification on 29th September, 2010.

(u) Training System in GSI has been revamped. Special Mission for training has been constituted. Partnership with other training institutes in geoscience sector is envisaged. GSI has started imparting training to the officials of the State Governments in GSI’s Training Institute free of charge. A post of Training Manager to oversee the functioning of GSITI has been created.

(v) Six Regional Training Institutes (RTI) have been operationalised at the six Regional Headquarters under GSITI. The Field Training Centres of GSITI located in different parts of the country (FTCs) shall be conducting field-based courses on different themes of earth sciences.

(w) GSI training Institute commenced Post PG Diploma Certificate course in Geoinformatics.

(x) Report on training needs assessments is expected to be submitted by February 2012.

(y) Vehicle repair workshops have been closed since 31st July, 2009 and job work has been given on outsourced basis.

(z) The peer-reviewed Standard Operating Procedures, for functional domains has been finalized and uploaded. Hard copy of operating procedures pertaining to Mission 1A also released.

(aa) Proposal to setup ‘Geoscience Advisory Council’ has been approved by the Hon’ble Prime Minister’s Office. First meeting was held in September 2011.

(ab) For setting up ‘Indian Geosciences Congress’ as a registered Society, laws and byelaws governing such society drafted, papers sent to Planning Commission for ‘in
principle’ approval before obtaining cabinet approval.

(ac) Geophysics, Chemistry and Engineering, Group ‘A’ in GSI to be accorded ‘Organised Service’ status as approved by the Cabinet on 25th October, 2011. Draft Recruitment Rules on ‘organised service’ pattern for the above mentioned streams have been submitted to DoPT for approval on 6th January, 2012.

(ad) Quality Management Cell of GSI

Peer Review of GSI Field Reports

The peer review of reports has been introduced in GSI at the instance of MoM to improve the overall quality of GSI reports.

FS: 2007-08 (10% reports)

Total reports generated: 230 reports

No. of Reports randomly picked up for peer review (10%): 33 reports

No. of peer reviewers: 11

Status: Peer Review completed

Action taken: The peer reviewed reports were analysed by the QM Cell and by a collegium constituted by the DG, GSI, and after approval by the DG, GSI, the recommendations of the collegium regarding modification and resubmission of the 6 reports have been sent to the respective Regions for immediate compliance. The other reports also have been sent back to the respective Regions for circulation among field and supervisory officers for educative purpose and for improving the Quality of reports in the future.

Secretary (Mines) Shri Vishwapati Trivedi at Stona 2012 Exhibition
Field Season (FS): 2008-09 (20% reports)
Total reports generated: 202 reports
No. of Reports randomly picked up for peer review (20%): 62 reports
No. of peer reviewers: 20

Status: Peer Review completed

Action taken: The peer reviewed reports were analysed by the QM Cell and a collegium constituted by the DG, GSI, and after approval by the DG, GSI, the recommendations of the collegium regarding modification and resubmission of the 9 reports have been sent to the respective Regions for immediate compliance. The other reports also have been sent back to the respective Regions for circulation among field and supervisory officers for educative purpose and for improving the Quality of reports in the future.

FS: 2007-08 (additional 10% reports)
Total reports generated: 230 reports
No. of Reports randomly picked up for additional peer review (10%): 19 reports
No. of peer reviewers: 7

Status: The Peer Reviewed reports are being received back (15 reports received).

Action taken: The peer reviewed reports will be analysed by the QM Cell and the collegium constituted by the DG, GSI, for further necessary action.

FS: 2009-10 (10% reports)
Total reports generated: 282 reports
No. of Reports randomly picked up for additional peer review (10%): 30 reports
No. of peer reviewers: 17

Status: The Peer Reviewed reports are being received back (2 reports received).

Action taken: The peer reviewed reports will be analysed by the QM Cell and the collegium constituted by the DG, GSI, for further necessary action.

Preparation of Modus operandi for fieldwork and report scrutiny

The QM Cell has prepared detailed ‘modus operandi’ and ‘flow charts’ for

1. Quality Management at SHQ and RHQ levels and reporting system at various levels.

2. Report scrutiny at various levels and uploaded the same in GSI portal for comments/review. These have been reviewed by a collegium and after approval by the DG, GSI will soon be implemented in GSI.

ISO Certification of GSI (Regional) Chemical Labs

Seven coordinators were selected from the Regional chemical Labs and the Central Gem Testing lab and trained at IIQM, Jaipur on “Laboratory Quality Management System and Internal Audit as per ISO 170025:200)” from 10-13 May 2011.
The QM Cell has arranged a study visit for the 14 officers from the selected labs to the ISO Certified ONGC Labs at Dehradun on 17th October, 2011.

The proposal for engaging a consultant for ISO Certification of Labs is under consideration.

Rechecking of 5% NGCM samples analysed during FS: 2008-09

The QM Cell received 345 duplicate NGCM samples for reanalysis from the six Regions, along with the original analytical results. Thereafter, the QM Cell selected 292 samples for rechecking and after false numbering them, were sent to different Regional Chemical Labs for reanalysis, under various NGCM packages. The QM Cell has subsequently received a majority of the results of reanalysis of the samples. The QM Cell is now analysing the results for variance.

8.7 Modernisation drive in GSI

As part of the effort to meet emerging challenges, GSI is constantly upgrading its technology both for field as well as laboratory equipment.

The current status on procurement of the important capital assets is as under:

(i) Procurement of a new ocean going research vessel in replacement of GSI’s existing Research Vessel Samudra Manthan: underway [GSI has signed contract agreement for the construction of a ship as a research vessel with M/s Wartsila Ship Design, Norway AS on 28th November, 2009. The Ship Acquisition Cell (SAC) of M&CSD is monitoring the progress on a day to day basis and Task Force reviews the progress at regular intervals and providing direction to the SAC. Review meetings with the consultants appointed for the project (M/s Shipping Corporation of India and M/s Wartsila Ship Design, Norway) are being organized regularly. A team of MoM and GSI had visited Ulsan, S. Korea (between 7th June, 2011 to 11th June, 2011) for a kick-off meeting with M/s HHI for discussing various issues related to project management, progress and finance requirements, status of POS etc. Representatives of the consultants also participated in the meeting. Two batches of GSI Scientists (10 officers each) went for foreign training on Multichannel Seismic Systems and Gravity-Multibeam at Lamont Doherty Earth Observatory (LDEO) Palisades, New York, USA. One batch returned on 17th October, 2011 after completion of training in Gravity and Multibeam at the Institute. The trainings are being organised by M/s Wartsila Ship Design, Norway (consultants) as part of fulfilment of terms of agreement in connection with acquisition of Ocean Going Research Vessel. M/s Hyundai Heavy Industries (M/s HHI), Korea, the shipyard where the new vessel
is under construction submits monthly progress report which is scrutinized by the consultants and GSI. The second installment has been paid on 29th September, 2011 to M/s HHI. M/s HHI assured that the third milestone (steel cutting) will be achieved by 12th March 2012 and the third instalment will be paid after that in the month of March, 2012. Revised Proposal for allotment of required fund for the payment of the third instalment of ` 86.87 at ` 49.34 per dollar (24th November, 2011) equivalent to USD 17,605,500 had been raised in the Second Supplementary Demand and the fund has been allotted to GSI.

(ii) Procurement of a Heliborne Geophysical Survey System for GSI at a cost of ` 52.00 crore: almost complete [DGCA has issued permission to HAL for handing the CAMO and CAME operations of Dhruv Helicopter during installation and integration of geophysical sensors. The integration of sensors with the Helicopter by M/s Hindusthan Aeronautics Limited (HAL), Bangalore is under progress. HAL, as per new schedule, will hand over the helicopter after all certifications etc. by end of February 2012. The training of pilot is the responsibility of the O&M agency, which is going to take charge of the Helicopter once the HAL hands it over.

(iii) Acquisition of a new Geotechnical Vessel with shallow drilling capacity for GSI at a revised cost of ` 70.20 crore: Proposal finalized. The final copies of Request For Proposal (R.F.P.) for Selection of Shipyard for Acquisition of Geotechnical Vessel with Shallow Water Drilling Facility for Geological Survey of India (Marine and Coastal Studies Division) have been sent to the eighteen short listed shipyards on 19th / 20th October, 2011 by speed post. The pre-bid meeting has been organized on 22nd and 23rd November, 2011. All the clarifications sought by the shipyards have been answered and corresponding amendments are being compiled for onward transmission to all short listed shipyards. The estimated cost of the vessel is ` 70.2 crore including consultancy charges as approved by the Departmental EFC subject to the outcome of the tendering process.

(iv) Laboratory and IT equipment: In addition, as a part of modernization drive GSI has been purchasing laboratory and field equipments besides the Ocean going vessel, Helicopter etc. and the detailed list of items along with the expenditure towards such purchase is tabulated in Table: 8.2.

8.8 Free Data Policy

Documents (both text and graphic) generated and circulated by GSI are basically of two types: (a) printed and published for sale as well as for
free distribution and (b) unpublished documents for circulation within GSI and also for sale after costing on case to case basis for bonafide users. The Policy in this regard has been modified under direction of the Government on 5th June, 2009 and free data policy is presented at Annexure - 8.3.

Since initiation 34,858 metadata of unpublished reports have already been uploaded to GSI Portal till December 2011 along with the uploading of 9231 unpublished reports and during the FY 2011-2012, 353 reports have been circulated till December 2011.

8.9 Performance of GSI During 2011-2012

Summarised performance of GSI with physical target and achievement for last three financial years (2009-10, 2010-11, 2011-12, up to December 2011) of XI Plan Five Year Plan (2007-2012) is presented at Annexure 8.2.

MISSION-I: BASELINE GEOSCIENCE DATA GENERATION

8.10 Systematic Geological Mapping

Systematic Geological Mapping on 1:50,000 scale, the fundamental geological mapping programme, has been carried out by GSI for past few decades and has catered most basic geologic data to the National Geoscientific knowledge base. Out of the 3.146 million sq. km mappable area, 3.094 million sq. km have so far been covered by systematic mapping, bringing the total coverage to 98.36%. Systematic Geological Mapping of an area of about 620 sq km in parts of Zunheboto, Mon, Kiphire, Tuensang and Phek districts in Nagaland and Dibrugarh, Kamrup and Goalpara districts of Assam has been completed in the Financial Year 2011-12 upto December 2011.

8.11 Specialised Thematic Mapping (STM)

GSI launched specialized theme oriented large-scale (1:25,000 or larger) studies/mapping items (Specialised Thematic Mapping) from VIII Plan period. The studies involve application of multidisciplinary techniques, often complemented by precision laboratory studies. The outcome of these mapping efforts have already proven its importance in the areas of prognostication of natural resources, environmental analysis, natural hazard recognition and risk management, land use management, evaluation of major civil engineering projects etc. During the FY 2011-12 (up to December 2011) an area of 6326 sq km has been covered by specialised thematic mapping. While a total area of 36,498 sq km has been completed during the XI Plan period upto December 2011, and 14,416 sq km has been covered in the current FS 2010-12 (till December 2011).

8.12 Geophysical mapping

Systematic ground gravity - magnetic surveys under the Geophysical Mapping (GPM) programme was initiated during X Plan Period and is being continued in XI Plan Period. The mapping process
involves acquisition of gravity and magnetic data with an average station density of one station per 2.5 sq km area for compilation of standardized gravity and magnetic maps of the country on 1:50,000 scale. During the FY 2011-12 (up to December 2011), an area of 13,268 sq km has been covered under GPM programme. During field season 2010-2012, a total of 22,930.5 sq km area has been covered and during the XI Plan period upto December 2011 an area of 96,201.5 sq.km. has been covered.

8.13 Geochemical mapping

National Geochemical Mapping (NGCM) Programme in India was initiated by GSI in 2001-02 with launching of a number of pilot surveys in different States all over the country. The prime objective of this endeavour is to produce a body of geochemical data on 1:50,000 scale for the Indian landmass based primarily on stream sediments, analyzed using a consistent set of methods. These data will comprise a complete, national-scale geochemical coverage of the Indian land area and will enable preparation of geochemical maps, refine estimates of baseline concentrations of chemical elements in the sampled media, and provide context for a wide variety of studies in the geological and environmental sciences. The extent of landmass of the country covered with hard rock, soft rock and alluvial tracks is 3.28 million sq. km corresponding to 5065 toposheets. A NGCM database is being created centrally with the intention of producing maps depicting geochemical anomalies requiring detailed investigation for various purposes including mineral investigation. During the FY 2011-12 (up to December 2011), an area of 27,198 sq km has been covered systematically under the National Geochemical Mapping Programme. During field season 2010-2012, a total of 43,976.6 sq km area has been covered and during the XI Plan period upto December 2011 an area of 1,20,886.6 sq.km. has been covered.

8.14 Remote Sensing and Airborne Survey

(i) Airborne Geophysical Surveys are being carried out by the Twin Otter Airborne Survey System (TOASS) with Magnetic and Gamma Ray Spectrometric sensors acquired by GSI in 1986. Since then (up to F.S. 2009-2010) a total of 4,90,923 line km over an area of 2,91,976 sq.km. was covered by deploying multi sensor systems. A total of 14,761 lkm. (36,902 sq.km.) was flown over parts of West coast from Hosadurga to Vengurla, over pats of Karnataka and Maharastra. The flight (TOASS) was operative till April, 2010 and since then due to the break down of the Navigational System PNAV-2100, no airborne survey could be conducted and the repairing process has been initiated. The equipments for repairs/ replacement of TOASS were received from Canada and were tested and integrated by the engineers of PicoEnvirotec,
Canada. The equipments were taken to the airport of “Taneja Aerospace and Aviation limited” (TAAL) for installation in the Twin-Otter aircraft, which has been completed. The TOASS system was repaired and tested. The test flights were conducted after integration and checked for the data quality and found satisfactory.

(ii) As part of the modernization programme, GSI has procured one helicopter with state-of-the-art TM domain, EM system fitted on a heliborne platform along with the latest magnetic, spectrometric and gravity heliborne geophysical survey systems. The first Heliborne survey is planned over a test area, which has been flown earlier over known mineralization for testing the response of different sensors after their installation is over.

(iii) A proposal for National Geomorphological and Lineament Mapping on 1:50,000 scale was approved with GSI and ISRO as nodal agencies for quality and execution. As per the project proposal the entire work is to be carried out through outsourcing and 32 partner institutes under the control of National Remote Sensing Center (NRSC) as working centers were selected. The geo-referenced LISS - III data along with manual and NRCGeom software developed by them handed over in February 2010 to different partner institutes. The Standard Operating Procedure (SOP) document for External Quality Check (EQC) was finalised by GSI and NRSC. PGRS Divisions of GSI were entrusted with the responsibility of external quality checking (EQC) and project execution. The work is in progress and 732 nos. of EQC completed by the end of December 2011.

(iv) Development of Hyperspectral sensor for mineral mapping is being stressed upon as it is very effective and sophisticated tool for identifying mineral deposits. For this, building up of spectral library of minerals and rocks in Indian context is a prerequisite. During FS 2010-12, Hyper spectral remote sensing studies continued under 4 programmes: Sargipalli shear zone, Sundargarh District, Orissa; Kharkari River - Rajdah Sector of Singhbhum shear zone, Singhbhum.
District, Jharkhand; Precambrian terrain of Eastern and Northern Gujarat; Sakoli mineralized belt, Bhandara district, Maharashtra.

**8.15 Marine and Coastal Surveys**

1. Geological Survey of India has completed seabed mapping of 1,29,200 sq km out of 1,50,000 sq km in 5 km x 2 km grid within TW and 18,49,178 sq km out of 18,64,900 sq km in the EEZ (beyond Territorial Waters) on reconnaissance scale of 40 km x 20 km grid. The total EEZ coverage including TW is 19,78,378 sq km out of a total EEZ area of 20,14,900 sq km upto December 2011.

2. During FS 2010-12 (up to December 2011), 7175 lkm of bathymetry, 6895 lkm of magnetic survey and 73,803 sq km multibeam swath bathymetry has been completed by the cruises of RV Samudra Manthan. In addition, systematic coverage within Territorial Water for 1580 sq km has been covered by RV Samudra Kaustubh and RV Samudra Shaudhikama along with coverage of 3785 lkm bathymetry, 1993 lkm of shallow seismic, 2185 l km magnetic and 286 sq km multibeam bathymetry.

3. Marine geoscientific programmes during FS 2010-12 (Upto December 2011) comprised the following:

(A) Eight cruises were mounted onboard RV Samudra Manthan within EEZ covering:

- Multibeam Bathymetric Survey to the East of Nicobar Islands between West Andaman Fault and Sewell Rise was taken up from 10th November to 2nd December 2010 (SM-214)
- Study of sea bed morphology and mannetic anomaly pattern across the arc-trench gap of Great Nicobar Island was taken up from 6th December to 29th December, 2010 (SM-215)
- Studies on geomorphological configuration of Barren Island along with acquaintance of multibeam ecosounder was taken up from 2nd January to 8th January 2011(SM-215A)
- Systematic magnetic survey in Bay of Bengal over 850 E Ridge and Multibeam Bathymetric Survey of the three submarine valleys off Pondicherry was taken up from 20th January to 13th February 2011 (SM-216).
• Search for possible occurrence of phosphatic sediments off Ratnagiri, Maharashtra was taken up from 17th February to 13th March 2011 (SM-217)

• Multibeam Bathymetric Survey of the continental slope off Gopalpur - Kalingapatnam - Pudimadaka, Orissa (Andhra Pradesh coast) was taken up from 10th April to 4th May 2011 (SM-218)

• Study of the sea bed morphology and magnetic anomaly pattern across the arc-trench gap off Great Nicobar Island was taken up from 22nd October, 2011 to 8th November, 2011 (SM-219)

• Multibeam Bathymetric Survey to the East of Nicobar Islands on the seawell Rise was taken up from 14th November, 2011 (SM-221)

• Multibeam bathymetric survey to the east of Nicobar Islands on the Seawell Rise was taken up from 12th November, 2011 to 6th December, 2011 (SM-221).

• Monitoring of changes of Curie Isotherm around Barren Island and Multibeam bathymetric survey around the Barren Island was taken up from 12th November, 2011 to 6th December, 2011 (SM-220).

(B) Eight cruises were mounted onboard RV Samudra Kaustubh within Territorial Water (TW) of the East Coast of India covering:

• Placer Mineral resource evaluation in the territorial waters off Bhimunipatnam, Andhra Pradesh was taken up between 27th October 2010 to 20th November, 2010 (ST-216)

• Placer mineral resource evaluation in the territorial waters off Palur - Malud, Orissa was taken up from 22nd November 2010 to 16th December 2010 (ST-210)

• Geotechnical appraisal off Harichandi - Puri, Orissa was taken up in the period between 20th December, 2010 to 4th January 2011 (ST-211)

• Parametric surveys between Gopalpur and Dhamara areas of Orissa coast was taken up from 7th January to 13th January 2011 (ST-212)

• Parametric Survey within Territorial waters off Porto Novo and north of Pondicherry, Tamilnadu was taken up from 25th January to 18th February 2011 (ST-213)

• Mapping of seabed within Territorial Waters north-east of Point Calimere, Tamilnadu was taken up from 22nd February to 18th March 2011 (ST-214)

• Parametric (Magnetic, Seismic & Bathymetric) surveys between Bhimunipatnam to Kalingapatnam off north Andhra Pradesh coast was taken up from 28th March to 19th April 2011 (ST-215)

• Placer Mineral resource evaluation in the territorial
waters Bhimunipatnam, Andhra Pradesh was taken up from 9th November, 2011 to 28th November, 2011 (ST-216)

- Study of the seabed morphology in the outer continental shelf off Chhatarpur, Orissa was taken up from 5th December, 2011 to 28th December, 2011 (ST-217)

(C) Six cruises were mounted onboard RV Samudra Shaudhikama within TW of the West Coast of India covering-

- Mapping of the seabed off Okha, Gujarat Coast was taken up between 03rd November and 22nd November 2010 (SD-230)
- Swath bathymetric survey of part of Gulf of Cambay off Valsad, Gujarat was undertaken from 1st December to 26th December, 2010 (SD-231)
- Parametric (Seismic and magnetic) survey in the shelf area off Vzhinjim-Kanyakumari, Kerala & Tamilnadu coast was taken up from 30th December 2010 to 23rd January 2011 (SD-232)
- Evaluation of relict sand body off Shertallai, Kerala was taken up from 27th January to 20th February 2011 (SD-233)
- Geotechnical appraisal off Kulai, Karnataka was taken up from 24th February to 20th March, 2011 and again from 28th March to 2nd April, 2011 (SD-234)
- Parametric (magnetic) survey within Territorial waters of Gulf of Mannar was taken up from 12th April to 4th May, 2011 (SD-235)
- Mapping of the seabed off Okha, Gujrat was taken up from 3rd December, 2011 (SD-236)

(D) Other Programmes during FS 2010-12 included:

- Study of seabed sediments from around West Andaman Fault and Central Andaman trough to delineate zones of hydrothermal activity. (Item:065)
- Test diameter mean test size variation of Orbulina universa d’Orbigny during last Glacial-Interglacial transition - study from a Central Bay of Bengal deep sea core. (Item 066)
- Geological appraisal of Azhikkal Port, Kannur, Kerala (Item 063).
- Preliminary Geological studies at Ponnani Harbour, Kerala (Item 061)

MISSION- II: NATURAL RESOURCE ASSESSMENT

8.16 Mineral Resource Assessment

The New Mineral Policy (2008) envisages the Geological Survey of India to perform the tasks of regional survey and exploration for minerals and the private sector to be the main source of investment in reconnaissance and exploration. The government agencies will expend public funds primarily in
areas where private sector investment will not be forthcoming. The exploration activities of GSI have been prioritized keeping in view the thrust accorded by the Government of India, the directives given by the Planning Commission, the recommendations of CGPB and SGPBs and the requests received from State Governments.

GSI’s work under mineral exploration programme is mainly confined within the limits of ‘reconnaissance’ [4] and ‘prospecting’[3] though in some cases it also encompasses ‘general exploration’ [2] [United Nation Framework Classification (UNFC): G- axis]. Thus the resource estimates by GSI comes under the category of ‘334’ [reconnaissance mineral resource]; ‘333’ [inferred mineral resource] and ‘332’ [indicated mineral resource] under the UNFC. GSI has been tasked to revisit its exploration reports from the FS 1998-99 to 2008-09 to make it UNFC compliant and all the exploration reports pertaining to the period (666 nos) are presently UNFC compliant. Mineral commodity-wise exploration block database is also being prepared, which is in consonance with GSI’s ‘geoinformatics’ programme initiated during the year 2000. A renewed thrust will be given to this programme to prepare a ‘mineral inventory’ during the XIIth Plan. GSI has also been identified as the nodal agency for archiving of the RP reports and dissemination of the RP report data after the lock-in period of two years.

The significant highlights of mineral investigations during the Field Season 2010-12 are as follows:

Gold

- Gold ore resource has been estimated for Ajjanahalli Block C, Tumkur district, Karnataka, where Prospecting stage (G-3) exploration was completed during F.S. 2009-10. An inferred resource (333) of 0.9946 million tonnes with average grade of 2.17 g/t at 1 g/t cut off was estimated. In Ajjanahalli East block (B-block-south of A-Block), Chitradurga district, which was explored during F.S. 2006-08, an indicated resource (332) of 0.36 million tonnes of gold ore with 1.35 g/t Au at 0.5 g/t cut off and alternatively, 0.12 million tonnes with 2.71 g/t at 1.0 g/t cut off has been estimated.

- Investigations for gold are being carried out in the states of Jharkhand, Bihar, Karnataka, Andhra Pradesh, Rajasthan, Uttarakhand and Chhattisgarh.

- Gold exploration was carried out in Proterozoic rocks of Sonapahari area, Sonbhadra district, U.P. which involved both the surface trenching and sub-surface drilling to prove lateral as well as depth continuity of the zones in order to evaluate the mineralisation potentiality.

- The trenches excavated along various drill holes and the intervening areas indicated low Au values with only limited zones of + 1 g/t Au. Such zones include 1.61 g/t /1m; 1.12g/t.
Au/1.00m; 1.25 g/t Au/1.00m; 5.25 g/t Au/1.40m and 1.5 g/t Au/1.50m

- The analytical results nineteen test drill holes indicate lean Au value generally ranging from 0.1 - 0.4 g/t Au except for 4.30 g/t Au/0.77 m and 1.14 g/t Au/1.30 m respectively indicating a zone of + 1.00 g/t Au over more than 170 m.

- Tentative ore grade and reserve estimation this ore body in block H has indicated 52806.25 tonnes of ore of 3.03 g/t Au of average grade of probable and possible categories.

- The exploration carried out down to shallow depth of 50 m confirms gold mineralisation of lean value and continuation of zones up to 100m depth.

**Molybdenum**

- In Vellampatti area, Dharmapuri district, Tamil Nadu, which was explored during F.S. 2009-10, an inferred resource (333) of 2.74 million tonnes of molybdenum ore with an average grade of 0.102% Mo has been estimated.

**Platinoid Group of Elements (PGE)**

- In Hanumalapura Block-A, Davanagere district, which was explored during F.S. 2005-08, a Reconnaissance resource (334) of 0.84 million tonnes of PGE ore with 0.50 to 2.93 g/t Pt+Pd has been estimated.

- PGE investigations are being carried out in the states of Maharashtra, Tamil Nadu, Karnataka, Andhra Pradesh, Kerala, Orissa and Manipur.

**Basemetal**

- In Bishkhan Khari block, Betul district, Madhya Pradesh, which was explored during F.S. 2006-09, an indicated resource (332) of 1.91 million tonnes of zinc ore with 1.14% Zn has been estimated.

- In Jangaldehri block, Chindwara district, Madhya Pradesh, which was explored during F.S. 2008-09, an indicated resource (332) of 0.98 million tonnes of Zn ore with 1.10% Zn has been estimated.

- Investigations for basemetal are being continued in the states of Rajasthan, Maharashtra, Jammu & Kashmir, Haryana, Sikkim, Gujarat, Himachal Pradesh and Meghalaya.

- A new find of copper mineralisation in Khera Block, Mundiyawas-Khera area, Alwar district, Rajasthan. Khera block is located nearly 5 km SSW of Thanaghazi, district Alwar, Rajasthan
in part of toposheet no. 54 A/ 7.

On the surface, three zones of mineralization (MZ-I, MZ-II and MZ-III) manifested by malachite stain, presence of old workings and occasionally fresh sulphides in the form of bornite, chalcopyrite and pyrite are delineated during the current field season.

The first borehole KBH-1 intersected a 107.60 m thick mineralised zone (60.70m to 168.30 m along the borehole) with 0.29% Cu and associated silver and gold - It is a first time report of 107.60 m thick Cu mineralisation from the Alwar Basin of the North Delhi Fold Belt which includes a no. of lodes of 78.15 m x 0.35% Cu (at 0.2% cut-off) and 33.8 m x 0.65% Cu (at 0.5% cut-off).

Drilling in borehole KBH-2, which is further 185.0 m north of KBH-1 along the strike also intersected similar type of sulphide mineralization from 35.0 m to 225.0 m (190 m) with 0.2-0.5 % Cu (V.E).

Iron Ore

• In Devadaribetta Range (NMDC block), Bellary district, Karnataka, which was explored during F.S. 2005-08, a Reconnaissance resource (334) of 8.20 million tonnes of iron ore (Hematite) with 57.37% Fe has been estimated.

• In Chhattisgarh, Prospecting stage (G-3) investigation initiated during F.S. 2007-08 for assessment of iron ore in Aridongri area, Kanker district as a sponsored item of Chhattisgarh Mineral Development Corporation Limited was completed after getting necessary forest clearance for drilling in the month of December 2010. A total inferred resource (333) of 10.01 million tonnes with a grade of 62.28% Fe has been estimated.

• Iron ore investigations are also continuing in the states of Rajasthan, Karnataka, Orissa, and Jharkhand.

Manganese

• Prospecting stage investigation (G-3) initiated during F.S. 2009-10 was continued in Bonai-Kendujhar belt in the identified Damurda south block, Bolani south block and Bolani NE continuous Block of Kendujhar district in Orissa for resource assessment of manganese. The sub surface exploration so far carried out has identified mineralized zones over a strike length of 300m. The inferred ore resource estimated at 20% Fe cut off is about 0.152 million tonnes (333) with an average grade of 18.98% Mn (Resource figure with 30m strike length). The work is continuing.

• Investigations for manganese are being carried out in the states of Orissa, Maharashtra and Madhya Pradesh.

Coal & Lignite

• During FS.2010-12, exploration for coal was continued in different Gondwana basins which includes
Raniganj Coalfield and Rajmahal Master Basin of West Bengal, Ib-River and Talcher coalfields of Orissa, Mand-Raigarh, Hasdo-Arand and Tatapani-Ramkola coalfields of Chhattisgarh, Singrauli, Sohagpur, Jhilla and Pench Valley coalfields of Madhya Pradesh, Wardha Valley Coalfield of Maharashtra, Singrimari Coalfield of Assam and Godavari Valley Coalfield of Andhra Pradesh. The search for lignite resources has been given importance in the states of Tamil Nadu and Rajasthan. Reconnaissance and prospecting stage exploration is being carried out under promotional funding by MoC in East Coast lignite fields of Tamil Nadu and in the Nagaur South sub-basin belonging to West Coast Lignite Fields of Rajasthan.

- GSI has estimated coal resource of 2641.63 million tonne in the states of West Bengal, Orissa, Jharkhand, Chhattisgarh and Madhya Pradesh and 124.6 million tonne of lignite in Tamil Nadu, Rajasthan and West Bengal during 2010-12 (as on 01 April, 2011).

- GSI has started Gas desorption tests in some of the boreholes in selected coalfields to generate base level data on Coal Bed Methane (CBM) for some selected coal seams at different depth levels using temperature controlled canister. CBM and related study were taken up during F.S. 2010-12 in three boreholes one each in Ib-River Coalfield, Talcher Coalfield and Mand-Raigarh Coalfield. In-situ gas content of collected coal core samples collected so far, ranges from 0.06 to 0.52cc/gm, being maximum in Ib-River Coalfield.

Beside these investigations, GSI has also taken up investigations for chromite, bauxite, limestone, Rare Earths, phosphorite, apatite, gypsum, glass sand, talc-steatite and fullerene. Investigations for these minerals are continuing and results shall be known after completion of the investigations.

**MISSION - III : GEOINFORMATICS**

**8.17 GSI Net-Portal Project:** The GSI Portal received the Silver Award for 2010-2011 for the National Awards for e-Governance 2010-2011 under the category - “Best Government Portal”. It also received the Best Public Choice award in the G2G category in the World 2011 Awards.

The GSI-NET Portal Project resulted in implementation of the following ICT components:

- GSI Intranet: The state-of-art robust secure, scalable, organization wide networking with inbuilt QOS features for information /data flow in the form of voice, data and video in single channel.

- LAN at all Regional / Wing / Operational Offices spread all over the country (37 locations).

- WAN (MPLS VPN) connecting all these offices.

- Enterprise Integrated Portal (EIP):
A centralized, n-tiered web-based, cost effective Portal solution, which provides a single point of access to all the applications in the GSI Enterprise Application suite.

- Data Centre at Kolkata and Disaster recovery site at Hyderabad.
- The GSI Enterprise Application suite consisting of Information Portal, transactional application for back-office, scientific applications with map services and collaborative services:
  - IP telephony and Video conferencing: Use of IP telephony all over GSI, and Video conferencing application deployed over the CHq, and Regional headquarters.

8.18 Information dissemination:

GSI is serving the following information through its Portal (http://www.portal.gsi.gov.in)

- Activities and Field Season Projects of GSI
- Products like Unpublished Progress Reports, Published maps (Geological Quadrangle Maps, District Resource Maps, etc), Publications (Records, Memoirs, etc.), DIDs, etc.
- 1:2 million geological and mineralogical map of the country and 1:1 million seismotectonic atlas as map services
- Fossil and meteorite repository
- Employee information
- Other topics of popular interest such as case studies, photo gallery, Indian Geology, Geotourism, etc.
- Official and transactional information such as budget, expenditure, claims, tour, leave, etc.

A Map service depicting 1: 50K geology of India is available over the intranet. The data is centrally stored in a multi-user geodatabase which is accessed by authorized users of GSI to load toposheet-wise geological maps. At present geological maps pertaining to 4756 sheets are available in the geodatabase.

8.19 OCBIS Project:

8.18 Online Core Business Integrated System or OCBIS is envisaged to be an integrated system with suitable MIS and data workflow mechanism to facilitate proper execution of Core Business processes.

- The system will seamlessly integrate geoscientific and administrative processes / dataflow in Missions and support systems;
- It will integrate all available data in a spatial environment, allowing search and exploration using attribute-based and AOI based queries; will enable Geoscientists in field and laboratories to explore, observe, consult and make decisions using the spatial data service, which serves existing data in the form of maps, reports and publications;
- Integrate with the existing FSPMIS (Field season project management...
information system), LMS (Laboratory Management system) and HRMS (Human resource management system) and other transactional systems; enhance and / or re-engineer the existing information and MIS systems and establish linkages with the proposed system;

- Enable workflow based data collection, review, analysis, storage, report generation and dissemination; preserve all versions of data / documents pertaining to a field project since its inception to completion;

- Disseminate integrated MIS report through the Web Portal and through mobile devices and facilitate real-time collaboration and interaction among stakeholders

To achieve the above referred goals GSI has contracted NISG (National Institute of Smart Government). The broad Terms of Reference of NISG’s work are as follows:

- Understand Data Content, Standards, Services, Information Requirements & Workflows, Understand Legal and Regulatory Framework, Stakeholder Analysis

- Current State Assessment and Gap analysis and To Be Requirements Planning

- Preparation of Functional Requirement Specifications (FRS) for OCBIS

- Preparation of Detailed Project Report (DPR)

- Prepare RFP Document for implementation of DPR

GSI will publish the RFP to select a System Integrator / Vendor (SI) for turnkey implementation of the total project (OCBIS) as outlined in the DPR. The Consultant will also assist GSI towards SI selection based on technical and financial bids as per published RFP.


GSI has submitted an EFC Memorandum for the OCBIS Project on 25th November 2011. The ‘in-principle’ approval of Planning Commission for the OCBIS Project is awaited.

Portal applications:

GSI is having more than 34,858 metadata of unpublished reports till December 2011 and out of 4,905 (topo-sheets) Geological maps on 1:50,000 scale 4,756 maps have already been uploaded to portal.

MISSION- IV: FUNDAMENTAL AND MULTIDISCIPLINARY GEOSCIENCES AND SPECIAL STUDIES

8.20 Laboratory Studies, Research and Development

8.20 As a result of up gradation and establishment of state-of- the-art
instrumental facilities in the fields of Petrology, Geochronology and Isotope Geology, Palaeontology, Photogeology and Remote Sensing, Geophysics, Mineral Physics, Analytical Chemistry etc. intensive laboratory studies were carried out to generate precise analytical database in consonance with the global trend and to keep pace with the research activities carried out in similar Surveys elsewhere. Input from Electron Probe Micro Analyses, Fluid inclusion study, Optically Stimulated Luminescence (OSL) dating etc. has been widely and effectively used in different research projects as well as in STM and metallogenic projects.

GSI carried out several research projects with an idea to augment the mineral resources of the country. GSI has taken up research projects on PGE Exploration, polymetallic minerals, coal, gold exploration etc. and the scientists engaged in such research in collaboration with the exploration geologist has opened up new areas of interest. Other research work like stratigraphic correlation, palaeontology, experimental petrology shall also be pursued by GSI with equal zest as they broaden the horizon of understanding of earth sciences.

Most of the research projects under taken during the field season are being continued this year and details of the projects can be found in the Annual Report of GSI for the current year.

During the period from April, 2011 to December, 2011 a total no. of 1,39,558 NGCM & Non-NGCM samples have been analyzed for 10,03,336 no. of determinations.

**Specialized Investigations**

**8.21 Geotechnical Surveys**

- Geological Survey of India has made commendable contribution at different stages of geotechnical investigations for the successful completion of large numbers of Water Resource Projects like hydroelectric, irrigation and river linking projects within and outside the country. Twenty-Nine items of geotechnical and engineering geological studies through 134 investigations has been undertaken related to civil engineering projects for water resource development, communication and miscellaneous projects in almost all the states of the country as well as in neighbouring countries.

**8.22 Landslide Hazard Studies**

- Landslide hazard zonation study on macro scale i.e. 1: 50,000/1:25,000 scale: carried out in the state of Arunachal Pradesh, Utarakhand and Himachal Pradesh. During the field season 550 sq km area was so far covered also Under item Rampur-Narkanda-Khab communication route, H.P., preparation of hydrogeological map covering 150 Sq km was carried out.

- Landslide hazard zonation on meso scale i.e. 1:10,000/1:5000 scales
of Shillong Town, East Khasi Hills District, Meghalaya was taken up.

- Landslide inventory: During the FS 2010-12 landslide inventory works has been carried out in the states of Maharastra, Karnataka, and Goa Inventory of landslides along Ghat Sections in parts of Ratnagiri, Sindhudurg, Satara, Nasik, Thane, Kolhapur and Pune Districts, Western Maharashtra. So far 259 line km was completed.

- Site specific study of landslide: During 2010-12, 13 site specific investigation including monitoring items are being carried out in the states of Sikkim, West Bengal, Karnataka, Tamilnadu, Kerala, Goa. So far 2.24 sq km area was covered. Detailed site specific studies and concurrent monitoring of few selected landslides in the states of West Bengal, Sikkim, Tamilnadu and Maharashtra are taken up by Geological Survey of India in the FS 2010-12.

- Rapid response to suggest immediate measures in the event of landslide events: During the current FS also Geological Survey of India has undertaken measures for immediate dispatch of expert team to the sites of distressing in the events of any major landslide events for an on spot evaluation and to suggest measures to content the distressing. The immediate findings are reported to the concerned authorities.

- Landslide Hazard Information Management: During work taken up includes Incorporation of landslide data in the Standard Format from Investigation Reports and Development of database on FIRs, Landslide Reports and Landslide incidences.

### 8.23 Earthquake Geology

- GSI undertakes the study of active faults (study of source region of earthquake) and seismic microzonation (site of interest) of urban agglomerations in various geological domains of the country.

- The work carried out under the Seismological Monitoring including detection, recording of earthquakes by the network comprising three Seismic observatories near Gangtok, Agartala, and Itanagar and release of quarterly bulletins and information to the respective regional offices, state administration etc.

- During the Field Season 2010-2012, six items of active fault mapping and DGPS based crustal deformation studies in the states of H. P, Assam-Arunachal, Maharastra- M.P, West Bengal, Sikkim and Andaman & Nicobar (Jorhat, Surat, Jallandhar and Vijaywada) were undertaken.

- The permanent GPS station at Lucknow (established by DST since 1999) is engaged in round the clock monitoring of GPS data. The data is supplied regularly to National GPS Data Centre, Survey of India, Dehradun for further processing/interpretation.
• The micro-earthquake investigation at and around the proposed “Tamanthi Hydroelectric projects, Myanmar” for NHPC was completed during the FS 2010-2012.

• Macro-seismic survey after Sikkim earthquake of 18th September 2011 and Sasan Gir earthquake of Gujarat of 20th October 2011 besides micro seismic activity in Kalpurki, Talewad and Malghan villages of Basavana Bagewadi Taluk, Bijapur District, Karnataka were also undertaken during the FS 2010-2012.

8.24 Environmental Geology & Medical Geology

• GSI took up 17 items pertaining to Environmental Geosciences and related studies during F.S.2009-10 and 2010-12. These investigations include Environmental Geology (2 items), Medical Geology (5 items), Climate Change Impact and Fragile Eco-system (2 items), Glaciology (5 items) and 3 items on Syn-Exploration Baseline Data Generation (SEBDG) on geo-environmental aspects in connection with exploration for coal.

• The Medical Geology items taken up by GSI have direct bearing on society and GSI has been working for the last several years on Arsenic and Fluoride pollution in groundwater in the states of U.P., West Bengal and Rajasthan.

• Study of coastal processes has been taken up in Orissa.

8.25 Glaciological Studies

• Detailed studies on the Hamta Glacier of Lahaul and Spiti were continued. Paleoclimatic reconstruction through monitoring of glacier retreat events in parts of Satluj valley, Kinnaur district, Himachal Pradesh has been attempted. Identification of signatures of palaeo-glaciation, change in climate, availability of water resources etc in Ganga Basin, Uttarakhand was carried out with the compilation of recession data on glaciers of Ganga basin. Updation of glacier inventory of Sikkim has been taken up and details of latitude, longitude, orientation, highest and mean elevation etc. were recorded.

8.26 Arctic / Antarctic Studies

• GSI was inducted in the Arctic Expedition of National Centre for Antarctic and Ocean Research (NCAOR) in 2008. Since then, the item on parameterization of Glaciers in Northern Hemisphere to variations of Climate-Inter Annual and Intra Annual is being carried out by GSI to understand polar glacier teleconnection and the processes controlling these interactions.

• GSI has been participating in expeditions to Antarctica since 1981 and the major programmes undertaken include: geological mapping on 1:50,000 scale, thematic mapping for petrochemical, structural and geochronological studies; glaciological observations on advance / retreat of polar continental ice, studies on shelf ice for accumulation patterns; study of
the glacial dynamics recording the movement direction and velocity of the polar ice sheet; ice core drilling and lake sediment coring for palaeoclimatic studies; GPR survey for plotting lake bathymetry, etc.

- A project entitled ‘Palaeoclimatic and Magmato-Metamorphic history of Wilkes Land, East Antarctica: constraints from accessory minerals, Clay Mineralogy and Micropalaeontology in Oceanic Sediments’ is being carried out in collaboration with Delhi University. So far 105 sediment samples from IODP, Wilkes Land Expedition - 318 have been analysed for clay mineralogy, 25 samples have been analysed for grain size distribution studies. Heavy mineral assemblages and SEM of quartz grains are also completed for top 50m sediments. These studies have given valuable insights into the provenance of these sediments, their mode of transport and depositional environment.

- A scientist from GSI participated in the XXX Antarctic Expedition as the Voyage Leader for the second consecutive austral season (2010-11) to supervise the construction of India’s third Antarctic Research Station, “Bharati” at Larsemann Hills. He accomplished all the scientific and logistic tasks successfully as per approved plan and within the stipulated period. The scientist was also imparted training on the use of NONEX explosives as rock breaking technology at Johannesburg. He used this acquired knowledge in construction activities like rock breaking for carving out road, leveling of Helipad and main station site etc. in Larsemann Hills. The barren promontory at Larsemann Hills after the completion of expedition now has 13 tank containers, a world class helipad of 30 x 30 meters made out of pre-cast concrete slabs with most advanced fuel station, 400 meters of carpeted road and about 600 meters of pipeline to bring in fuel and sea water to station and take the refuse back to the sea after treatment. The excavation and levelling of 70 x 60 meters area for the station and the driving of more than 90 piles of depths ranging from 6 to 14 meters and each capable of bearing a load of 80 metric tons has also been accomplished.

MISSION - V: TRAINING AND CAPACITY BUILDING

8.27 Human Resource Development

- HPC has envisaged that the Geological Survey of India Training Institute (GSITI) at Hyderabad should be developed into a ‘Centre of Excellence’ for providing high quality cutting edge training/knowledge delivery with state-of-the-art facilities. Thus, the Institute has embarked on
a programme of capacity building to raise the technical ability of departmental candidates, officers of various State Governments, students, research scholars and faculties from Universities and geoscientists from the private sector. Six Regional Training Institutes (RTI) have been operationalised at the six Regional Headquarters under GSITI. The Field Training Centres of GSITI located in different parts of the country (FTCs) shall be conducting field based courses on different themes of earth sciences. Six new FTCs namely at Kothagudem (Andhra Pradesh), Jabalpur (Madhya Pradesh), Saketi (Himachal Pradesh), Salem (Tamilnadu), Sukinda (Orissa) and Wajrakarur (Andhra Pradesh) have been established to provide training in different aspects of geoscientific studies in the areas known for their geological significance.

- Geological Survey of India Training Institute conducts training in Advanced, Refresher, Induction, International and special courses as demanded by the mineral sector. For the FS 2010-12, 114 items, in different disciplines, are being implemented. Of these, 22 items are being conducted by the Mission Headquarters which include 3 International courses for the participants covered under Indo-Africa Forum Summit, 8 Induction Level Orientation courses-this includes 3 completed courses i.e. 33rd OCG (Spillover course of FS 2009-2010), 34th OCG and 5th OCGP, and two other in progress i.e 35th OCG, 6th OCGP, the other induction level courses include 8th and 9th OCC and 2 Orientation courses, one each for newly recruited Engineers and Administrative Officers of the Department. The remaining 10 are specialized courses, which includes 2 courses to be conducted in collaboration with ISRO. Till December 2011, 61 FSP programmes were completed. 58 Outside FSP programmes that were conducted as per the request of various offices and divisions that include E-Governance, NGCM training, Women empowerment, etc.

- GSITI has been given affiliation by Osmania University, Hyderabad for post -P.G. Diploma course in Geoinformatics in Earth Science.

8.28 COLLABORATIVE PROJECTS WITH OTHER ORGANISATIONS

The following programmes, State-wise, have been accommodated on the basis of the suggestions, recommendations and requests made by various
stakeholders in the Annual Programme of GSI 2010-12:

**MADHYA PRADESH**

1. Detailed prospecting for phosphorite in Piploda Block and Dhanpura-Khatama Block, Jhabua District, Madhya Pradesh. One officer (geologists) from DGM, MP will be associated with the project.

**MAHARASHTRA**

2. Investigation of manganese ore in Parseoni extension area, Nagpur dist., Maharashtra (E-I stage) (continuing)

**ANDHRA PRADESH**

3. Investigation for possible fullerene occurrence within carbonaceous tuff of Mangampet Baryte prospect and demarcation of carbonaceous tuff bearing areas for prospective drilling work around Mangampet, Kadapa District, Andhra Pradesh, Karnataka


**KARNATAKA**

5. Investigation of the iron ore resources in selected freehold areas in Kenkeri, Melanahalli, Guruvapura, Kempanahalli, Dasudi, Kandikere Blocks and adjacent areas in Hosadurga Taluk, Chitradurga District, Karnataka. (2010-12) (G-4).


7. Examination of SMS Grade limestone for Alkali content around Jalikatte, Lokapur and adjoining areas, Bagalkot District, Karnataka. (2010-12)(G-4).

**KERALA**

8. Evaluation of relict sand body off Shertallai, Kerala

9. Evaluation of relict sand body off Ponnani, Kerala

**TAMIL NADU**

DGM, Tamil Nadu would like to collaborate with GSI (regular items of GSI in Tamil Nadu)

10. Electrical resistively surveys along the coast between Puducherry and South of Chidambaram up to Coleroon River, Tamil Nadu

**ARUNACHAL PRADESH**


12. Landslide Hazard Zonation of a 2 km wide strip in the catchment area for Dibang Multipurpose Project, Lower Dibang valley, Arunachal Pradesh.
MEGHALAYA


SIKKIM

14. Reappraisal for the basemetalts and gold in Chakung-Jugdum areatoposheet no 78A/4 & 8 covering parts of West District, Sikkim(G-4)

15. Updating the inventory of glaciers in Sikkim Himalaya.

16. Detailed geotechnical investigation of some important landslides of Sikkim.

The landslides proposed to be taken for detailed geotechnical investigation: Km 5.30 (Namok) slide on Rangrang -Dikchu Road; Km 72.10 (Lantakhola) slide on Gangtok -Chungthang Road; Km 78.50 (Mayang Chu) slide on Gangtok -Chungthang Road; Km 87.50 (Theng) slide on Gangtok -Chungthang Road; Manvir Colony(1.9) on Indira Bye pass; Km 24 on JNM

HARYANA

17. Preliminary assessment of gypsum in parts of Hissar and Bhiwani districts, Haryana. (G-3)(2010-12).

HIMACHAL PRADESH

18. Specialized thematic mapping of Upper Krol for tracing of limestone/ dolomite bands

19. Search for quartzite horizon suitable for glass industry (glass sand) in Rampur Group of rocks, Distt. Shimla & Kulu, Himachal Pradesh (G-4).

UTTARAKHAND

20. Geoenvironmental impact assessment of mining in the Beas and Pabbar riverbeds / terraces for sustainable exploration of minor minerals (53E/1,2,12,16; 52H/4).


JAMMU & KASHMIR


GUJARAT

23. GSI will continue to provide technical guidance for Kachchh geochemical mapping project to be carried out by GMRDS / CGM, Govt. Gujarat.

RAJASTHAN

24. Regional assessment of low-grade phosphorite occurrences of Kalinjara, east of Sallupat, Banswara district, Rajasthan.

25. To provide technical guidance for Geochemical Mapping Project to be carried out by DMG, Govt. of
Rajasthan, (under MoU between GSI, DMG & RSMML, Govt. of Rajasthan) - geochemical mapping of toposheet 45L/1 to L/13 & L/16, 45G/6 to G/16 covering parts of Chittaurgarh Pali, Pratapgarh, Rajsamand and Udaipur districts.

BIHAR

26. Investigation for gold in Gosari-Ghutwe Block of Sono area, Jamui district, Bihar (G-3) (2010-12).

JHARKHAND

27. Appraisal for iron ore around Silpunji-Kantoria Block, West Singhbhum District, Jharkhand (G-4) (2010-2012). One officer (geologists) from DGM, Jharkhand will be associated with the project.

WEST BENGAL

28. Investigation for talc-steatite around Lapcha Basti and Singla in the extension areas of Gok-Karmi of Darjeeling district, West Bengal (G-4) (2010-12).

OTHER PROJECTS

29. Collaborative participation of SAC, Ahmedabad and GSI - Use of hyperspectral data for the search of mineralized provinces in the Precambrian terrain of eastern and northern Gujarat.

30. To carry out geomorphological and lineament mapping of India on 1:50,000 scale with three years duration in collaboration with NRSC under NNRMS-SC (G) using digital data.

31. Seismic Hazard/ Microzonation of Surat Town (2010-2013) in collaboration with ISR, Gandhinagar

8.29 Other Activities

- GSI took part in different exhibitions / book fairs essentially to interact with and enlighten the general public on various aspects of geoscience.

International Commercial Projects: India- Myanmar (through NHPC)

A MoU (geophysics part) between GSI and NHPC Ltd. for the micro-earthquake studies of Tamanthi Project, Myanmar was signed on 24th December, 2010. As the follow-up action, three geophysicists from CGD, Kolkata undertook micro earthquake studies related to the proposed Tamanthi (1200MW) Project. The project was completed.

Bhutan and Nepal

As per the signed agreements with CWC (for Bhutan) and with JPO-SKSKI (for Nepal), the GSI officers visit Bhutan and Nepal for carrying out geo-technical work related to hydro-electric projects.

SCIENCE & TECHNICAL SUPPORT SYSTEM

8.30 IT Infrastructure & Connectivity:

GSI has established an organization-wide IT infrastructure in the form of a DC & DR with network connectivity based on MPLS (Multiprotocol Label
Switching) VPN technology that connects its offices spread over the country with hub and spoke technology. The network is capable of transferring data, voice and video and provides different services to its employees through GSI Portal as gateway which includes GIS Services and Transactional applications. The portal is available for public access and is the instrument for information dissemination for GSI. IP Telephony and Video Conferencing have been used in the GSI Intranet for office communication and collaboration.

The ICT infrastructure at GSI comprises of the following:

- GSI Intranet (LAN and WAN)
- Data Center (DC) at Kolkata
- Disaster Recovery Center (DR) at Hyderabad
- IP telephony and videoconferencing infrastructure
- Desktop Infrastructure

**8.31 Future Roadmap for IT in GSI:**

The future IT roadmap in GSI will imbibe the Mission mode structure of GSI and provide systems and applications catering to Missions and Support services and the overall information delivery sub-system. The non-core services of GSI will be dealt in two broad sections - ICT infrastructure services (essential for both core and non-core business) and e-Governance services. The ICT infrastructure services section include the critical components such as enterprise portal, content management system, communication channels, security and ICT services like SOA governance and performance management. The e-Governance services include financial management system, HRMS, material management and e-procurement. The support services will also include biometric attendance system integration as well as other e-Governance services like Rajbhasha and vigilance.

This future IT infrastructure will be achieved through the OCBIS Project which will use a service integration framework. Service Oriented Architecture (SOA) strategy at the enterprise level is a fundamental requirement for the OCBIS application, as this will help GSI enhance the flexibility of the technical and scientific processes along with reducing IT costs. Despite being an IT architectural approach, this endeavour will combine people, process and technology to establish a technology framework which will serve the day-to-day operations across GSI and also re-use components to accommodate ongoing needs, change and growth of GSI.

Following are some of the characteristics of the future IT architecture of GSI:

- Adoption of open standards
- Alignment of GSI technical processes with IT
- Integration of functions and processes across GSI
- Enablement of agility, flexibility and responsiveness
• Framework for integrating external and legacy applications

At its core, SOA will allow the various GSI application functionalities to be exposed as loosely coupled services to other applications (and vice versa), providing exchange of information using a standards-based approach.

The key to ICT enablement in any organization, especially in organizations handling large volumes of data on a daily basis, is the implementation of efficient data center and data recovery center. A Tier 2 Data Centre will be established in the Central Headquarters, Dharitri Building, Salt Lake, Kolkata. The DR at Southern Region office of GSI, Hyderabad will have enhanced functionalities and capacity. Additionally, the infrastructure currently available at CHQ will be fully utilized to render a near site node for synchronized zero data loss replication, development center and QA environments. The DC/DR/NS architecture has been planned to ensure loss-less transmission and synchronization of data.

8.3.2 Analytical Chemistry and Chemical Laboratory Network

There are 21 Chemical Laboratories in GSI functioning in six Regions with its headquarter at Kolkata and rendering key supportive role in all geo-scientific activities. Chemical analytical data is utilised in the field of mineral exploration, PGE investigations, geo-environmental studies, fundamental research etc. by way of providing highly precise and accurate analytical data from percentage to ppb/ppt level using conventional as well as modern state-of-the-art analytical instrumentation techniques. With the induction of NGCM programme in GSI in the year 2001 and for its successful completion in a time bound manner with the aim of providing geochemical Maps to supplement geophysical and geological maps for a variety of uses, chemical laboratories play vital role. In addition to mineral exploration as well as other investigation works, chemical laboratories are dedicated for generation of highly precise and accurate analytical data for the generation of interim report of NGCM programme. The analysis of the 61 elements are being carried out by several instrumental techniques e.g., XRF, ICPMS, DMA, AAS etc. and for the simplicity of analysis, these 61 elements have been grouped into 9 packages. These are (a) Package A (26 elements-XRF), (b) Package B (Au-GFAAS), (c) Package C (Li & Cs-FAAS), (d) Package D (As, Sb, Bi & Se-VGA) (e) Package E (F-ISE), (f) Package F (Ag & Cd-GFAAS), (g) Package G (Hg-DMA), (h) Package H (22 elements-ICPMS) (i) Package I (Pt & Pd-FA cum GF AAS). After rigorous R & D works, methodologies have been developed and standardized for Package A-H by the chemical division to attain the stipulated LLD values as per NGCM programme. For Package I, R & D activities are still going on to achieve the targeted LLD values.

Chemical Laboratory Networking is a PAN India activity covering all the laboratories with an objective to
provide an adequate, effective and more coordinated service delivery while
day-to-day operational management,
overall planning, procurement of costly
equipments, closer monitoring of
laboratory equipment usage, analytical
output & operating cost among the
different chemical laboratories of GSI.
Presently all the 21 chemical labs except
J & K and Mangalore are connected with
LAN facilities through which generated
analytical data are directly forwarding
with the help of GSI portal system.

8.33 Laboratory Network (Other than Chemical)
  • Electron Probe Micro Analyser
    (EPMA) instruments are in operation
    at Central Petrological Laboratory,
    Kolkata, Petrology Division
    Hyderabad, EPMA Lab Faridabad and
    PPOD, Bangalore.
  • The Scanning Electron Microscope
    (SEM) laboratories are operating in
    Kolkata, Hyderabad, Nagpur and
    Lucknow respectively.
  • Petrological Laboratories are
    at Headquarters, Kolkata and
    in each Region, in Mission-1A
    (MCS), Mission-IIB (Natural Energy
    Resource-NEnR) and other State-
    based operational units, to cater to
    the needs of the various disciplines
    of Earth science and also to carry
    out research on fundamental
    and applied aspects of igneous,
    sedimentary, metamorphic petrology,
    ore-mineralogy, coal petrography
    and clay mineralogy. Studies of
    meteorites are also being carried out in
    Central Petrology Laboratory,
    Kolkata. Most of the Regions and
    Mission laboratories are equipped
    with Advanced Research Polarizing
    Microscope with photographic
    attachment, digital camera and image
    analysis system.
  • The Gem Testing Laboratory of GSI
    at Central Headquarters, Kolkata
    provides commercial service for
    identification, authentication and
    certification of the gemstones. Gem
    Testing facilities are also available
    at Regional Petrology Divisions of
    different States. Gem testing facility
    has been started in the Petrology
    Division, W.R.
  • Experimental Petrology laboratory
    was established at Central Petrology
    Laboratory, CHQ, Kolkata in 2001
    and since then three equipments
    have been installed. These are 1) Extra
    Thermal Kanthal furnace (up to
    1750°C) used for preparation of glass.
    2) Graphite furnace for 1atm melting
    experiments, and 3) Hydrothermal
    Instruments for hydrothermal
    experiments (installed in 2006).
  • Mineral Physics Laboratories are
    located in all the six Regions of GSI
    apart from the one at Kolkata (CHQ)
    and equipped with single crystal X-ray
    diffractometer, thermal analyzer and
    infrared spectrometer.
  • Fluid inclusions study is being carried
    out at PPOD, Bangalore, Central
    Petrological Laboratories, Kolkata
    and Regional Petrology Division,
In these laboratories the heating-freezing experiments were done up to 600° C. The instrument is attached with software to study the various parameters of heating-freezing Experiments.

• Palaeontological Laboratories are at Central Headquarters, Kolkata and in each Region, and in Mission-1A (MCS), Mission-IIB (Natural Energy Resource) to cater to the needs of the various disciplines of paleontology and other research on fundamental and applied geosciences. Most of the laboratories are equipped with Advanced Research Microscopes.

• The Geochronology and Isotope Geology Laboratories at CHQ, Kolkata is only one of its kind in GSI and has been carrying out radiometric dating of hard rocks by U-Pb, Sm-Nd and Rb-Sr systematics in Thermal Ionisation Mass Spectrometer (TIMS) and 14C dating of quaternary sediments by Liquid Scintillation Counter.

8.34 Geophysical Laboratories

The physical property measurement laboratory in Southern Region is equipped with Pulse Magnetiser, Minispin Spinner Magnetometer and Shielded Demagnetizer along with other measurement units and carried out density, magnetic susceptibility and natural remanent magnetization of rock samples from different field areas. A total of 138 rock samples were collected from Anantpur area, Andhra Pradesh for measurements of density and magnetic susceptibility. Central Region is equipped with digital Spinner magnetometer (JR-6), AF demagnetizer. Northern Region has carried out Magnetic Susceptibility and Density measurements of 11 rock samples from 8 sites falling under 54K/8 &12. The Physical property measurement laboratory in Central Geophysics Division carries out seismic wave velocities (Vp and Vs), density, Thermal conductivity and magnetic susceptibility measurements of rock samples.

8.34 The major Laboratory equipments acquired and installed and other major purchases in GSI during the Financial Year (FY) 2011-2012 is tabulated at Table: 8.3.

Table: 8.3
Expenditure Incurred Under M & E Head in the Financial Year 2011-12
(Upto December 2011)

<table>
<thead>
<tr>
<th>Description of Stores</th>
<th>Actual Expenditure (₹ in Lakh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Triplex single acting skid mounted pump</td>
<td>4.46</td>
</tr>
<tr>
<td>HX Casing</td>
<td>68.34</td>
</tr>
<tr>
<td>NX Casing</td>
<td>52.07</td>
</tr>
<tr>
<td>Description</td>
<td>Amount</td>
</tr>
<tr>
<td>----------------------------------------------------------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>BW R/H Threaded internally upset ends Drill Rods 1500 Nos.</td>
<td>107.25</td>
</tr>
<tr>
<td>Multi Electrode Resistivity Agency commission</td>
<td>1.40</td>
</tr>
<tr>
<td>AMC for thermal Ionization Mass Spectrometer</td>
<td>2.98</td>
</tr>
<tr>
<td>EPMA SX-100 Tech &amp; Logistic Serial charges</td>
<td>53.72</td>
</tr>
<tr>
<td>Multi Parameter Bore Hole Unit Agency Commission</td>
<td>2.88</td>
</tr>
<tr>
<td>NW-R/H threaded Drill Rod</td>
<td>10.93</td>
</tr>
<tr>
<td>Duplex double acting skid mounting pump</td>
<td>6.11</td>
</tr>
<tr>
<td>Triplex single acting skid mounted pump</td>
<td>1.88</td>
</tr>
<tr>
<td>Direct Solid Mercury Analyser</td>
<td>3.30</td>
</tr>
<tr>
<td>IP Resistivity Instrument 3 KW)</td>
<td>235.42</td>
</tr>
<tr>
<td>FIAS 100 SYSTEM(Flow injection for Atomic Spectrometry) for existing parking elmer model PE-700AS</td>
<td>7.70</td>
</tr>
<tr>
<td>Rotary core Drilling flush jointed Right Hand threaded NQ Drill rods x 3 mtrs. Long = 3000 NOS</td>
<td>65.50</td>
</tr>
<tr>
<td>Duplex double acting skid mounting pump</td>
<td>2.57</td>
</tr>
<tr>
<td>Triplex single acting skid mounted pump</td>
<td>1.13</td>
</tr>
<tr>
<td>Custom duty Micromill</td>
<td>1.60</td>
</tr>
<tr>
<td>Heavy Duty skid mounted Diamond Core Drill 1000 mtrs. Capacity. - 5 Nos.</td>
<td>69.53</td>
</tr>
<tr>
<td>Sub-boiling distillation unit</td>
<td>6.24</td>
</tr>
<tr>
<td>Custom clearance for FIAS and IP Resistivity</td>
<td>28.26</td>
</tr>
<tr>
<td>Spares for thermal ionization Mass Spectrometer</td>
<td>30.53</td>
</tr>
<tr>
<td>Custom duty for clearance of consignment</td>
<td>21.39</td>
</tr>
<tr>
<td>Regional Purchase other than CHQ</td>
<td>1853.49</td>
</tr>
<tr>
<td>2nd Installment payment for OGRV</td>
<td>7199.00</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>9837.68</strong></td>
</tr>
</tbody>
</table>

**ADMINISTRATIVE SUPPORT SYSTEM**

**8.35 Human Resources**

A rational and comprehensive approach on HRD necessitating review of mode of induction, training, motivation including career progression and manpower deployment is receiving constant attention. Considering the present level of manpower deployment vis-à-vis the envisaged intensification and diversification in scientific programmes, a process of bulk induction in all the S & T streams has already been initiated from 2006 with the approval of the Government and it will continue till the optimum strength is attained. Statement showing strength/Incumbency in
Group-A posts in various Streams in Geological Survey of India is listed in TABLE 8.4. Periodic exposure of scientific and technical professional to emerging developments in techniques and concepts in various domains of earth science activities is needed from both within and outside the country.

During the F.S. 2010-12 (Oct. 2010 to till Dec. 2011), a total of 2867 nos. of personnel has been trained (From GSI: 2514; From States: 117; From other organizations: 198 and From Abroad: 38).

### Table-8.4

**Statement showing strength @ / incumbency in Group ‘A’ posts in various streams in Geological Survey of India as on 31.12.2011**

<table>
<thead>
<tr>
<th>Stream</th>
<th>JTS</th>
<th>STS</th>
<th>JAG</th>
<th>JAG [{including JAG (NFSG)}]</th>
<th>SAG</th>
<th>HAG</th>
<th>APEX</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S</td>
<td>F</td>
<td>S</td>
<td>F</td>
<td>S</td>
<td>F</td>
<td>S</td>
<td>F</td>
</tr>
<tr>
<td>Geology</td>
<td>1086</td>
<td>779</td>
<td>978</td>
<td>446</td>
<td>-</td>
<td>-</td>
<td>639</td>
<td>288</td>
</tr>
<tr>
<td>Geophysics</td>
<td>264</td>
<td>113</td>
<td>190</td>
<td>50</td>
<td>-</td>
<td>-</td>
<td>91</td>
<td>21</td>
</tr>
<tr>
<td>Chemistry</td>
<td>250</td>
<td>117</td>
<td>171</td>
<td>24</td>
<td>-</td>
<td>-</td>
<td>80</td>
<td>25</td>
</tr>
<tr>
<td>Engineering</td>
<td>38</td>
<td>23</td>
<td>42#</td>
<td>27#</td>
<td>-</td>
<td>-</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Personnel / Administration</td>
<td>28</td>
<td>14</td>
<td>12</td>
<td>7</td>
<td>6</td>
<td>5</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Finance</td>
<td>15</td>
<td>1</td>
<td>8</td>
<td>3</td>
<td>9</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Stores</td>
<td>-</td>
<td>-</td>
<td>7</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Library</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Survey</td>
<td>20</td>
<td>-</td>
<td>10</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Civil Engineering (SE Construction)</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Official Language</td>
<td>7</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Law officer</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Vigilance</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Stenography</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td>1713</td>
<td>1047</td>
<td>1420</td>
<td>664</td>
<td>17</td>
<td>7</td>
<td>822</td>
<td>341</td>
</tr>
</tbody>
</table>

* as on date this post is common to Geophysics, Chemistry & Engineering Stream, presently it is filled by a Chemistry Stream officers.
# includes posts at NFJAG.

---

**GEOLOGICAL SURVEY OF INDIA (GSI)**

---

**Ministry of Mines**

---
8.36 Drill Core Repository

Collegium headed by, DDG, Mission-III had examined and submitted their recommendations for finalisation of location of National drill core library either at Nagpur or at Hyderabad. The members of the Collegium critically examined and made a comparative assessment of the availability of space, infrastructure facilities and future scope for expansion available both in Nagpur and Hyderabad and recommended for the location and establishment of National Drill core Library (NDCL) at Hyderabad. The administrative control of the NDCL will be with HOD, SR and the overall technical control shall be with the DDG, PSS, CHQ, GSI. The recommendations of the Collegium have been approved by DG, GSI.

The policy document for establishing NDCL with respect to core acquisition, selection criteria, preservation and core library management system has been finalized and submitted to DG, GSI for his kind approval. The tentative cost estimate for establishing NDCL at Hyderabad is being worked out.

Besides Each Regional Heads has been requested to give cost estimates for upgrading the Regional core Libraries. The process of establishing NDCL and upgrading Regional drill core library shall be initiated once the final approval is accorded for the proposed XII Plan document.

8.37 Geological Monuments & Parks

Undertaking the responsibility of protection and promotion of geological monuments, GSI has declared 27 such sites, located in various parts of the country, as National Geological Monuments. To provide a unique spectrum of geo-heritage and geo-diversity for showcasing geological attractions that can provide an insight into the past formations of the subcontinent, its orogeny, palaeo-environment and exotic collection of palaeo-flora and fauna, for public education, recreation and sustainable economic development.

A project being promoted by Tourism Dept., Govt. of Sikkim to set up a fossil park at Mamley, South Sikkim where rare one billion year old Stromatolite fossils occur. GSI will also help to set up a geological museum in Sikkim where fossils and rock samples etc. from various parts of India will be displayed. GSI will also create a Rock Garden of relevance to the state of Sikkim besides providing two life-size Dinosaurs models. A fossil park for fossil wood occurring within Tipam Formation of Tripura has also been proposed.

8.38 Museums

Over the course of the last 160 years, innumerable specimens have been collected from all over the Indian subcontinent and abroad. GSI has systematically catalogued fossil, rock,
mineral and meteorite collections. The foreign specimens have been preserved for comparison. The large numbers of these valuable specimens are preserved in the galleries of the Indian Museum and in the Central Headquarters of GSI. The meteorite collection is preserved at the Central Geological Laboratories, Kolkata. The four geological galleries of GSI at the Indian Museum, Kolkata are Siwalik Fossil Gallery, Invertebrate Fossil Gallery, Rock & Mineral Gallery and Earth & Meteorite Gallery.

POLICY SUPPORT SYSTEM

8.39 Planning and Monitoring

The Planning - Programming and Monitoring operation, with its different Monitoring Divisions, is the nerve centre of CHQ as well as GSI and it acted in the domains of policy formulation, policy dissemination, linking- translating the decisions of different committees like SGPB, CGPB committees, advisory board of allied organisations and undertakings in the Annual Programme etc. One of the most important functions is the formulation of draft annual programme April 2012 -March 2013 where it keeps nation’s geo-scientific requirements in consideration and put the set policies into monitored implementation. The Monitoring Divisions of the Operation monitored the items in various mineral commodities, mapping and specialized investigations of F.S. 2010-12. Norms and guidelines for field activities, e.g., Airborne Surveys, Engineering Geology, Landslide Hazard, Earthquake Geology, Marine Geology, Environmental Geology, Desert Geology, Geothermal, Glaciology, Medical Geology, Geophysical and Geochemical mapping etc. are set and periodic progress in specialised domains are monitored. Planning Division looked after task force activity, prepared budget estimates of F.Y. 2011-12 as well as the annual plan of GSI 2012-13, budgetary managements of F.Y. 2010-11 and F.Y. 2011-12 and modernization aspects while Parliament Cell provided information and supplementary details to MoM on parliament questions.

PSS-P&M Divisions prepared several documents/ material including for Annual Plan, Briefing Book-GSI, Performance for Parliamentary Standing Committee, Annual Report and Quarterly Progress Review Meetings, review of base documents of CGPB Committees along with material for periodic returns to MoM e.g., Annual Action Plan of MoM, Cabinet DO-Thrust Area, monthly DO to the Secretary (Mines), monthly summary of work for all the programmes, etc. The Division is also monitoring implementation of annual programme 2010-12 in different Regions.

Offices of the CGPB Secretariat, Science Policy & Coordination, Geoscience partnership, International Co operation and Commercial Operation Divisions are now functional in the ‘DG’s camp office in Delhi’, as suggested by HPC. Science Policy & Coordination division will identify critical areas in field of geoscience in short-, medium- and
long-term periods, develop strategies, work out priorities for GSI over different timeframe, interact/collaborate with other national and international organizations and suggest changes about infrastructural capabilities, skill mix and integrated approach to enable GSI to meet challenges.

Annual Report of GSI 2010-2011 has been published as Records of the Geological Survey of India Volume 145, Part 9 and released and distributed during the 49th CGPB meeting at New Delhi. The wide spectrum of GSI’s work has been brought out in the Annual Report 2010-2011.

8.40 Central Geological Programming Board [CGPB]

Since the creation of the CGPB Secretariat, the 45th, 46th, 47th, 48th and 49th CGPB meetings have been organized successfully. On each of these occasions, except the 48th CGPB, two-day exhibitions were also held depicting various themes of GSI. The 50th CGPB meeting was held on 2nd and 3rd February 2012.

The 48th CGPB was held on 3-4 Feb 2011 at Vigyan Bhawan New Delhi. However, due to certain unavoidable circumstances, the exhibition proposed to be held on the theme of Geoinformatics was called off.

The 49th CGPB meeting was held on 24-25 August 2011 at Indian Council of Agricultural Research (ICAR), Pusa. The two-day exhibition held during the meeting showcased the activities of GSI and its sister organizations on the theme of ‘Geophysics’. FUGRO, a private organization, also participated in the exhibition.

50th CGPB Meeting

In the CGPB Meeting held on 2nd -3rd February, 2012, the following important issues were taken up:-

- The Field Season Programme 2012-13 was approved taking into account the proposals received from State Governments and other stakeholders.
- Proposals for carrying out heliborne surveys in various States on request made by State Governments.
- Special assistance to DGMs of NER by providing equipments and instruments, training and capacity building of officers by organizing customized and specialised training courses.
• Elaborate discussion on implementation procedure to be adopted for online Tenement Registry and Geo-referencing of lease boundaries.
• Establishment of National and Regional Core libraries following international best practices. Also, establishing Geoparks at suitable places in the country.
• Issues relating to constraints in obtaining forest clearances for mineral exploration and MoEF stipulation on drilling density for mineral exploration/prospecting in forest areas.
• Issue of adopting UNFC and JORC system of reporting of Mineral resources.

**Finalization of Base Documents of CGPB Committees**

As decided during the 47th CGPB, the Base Papers, prepared by the 12th CGPB Committees, prior to their circulation were to be vetted by CHQ. Accordingly, the CGPB Secretariat got the Base Documents vetted by the CHQ and thereafter, sent them to the Ministry for approval. The Ministry, subsequently, directed the CGPB Secretariat to get the Base Documents peer-reviewed by external subject experts. The CGPB Secretariat, in consultation with the Conveners of all the 12 Committees coordinated the peer-review of the Base Documents.

The Secretariat has already received the peer-reviewed Documents in respect of...
three committees, and has been informed that the rest of the Base Documents are in the process of finalization.

**CGPB Committee Meetings**

As a matter of convention, the CGPB Committees hold their meetings on their respective themes prior to the main CGPB so that their recommendations are discussed in the main forum. The 12 themes identified by the HPC are Ferrous Minerals, Precious Metals and Minerals, Non-Ferrous and Strategic Minerals, Industrial and Fertilizer Minerals, Energy Minerals and Resources, Marine Geology and Exploration and Coastal Geoscience, Airborne Survey and Remote Sensing, Geology and Mineral Resources of NER, Geoscientific Investigations, Fundamental and Multidisciplinary Geosciences, Geoinformatics and Data Management and Geoscience for Sustainable Development.

Accordingly, the CGPB Committees held their 4th and 5th meetings prior to the 48th and 49th CGPB meetings respectively. The wide range of membership in these meetings brought to the fore various issues of national and regional significance for discussions. Various projects in which a collaborative approach could be worked out were also discussed. These collaborations include those with various Central Ministries, State govt.s., institutes, universities etc.

Some of the major developments reported during the above meetings are as follows:

(i) GSI and MoES have agreed for finalization of Draft Agreement on joint implementation of comprehensive swath bathymetry as per NMP-2008.

(ii) The MoU between GSI and TERI on Carbon Sequestration, Geothermal Energy Resource Development and Collaboration on related Geoscientific Data Sharing has been finalized and approved by MoM. However, TERI has requested for enlarging the scope of data sharing in the MoU.

(iii) With a view to steering general geo-scientific activities of MoM/GSI in line with national geo-scientific priorities and GSI’s Vision, a Geo-scientific Advisory Council (GAC) has been constituted. GAC consists of representatives from MoES, S&T, MoEF, DAE and Planning Commission. Meanwhile GAC held its first meeting in September 2011 at ICAR, Pusa.

**SGPB Meetings**

Between the 47th and 48th CGPB, State Geological Programming Board meetings were conducted by the States of Assam, Gujarat, Haryana, Jharkhand, Karnataka, Kerala, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal. The meetings discussed proposals for Field Session (FS) 2010-11 and 2011-12 and also analysed the work done pertaining to FS 2010-2011.
Shri Dinsha Patel, Hon’ble Union Minister of State (IC), Ministry of Mines, paid a visit to the petrology section of the museum at the GSI, Lucknow Office on 16th November, 2011

DGM, Gujarat approved several proposals related to detailed Mapping and Exploratory Drilling schemes. DGM, Haryana emphasized the need for investigations of strategic minerals like copper in Haryana.

Between the 48th and 49th CGPB, State Geological Programming Board meetings were conducted by the States of Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Gujarat, Haryana, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Mizoram, Nagaland, Orissa, Tamilnadu and West Bengal held their SGPB meetings. The meetings took stock of the progress of work pertaining to FSP 2010-11 and discussed new proposals for FSP 2011-12.

Beside these State Geological Programming Board meetings two bilateral meetings were also held between Geological Survey of India and Uttarakhand State Government and between Geological Survey of India Jammu and Kashmir State Government.

After 49th CGPB, State Geological Programming Board meetings were conducted by the States of Maharashtra, Orissa, Kerala and Sikkim and one bilateral meeting was held between Geological Survey of India and Uttarakhand State Government to review the progress of collaborative mineral investigation programme at Ratura, Rudraprayag district and to discuss the issue of geotechnical assessment of 500 villages affected by natural disaster.

Accumulation Zone of Milam Glacier, Pithoragarh, Uttarakhand

8.41 International Cooperation

International activities by Geological Survey of India (GSI) with various foreign governmental organisations/ scientific agencies has been continued by GSI through collaborative and bilateral exchange programme in geoscientific projects, participation in international seminars, symposia, workshops, advanced foreign training programme and in Indian Scientific Expedition to Antarctica and Arctic region. The Ministry of Mines & GSI, in order to share expertise, develop national & international partnerships and promoting
geoscientific activity, has entered into MoUs with various organizations and countries. GSI has also organised training programmes for geologists of the Government of Afghanistan and different African countries.

8.42 International Geoscience Programme (IGCP)

International Geological Correlation Programme renamed as the International Geoscience Programme since 2004 with retention of its acronym IGCP and logo, was jointly established by UNESCO and IUGS in 1972. It contributes through coordinated interdisciplinary activities involving all branches of earth science to the prevention and solution of problems of the natural and social sciences with the objectives to serve the geoscientific needs of the society. India was one of the first few countries to support the IGCP since its launching. The activities of the IGCP projects in India are monitored by a duly constituted Indian National Committee (INC) for the IGCP for which the GSI is the nodal agency and the Director General, GSI is the Ex-officio Chairman. The International Division, GSI, acts as the Secretariat of the INC and with the Director, as ‘Member Secretary’ of the INC. Every year a brief account of the activities of the ongoing IGCP projects in India is brought as ‘IGCP Newsletter’. At present there are fourteen (14) INC members, from leading Indian scientific organisations/institutes, which include AMD, NGRI, ONGC, WIHG, FIMI and other distinguished universities. The INC identifies new projects from those already approved by the IGCP Scientific Board, Paris for Indian participation and reviews the progress of on-going projects as well as recommends new projects proposals for future implementation.

GSI is the accredited nodal agency for IGCP activity in India and so far India participated in 101-IGCP Projects out of which 8 are ongoing. The various IGCP Projects deal with geological problems of global as well as regional significance taking into consideration the various geological, geochemical, geophysical parameters, tectonism, metallogeny, environment etc., in order to obtain in-depth understanding of the process involved in a regional perspective.

8.43 Training, Seminars, Symposia Etc.

Twenty-seven (27) officers from GSI attended International Training Programme in India and abroad and twenty-nine (29) officers participated in International/ National seminars/symposia/workshops/conferences/Expert members, etc during the period from April to October 2011.

Apart from above programmes, Geological Survey of India participates regularly in PDAC - International Convention, Trade Show, and investor’s exchange, Canada and Mining Indaba, South Africa.

GSI continued its interactions with other countries to explore possible bilateral cooperation and collaborative programmes. Details of MoU and activities there under are as follows:
8.44 BILATERAL COLLABORATIVE ACTIVITIES

GSI continued its participation in bilateral cooperation and collaborative programmes with other countries on several geoscientific arenas for mutual benefit. Ministry of Mines as well as GSI has entered into MoU with different countries in various ambit of geosciences.

8.45 MoU between GSI and other countries

1. India-Netherlands (Project: INDIGEO)

Since 1999, GSI entered into a collaborative Project: INDIGEO with the International Institute of Geo-information and Earth Observation (ITC) along with Maastricht School of Management (MSM) of Netherlands and the Association of Exploration Geoscientists (AEG) with the objective of Institutional strengthening and Human Resource Development in the application of Digital techniques in GSI and other Earth Science Institutes in India.

GSI entered into a collaborative Project: INDIGEO-2 on 28th July, 2004 with the International Institute of Geo-information and Earth Observation (ITC) along with Maastricht School of Management (MSM) of Netherlands and the Association of Exploration Geoscientists (AEG) with the objective of strengthening the capability for application of digital methods in Geophysical, Geochemical and Geological mapping at the national geoscientific institutions of India.

Research/ Training on Landslide Hazards

As part of the collaborative study, a MoU was signed among GSI, NRSA and ITC for the Ph.D Programme with duration of 3½ to 4 years (partly in India and partly in the Netherlands) for three scientists. Under the programme, S/Shri Saibal Ghosh, Senior Geologist, Eastern Region, Kolkata and Pankaj Jaiswal, Senior Geologist, Southern Region, Hyderabad have been nominated by the Director General, GSI respectively for carrying out research work on ‘Use of New Earth Observation Techniques for Landslide Hazard and Risk Assessment’ in Himalaya and Nilgiri areas. They have completed qualifier phase (at ITC), Phase - I (in India), Phase - II (at ITC), Phase - III (in India), Phase - IV (at ITC), Phase - V (in India) and Phase - VI (at ITC) of the research work. S/Shri Saibal Ghosh and Pankaj Jaiswal had been conferred upon the degree of doctor at the University of Twente (ITC, the Netherlands) on 5th July, 2011.

On satisfactory progress/completion of the earlier Projects, the Project: INDIGEO-3 was signed between GSI, Kolkata and ITC, Enchede, the Netherlands concerning ‘Collaboration in strengthening capabilities in the application of digital methods in geological, geophysical and geochemical mapping and geo-hazard assessment’ for 5 years, which will end in 2012.

2. India-China

A MoU on scientific cooperation between GSI and China Geological Survey (CGS) in geosciences was signed
on 14th January, 2008 and shall remain in force for a period of five years.

Areas of cooperation under the MoU include the following:

(i) Palaeo climatic and Palaeo-environmental changes in Asian Continent through Speleological Studies with the aid of TIMS-U Dating and Stable Isotope Studies.

(ii) Dating of Indian khondalites for provenance characterization and correlation with similar rocks in other parts of the world

(iii) Technology exchange on sampling and laboratory methodologies used in geochemical mapping for mineral resource.

Dr. S.K. Wadhawan, Dy. Director General, SU; Rajasthan, WR, Jaipur participated as a member of the Indian delegation in the China Mining (Congress & Expo) 2011 held at Tianjin, China and also in field visits from 6th to 11th November 2011.

3. India-Argentina

MoU pertaining to scientific and technical cooperation in the earthsciences between Servicio Geologico Minero Argentino (SEGEMAR) of the Argentine Republic and GSI was signed on 14th October, 2009.

The scientific and technical cooperation in the field of Earth Science between the parties as identified in Article 2 are as follows:

- Exchange visits of scientists and specialists
- Exchange of scientific and technical information
- Joint research programme
- Collaboration on research of mutual interest
- Training of individual scientists through participation in collaborative projects
- Conducting joint symposia, conferences and seminars
- Other forms of cooperation as may be mutually agreed between the Parties.

The specific areas of cooperation on areas of mutual interest as mentioned in Article 3 are as follows:

- Regional geology and mineral resources assessment
- Geophysical exploration for mineral resources
- Marine Geology
- Other areas such as Subduction Tectonics
- Geographical Information System (GIS)

4. GSI-USA Universities

The MoU on the collaborative study on “Rotation, Fragmentation and Flexure at the Northeast Corner of the Indian Plate” involving Geological Survey of India (GSI), the Regents of the University of Colorado, Michigan University and California State University, Northridge, USA was signed
on 27<sup>th</sup> January, 2009. The MoU will remain valid up to March 2014. As a follow-up action, Dr. Roger Bilham, Prof. of Geology, University of Colorado, USA visited the project areas in North Eastern India during 30<sup>th</sup> May to 5<sup>th</sup> June, 2009.

5. India-Bhutan
GSI-WAPCOS Ltd.

The MoU between GSI and Water and Power Consultancy Services (India) Ltd. (WAPCOS) concerning preparation of Detailed Project Report (DPR) for Punatsangchhu Hydro Electric Power Project - II, Bhutan was signed on 01 February, 2008 on approval of Ministry of Mines.

Another MoU between GSI and Water and Power Consultancy Services (India) Ltd. (WAPCOS) concerning additional work around the modified Dam Axis site and its other components of Punatsangchhu Hydro Electric Power Project - I, Bhutan was signed 3<sup>rd</sup> September, 2008 on approval of Ministry of Mines.

6. India-Nepal
GSI-JPO SSKI

The MoU between GSI and Joint Project Office, Saptakosi Sunkosi Investigation (JPO-SKSKI), Nepal for carrying out geological investigations required for preparation of Detailed Project Report (DPR) for Saptakosi and Sunkosi Project, Nepal was signed in March 2007. Subsequently, the validity of the MoU was extended till March 2012.

7. India-Saudi Arab

The Agreement on ‘Technical Cooperation Programme between Saudi Geological Survey and Geological Survey of India’ has been signed on 2<sup>nd</sup> March, 2011 by Dr. K.Ayyasami, Deputy Director General, GSITI at Jeddah, Saudi Arabia. As a follow-up action of the agreement GSITI is giving training in various fields of earth science for the geoscientists of SGS covering all the aspects discussed during the visit.
9.1 The Indian Bureau of Mines (IBM) is a subordinate office under the Ministry of Mines. It is engaged in the promotion of scientific development of mineral resources of the country, conservation of minerals and protection of environment in mines, other than coal, petroleum and natural gas, atomic minerals and minor minerals. It performs regulatory functions, with respect to the relevant provisions of the Mines and Minerals (Development and Regulation) Act, 1957 and enforcement of the rules framed thereunder namely Mineral Conservation and Development Rules, 1988 and Mineral Concession Rules, 1960 and Environmental (Protection) Act, 1986 and Rules made thereunder. It also, undertakes scientific, techno-economic, and research oriented studies in various aspects of mining, geological studies, ore beneficiation and environmental studies.

9.2 IBM provides technical consultancy services to the mining industry for the geological appraisal of mineral resources and 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 a 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.

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

Organizational Set-up

9.4 IBM is organized into six functional divisions, namely:

- Mines Control and Conservation of Minerals Division.
- Ore Dressing Division.
- Technical Consultancy, Mining Research and Publication Division.
- Mineral Economics Division.
- Mining and Mineral Statistics Division.
- Planning and Co-ordination Division having Two Sub-Divisions:

(a) Administration and Establishment

Matters (including training), Accounts with all other administrative and financial matters and;
(b) Planning and Co-ordination.

9.5 IBM has its headquarters at Nagpur, 03 Zonal Offices at Ajmer, Bangalore and Nagpur, and 12 Regional Offices at Ajmer, Bangalore, Bhubaneswar, Chennai, Dehradun, Goa, Hyderabad, Jabalpur, Kolkata, Nagpur, Ranchi and Udaipur and 2 sub-regional offices at Guwahati and Nellore.

9.6 IBM has well equipped Ore Dressing Laboratories and Pilot Plants at Ajmer, Bangalore and Nagpur. A Clay laboratory has also been established at Kolkata to cater to the needs of the North-Eastern Region.

Performance of IBM

9.7 Performance relating to various activities of IBM during the year 2011-12 (up to December 2011) is given below:-

Inspection of Mines

9.8 During the year 2011-12 (up to December 2011), 1,741 inspections for enforcement of the provisions of Mineral Conservation and Development Rules (MCDR) 1988 and for examination of mining plans/schemes of mining/mine closure plans were carried out. Consequent to inspection of mines, during the year 2011-12 (upto December 2011) 2447 violations of various provisions of MCDR, 1988 were pointed out in respect of 989 mines and 710 violations were rectified. 7 prosecution cases were launched in various courts, 5 cases were decided in favour of IBM for which a total fine of ₹ 34,000/- was imposed and 8 cases were compounded for which a fee of ₹ 68,000/- was recovered. Besides, mining operations were suspended under rule 13(2) and 56 of MCDR 1988 in 55 mines for not carrying out mining operations in accordance with the approved mining plan/scheme of mining. A list of principal violation observed during mine inspection is given at Annexure 9.1. The status of mining leases and mines in India in respect of scheduled minerals is given at Annexure 9.2.

9.9 State-wise break-up of inspection of mines carried out during 2011-12 (up to Dec. 2011) is given at Table 9.1.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>State</th>
<th>No. of inspection</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Andhra Pradesh</td>
<td>226</td>
</tr>
<tr>
<td>2</td>
<td>Assam</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Bihar</td>
<td>13</td>
</tr>
<tr>
<td>4</td>
<td>Chhattisgarh</td>
<td>77</td>
</tr>
<tr>
<td>5</td>
<td>Goa</td>
<td>88</td>
</tr>
<tr>
<td>6</td>
<td>Gujarat</td>
<td>131</td>
</tr>
<tr>
<td>7</td>
<td>Himachal Pradesh</td>
<td>47</td>
</tr>
<tr>
<td>8</td>
<td>Jharkhand</td>
<td>147</td>
</tr>
<tr>
<td>9</td>
<td>Karnataka</td>
<td>113</td>
</tr>
<tr>
<td>10</td>
<td>Kerala</td>
<td>19</td>
</tr>
<tr>
<td>11</td>
<td>Madhya Pradesh</td>
<td>194</td>
</tr>
<tr>
<td>12</td>
<td>Maharashtra</td>
<td>57</td>
</tr>
<tr>
<td>13</td>
<td>Manipur</td>
<td>0</td>
</tr>
<tr>
<td>14</td>
<td>Meghalaya</td>
<td>12</td>
</tr>
<tr>
<td>15</td>
<td>Odisha</td>
<td>167</td>
</tr>
</tbody>
</table>
Mine Closure Plan

9.10 The existing Mining regulations i.e. the Mineral Concession Rules, 1960 and the Mineral Conservation and Development Rules, 1988, stipulate that mining operations are required to be done as per approved Mining Plan and after extraction of minerals, the mines are required to be reclaimed as per approved Mine Closure Plan. The Mine Closure Plan is required to comprise of a Progressive Mine Closure Plan prepared for five yearly periods of the successive mining schemes and a Final Mine Closure plan. Mine Closure Plan is expected to address issues relating to environment protection including air, water and land protection, management of top soil and overburden reclamation and rehabilitation of lands and control on ground vibration, surface subsidence and restoration of flora. These plans are approved by the Indian Bureau of Mines and in case of 29 minerals, the powers have been delegated to the State Governments.

9.11 As on December 2011, Financial Bank Guarantees for a value of ₹ 165,87,56,935/- have been collected and certificates under Rule 29 (a) of MCR 1960 have been issued for 76 cases of partial or full surrender of lease.

9.12 During the year 2011-12 (up to December, 2011), 133 mining plans were approved and 30 were not approved, 253 schemes of mining were approved and 45 were not approved and 25 final Mine closure plans were approved and 1 final mine closure plan was not approved. State-wise break-up is given in Annexure 9.3. In 52 cases, mining plans were modified. Details are given at Annexure 9.4. Lessee may continue to operate a lease under deemed extension, pending disposal of the renewal of application by the State Government under Rule 24 A(6). State-wise number of mines working under deemed extension is available at Annexure 9.5.

Technical Studies

9.13 The performance of Annual Programme of IBM including technical studies, investigations and preparation of mineral inventory/maps, etc. is indicated at Table 9.2.

9.14 During the year 2011-12 (up to December, 2011), updation of National Mineral Inventory (NMI) as on 1st April, 2010 in respect of 8237 leaseholds was completed.

9.15 IBM monitors the progress of reconnaissance permits and prospecting licences, the details of which are given in Annexure 9.6 and 9.7, respectively.
Preparation of Mineral Maps

9.16 During the year 2011-12 (up to November 2011), preparation of 100 multi-mineral leasehold maps on a scale of 1:50,000 with corresponding forest overlays in respect of Jammu & Kashmir, Himachal Pradesh, Haryana, West Bengal, North-Eastern States, Kerala and Goa States was at various stages of completion.

Mineral Beneficiation

9.17 Mineral beneficiation studies including mineralogical testing and chemical analysis is intimately related to both conservation and development of mineral resources. During the year 2011-12 (up to December 2011), 49 ore dressing investigations, 35,904 chemical analyses, 1,818 mineralogical examinations and 01 in-plant study were completed. Ore Dressing Division of IBM has brought out a publication viz. “Iron & Steel, Vision 2020” during August 2011 taking cognizance of policy orientation towards zero waste mining.

National Mineral Inventory (NMI)

9.18 During the year 2011-12 (up to December, 2011), updation of NMI as on 1st April, 2010 as per UNFC system was in progress. Data was collected and deposit wise updation finalized for 3825 freehold & public sector leasehold deposits during the year. Data entry & computerization was completed for 12000 deposits and summary outputs for 39 minerals were generated.

Market survey of Minerals and Metals

9.19 Report of Market Survey on copper, lead and zinc was completed and published.

TABLE 9.2
Performance of Annual Programme of IBM including Technical Studies, Investigations and Preparation of Mineral Inventory/Maps in 2011-12 (up to December 2011)

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Item</th>
<th>2009-10*</th>
<th>2010-11*</th>
<th>2011-12</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Target</td>
<td>Achievemement**</td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>MCDR/ MP/ MS/ FMCP Inspections</td>
<td>2,371</td>
<td>2177</td>
<td>2500</td>
</tr>
<tr>
<td></td>
<td>RMGS@ / Updation of NMI as on 1.04.2010 in respect of Private Sector Leaseholds</td>
<td>12 RMGS</td>
<td>NMI data for 7232 Private Sector leasehold deposits updated</td>
<td>12 RMGS</td>
</tr>
</tbody>
</table>

4. Preparation of multi-mineral maps with forest overlays 100 maps 100 multi-minerals maps of MP, Uttarakhand and U.P. 100 maps 100 multi mineral maps are in progress at various stages

5. OD Investigations 66 60 70 49 completed

6. Chemical Analysis (No. of radicals) 50,519 41,925 50,000 35,904 completed

7. Mineralogical Studies 2,383 2,060 2,500 1,818 completed

8. Technical Consultancy Assignments 10 06 08 04 completed & 05 in progress

9. Mining Research including Environmental Studies 08 07 01-02 07 completed

10. Training 15 12 12 09

MCDR-Mineral Conservation & Development Rules; MP-Mining Plan; MS-Scheme of Mining; FMCP- Final Mine Closure Plan; @ Regional Mining Geological Studies,
* Actual,
** Up to December 2011

Statistical Publications

9.20 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.

Consultancy Service

9.22 IBM provides technical consultancy services on prescribed charges for geological appraisals, survey of the areas, preparation of feasibility study reports, environment impact assessment and environment management plan, selection of suitable mining equipment, evaluation of feasibility report prepared by other consultants, financial institutions, etc. During the year 2011-12 (up to December 2011), 04 assignments were completed and 05 were in progress.

Technical Publications

9.23 IBM brings out technical publications relating to mines and minerals, mineral based industries, trade, beneficiation, R&D activities, etc. During the year 2011-12 (up to December 2011), Bulletin on Mining Leases & Prospecting Licenses 2010 issue and half-yearly Bulletin on Mineral Information, (April - September 2010 and October 2010 - March 2011) issues, Indian Mineral Year Book (IMYB) 2010 and Iron & Steel Vision 2020 were released.

Minning Research

9.24 Applied Mining Research is carried out in IBM on various mining aspects so as to help in systematic development of mines and improvement in productivity in mines through evolution of suitable norms. Industry sponsored assignments on environment and rock mechanics on charge basis are also undertaken. During the year 2011-12 (up to December 2011), 07 such assignments have been completed.

Training

9.25 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 2011-12 (up to December 2011), 9 training programmes were conducted in which a total of 69 IBM personnel, 236 industry personnel and 18 officers of Directorate of Geology and Mining participated.

Advisory Role

9.26 IBM continued to advise the Central and State Governments on matters concerning mines and minerals, mining legislation, export and import policies, mineral consumption and industrial utilization, recovery of by-products, demand and supply of minerals, renewal of mining leases, etc. Assistance was also rendered to private parties, institutions and foreign organizations on subjects like mineral production and other statistics.
Measures for Abatement of Pollution and Environmental Protection

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

9.28 As a result of follow up for implementation of EMP, extensive afforestation has been undertaken in the mines by the mine owners. During the year 2011-12 (upto December 2011), about 3.56 million saplings have been planted over 888 hectares. in and around mine areas. Thus, so far, 101.2 million saplings have been planted over an area of about 40295 hectares. with a survival rate of 67%.

9.29 Simultaneous reclamation in working mines, and reclamation of abandoned mines are required to be carried out wherever feasible. During the year 2011-12 (upto December 2011), simultaneous reclamation / rehabilitation is in progress on in 56 working mines covering an area of about 402 hectares, taking the cumulative figure upto 1,360 working mines covering an area of about 12,921 hectares. So far, 53 abandoned mines covering an area of 660 hectares have been reclaimed/rehabilitated.

9.30 IBM continued to take initiative to organize Mines Environment and Mineral Conservation (MEMC) Weeks every year in important mining centres through its regional offices to promote awareness amongst mine owners for minimizing environmental pollution. During the year 2011-12 (up to December 2011), MEMC weeks were organized under the aegis of three regional offices and such weeks will be celebrated under the aegis of remaining eight regional offices by the end of March 2011.

Revenue Generation

9.31 IBM generates revenue through promotional activities. Revenue generated during 2011-12 (up to December 2011), is of the order of ₹ 120.06 lakh comprising ₹ 10.67 lakh from the consultancy work
in mining and geology; ₹ 76.92 lakh from Mineral beneficiation assignments; ₹ 1.46 lakh from mining research assignments; ₹ 9.98 lakh from processing of mining plans / schemes of mining and compounding fees & fines; ₹ 15.6 lakh from training and balance ₹ 5.43 lakh through sale of publications, mineral maps, mineral inventory data etc.

**Grant of Exploration Licence in the Offshore Waters**

9.32 The Controller General, Indian Bureau of Mines, who has been declared as an Administering Authority for the purpose of the Offshore Areas Mineral (Development and Regulation) Act, 2002 vide Notification 339(E) dated 11th February, 2010, has notified the mineral bearing blocks available for the grant of Exploration Licence in the offshore waters of Bay of Bengal and Arabian Sea vide Notification 1341(E) dated 7th June, 2010. In response to this, 377 applications had been received for grant of Exploration Licence and Grant orders had been issued for 62 blocks to 16 applicants in April 2011. Further progress in executing the Exploration Licences was stalled as the matter was subjudice. However, in the Writ Petition No.1502 filed in the Hon’ble High Court of Judicature at Bombay, Nagpur Bench, the Hon’ble Court agreed to the contention of the petitioner that petition should be confined only to the 17 blocks applied. Therefore, the action for executing the remaining Exploration Licenses after following the due process is being initiated. Commencement of offshore exploration will set a new benchmark in the achievement of Indian Mining industry hitherto unheard of and India will join the elite club of select few nations in this pioneering feat.

9.33 A technical committee to frame field guidelines for exploration on offshore areas as per UNFC classification, was constituted vide Ministry’s Order dated 27th August, 2010 under the Chairmanship of Shri C.S. Gundewar, Controller General, IBM with representatives from Ministry of Earth Sciences, New Delhi, National Centre for Antarctic & Ocean Research, Vasco da Gama and National Institute of Oceanography, Dona Paula, Goa. The committee held two meetings in the year 2011 up to December 2011. In its first meeting, held on 19th and 20th of January 2011 at IBM Headquarters, Nagpur, Geological axis guidelines were finalized. In the second meeting, held on 11th August 2011, Economic axis and Feasibility axis guidelines were discussed and the same are under modification/finalization.

**Computerization**

9.34 The Regional/Zonal offices and Headquarters of IBM have been linked through a sophisticated system based on client server architecture established with the help of BRGM, France, which includes databases required by IBM. IBM has well established LAN facility, besides WAN system to communicate and exchange data to and fro Regional, Zonal offices and Headquarters.
9.35 A new Web Portal of IBM as per the guidelines of Government of India was designed by National Informatics Centre (NIC) and hosted on its server in July, 2010 at www.ibm.gov.in. Information regarding IBM’s history, functions, organization, divisions of IBM and its activities, jurisdiction of regional & zonal offices, services offered by IBM, Mining Plans - guidelines / formats / circulars thereof, RQPs - guidelines / formats thereof, UNFC guidelines, Mining Laws, Mineral Information like mineral reserves, value, royalty and dead rent, details of reconnaissance permits, threshold values, notices & returns under MCDR, 1988 Mining Leases distribution data, Indian Mineral Year Book 2010, Bulletin of Mining Leases & Prospecting Licenses 2010, Bulletin of Mineral Information April-September 2010, Offshore Mineral Concession Rules, Notification & Form G thereof, Tenders, RTI information, Photo gallery, etc., has been displayed on the web portal. There is also provision for online submission of vigilance complaints and Grievances.

9.36 As a Result of amendment to Rule 45 of MCDR, 1988 vide notification No. 75(E), dated 9th February, 2011, it was decided to create a portal of IBM for facilitating online registration of miners, traders, stockists, exporters and end users of mineral and submission of monthly and annual return thereon. This programme is to be carried out in a phase manner: (i) Award of work, (ii) Project initiation, system design, (iii) Development and Testing and (iv) Security audit, training and sign off. The amended Rule 45 provide for two activities to be performed by all those who are engaged in mining sector. It provides for registration of every mine owner or any person or company engaged in storage or trading or end-use or export of minerals mined in the country with IBM and submission of the monthly and annual returns by lessee in form F1 to F8 and H1 to H8 in case of mines and N and O in case of storage or trading or end-use or export of minerals. The NIC, Mines designed and developed the registration module for on-line registration of all those who are engaged in mining or storage or trading or end-use or export of minerals mined in the country. This software is made available on-line to all those who wish to register with IBM as per the provision of Rule 45 of MCDR, 1988. IBM organized a two days workshop at Nagpur on 17th and 18th November, 2011 with participation of 180 participants from mining industry, State Governments and IBM. The main focus of the workshop was on on-line procedure for registration and popularisation of the concept of submission of monthly and annual returns on-line. Further, Regional offices of IBM have organized workshops-cum-camps at several places in order to facilitate the miners to register themselves with IBM. IBM had requested NIC, Nagpur for developing software to facilitate the on-line submission of monthly and annual returns indicated above. M/s UBICS - a Software Development Agency from Pune was engaged through NICSI, Delhi. Representatives from IBM, NIC, Nagpur
and UBICS, Pune had series of meetings to discuss and identify the workflow for developing the software for on-line submission of returns. Online monthly return forms F1 and F2 have been prepared and are under trial run. IBM finalized the prototypes for all the returns in F and H series and forms N and O. The development of software on F series and Form N has been taken up as top priority as these forms pertain to monthly returns and Rule 45 provides for their submission to RCOM by 10th of every month. The development of software for H series and form O will be continued simultaneously. Work order for installation of Wide Area Network (WAN) has been issued to the recommended party. The entire activity of facilitating the industry will be carried out through IBM Portal which will be upgraded from time to time for providing access to the industry.

9.37 IBM has implemented “IT Infrastructure Security Policy (version 1.0 of 2006)” with a view to comply with Information Security to safeguard information infrastructure from possible attack through Internet or corruption, compromise of data etc.,

Mineral Concession Approval System (MCAS)

9.38 Data entry at the Regional Offices for operationalization of MCAS was carried out. Data entry, for a total of 9935 Letter of Intent (LOI), has been completed. In addition, data of 11769 records pertaining to Mining Plan/Scheme of Mining, Prospecting Licence & Reconnaissance Permits, Commencement of Mining Operations, etc. has also been entered.

Threshold Values of Minerals

9.39 In the interest of systematic development of mineral deposits and conservation of minerals, Controller General, IBM issued directives under Rule 54 of MCDR, 1988 notifying threshold value of minerals vide Notification No. T-45031/CGBM/2007 (PF) dated 16 October, 2009, for general information and immediate compliance by the mine owners. Subsequently, circulars highlighting the procedure to be followed for exploration within the leaseholds in respect of which the threshold values have been significantly changed i.e. for iron ore, chromite, bauxite, limestone & dolomite, wollastonite and magnesite were also issued for reassessing the reserves / resources.

Preparation of Status Paper on Beneficiation of Iron Ore

9.40 In order to encourage the zero-waste mining, it is essential that all the ROM ore mined is utilised. In this direction, the role of mineral beneficiation is critical and important. Iron ore is important mineral of our country. However, the most of the iron ore is being exported without value addition. In this context, to give policy inputs on incentivization of beneficiation and pelletisation to Ministry of Steel for preparing a suitable Central Government

IBM Advisory Board

9.41 Sixteenth meeting of the IBM Advisory Board was held under the chairpersonship of Ms. Santha Sheela Nair, the then Secretary (Mines) on 27th July, 2010 at New Delhi. Highlight of the meeting was presentation of the draft report of the Committee for Review and Restructuring of the Functions and Role of IBM, which was discussed in detail.

Committee for Review and Restructuring of the Functions and Role of IBM

9.42 A Committee was constituted on 23rd July, 2009 by the Ministry of Mines for reviewing and restructuring of functions and role of IBM in terms of the Policy directions given in the National Mineral Policy 2008. Based on the deliberations of the stakeholders meeting held on 20th December, 2010 under the Chairmanship of Secretary (Mines), the Committee had modified the report. Subsequently a meeting with industry personnel was held under the Chairmanship of Secretary (Mines) on 30th August, 2011 on the issue of continuance of Ore Dressing Division in IBM. It was decided in the meeting that IBM’s role should be restricted to be a Regulator in the field of mineral beneficiation rather than as commercial organization for development of flow sheets. Based on the decisions taken in the meeting held on 30th August, 2011, certain chapters of the Report were again redrafted. The modified draft report of the Committee is ready for submission.

Group to Evolve Model Guidelines on Environmental Aspects of Quarrying of Minor Minerals

9.43 Ministry of Environment & Forests had constituted a Group of State Secretaries of both the Environment and Mining Departments of major States under the chairmanship of Secretary (E&F), Government of India, to evolve model guidelines on environmental aspects of quarrying of minor minerals. Shri R.K. Sinha, Controller of Mines, IBM represented Ministry of Mines as a member of the Group. The Group submitted its report in March 2010. As a follow up of the recommendations of the Group, on the direction of Ministry of Mines, the Controller General, IBM constituted a committee under the chairmanship of Dr. B.P. Sinha, COM to draft the documents on (i) Mining framework for minor minerals, (ii) Framework for cluster of mines, and (iii) Guidelines for reclamation and rehabilitation. Report of the committee has been submitted to the Ministry.

Internal Committee for drafting Sub-legislation

9.44 An Internal Committee was constituted in the Ministry of Mines under the Chairmanship of Joint Secretary for drafting Sub-legislation in terms of new MMRD Bill, 2011. Shri B. Ram Mohan,
DCOM is a member of the committee from IBM. As decided in the first meeting of the committee, sub-committees were constituted in IBM and their work is in progress to prepare draft sub rules on Mineral Concession (Grant and Management) Rules, Scientific Mining and sustainable Development Rules, Mineral Royalties and Cess Rules, District Mineral Fund Rules, Mining Regulatory Authority Rules, Mining Tribunal Rules and Mines and Minerals (Special Court) Rules.

**Steps taken to curb Illegal Mining**

9.45 Mining leases are granted by the State Government and the boundaries of the executed leases are marked on the ground by State Revenue Authorities. They also control issue of transport permits and collection of royalty. Section 23(C) of Mines and Minerals (Development and Regulation) Act 1957 empowers the State Governments to frame rules to prevent illegal mining and the State Government may, by notification in the Official Gazette, make such rules for preventing illegal mining, transportation and storage of minerals and for the purposes connected therewith in the State. The issue of prevention of illegal mining is not covered within the functioning of IBM. However, IBM associated with State Governments and its law enforcing agencies in curbing the illegal mining activities.

9.46 The Ministry of Mines have formulated a three-pronged strategy for prevention of illegal mining viz. constitution of Task Force by the State Government at State and District Level having a representative of IBM, framing of rules under Section 23(C) of the MMDR Act, 1957 and furnishing of quarterly returns on illegal mining for review by the Central Government.

9.47 With rigorous follow-up made by IBM and the Ministry with various State Government(s), all together, 20 State Governments have constituted Task Force namely, Andhra Pradesh, Assam, Chhattisgarh, Goa, Gujarat, Haryana, Himachal Pradesh, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Manipur, Mizoram, Nagaland, Odisha, Punjab, Rajasthan, Tamil Nadu, Uttarakhad and West Bengal and 17 States have framed the rules under Section 23(C) of MMDR Act 1957 namely Andhra Pradesh, Bihar, Goa, Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Nagaland, Orissa, Rajasthan, Uttar Pradesh, Uttarakhad and West Bengal so far. The function of the Task force is to review the action taken by member departments for checking the illegal mining activities in their respective jurisdiction. Further, whenever IBM detects illegal mining during the course of routine MCDR inspection, the same is reported to the State Govt. concerned to take suitable action.

9.48 Indian Bureau of Mines (IBM) has conducted special drive to increase awareness on the issue of illegal mining
by organising “Pakhwara’ (Fortnight Programme) as per directions from the Ministry. Accordingly, IBM has initiated action on the matter and nominated one officer each from the regional offices of IBM for the event. So far such ‘Pakhwaras’ were organized in States, viz., Himachal Pradesh, Madhya Pradesh, Gujarat, Jharkhand, Karnataka, Madhya Pradesh, Rajasthan, Tamil Nadu and Goa during the years 2008-09, 2009-10 and 2010-11.

9.49 Besides, IBM has nominated Nodal Officers for every zonal/regional office to look after all the work of prevention of illegal mining activities in their respective regions/States mainly for surface deposits of major and minor minerals. They will co-ordinate with the State Governments for timely submission of quarterly returns on illegal mining; liaising with State Governments for framing of rules under Section 23(C) of MMDR Act 1957 and constitution of Task Force; participation in the regular Task Force meetings, coordination in organizing Pakhwara for prevention of illegal mining; attendings to all the references pertaining to illegal mining and submission of report/comments thereof, referring the cases of illegal mining noticed during MCDR inspections to the State Government and action taken by the State Government and other related issues.

9.50 In compliance of the direction of the Ministry, Task Force-I of IBM was constituted during 2009-10 to check illegal mining in the States of Andhra Pradesh, Jharkhand, Karnataka and Odisha for iron and manganese ore and Gujarat for bauxite, which are the major States where illegal mining is rampant. Similarly Task Force-II of IBM was constituted during 2010-11, which had carried out mine inspections in identified endemic areas in a phased manner.

9.51 The Task Force-I had inspected 106 mines and mining operations were suspended in 64 mines under Rule 13(2) of MCDR, 1988. So far upto December 2011, suspension orders were subsequently revoked in 56 mines after ensuring rectification of violation(s).

9.52 Upto December 2011, the Task Force-II has inspected 348 iron / manganese ore, chromite and bauxite mines (11 AP, 23 Chhattisgarh, 57 Jharkhand, 106 Karnataka, 115 Odisha, 8 Maharashtra, 7 MP & 21 Goa) and mining operations were suspended in 91 mines under Rule 13(2) of MCDR, 1988. Suspension orders were subsequently revoked in 41 mines after ensuring rectification of violation(s).

9.53 During the year 2011-12, 15 State Governments have submitted the quarterly return on illegal mining upto the quarter ending June 2011 and 18 State Governments upto the quarter ending September 2011. Yearly compilation of illegal mining, for the year 2011-12 (up to September 2011) in respect of Major Minerals given at Annexure 9.8 and Minor Minerals Annexure 9.8(A), respectively.
10.1 The East Coast bauxite discovery led to the setting up of India’s largest Alumina-Aluminium complex, National Aluminium Company Ltd (NALCO) in 1981 following technical collaboration agreement with Aluminium Pechiney of France. The project cost of ₹ 2,408 crore was part financed by 980 million euro dollar loan extended by a consortium of International banks. The Company has long back prepaid the loan, besides contributing more than ₹ 16,000 crore to Central and State exchequer as tax and duties etc, besides having huge cash reserve for future growth activities.

10.2 Presently, Govt. of India holds 87.15% share in NALCO. It is an integrated and diversified mining, metal and power group ‘A’ CPSE with annual sales of ₹ 6,370 crores in FY10-11. The Company has bulk shipment facilities at Vizag port, besides utilizing the facilities at Kolkata and Paradeep ports.

10.3 With the emergence of NALCO on the aluminium scene, there has been a quantum jump in alumina and aluminium production in the country. NALCO is the 1st Public Sector Company in the country to venture into International market in a big way with LME registration since May 1989. Export sales account for almost 30-35% of its turnover with business in more than 30 countries in recent past. Its alumina and metal enjoy premium in world market on account of quality and international standard.

10.4 The production units at NALCO are operating consistently near or more than 100% capacity. Due to its consistent track record in managing operations and improving costs and output, the Company has been accorded prestigious ‘Navratna’ status by Govt. of India in 2008. NALCO is one of the lowest cost producers of alumina and aluminium in the world.
10.5 The Company is listed at Bombay stock exchange (BSE) since 1992. Besides, ISO 9002, ISO 14001 & OHSAS 18000 certifications, the Company has also adopted SA 8000 International Standards, for Corporate Social Accountability.

10.6 For its genuine concern and care of the locals, the Company has endeared itself to the people of the State. For its care for ecology and environment, the Company has received the coveted ‘Indira Priyadarshini Vrikshamitra Award’ and ‘Indira Gandhi Paryavaran Puraskar’.

10.7 In addition to existing operations, NALCO has extensive plans for brown field and green field expansion projects worth ₹ 40,000 crore in the country and abroad. Further, the Company has taken up steps for commissioning of allotted coal block (Utkal-E in Odisha) at a cost of ₹ 338 crore. At the same time, to offset the vagaries of international market related to aluminium, NALCO is looking beyond its core strength and venturing into other metals and energy sectors. NALCO has signed agreement with Nuclear Power Corporation of India Limited (NPCIL) to form a joint venture Company for establishment of 2X 700 MW nuclear power plants at Kakrapara in Gujarat, where the construction work has already started. To harness the non-conventional energy source, the Company is setting up a wind power project of 50.4 MW capacity in Andhra Pradesh for which order has been placed in June, 2011. The Company has also been shortlisted by Govt. of Gujarat for alumina refinery.

10.8 NALCO has plans to set up thermal power plants as independent power project (IPP) and even Ultra Mega Power Projects (UMPP) and exploring for solar plants also. Further, the Company is developing bauxite mines (Gudem and KR Konda in Andhra Pradesh and likely to start Pottangi in Odisha); besides setting up forward and backward integration projects.

10.9 Leveraging the technical collaboration with Aluminium Pechiney (now Rio Tinto Alcan) since 1982, NALCO has continued to add value and is poised to grow further.

**Bauxite Mine**

10.10 The Company mines bauxite requirements which is the primary raw material used to produce alumina.
This bauxite mine is situated on a hill in Damanjodi, Koraput, in the State of Odisha. This plateau bauxite deposit is mined by a fully mechanised system at a capacity of 6.3 million tonnes per year.

10.11 The Panchpatmalli plateau stands at elevation of 1154 meter to 1366 meter above mean sea level. Bauxite occurs over the full length of the Panchpatmali plateau, which spans over 18 kms.

**Alumina Refinery**

10.12 The alumina refinery is located at Damanjodi, Odisha, approximately 14 kms from the bauxite mine at Panchpatmalli. The mined out bauxite from captive mine is transported to refinery by a 14.6 km long single flight multi curve 1,800 tonnes per hour (TPH) capacity cable belt conveyer. The alumina produced is transported to aluminum smelter at Angul and to Vizag port storage and handling facilities by rail for export.

10.13 The present capacity of alumina refinery is 2.1 million tonnes per year, consisting of four production lines of 525,000 metric tonnes each. The capacity is being augmented to 2.275 million tonnes per year under 4th stream up-gradation project at an estimated cost of ₹ 409 crore. Alumina produced is used to meet Company’s own requirements for production of primary aluminum at smelter. The surplus alumina that remains after internal consumption is sold to third parties in the export markets.

**Aluminum Smelter**

10.14 The aluminum smelter is located at Angul, Odisha, approximately 699 kms, from refinery and 5km away from captive thermal power plant. The aluminum produced at aluminum smelter is transported to Vizag port storage and handling facilities (564 km away) and the Paradeep port (194 km away) by rail for export.

10.15 The aluminum smelter started production progressively from 1987. After completion of 2nd phase expansion in December, 2009, the present capacity of smelter is 4.60 lakh tonnes per year,
which is being augmented to 5.67 lakh tonnes per year under current amperage up-gradation project from present 180 KA to 220 KA in phases. Alumina is converted into primary aluminum through a smelting process using electrolytic reduction. From the pot-line, the molten aluminum is routed to either NALCO’s casting units, where the aluminum is cast into ingots, sow ingots, tee ingots, billets, wire rods, cast strips and alloy ingots, or to holding furnaces at flat aluminum products unit where the molten aluminum can be rolled into various cold-rolled products or casted into aluminum strips.

**Captive Power Plant**

10.16 The coal based captive power plant is located at Angul approximately 5 kms away from aluminum smelter with access to low cost electric power and minimal transmission losses.

10.17 The location of captive thermal power plant at Angul is also strategic to the coal availability and supply.

The Company sources major coal requirement for captive thermal power plant from the Talcher coalfields of Mahanadi Coalfield Ltd. located approximately 15 kms from Angul. The 18.5 kms captive railway system links the captive thermal power plant to the Talcher coalfields, enabling it to transport the critical and bulk requirement of coal at relatively low cost.

10.18 The captive thermal power plant commenced operations in 1986. Presently the captive thermal power plant has generation capacity of 1200 MW with 10 turbo-generators, each rated at 120 MW. While the captive thermal power plant provides entire electric power requirement of aluminum smelter, it also provides for approximately 35% of the power requirement of alumina refinery plant.

10.19 Physical performance, Financial performance and sales performance from 2009-2010 to 2011-2012 are shown at Table 10.1, 10.2 and Table 10.3.

### Table 10.1

**Physical Performance of NALCO**

<table>
<thead>
<tr>
<th>Product</th>
<th>Unit</th>
<th>2009-10 Actual</th>
<th>2010-11 Actual</th>
<th>Target for 2011-12</th>
<th>2011-12 Actual up to Dec’11</th>
<th>2011-12 Estimated Jan’12 to Mar’12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bauxite</td>
<td>MT</td>
<td>48,78,888</td>
<td>48,23,909</td>
<td>60,00,000</td>
<td>37,08,359</td>
<td>12,00,000</td>
</tr>
<tr>
<td>Alumina Hydrate production</td>
<td>MT</td>
<td>15,91,500</td>
<td>15,56,000</td>
<td>20,00,000</td>
<td>12,18,300</td>
<td>4,81,700</td>
</tr>
<tr>
<td>Aluminium Metal Production</td>
<td>MT</td>
<td>4,31,488</td>
<td>4,43,597</td>
<td>4,38,000</td>
<td>3,09,018</td>
<td>1,00,983</td>
</tr>
<tr>
<td>Net Power Generation</td>
<td>MU</td>
<td>6,295</td>
<td>6,608</td>
<td>7,160</td>
<td>4,597</td>
<td>1,685</td>
</tr>
</tbody>
</table>

MT- Metric Tonnes

MU- Million Tonnes
Export/Import Performance

10.20 Under the Foreign Trade Policy 2009-10, NALCO has been granted with ‘Premier Trading House Status’ for achievement in export target. Certificate of recognition as Premier Trading House has been issued on 30th September, 2009 which is valid upto 31th March, 2014. Premier Trading House status is the highest status awarded to any Export House by Govt. of India. NALCO has achieved export earnings of ₹ 2,065 crore in the year 2010-11 and ₹ 1,493 crore during the year 2011-12 upto November, 2011.

10.21 Memorandum of Understanding (MoU) Rating of NALCO during last three years is given below:

<table>
<thead>
<tr>
<th>Year</th>
<th>Composite Score</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008-09</td>
<td>1.78</td>
<td>Very Good</td>
</tr>
<tr>
<td>2009-10</td>
<td>2.06</td>
<td>Very Good</td>
</tr>
<tr>
<td>2010-11</td>
<td>2.35(Prov.)</td>
<td>Very Good</td>
</tr>
</tbody>
</table>
On-Going Projects

Utkal-E Coal Block

10.22 Ministry of Coal, Govt. of India had allocated Utkal-E coal block in August, 2004 to meet the coal requirement for 9th & 10th as well as proposed 11th & 12th captive power plant units of NALCO, at Angul. As per the feasibility report, the total mineable reserve of Utkal-E coal block is 67.49 million tonnes. The mine life works out to over 30 years at the target production of 2.0 million tonnes per year. The estimated cost of the project is `337.61 crore at May, 2011 price level, with internal rate of return (IRR) of 34%.

10.23 PRESENT STATUS

• The activities have picked up in real sense after getting the environmental clearance from M/o of Environment & Forests (MOEF) in December, 2009.

• After consistent follow up by the Ministry of Mines with Ministry of Coal, mining lease of the block has been recommended to Govt. of Odisha vide letter dated 14.06.2011 for approval.

• Presently, the Company is pursuing with MOEF for stage-I forest clearance.

The Brief Status of other recent activities indicated as under:

• Water allocation granted by State Water Resource Dept. in October, 2010.

• The final award register for private land acquisition in mining lease area is in preparation.

• Land acquisition for construction of R&R Colony is in advance stage. Tender document for appointment of an agency for construction of R&R Colony submitted by 3 parties are under evaluation.

4TH STREAM UP-GRADATION PROJECT OF ALUMINA REFINERY

10.24 Upgradation of 4th stream of alumina refinery from 5.25 lakh TPY to 7.0 lakh TPY and that of bauxite mines from 6.3 million TPY to 6.825 million TPY was approved by Board at an estimated project cost of `409 crore with 21.08.2008 as the “Zero Date”.

PRESENT STATUS

10.25 Cumulative physical progress achieved is 80% as of December, 2011. Backlog is attributed to the delay in start of civil & structural works due to late receipt of environmental clearance (obtained on 11.05.10) from MOEF.

50 MW WIND POWER PLANT

10.26 The Company has started work in June, 2011 for a 50 MW wind power plant in Andhra Pradesh at an investment of `274 crore, scheduled to be commissioned in March, 2012.

Expansion and Diversification

Expansion

10.27 Status of 2nd Phase Expansion. The Government of India accorded
approval for 2nd Phase Expansion of mines, alumina refinery, aluminium smelter and captive power plant of NALCO on 26th October, 2004 at an outlay of ₹ 4091.51 crore with a completion period of 50 months from date of approval. The project cost has been revised to ₹ 4402 crore at November, 2008 price level by the Company. With the commissioning of 4th stream of alumina refinery in June, 2011, the 2nd phase expansion project stands completed. The capacity of the various project segments before and after 2nd phase expansion is given at Table 10.4.

### Table 10.4

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Project Segment</th>
<th>Capacity after 1st phase Expansion</th>
<th>Capacity after 2nd Phase Expansion</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Bauxite Mine</td>
<td>48 Lakh TPY</td>
<td>63 Lakh TPY</td>
</tr>
<tr>
<td>B</td>
<td>Alumina Refinery</td>
<td>15.75 Lakh TPY</td>
<td>21 Lakh TPY</td>
</tr>
<tr>
<td>C</td>
<td>Aluminium Smelter</td>
<td>3.45 Lakh TPY</td>
<td>4.6 Lakh TPY</td>
</tr>
<tr>
<td>D</td>
<td>Captive Power Plant</td>
<td>960 MW</td>
<td>1,200 MW</td>
</tr>
</tbody>
</table>

10.28 Greenfield Growth Projects in India:

- NALCO has planned to set a Greenfield smelter and power plant in Sundargarh district in Odisha at an estimated investment of ₹ 13,500 crore. As advised by the State Govt., NALCO is assessing water availability at the proposed location, based on which Company’s proposal is likely to be approved.

- NALCO has been granted mining leases over Gudem and KR Konda bauxite reserves in Andhra Pradesh. Based on the above bauxite reserves, the Company plans to set up a 4.2 million tonnes per annum (MTPA) bauxite mines and 1.4 MTPA alumina refinery complex in Andhra Pradesh at an investment of ₹ 5,600 crore. Considering the sensitivity associated with bauxite mining in the tribal dominated areas, the Company is not undertaking any field activities, except for some CSR endeavours.

- NALCO is pursuing to set up an 1.0 million tonnes alumina refinery in Gujarat, based on supply of bauxite from Kutch region by Gujarat Mineral Development Corporation (GMDC).

Greenfield Growth Projects abroad:

10.29 NALCO is exploring to set up a 0.5 MTPA smelter and a 1250 MW CPP in Indonesia considering availability of abundant quantity of coal at economic price. The estimated investment for the project is ₹ 16,500 crore. The Company has prepared feasibility report and has opened a project office in Jakarta to take up the pre-project activities. Presently, the Company is finalising the coal sourcing arrangement for the project.

10.30 Diversification:

- NALCO has signed the Joint Venture agreement with Nuclear
Power Corporation of India (NPCIL) to build Kakarpur – 3 & 4 nuclear power plant at Kakarpur Gujarat. The Company would be initially investing Rs. 894 crore towards 26% equity, which would be subsequently enhanced to 49%. The construction of the plant is at advance stage.

- NALCO, being committed to green power generation, plans to set up another wind power plant of 50 MW capacity on EPC basis in any wind potential State in India, for which it has invited commercial offers from wind farm developers. Similarly, the Company is also exploring to set up 15 MW solar power project on EPC basis.

10.31 New Schemes:

- NALCO is exploring to set up a specialty alumina plant at Damanjodi in Joint Venture (JV) with a firm having technology for production of specialty alumina products.
- NALCO has signed with a MoU with Indian Rare Earth Ltd. (IREL) for establishment of titanium complex in JV in the premises of Orissa Sand Complex of IREL at Chhatrapur in Odisha.
- NALCO will have 49% equity in the proposed JV. Presently, the Company along with IREL is in process of selection of appropriate technology for the project.
- NALCO has signed a MoU with Power Grid to set up aluminium conductor plant in JV.
- As a matter of backward integration, NALCO has proposed to set up a Caustic Soda plant in joint venture with GAACL.

10.32 Energy Conservation

NALCO carries out the energy conservation measures exceedingly well in all its units. Its smelter unit has been awarded with prestigious National Energy Conservation Award by Ministry of Power in succession for last two years. NALCO is carrying out energy conservation measures through Small Group Activities (SGAs) by enhancing the energy efficiency in its different activities and processes.

The energy conservation measures adopted by NALCO in its different units during the year, are as under:

Automatic shut down / switching off of equipments and lights during idle time, installation of energy efficient lighting products (T-5 fluorescent fittings, electronic ballasts, etc.), installation of energy meters for effective monitoring and control of energy consumption, installation of variable frequency drives in various pumps and drives like makeup water pumps in boiler-4, power house-3, green liquor pumps, digestion and dilution pump, 23 various drives in refinery, cooling towers fans of CPP, cable belt and auxiliary system at mines, etc.
Reduction of DC energy consumption in pot lines, incorporation of magnetic resonator in HFO lines of furnaces to achieve better fuel efficiency, introduction of slotted anodes in pot lines for reducing the pot voltage, installation of modified Re-cuperator in melting furnace of caster-1 in rolling plant in the smelter plant.

Installation of heating coil in pre desilication heating tanks to decrease steam consumption & process dilution, installation of standby dump condenser to avoid water and heat energy loss in case of low process demand, optimisation of motor rating for inter stage coolers, installation of magna drive coupling in conveyor-6A in the alumina refinery.

Installation of energy saving blades in cooling towers of unit 1 and 6, on-line monitoring of high energy drains installed in unit #6, installation of intelligent power controllers in NALCO’s captive power plant.

Introduction of solar LED street light general illumination, replacement of low capacity transformer by high capacity transformer based on load requirement to save power in Company’s bauxite mines.

Being a Navratna Company, NALCO is committed for optimizing its process efficiency and reducing the energy consumption for its own benefit as well as in the greater interest of the nation at large.

10.33 Computerisation

NALCO leverages on information and communication technology (ICT) to strengthen and boost its business processes, so as to help deliver its strategic business objectives to increase sales, maximise operational efficiency, reduce operational risks and improve productivity.

NALCO’s ERP project commenced from July, 2008, and by now all the modules have stabilised. It covers materials & contracts (MM) with supplier relationship management (SRM), sales & distribution (SD), production planning (PP) with supply chain management (SCM) module advanced planning & optimization (APO), quality, finance & controlling (FICO) and human resource management (HR) modules. Additional modules of SAP such as business intelligence (BI) and document management system (DMS) have also been implemented, and employee self service (ESS) is on the anvil. NALCO has migrated all its major functions into SAP environment across the organisation, including for the sales offices. In the area of maintenance management, NALCO uses the Ramco-e-Apps maintenance module, which has been implemented since 2000.

This provides a strong centralised information base integrating all functions and business processes of the Company and a knowledge base to assist the management with appropriate dashboards for monitoring all the processes and to be pro-active in
their decision making. Further down the line, knowledge management will be implemented for organised storage and access of information and experience, using the data warehouse of ERP along with all non-SAP based data and information in the organisation. This will enable availability of information and knowledge to authorised users at a click, with simplicity of internet browsing.

New technologies like server virtualisation for enterprise services, link load balancing for internet links, etc, have been implemented. There are plans to use RFID technology for file tracking, and other uses like asset and material tagging, vehicle tracking, etc. Video conferencing, currently used at elementary level, is being popularised, and the infrastructure is being enhanced for wider coverage, so as to make video conferencing a regular tool in day to day working. Towards technical compliance to the internet world, NALCO is taking steps to migrate the internet facing elements to IPv6 technology by 03/2012.

In the area of e-governance, project for biometric based attendance and access control solution is in progress. E-tendering for export sales has been implemented with security measures like server secure socket layer (SSL) certificate and end user PKI digital certificate. After the stabilisation of SAP applications, processes like materials procurement, service tenders, and recruitment processes are under enhancement to go the e-way. Towards such intent, a consultant was appointed, and we now have a road map and action plan for e-tendering in the materials and services procurement arena. Against the green measures proposed by the Ministry, proposal for Board meetings on video conference and Company AGM on video conference are also on the anvil.

The in-house state-of-the-art data centre with 24x7 conditioned power supply and air conditioning along with the usual safety measures and monitoring systems at Corporate Office provides stable housing for Company’s SAP and other servers and core network. This will be further strengthened with a disaster recovery site shortly, so as to effectively implement business continuity plan for the IT based processes.

NALCO has strengthened its data pipelines both to the Internet and to the works locations with fault tolerant high bandwidth links, to ensure un-interrupted data connectivity. This also enables tele-presence activities between Corporate Office and works locations. Shortly the local area networks (LAN) at all the works sites and Corporate Office will be replaced with high bandwidth and fault tolerant state of the art networks, which will support data as well as broadband applications.

10.34 Pollution Control and Environment:

NALCO is a careful organisation of its environment and has taken several steps for abating pollution and improvement of the environment. All the units of
NALCO are certified to International Standard ISO14001:2004-Environmental Management System. NALCO is proactive and has adopted preventive strategies like 3R principle of reduce, reuse and recycle.

The Company has optimized its resource consumption thereby minimizing the waste and optimizing the operating efficiency in all its units. It has eliminated the use of Ozone depleting substance in its operation and substituted with better technology like vapour absorption machines (VAM) based chiller plant in CPP, CFC free cabin air conditioning system in PTMs, high efficiency fume treatment center at smelter plant.

All the units of NALCO have adopted zero discharge with respect to waste water management. The waste waters are treated in effluent treatment plants and then are reused in the process. All units of NALCO are provided with sewage treatment plant and the treated water is used for horticulture and gardening purposes. NALCO has also adopted rain water harvesting system in all its units.

Electrostatic precipitators with advance intelligent control equipments in power plants are being retrofitted by adding more fields to achieve higher efficiency in SPM emission level. NALCO has adopted high efficient ESPs of 80 mg/NM3 in its new units of CPP, which shows NALCO’s proactive approach for abating pollution.

NALCO has taken up a project to fill the ash in the abandoned mine voids of Mahanadi Coalfields Ltd (MCL) to reclaim and restore the mined area.

For hazardous waste management, NALCO has taken utmost care as per the guidelines provided by statute. NALCO is having hazardous waste land fill for disposal of spent pot lining materials, incinerators, etc.

NALCO has taken up pilot scale cum demonstration project for carbon sequestration at captive power plant, which is unique in the country.

NALCO has not only planted massive trees in all its units but also has carried out massive plantation in its peripheral villages as well.

Efforts of NALCO has been recognized by different organization like MoEF, SPCB, CII, DFB, FIMI, etc. and NALCO has been awarded with prestigious award like, Indira Gandhi Paryavaran Puraskar, Indira Priyadarshini Brikshyamitra Award, Pollution Control Excellence Award, Best practices in ESH, Best Environment Management Award, etc.

10.35 RESEARCH & DEVELOPMENT

Setting up of NALCO Research & Technology Centre (NRTC) at Bhubaneswar:

Vision: To be a world class, state of the art research and development centre in the field of bauxite, alumina, aluminium, downstream products, power, waste utilization and allied areas.
Mission:

- To develop and strengthen technological expertise pertaining to bauxite mining, alumina refining, aluminium smelting and to continuously develop new products, improve quality and reduce cost.
- To explore technologies for scarce and other metals where NALCO would venture in future.
- To understand and adapt new and renewable sources of energy apart from improving continuously the efficiency of present thermal power generation.

In order to succeed in the primary mission, and balance the need for technical expertise to support present operations with development of technology to assure future competitiveness, a number of tasks that the NALCO Research & Technology Centre (NRTC) will need to accomplish, have been identified. These are as under:

- Identifying technical innovations in other fields and evaluating as possible improvements in the aluminium production processes.
- Acquiring in-house engineering expertise appropriate to the retrofitting of existing power plants, refineries, smelters and casting centres as well as to commissioning of green field facilities.
- Examining routes to reduce energy and fresh water requirements in refining, smelting and fabricating processes.
- Developing technologies for the economic utilisation of industrial wastes.
- Identifying and prototyping the economic production of higher value products, e.g. alumina-derived chemicals.
- Creating/modifying control devices & algorithms to improve process efficiencies throughout the integrated production and guarantee product quality at all process stages.

A road map for implementation of NRTC with the details of R&D projects that are to be planned in the NRTC has been prepared with the help of an Ad-hoc Committee consisting of experts from outside and the technical consultant.

Thrust has been laid on patenting of process know-how developed in the Company either through in-house or collaborative R&D efforts. Till date 22 patents have been sent for filings which include 4 patents being filed in the current year. Board level technology committee meetings are being held once in a quarter to review the R&D activities of the Company including technological upgradation and innovative modification carried out in different units and benefits derived thereon for further improvements and the process and productivity.
Specific areas in which R&D Activities carried out by NALCO are :-

10.36 In-house R & D Activities

Alumina Plant

• Studies to establish the effect of fine seed addition on granulometry and to develop it as a tool to control granulometry.
• Studies to establish solubility of CaO from different sources of Lime.
• Studies related to use of CAIS as filter aid.
• Studies to establish impact of over flocculation in settler overflow.
• Commercialization of high temperature resin developed in-house.
• Impurity identification and salt removal studies starting with V2O5.
• Installation of heating bundles in pre desilication tank.
• Preparation of low alpha special alumina for ceramic Use.
• Study on impact of surface mined bauxite on process.
• Laboratory scale studies were carried out along with the suppliers of various flocculants for use in high rate thickeners and deep cone washers of new stream.

Smelter Plant

• Regular characterization of baked anode and monitoring of its quality.
• Improvement in quality of raw materials to carbon plant.
• Development of indigenous vendor for carbon lining paste.
• Anode bench scale studies.
• Regular metallographic studies of cast products for quality improvement.
• Impact of blending of different quality of CP Coke on anode quality.
• Effect of quality & quantity of butts on anode quality.
• Dendritic arm spacing (DAS) of cast billets vrs cooling water quality.
• Development of billet casting simulation model.
• Slotted anodes are being used in potline.
• Fuel oil savings by use of magnetic resonators in cast house furnaces.
• Bench scale/ pilot scale investigation of utilization of carbon portion of spent pot lining.
• Development of chequered sheet as a new product.
• Measurement of melt loss in cast house furnaces.
• Reduction of iron content in anodes through process improvement.
• Development of process for production of 99.9% pure HP-2 grade aluminium metal.

10.37 Collaborative R&D Activities:

Some of the collaborative R&D work in
which substantial progress has been made during the year, are:-

- Pilot scale development of constructional blocks, bricks & chips from red mud in collaboration with JNARDDC, Nagpur.
- Plasma smelting of red mud for production of pig /cast iron and alumina rich slag in collaboration with IMMT, BBSR.
- Infra red thermography studies with JNARDDC, Nagpur.
- Development of heat treatment process for destruction of toxic cyanide and recovery of valuables (Sodium, Fluorides, etc. from spent pot-linings materials (SPL).
- Preparation of low ferric alum from waste aluminium dross.
- Development of light weight aggregates from red mud.
- Bench scale studies for development of glass ceramics from red mud.
- Lab scale study on alumina tri-hydrate productivity using catalyst by IMMT, BBSR.
- Development of nano alumina and aluminium composites for auto application with IIT, Kharagpur.
- Development of ceramic tiles from fly ash in collaboration with IIT, Kharagpur.
- Development of metal matrix composites with IIIMT, Bhubaneswar.

10.38 Benefits derived as a result of the above R & D (in-house & collaborative):

- This helps to maintain desired level of seed surface area, thus control product quality (in terms of granulometry and soda incorporation) at the same time improving the liquor productivity and hence production.
- Helps to take corrective action whenever solids are high so that product CaO is not increased on this account.
- The tests once concluded will establish the effect of various sources of lime.
- Tests show improvement in filtration rate with over flocculation. A plant scale trial shall be taken up to establish the same.
- Use of the high temperature resin will result in huge savings in makeup water consumption in boilers and energy consumption.
- Impurity control and segregation of salt as value added byproduct and also reduction in lime consumed for causticisation.
- Elimination of sodic condensate dilution in process liquor, thus saving in steam and hence energy required for evaporation.
- Low alpha special alumina is a value added product.
- Split feeding helps to control soda in the product by reducing occluded soda.
• Addition of one more interstage cooler in precipitation circuit will result in improvement in liquor productivity by about 0.5 to 0.7 Kg/m³.

• Usage of reprocessed rejected paste has helped in a saving of revenue.

• Trials with indigenously developed ramming paste helped in development of indigenous vendors.

• Studies conducted in anode bench scale plant and regular characterizations of anodes have helped in process and anode quality improvements.

• Optimisation of boric acid addition in pots has resulted in reduced consumption of boric acid to the tune of approx. 5MT/month i.e saving of approx ₹ 2 lakh/month.

• Usage of reprocessed rejected paste has helped in a saving of approx. 41 lakh for 15 pots lined with this material.

• Trials with indigenously developed ramming paste will help in development of indigenous vendors. Indigenous paste cost advantage is ₹ 20000/tonne of paste compared to imported supply.

• Studies conducted in anode bench scale plant and regular characterizations of anodes have helped in process and anode quality improvements.

• Inclusion analysis and metallographic studies have helped to improve product quality.

• 5 pots have been lined with reprocessed ramming paste whose life had expired. Cost savings is approx ₹ 13 lakh.

• 10 pots have been lined using 10 sets of SiC & semigraphite composite side block to reduce side lining failure.

• Expected benefit by improvement of oxidation behaviour of anodes would be approx ₹ 3 crore/annum.

10.39 Future Plan of Action and New Projects:

• Setting up of a world class NALCO Research & Technology Centre at Bhubaneswar.

• Demonstration cum pilot plant for production of construction bricks from red mud.

• Commercialisation of few R&D processes.

• Utilisation of fly ash in ceramic tiles manufacturing.

• Development of a process know how for extraction of alumina from PLK.

• Implementation of Bayer process simulation package for better process control and reduction in cost of production.

• Use of CAIS as filter aid in Kelly filtration to improve filtration.

• Reaction kinetics study for optimizing the process parameters.

• Reaction kinetics study of precipitation for improving productivity with minimal impurity occlusion.
• Industrial implementation of medium pressure digestion for better extraction of alumina and productivity.
• Salt removal studies to prevent scale formation in equipments and pipelines.
• Melt loss measurement in cast house furnaces.
• Trial with magnetic resonator for fuel oil saving.
• Trial with non-wetting castable lining of tapping ladles.
• Modelling billet casting process.
• Trials with new type cathodes & ramming mass for energy conservation & environmental advantages.
• Reduction of iron content in anodes.

*Captive Power Plant of NALCO*
11.1 Hindustan Copper Limited (HCL) was incorporated on 9th November, 1967, under the Companies Act, 1956. It was established as a Govt. of India Enterprise to take over all plants, projects, schemes and studies pertaining to the exploration and exploitation of copper deposits, including smelting and refining from National Mineral Development Corporation Ltd. The Government of India nationalized the only copper producing company in the private sector, Indian Copper Corporation Ltd. at Ghatsila in Jharkhand in March 1972 and handed over its management and ownership to Hindustan Copper Limited. The Smelter Plant at Khetri Copper Complex (KCC) in Rajasthan with capacity of 31000 tonnes was dedicated to the nation on 5th February 1975. In November 1982, Malanjkhand Copper Project (MCP) comprising of a large and fully mechanized open pit mine and Concentrator plant was dedicated to the nation. The Continuous Cast Copper Rod plant at Taloja Copper Project (TCP) of Hindustan Copper Ltd. was commissioned in December, 1989 with an installed capacity of 60,000 tonnes. The Company has selected Southwire SCR-2000 technology for the plant and using natural gas as fuel.

“Highlights of 2011-12”

- Miniratna (Category-1) status company.
- “Zero debt Company” as on date.
- The Company has paid ₹ 92.14 crore as dividend to Government of India for the year 2010-11.
- Expected profit after tax (PAT) of ₹ 316.46 crore in the year 2011-12.
- The Cabinet Committee on Economic Affairs in its meeting held on 30th September, 2011, had approved the investment of ₹ 1856.36 crore for the project for expansion of Malanjkhand Copper Project mine from 2.0 million tonne per annum open cast to 5.0 million tonne per annum Underground mine.

11.2 The Company has awarded six projects valuing ₹ 1900.10 crore for mine construction and development work. The details of the contracts awarded are given below:

<table>
<thead>
<tr>
<th>No.</th>
<th>Project</th>
<th>Date of award/Lol</th>
<th>Value (₹ crore)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Banwas</td>
<td>19.4.2010</td>
<td>90.50</td>
</tr>
<tr>
<td>2</td>
<td>Khetri</td>
<td>15.7.2011</td>
<td>96.80</td>
</tr>
<tr>
<td>3</td>
<td>Malanjkhand</td>
<td>8.11.2011</td>
<td>1176.12</td>
</tr>
<tr>
<td>4</td>
<td>Surda</td>
<td>18.11.2011</td>
<td>206.34</td>
</tr>
<tr>
<td>5</td>
<td>Kendadih</td>
<td>20.1.2012</td>
<td>73.84</td>
</tr>
<tr>
<td>6</td>
<td>Chapri-Sidheswar</td>
<td>8.11.2011</td>
<td>256.50</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>1900.10</td>
</tr>
</tbody>
</table>
The capital structure of the Company as on 31st March, 2011 is at Table 11.1 and Physical Performance and Financial Performance in Table 11.3 and 11.4.

### Table 11.1

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Authorised Capital</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>i)</td>
<td>180 crore Equity shares of Rs.5/- each</td>
<td>₹ 900 crore</td>
</tr>
<tr>
<td>ii)</td>
<td>20 lakh Preference shares of Rs.1000/- each</td>
<td>₹ 200 crore</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>₹ 1100 crore</td>
</tr>
</tbody>
</table>

Issued, Subscribed and Paid-up Capital

1. 92, 52, 18,000 equity shares of ₹ 5/- each | ₹ 462, 60, 90,000/-

11.4 Present capacities of HCL’s Mines and Smelters are at Table 11.2.

### Table 11.2

<table>
<thead>
<tr>
<th>Location of Mines</th>
<th>Ore Capacity (lakh tonnes per annum)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Khetri Copper Complex, Rajasthan #</td>
<td>14.00</td>
</tr>
<tr>
<td>Malanjkhand Copper Project, Madhya Pradesh</td>
<td>20.00</td>
</tr>
<tr>
<td>Indian Copper Complex, Jharkhand</td>
<td>4.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>38.00</strong></td>
</tr>
</tbody>
</table>

# - includes production capacity of Khetri Kolihan and Banwas mines (which is under development)

### Smelters

<table>
<thead>
<tr>
<th>Location of Smelters</th>
<th>Metal Capacity (Tonnes per Annum)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Khetri Copper Complex, Rajasthan *</td>
<td>31,000</td>
</tr>
<tr>
<td>Indian Copper Complex, Jharkhand</td>
<td>20,500</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>51,500</strong></td>
</tr>
</tbody>
</table>

* Plant not operated since December, 2008 due to economic reasons.

### CC ROD PLANT

<table>
<thead>
<tr>
<th>Location of Plant</th>
<th>Capacity (Tonnes per Annum)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taloja Copper Project, Maharashtra</td>
<td>60,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>60,000</strong></td>
</tr>
</tbody>
</table>
Table 11.3
Physical Performance of HCL

Production of ore, metal in concentrates, refined copper (cathode) and wire rod during the year 2009-10, 2010-11 and 2011-12 (upto December, 2011) are given below:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ore Production ('000MT)</td>
<td>3204</td>
<td>3603</td>
<td>3600</td>
<td>2644</td>
</tr>
<tr>
<td>Metal in Concentrate (MT)</td>
<td>28202</td>
<td>31683</td>
<td>35000</td>
<td>24281</td>
</tr>
<tr>
<td>(Cathode) (MT)</td>
<td>17488*</td>
<td>24001*</td>
<td>17500</td>
<td>20839*</td>
</tr>
<tr>
<td>Wire rod (MT)</td>
<td>41999</td>
<td>22993</td>
<td>27700</td>
<td>17180</td>
</tr>
</tbody>
</table>

* includes tolled cathodes of 1614 tonnes in 2009-10, 10317 tonnes in 2010-11 & 7736 tonnes in 2011-12 (upto December, 2011).

Table 11.4
Financial Performance of HCL

Financial Performance of the HCL since 2009-10 is given below (₹ in crore)

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Details</th>
<th>Actuals for the previous 2 years</th>
<th>Target for 2011-12</th>
<th>2011-12 (upto Dec., 2011)</th>
<th>2011-12 (Anticipated)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2009-10</td>
<td>2010-11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Income</td>
<td>1506.04</td>
<td>1409.45</td>
<td>1358.07</td>
<td>1148.15</td>
</tr>
<tr>
<td>2.</td>
<td>Operating Cost</td>
<td>1205.67</td>
<td>974.55</td>
<td>948.07</td>
<td>774.29</td>
</tr>
<tr>
<td>3.</td>
<td>Interest and Transaction cost</td>
<td>3.49</td>
<td>2.42</td>
<td>0</td>
<td>0.27</td>
</tr>
<tr>
<td>4.</td>
<td>Depreciation and Amortization</td>
<td>81.04</td>
<td>97.27</td>
<td>90.42</td>
<td>106.72</td>
</tr>
<tr>
<td>5.</td>
<td>Net Profit/(Loss) before Income Tax</td>
<td>215.84</td>
<td>335.21</td>
<td>319.58</td>
<td>266.87</td>
</tr>
<tr>
<td>6.</td>
<td>Net Profit/(Loss) after income tax</td>
<td>154.68</td>
<td>224.10</td>
<td>213.45</td>
<td>186.01</td>
</tr>
<tr>
<td>7.</td>
<td>Net Profit/(Loss) after income tax &amp; dividend</td>
<td>154.68</td>
<td>116.39</td>
<td>105.77</td>
<td>186.01</td>
</tr>
</tbody>
</table>
Sales Performance

11.5 The Company has achieved total sales of 18475 MT of copper during 2011-12 (upto December, 2011) of which, 16,140 tonnes in the form of CC Wire Rod and 2,335 tonnes in the form of Cathodes. The anticipated sales of wire rod and cathode during 2011-12 would be around 27,569 Tonnes.

Mine Expansion Schemes

11.6 The Company has prepared an action plan to expand its mine capacity from existing 3.4 million tonne per annum to 12.4 million tonne per annum by 2016-17 at an estimated capital expenditure of Rs 3435 crore. Eight different projects in the state of Madhya Pradesh, Jharkhand and Rajasthan are being implemented. Cabinet Committee on Economic Affairs (CCEA) has approved the investment proposal of ₹1856 crore of Malanjkhand Underground Project in the month of September, 2011. Selection of EPC contractor for execution of the eight mine projects has been completed. The details of the expansion scheme are at Table 11.5.

Table 11.5

<table>
<thead>
<tr>
<th>No</th>
<th>Mine</th>
<th>Type of Mine</th>
<th>Capital Expenditure Layout (Rs crore)</th>
<th>Capacity (million tonnes per annum)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Current</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Malanjkhand</td>
<td>Open cast</td>
<td>1856</td>
<td>2.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Khetri</td>
<td>Underground</td>
<td>167</td>
<td>0.5</td>
</tr>
<tr>
<td>3</td>
<td>Kolihan</td>
<td>Underground</td>
<td>274</td>
<td>0.5</td>
</tr>
<tr>
<td>4</td>
<td>Surda</td>
<td>Underground</td>
<td>219</td>
<td>0.4</td>
</tr>
<tr>
<td>5</td>
<td>Banwas</td>
<td>Underground</td>
<td>92</td>
<td>Nil</td>
</tr>
<tr>
<td>6</td>
<td>Rakha</td>
<td>Underground</td>
<td>315</td>
<td>Nil</td>
</tr>
<tr>
<td>7</td>
<td>Kendadih</td>
<td>Underground</td>
<td>94</td>
<td>Nil</td>
</tr>
<tr>
<td>8</td>
<td>Chapri- Sideshwar</td>
<td>Underground</td>
<td>417</td>
<td>Nil</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>3434</td>
<td>3.4</td>
</tr>
</tbody>
</table>
Status of Further Public Offer

11.7 Cabinet Committee on Economic Affairs (CCEA) in its meeting held on 15th June, 2010 approved the proposal to divest 10% pre-issue paid up capital of Hindustan Copper Limited (HCL) in conjunction with the issue of fresh equity of equal size by the Company through a further public offering (FPO) in the domestic market. Issue of fresh equity was proposed to meet the fund requirement for mine expansion of the Company.

11.8 Pursuant to the approval of CCEA, the Company took steps to appoint Book Running Lead Managers and other intermediaries required for the FPO. The Draft Red Herring Prospectus (DRHP) was filed with SEBI on 27th September, 2010. Non-deal road shows were completed on 22nd October, 2010. Red Herring Prospectus (RHP) taking into account the observations of SEBI was also prepared and Board approval taken. The issue was scheduled for opening in the second week of December’2010. As the valuation given by Merchant bankers was far lower than the market quote of HCL the issue could not materialize.

11.9 Considering the current buoyancy in copper price and outlook for the future, the Company has reviewed its projected cash flow during the project duration and concluded that the most of the funds for expansion programme can be met through internal generation.

11.10 In view of improved financials of the Company, Ministry has decided to approach Cabinet Committee on Economic Affairs (CCEA) for modification of its decision taken on 15th June, 2010 for disinvestment of 10% Govt. of India’s holding in Hindustan Copper Limited (HCL) and issue of 10% fresh equity by HCL through a Further Public Offer (FPO) to the extent that only divestment of 10% paid up equity capital of Hindustan Copper Limited (HCL) out of Government of India’s shareholding in the domestic market.

11.11 HCL has two Smelter units with matching Electrolytic Refineries located at Khetri (KCC) & Ghatsila (ICC) having capacity to produce 31,000 MT and 18,500 MT of refined copper per annum respectively. Both Smelters,
commissioned in 1974 & 1971 at KCC & ICC respectively, are based on Outokumpu Flash Smelting technology. At present only ICC smelter is operative and KCC smelter has been shutdown due to economic consideration since December, 2008. Khetri facility requires more than 3.3 million tonnes of ore for processing and Ghatsila facility requires about 2 million tonnes of ore for processing. As against this, in-house ore production at Khetri is about 1 million tonne and at Ghatsila it is 0.4 million tonne.

11.12 For running these plants to full capacity, concentrate has to be transported partly from Malanjkhand and the balance from imports. Both the methods are not financially viable. Import of concentrate is not viable due to low Tc/Rc charges. Considering low availability of concentrate at the location of smelting/refining plants of the Company, high cost of logistics in case of import/transportation from other units and poor process efficiencies, smelting & refining business at KCC and ICC have poor economics and are financially unviable vis-à-vis international bench mark and tolling of concentrate by custom smelter. Long term strategy for operation of smelting/refining unit at Khetri and Ghatsila should take into captive production at Unit location, cost of compliance of environmental regulations, availability of water and competitive edge vis-à-vis domestic and international players.

11.13 Currently, HCL has one downstream unit for manufacturing wire rods. The Wire rod unit is located at TCP with an installed capacity to produce 60,000 tpa of continuous cast wire rod of size 8mm, 11mm, 12.5 mm, 16mm and 19mm, based on Southwire (SCR-2000) technology. Excess plant capacity to the extent of about 40,000 tonnes is lying idle at TCP for want of input cathodes. In order to utilize its surplus capacity and thereby reduce its overall cost, TCP undertakes job work for tolling of cathodes for other organizations. Long term strategy for the plant should involve manufacturing of value added products and job order which would be key to its survival and viability. Productions of wire rod during last three years are given below:

<table>
<thead>
<tr>
<th>Item</th>
<th>2010-11</th>
<th>2009-10</th>
<th>2008-09</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cathode (MT)</td>
<td>30036</td>
<td>17516</td>
<td>24001</td>
</tr>
<tr>
<td>Wirerod (MT)</td>
<td>51777</td>
<td>41999</td>
<td>22993</td>
</tr>
</tbody>
</table>

**Energy Conservation**

11.14 HCL continues to give priority for energy conservation measures at various stages of process from mining of ore to extraction of copper metal and other by-products. Recommendations arising out of energy audits done by the consultant-Petroleum Conservation Research Association (PCRA) appointed earlier have largely been implemented. Energy audit cells at each of the units are constantly monitoring the consumption in order to achieve overall reduction. For improving power factor, Automatic Power Factor
correction has been commissioned in September, 2010 at ICC. The power factor in all the four Units is currently being maintained above 0.95. Further, installation of high-tech Central Jet Distribution (CJD) burner at ICC Smelter has significantly reduced energy consumption.

11.15 The overall consumption of Power and Fuel during 2011-12 (upto December, 2011) and previous three years are at Table 11.6.

<table>
<thead>
<tr>
<th>Physical consumption</th>
<th>2011-12 (upto Dec., 2011)</th>
<th>2010-11</th>
<th>2009-10</th>
<th>2008-09</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power (Lakh KWH)</td>
<td>1502</td>
<td>2158</td>
<td>1961</td>
<td>2135</td>
</tr>
<tr>
<td>Fuel (Kilo liters)</td>
<td>7156*</td>
<td>6758*</td>
<td>8744*</td>
<td>20722*</td>
</tr>
<tr>
<td>Natural Gas (’000 NM³)</td>
<td>1203</td>
<td>1311</td>
<td>2509</td>
<td>2507</td>
</tr>
</tbody>
</table>

* KCC Smelter not in operation since December, 2008.

11.16 Science and Technology/R&D Activities

• To improve concentrate grade and recovery of copper and minimize loss in copper in tails at KCC, action has been initiated to install 20 nos. 300 cft cells in rougher circuit to increase the residence time, which will help in generating extra MIC due to enhanced recovery. Two nos. Ceramic vacuum filters, one each at MCP and KCC, have been successfully commissioned in mid July’10 and both are in operation since then. The moisture percentage in copper concentrate in both the Units has reduced to 8.5-9% from 12-13%.

• During major shutdown, de-bottlenecking jobs were also taken up at ICC Smelter in 2008-09. New CJD Burner, modified cooling elements and Oxygen enrichment system have been installed which has improved ICC Smelter plant operation as well as Smelter Blister Copper capacity has been enhanced to 20,500 MT per annum.

• Cooling tower and softening plant has been commissioned in April 2010 at ICC smelter. Supply of cooled soft water has lead to less scaling and better cooling effect on refractory, thus enhanced its life.

• Undertaken collaborative research work jointly with Central Institute of Mining and Fuel Research (CIMFR) Dhanbad and MCP to evaluate and quantify efficacy of ‘SPARSH’ in the open pit mine for improving safety and productivity of blasting operation.

Computerisation

11.17 Regular operations of all on-going applications at Corporate office, Units and Sales offices of the Company were performed successfully. The some of Regular operation are as under:-

• Company has implemented Enterprise Resource Planning (ERP), Oracle e-Biz Suite R12 solution
integrating all functional areas for faster information flow and efficient decision making. It has gone live on 1st October, 2008. ERP functions have since stabilized.

- Centralized Data Centre was setup at Corporate Office, housing high-end Servers, Data storage, Network Equipment and Safety appliances. The operations are smooth and working fine.

- Wide Area Network spanning at corporate office, units, sales offices and godowns was established for ERP, mailing and internet solutions with Multi-protocol Label Switching Virtual Private Networks (MPLS VPN) circuits. This has resulted in reliable and consistent communication links enabling smooth flow of data within the organization.

- Company website (both in English & Hindi version) is re-designed for better content and look.

- Property return has been computerized through ERP and implemented for executives.

- Vigilance Complaint monitoring system has been implemented.

- On-line secured booking system for copper and other allied products has been implemented.

MoU rating achieved by HCL during last eight years is given below:-

<table>
<thead>
<tr>
<th>Year</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003-2004</td>
<td>Very Good</td>
</tr>
<tr>
<td>2004-2005</td>
<td>Very Good</td>
</tr>
<tr>
<td>2005-2006</td>
<td>Very Good</td>
</tr>
<tr>
<td>2006-2007</td>
<td>Very Good</td>
</tr>
<tr>
<td>2007-2008</td>
<td>Very Good</td>
</tr>
<tr>
<td>2008-2009</td>
<td>Fair</td>
</tr>
<tr>
<td>2009-2010</td>
<td>Very Good</td>
</tr>
<tr>
<td>2010-2011</td>
<td>Very Good</td>
</tr>
</tbody>
</table>
11.1 Hindustan Copper Limited (HCL) was incorporated on 9th November, 1967, under the Companies Act, 1956. It was established as a Govt. of India Enterprise to take over all plants, projects, schemes and studies pertaining to the exploration and exploitation of copper deposits, including smelting and refining from National Mineral Development Corporation Ltd. The Government of India nationalized the only copper producing company in the private sector, Indian Copper Corporation Ltd. at Ghatsila in Jharkhand in March 1972 and handed over its management and ownership to Hindustan Copper Limited. The Smelter Plant at Khetri Copper Complex (KCC) in Rajasthan with capacity of 31000 tonnes was dedicated to the nation on 5th February 1975. In November 1982, Malanjkhand Copper Project (MCP) comprising of a large and fully mechanized open pit mine and Concentrator plant was dedicated to the nation. The Continuous Cast Copper Rod plant at Taloja Copper Project (TCP) of Hindustan Copper Ltd. was commissioned in December, 1989 with an installed capacity of 60,000 tonnes. The Company has selected Southwire SCR-2000 technology for the plant and using natural gas as fuel.

“Highlights of 2011-12”

- Miniratna (Category-1) status company.
- “Zero debt Company” as on date.
- The Company has paid ₹ 92.14 crore as dividend to Government of India for the year 2010-11.
- Expected profit after tax (PAT) of ₹ 316.46 crore in the year 2011-12.
- The Cabinet Committee on Economic Affairs in its meeting held on 30th September, 2011, had approved the investment of ₹ 1856.36 crore for the project for expansion of Malanjkhand Copper Project mine from 2.0 million tonne per annum open cast to 5.0 million tonne per annum Underground mine.

11.2 The Company has awarded six projects valuing ₹ 1900.10 crore for mine construction and development work. The details of the contracts awarded are given below:

<table>
<thead>
<tr>
<th>No.</th>
<th>Project</th>
<th>Date of award/Lol</th>
<th>Value (₹ crore)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Banwas</td>
<td>19.4.2010</td>
<td>90.50</td>
</tr>
<tr>
<td>2</td>
<td>Khetri</td>
<td>15.7.2011</td>
<td>96.80</td>
</tr>
<tr>
<td>3</td>
<td>Malnajkhand</td>
<td>8.11.2011</td>
<td>1176.12</td>
</tr>
<tr>
<td>4</td>
<td>Surda</td>
<td>18.11.2011</td>
<td>206.34</td>
</tr>
<tr>
<td>5</td>
<td>Kendadih</td>
<td>20.1.2012</td>
<td>73.84</td>
</tr>
<tr>
<td>6</td>
<td>Chapri-Sidheswar</td>
<td>8.11.2011</td>
<td>256.50</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>1900.10</td>
</tr>
</tbody>
</table>
11.3 The capital structure of the Company as on 31\textsuperscript{st} March, 2011 is at Table 11.1 and Physical Performance and Financial Performance in Table 11.3 and 11.4.

### Table 11.1

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Authorised Capital</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>i)</td>
<td>180 crore Equity shares of Rs.5/- each</td>
<td>₹ 900 crore</td>
</tr>
<tr>
<td>ii)</td>
<td>20 lakh Preference shares of Rs.1000/- each</td>
<td>₹ 200 crore</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>₹ 1100 crore</td>
</tr>
</tbody>
</table>

Issued, Subscribed and Paid-up Capital

| i)  | 92, 52, 18,000 equity shares of Rs. 5/- each | ₹ 462, 60, 90,000/- |

11.4 Present capacities of HCL’s Mines and Smelters are at Table 11.2.

### Table 11.2

<table>
<thead>
<tr>
<th>Location of Mines</th>
<th>Ore Capacity (lakh tonnes per annum)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Khetri Copper Complex, Rajasthan #</td>
<td>14.00</td>
</tr>
<tr>
<td>Malanjkhand Copper Project, Madhya Pradesh</td>
<td>20.00</td>
</tr>
<tr>
<td>Indian Copper Complex, Jharkhand</td>
<td>4.00</td>
</tr>
<tr>
<td>Total</td>
<td>38.00</td>
</tr>
</tbody>
</table>

# - includes production capacity of Khetri Kolihan and Banwas mines (which is under development)

### Smelters

<table>
<thead>
<tr>
<th>Location of Smelters</th>
<th>Metal Capacity (Tonnes per Annum)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Khetri Copper Complex, Rajasthan *</td>
<td>31,000</td>
</tr>
<tr>
<td>Indian Copper Complex, Jharkhand</td>
<td>20,500</td>
</tr>
<tr>
<td>Total</td>
<td>51,500</td>
</tr>
</tbody>
</table>

* Plant not operated since December, 2008 due to economic reasons.

### CC ROD PLANT

<table>
<thead>
<tr>
<th>Location of Plant</th>
<th>Capacity (Tonnes per Annum)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taloja Copper Project, Maharashtra</td>
<td>60,000</td>
</tr>
<tr>
<td>Total</td>
<td>60,000</td>
</tr>
</tbody>
</table>

Hindustan Copper Limited
Table 11.3
Physical Performance of HCL

Production of ore, metal in concentrates, refined copper (cathode) and wire rod during the year 2009-10, 2010-11 and 2011-12 (upto December, 2011) are given below:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ore Production ('000MT)</td>
<td>3204</td>
<td>3603</td>
<td>3600</td>
<td>2644</td>
<td>3500</td>
</tr>
<tr>
<td>Metal in Concentrate (MT)</td>
<td>28202</td>
<td>31683</td>
<td>35000</td>
<td>24281</td>
<td>31700</td>
</tr>
<tr>
<td>(Cathode) (MT)</td>
<td>17488*</td>
<td>24001*</td>
<td>17500</td>
<td>20839*</td>
<td>27664</td>
</tr>
<tr>
<td>Wire rod (MT)</td>
<td>41999</td>
<td>22993</td>
<td>27700</td>
<td>17180</td>
<td>27700</td>
</tr>
</tbody>
</table>

* includes tolled cathodes of 1614 tonnes in 2009-10, 10317 tonnes in 2010-11 & 7736 tonnes in 2011-12 (upto December, 2011).

Table 11.4
Financial Performance of HCL

Financial Performance of the HCL since 2009-10 is given below

(₹ in crore)

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Details</th>
<th>Actuals for the previous 2 years</th>
<th>Target for 2011-12</th>
<th>2011-12 (upto Dec., 2011)</th>
<th>2011-12 (Anticipated)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2009-10</td>
<td>2010-11</td>
<td>2011-12</td>
<td>2011-12</td>
</tr>
<tr>
<td>1.</td>
<td>Income</td>
<td>1506.04</td>
<td>1409.45</td>
<td>1358.07</td>
<td>1148.15</td>
</tr>
<tr>
<td>2.</td>
<td>Operating Cost</td>
<td>1205.67</td>
<td>974.55</td>
<td>948.07</td>
<td>774.29</td>
</tr>
<tr>
<td>3.</td>
<td>Interest and Transaction cost</td>
<td>3.49</td>
<td>2.42</td>
<td>0</td>
<td>0.27</td>
</tr>
<tr>
<td>4.</td>
<td>Depreciation and Amortization</td>
<td>81.04</td>
<td>97.27</td>
<td>90.42</td>
<td>106.72</td>
</tr>
<tr>
<td>5.</td>
<td>Net Profit/(Loss) before Income Tax</td>
<td>215.84</td>
<td>335.21</td>
<td>319.58</td>
<td>266.87</td>
</tr>
<tr>
<td>6.</td>
<td>Net Profit/(Loss) after income tax</td>
<td>154.68</td>
<td>224.10</td>
<td>213.45</td>
<td>186.01</td>
</tr>
<tr>
<td>7.</td>
<td>Net Profit/(Loss) after income tax &amp; dividend</td>
<td>154.68</td>
<td>116.39</td>
<td>105.77</td>
<td>186.01</td>
</tr>
</tbody>
</table>
Sales Performance

11.5 The Company has achieved total sales of 18475 MT of copper during 2011-12 (upto December, 2011) of which, 16,140 tonnes in the form of CC Wire Rod and 2,335 tonnes in the form of Cathodes. The anticipated sales of wire rod and cathode during 2011-12 would be around 27,569 Tonnes.

Mine Expansion Schemes

11.6 The Company has prepared an action plan to expand its mine capacity from existing 3.4 million tonne per annum to 12.4 million tonne per annum by 2016-17 at an estimated capital expenditure of Rs 3435 crore. Eight different projects in the state of Madhya Pradesh, Jharkhand and Rajasthan are being implemented. Cabinet Committee on Economic Affairs (CCEA) has approved the investment proposal of `1856 crore of Malanjkhand Underground Project in the month of September, 2011. Selection of EPC contractor for execution of the eight mine projects has been completed. The details of the expansion scheme are at Table 11.5.

Table 11.5

<table>
<thead>
<tr>
<th>No</th>
<th>Mine</th>
<th>Type of Mine</th>
<th>Capital Expenditure Layout (Rs crore)</th>
<th>Capacity (million tonnes per annum)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Current</td>
<td>After Expansion</td>
</tr>
<tr>
<td>1</td>
<td>Malanjkhand</td>
<td>Open cast</td>
<td>1856</td>
<td>2.0</td>
</tr>
<tr>
<td>2</td>
<td>Khetri</td>
<td>Underground</td>
<td>167</td>
<td>0.5</td>
</tr>
<tr>
<td>3</td>
<td>Kolihan</td>
<td>Underground</td>
<td>274</td>
<td>0.5</td>
</tr>
<tr>
<td>4</td>
<td>Surda</td>
<td>Underground</td>
<td>219</td>
<td>0.4</td>
</tr>
<tr>
<td>5</td>
<td>Banwas</td>
<td>Underground</td>
<td>92</td>
<td>Nil</td>
</tr>
<tr>
<td>6</td>
<td>Rakha</td>
<td>Underground</td>
<td>315</td>
<td>Nil</td>
</tr>
<tr>
<td>7</td>
<td>Kendadih</td>
<td>Underground</td>
<td>94</td>
<td>Nil</td>
</tr>
<tr>
<td>8</td>
<td>Chapri-Sideshwar</td>
<td>Underground</td>
<td>417</td>
<td>Nil</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>3434</td>
<td>3.4</td>
</tr>
</tbody>
</table>
Status of Further Public Offer

11.7 Cabinet Committee on Economic Affairs (CCEA) in its meeting held on 15th June, 2010 approved the proposal to divest 10% pre-issue paid up capital of Hindustan Copper Limited (HCL) in conjunction with the issue of fresh equity of equal size by the Company through a further public offering (FPO) in the domestic market. Issue of fresh equity was proposed to meet the fund requirement for mine expansion of the Company.

11.8 Pursuant to the approval of CCEA, the Company took steps to appoint Book Running Lead Managers and other intermediaries required for the FPO. The Draft Red Herring Prospectus (DRHP) was filed with SEBI on 27th September, 2010. Non-deal road shows were completed on 22nd October, 2010. Red Herring Prospectus (RHP) taking into account the observations of SEBI was also prepared and Board approval taken. The issue was scheduled for opening in the second week of December'2010. As the valuation given by Merchant bankers was far lower than the market quote of HCL the issue could not materialize.

11.9 Considering the current buoyancy in copper price and outlook for the future, the Company has reviewed its projected cash flow during the project duration and concluded that the most of the funds for expansion programme can be met through internal generation.

11.10 In view of improved financials of the Company, Ministry has decided to approach Cabinet Committee on Economic Affairs (CCEA) for modification of its decision taken on 15th June, 2010 for disinvestment of 10% Govt. of India’s holding in Hindustan Copper Limited (HCL) and issue of 10% fresh equity by HCL through a Further Public Offer (FPO) to the extent that only divestment of 10% paid up equity capital of Hindustan Copper Limited (HCL) out of Government of India’s shareholding in the domestic market.

11.11 HCL has two Smelter units with matching Electrolytic Refineries located at Khetri (KCC) & Ghatsila (ICC) having capacity to produce 31,000 MT and 18,500 MT of refined copper per annum respectively. Both Smelters,
commissioned in 1974 & 1971 at KCC & ICC respectively, are based on Outokumpu Flash Smelting technology. At present only ICC smelter is operative and KCC smelter has been shutdown due to economic consideration since December, 2008. Khetri facility requires more than 3.3 million tonnes of ore for processing and Ghatsila facility requires about 2 million tonnes of ore for processing. As against this, in-house ore production at Khetri is about 1 million tonne and at Ghatsila it is 0.4 million tonne.

11.12 For running these plants to full capacity, concentrate has to be transported partly from Malanjkhand and the balance from imports. Both the methods are not financially viable. Import of concentrate is not viable due to low Tc/Rc charges. Considering low availability of concentrate at the location of smelting/refining plants of the Company, high cost of logistics in case of import/transportation from other units and poor process efficiencies, smelting & refining business at KCC and ICC have poor economics and are financially unviable vis-a-vis international bench mark and tolling of concentrate by custom smelter. Long term strategy for the plant should involve manufacturing of value added products and job order which would be key to its survival and viability. Productions of wire rod during last three years are given below:

<table>
<thead>
<tr>
<th>Item</th>
<th>2010-11</th>
<th>2009-10</th>
<th>2008-09</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cathode (MT)</td>
<td>30036</td>
<td>17516</td>
<td>24001</td>
</tr>
<tr>
<td>Wirerod (MT)</td>
<td>51777</td>
<td>41999</td>
<td>22993</td>
</tr>
</tbody>
</table>

**Energy Conservation**

11.14 HCL continues to give priority for energy conservation measures at various stages of process from mining of ore to extraction of copper metal and other by-products. Recommendations arising out of energy audits done by the consultant-Petroleum Conservation Research Association (PCRA) appointed earlier have largely been implemented. Energy audit cells at each of the units are constantly monitoring the consumption in order to achieve overall reduction. For improving power factor, Automatic Power Factor
correction has been commissioned in September, 2010 at ICC. The power factor in all the four Units is currently being maintained above 0.95. Further, installation of high-tech Central Jet Distribution (CJD) burner at ICC Smelter has significantly reduced energy consumption.

11.15 The overall consumption of Power and Fuel during 2011-12 (upto December, 2011) and previous three years are at Table 11.6.

<table>
<thead>
<tr>
<th>Physical consumption</th>
<th>2011-12 (upto Dec., 2011)</th>
<th>2010-11</th>
<th>2009-10</th>
<th>2008-09</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power (Lakh KWH)</td>
<td>1502</td>
<td>2158</td>
<td>1961</td>
<td>2135</td>
</tr>
<tr>
<td>Fuel (Kilo liters)</td>
<td>7156*</td>
<td>6758*</td>
<td>8744*</td>
<td>20722*</td>
</tr>
<tr>
<td>Natural Gas (‘000 NM3)</td>
<td>1203</td>
<td>1311</td>
<td>2509</td>
<td>2507</td>
</tr>
</tbody>
</table>

* KCC Smelter not in operation since December, 2008.

11.16 Science and Technology/R&D Activities

- To improve concentrate grade and recovery of copper and minimize loss in copper in tails at KCC, action has been initiated to install 20 nos. 300 cft cells in rougher circuit to increase the residence time, which will help in generating extra MIC due to enhanced recovery. Two nos. Ceramic vacuum filters, one each at MCP and KCC, have been successfully commissioned in mid July’10 and both are in operation since then. The moisture percentage in copper concentrate in both the Units has reduced to 8.5-9% from 12-13%.
- During major shutdown, debottlenecking jobs were also taken up at ICC Smelter in 2008-09. New CJD Burner, modified cooling elements and Oxygen enrichment system have been installed which has improved ICC Smelter plant operation as well as Smelter Blister Copper capacity has been enhanced to 20,500 MT per annum.
- Cooling tower and softening plant has been commissioned in April 2010 at ICC smelter. Supply of cooled soft water has lead to less scaling and better cooling effect on refractory, thus enhanced its life.
- Undertaken collaborative research work jointly with Central Institute of Mining and Fuel Research (CIMFR) Dhanbad and MCP to evaluate and quantify efficacy of ‘SPARSH’ in the open pit mine for improving safety and productivity of blasting operation.

Computerisation

11.17 Regular operations of all on-going applications at Corporate office, Units and Sales offices of the Company were performed successfully. The some of Regular operation are as under:-

- Company has implemented Enterprise Resource Planning (ERP), Oracle e-Biz Suite R12 solution
integrating all functional areas for faster information flow and efficient decision making. It has gone live on 1st October, 2008. ERP functions have since stabilized.

- Centralized Data Centre was setup at Corporate Office, housing high-end Servers, Data storage, Network Equipment and Safety appliances. The operations are smooth and working fine.

- Wide Area Network spanning at corporate office, units, sales offices and godowns was established for ERP, mailing and internet solutions with Multi-protocol Label Switching Virtual Private Networks (MPLS VPN) circuits. This has resulted in reliable and consistent communication links enabling smooth flow of data within the organization.

- Company website (both in English & Hindi version) is re-designed for better content and look.

- Property return has been computerized through ERP and implemented for executives.

- Vigilance Complaint monitoring system has been implemented.

- On-line secured booking system for copper and other allied products has been implemented.

MoU rating achieved by HCL during last eight years is given below:-

<table>
<thead>
<tr>
<th>Year</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003-2004</td>
<td>Very Good</td>
</tr>
<tr>
<td>2004-2005</td>
<td>Very Good</td>
</tr>
<tr>
<td>2005-2006</td>
<td>Very Good</td>
</tr>
<tr>
<td>2006-2007</td>
<td>Very Good</td>
</tr>
<tr>
<td>2007-2008</td>
<td>Very Good</td>
</tr>
<tr>
<td>2008-2009</td>
<td>Fair</td>
</tr>
<tr>
<td>2009-2010</td>
<td>Very Good</td>
</tr>
<tr>
<td>2010-2011</td>
<td>Very Good</td>
</tr>
</tbody>
</table>
13.1 The Science and Technology programme of the Ministry of Mines initiated in the year 1978 covers the disciplines of geology, exploration, mining, bioleaching, beneficiation rock mechanics and ground control, non-ferrous metallurgy and environmental issues related to mining and metallurgy. Project proposals are entertained from S&T/R&D institutions for applied research in these areas and project grants are given. In addition to this Grants-in-Aid are provided under “Information Education and Communication” which is a part of S&T programmes of the Ministry. Under this scheme, ₹ 18.33 Lakh to “Pride of India Expo-98th Indian Science Congress held in Chennai, from 3rd to 7th January, 2011. ₹ 2.50 Lakh to Confederation of Indian Industries (CII) for preparation of “Skill Mapping Study in the Mining Sector” ₹ 10 Lakh to Federation of Mineral Industries (FIMI) for “Mining-Exploration Convention and Trade Show” held in Bengaluru from 5th to 7th September, 2011, respectively were released during 2011-12.

13.2 There are three S&T grant-in-aid institutions under the administrative control of the Ministry namely:-

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

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

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

13.3 In addition to the above, two registered Societies, namely, the Non-Ferrous Materials Technology Development Centre, Hyderabad (NFTDC) and Centre for Techno-Economic Policy Options (C-Tempo) both are non-grant institutions within the administrative purview of Ministry of Mines.

13.4 Based on scrutiny of a Project Evaluation and Review Committee (PERC) and approval of an inter-ministerial Standing Scientific Advisory Group (SSAG) chaired by Secretary (Mines). Grants are given to the projects submitted by R&D institutions.

13.5 During the year, 2 meetings of Project Evaluation and Review Committee were held on 7th March, 2011 and 16th March, 2011. Further, based on the scrutiny report of Project Evaluation and Review Committee (PERC), 41st Standing Scientific Advisory Group (SSAG) held on 7th June, 2011, S&T Project Proposals of 12 institutions were considered and recommended for Grant-in-Aid under S&T programme of
Ministry of Mines. In this meeting it was also decided that while considering the Grant-in-Aid proposals applied research with the idea of industrial utility should be important criteria for accepting the projects. It was also decided that the focus should be on new research projects having relevance to the mandate of the Ministry preferably those projects where industries has also agreed to make a contribution of project cost as it is indicative of projects relevance to the industry. Issues of intellectual property in such cases would have to be properly addressed.

13.6 It was decided that the following issues also should be kept in view by the Committee while considering various project proposals:

(i) List of Capital equipments funded fully or partially from SSAG grants in the past should be made available so as to enable a considered decision on the best use of the equipment.

(ii) Past performance of the institution in respect of project funded earlier by SSAG to be taken into account before funding the next proposal from the same institution.

(iii) Quantum of grant subject to availability of funds and total number of projects cleared for funding in this SSAG.

13.7 In the 41st SSAG meeting held on 7th June, 2012, the following projects were approved as shown in Table 13.1.

<table>
<thead>
<tr>
<th>S.No</th>
<th>Title</th>
<th>Implementing Agency</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Assessment of air pollutants and aerosol dispersion in and around coal mines in India through modeling and satellite observation”</td>
<td>Centre for Atmospheric Science, IIT Delhi</td>
<td>Recommended with Modifications &amp; Budget Rationalization.</td>
</tr>
<tr>
<td>2.</td>
<td>Characterization of Indian lean grade magnesite ore and improvement of its high temperature refractory properties with or without beneficiation.</td>
<td>Central Glass &amp; Ceramic Research Institute (CGCRI), Kolkata</td>
<td>Recommended Budget Rationalization ₹ 35 Lakh from MoM.</td>
</tr>
</tbody>
</table>
5. Extraction and preparation of value added material from mineral waste. Institute of Minerals & Material Technology (IMMT) Bhubaneswar
   Revision done;

6. Mineral systematics and pre-concentration of PGE values from low grade chrome ores of Boula mines, Orissa. Institute of Minerals & Material Technology (IMMT) Bhubaneswar
   Revised budget acceptable recommended.

   Recommended with Modifications & Budget Rationalization..

8. Joint Gravity and Magnetic Survey for delineation of possible chromite deposits around Sukinda zone in Orissa IIT, Kharahpur
   Recommended with modification expiration to R&D content to increase. Title itself to be revisited Budget to be revised to total Rs. 40L

13.8 The Table 13.2 and Table 13.3 shows Plan Grant and Non-Plan Grant released during the year 2011-12.

<table>
<thead>
<tr>
<th>Plan</th>
<th>Projects / Institution</th>
<th>Funds released (` In Lakh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Development of Multilayered materials for melting, Liquid metal handling and casting under high pressure and loads. (NFTDC, Hyderabad)</td>
<td>₹ 56.16 Lakh (Capital and Recurring Cost)</td>
</tr>
<tr>
<td>2.</td>
<td>Characterization and optimum utilization of Manganese Ore Resource of Orissa (IMMT, Bhubaneswar)</td>
<td>₹ 9.00 Lakh (1st Installment of ₹ 27 Lakh)</td>
</tr>
<tr>
<td>3.</td>
<td>A Pilot Study on Health Status of Mine Workers and Nearby Population around iron ore mines. (NIMH, Nagpur)</td>
<td>₹ 31.73 Lakh</td>
</tr>
<tr>
<td>4.</td>
<td>Development of Rapid Analytical procedures for Cobalt, Chromium and nickel. (JNARDDC, Nagpur)</td>
<td>₹ 5 Lakh (2nd and Final Installment of ₹ 35 Lakh)</td>
</tr>
<tr>
<td>5.</td>
<td>Development of a protocol for evaluation of vibration hazard potential of mining equipment. (NIMH, Nagpur)</td>
<td>₹ 7 Lakh (2nd and Final Installment of ₹ 23 Lakh)</td>
</tr>
</tbody>
</table>
Table 13.3
Non-Plan Grants

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name and Organizations</th>
<th>Amount released (₹ in Lakh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>National Institute of Miners Health (NIMH)</td>
<td>110 Lakh</td>
</tr>
<tr>
<td>2</td>
<td>National Institute of Rock Mechanics (NIRM)</td>
<td>10 Lakh</td>
</tr>
</tbody>
</table>

* Grant-in-aid for meeting the expenditure on payment of Salary and Wages.

13.9 The S&T/R&D activities of the 3 Grant-in-aid institutions under the Ministry are given in the following paragraphs:

**National Institute of Rock Mechanics (NIRM)**

13.10 The National Institute of Rock Mechanics (NIRM) is a premier centre for research in applied and basic rock mechanics. It is an ISO 9001 : 2000 certified research Institute. The Institute provides research and consultancy services for improving safety and productivity in the mining and civil engineering sectors. With its rich experience, underpinned with the strength of world class software and laboratory facilities, NIRM plays a vital role in offering technical services in mining, hydroelectric and tunnelling projects, site evaluation for construction of nuclear power plants and other infrastructure development projects both in India and abroad. Due to its assured quality of work, the Institute has been receiving a number of challenging projects from governmental and non-governmental organizations.

13.11 NIRM has been carrying out research work through both government-funded and industry-sponsored S&T and consultancy projects. The Institute has been extending its support to the industry in the following areas:

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

13.12 The major projects undertaken by NIRM, to mention a few, are the underground cavern for storage of crude oil at Vishakapatnam, controlled blasting for Bangalore metro project, site evaluation for nuclear power plant at Kudankulam, construction-stage technical services for a nuclear plant at Rawatbhatta, Rajasthan, DPR stage investigation at Bunakha project, Bhutan, achieving yet another milestone in the annals of NIRM during the year 2010-11.

13.13 During the year 2010-11, 37 projects were successfully completed and 33 were in progress. The finance of the Institute remained satisfactory during the year, by realizing a total cash flow of ₹ 8.6 crore. A highly skilled and creative research team of NIRM has contributed 51 technical papers at various national/international journals and proceedings of seminars.
13.14 Besides carrying out research and industry sponsored projects, NIRM organized the International Conference on Underground Space Technology (ICUST-2011), participated in the 98th Indian Science Congress, and offered 90 days training in various aspects of rock mechanics to the engineers and engineering geologists from hydropower sector.

13.15 The brief S&T / R&D activities in respect of few projects are given below:

- Estimating the recurrence of earthquakes in the Central-Eastern Himalaya and Upper Assam from the distant liquefaction features of the river plains.
- Contemporary depositional environmental investigations of Chorabari Glacier in Rudraprayag District of Garhwal Himalaya.
- Monitoring Indian Shield Seismicity with 10 BBS to understand seismotectonics of the region using V-SAT Connectivity.
- Caveability of roof strata in longwall panels.
- Study on blasting dust management system in an opencast coal mine.
- Assessment of ground water quality in the gold mining areas at KGF and its impact on health (In-house project).

13.16 Testing Services

NIRM caters to the needs of mining and other industries for testing of wire ropes, vital parts of mine machinery and its accessories involving Destructive and Non-destructive Testing (NDT). NIRM has state-of-the-art facilities and infrastructure to carry out tests as per various standards and statutory regulations including DGMS guidelines. It is one of the unique laboratories in India manned by qualified and experienced scientific personnel.

13.17 Industry Sponsored Projects

- Geological and geotechnical investigations for preparation of DPR for 2 x 350 MW Malshej Ghat PSS, Maharashtra.
- Construction stage engineering geological investigations of underground rock cavern complex for strategic storage of crude oil at Visakhapatnam, AP.
- Construction stage engineering geological mapping of foundation of Rajasthan Atomic Power Project, Rawatbhata, Rajasthan.
- Seismotectonic evaluation and related geological studies in Pudimadaka area in Achutapuram mandal, Vishakhapatnam, AP.
- Cross-hole seismic tomography at Sainj HEP, Himachal Pradesh.
- Seismic refraction and tomography survey at Bunakha HEP, Bhutan.
- Determination of in-situ stress parameters by hydrofrac method at proposed pressure shaft of Rangit HEP.
- Stability analysis of landslide area of Varunavat Parvat Project.
• Controlled blast design for rock excavation close to structures and green concrete and ground vibration measurement near Unit 7 & 8, Nuclear Plant, RAPP, Kota

• Technical guidance for rock blasting and monitoring of ground vibration, air overpressure and flyrock during excavation at underground stations from Chinnaswami Stadium to City Railway station (Bangalore Metro Project)

13.18 NIRM Scientists published 51 technical papers during the year 2010-11 and 37 technical reports on the projects undertaken by the Institute were released. The Institute has registered an external cash flow of ₹ 860 lakh during the period.

National Institute of Miners’ Health, Nagpur (NIMH)

13.19 National Institute of Miners’ Health, Nagpur (NIMH) is an autonomous institute established under Ministry of Mines, Govt. of India with the objective of promotion of occupational health and prevention of occupational diseases among the workers employed in mining and mineral based industries. The Institute is engaged in research and developmental activities relating to occupational health, work place monitoring etc., in mines and mineral based industries. The Institute also conducts training programme for development of manpower in these fields.

13.20 The main objectives of the Institute include:

• Promotion of health and prevention of diseases among persons employed in mines and mineral based industries.

• Research & development to ensure safe and healthy extraction of the country’s mineral wealth.

• Assessment of health hazards in the work environment of mines and allied industries for regulatory and remedial measures.
• Develop human resources in the field of occupational health, hygiene and safety.

• The Institute is providing technical support services in health surveillance, workplace airborne dust monitoring, noise exposure profile, vibration related health risk studies, ergonomic assessment of HEMMs, etc. to mines and mineral based industries.

Facilities available

13.21 The institute has adequate infrastructure, equipments and trained manpower to conduct health surveillance studies for occupational diseases and hazard monitoring of workplace as required under Mines Act, 1952 and subordinate legislations and research in occupational health and hygiene relating to mines. This includes -

• Health surveillance for notified diseases.
• Audiometry, Spirometry, electrocardiography.
• Personal exposure assessment for noise, dust and vibration
• Risk assessment of work environment for dust, noise and vibration.
• Determination of free silica (using FTIR) in airborne Respirable dust, heavy metals (using AAS), etc.
• Human Resource Development in Occupational Health and Hygiene.
• Research facilities relating to biomarkers in occupational diseases.
• Assessment of health risk due to vibration in mining machineries.

13.22 The institute is also developing expertise in health impact assessment and sustainable development relating to mining projects.

13.23 Pursuing the vision of “Safe Mines and Healthy Miners” with the mission “Indian mining and mineral industry free from occupational diseases”, the Institute with its limited resources, has carried out following work in the year 2011-12:

13.24 Workplace Monitoring Studies. Respirable dust survey

• Airborne Respirable Dust Studies & Free Silica analysis at Rajshree Cement Limestone Mines, Ultratech Cements Ltd., Malkhed Road, Gulbarga Dist, Karnataka.
• Airborne Respirable Dust Studies at Limestone mines of M/s Malabar Cements Ltd., Wayalar, Palakkad Dist. Kerala.

• Airborne Respirable Dust Studies at Yerekatte Limestone mine of Heidelberg cement India Ltd., Ammasamandra, Tumkur, Dist. Karnataka.

13.25 Vibration Study

• Vibration exposure & assessment of health risk in the use of mining equipments” at Jilling and Langalota Mines, Essel Mining and Industries Limited.

• Vibration exposure & assessment of health risk in the use of mining equipments” at Cuddegali voril Soddo Mine, Hardesh Ores Private Limited.

• Vibration exposure & assessment of health risk in the use of mining equipments” at Rampura Agucha Mines, Hindustan Zinc Limited.

• Whole body vibration studies at Ultratech Cement Limited, Karnataka.

13.26 Health Surveillance Studies

• Detection of Silicosis among Stone Mine Workers from Karauli District

• Periodical Medical Examination of employees of Gujarat Mineral Development Corporation:

• Evaluation of medical records of Iron Ore Mine Workers of M/s Mineral Enterprises Ltd:

• Periodical Medical Examination of employees of Rajasthan State Mines and Minerals (RSMML)

13.27 Science and technology Projects

Following are the S&T Projects under taken by the Institute.

• Development of a protocol for evaluation of vibration hazard potential of mining equipment

• Equipment vibration study

• Epidemiological Study

• Systematic study of potential biomarkers of occupational diseases in miners

13.28 Pilot study on Health Status of Mine workers and nearby Population around Iron Ore Mines

The workers engaged in mining of Iron Ore are at risk of exposure to iron ore dust which invariably contains silica. While exposure to respirable silica can cause silicosis, excessive exposure to iron ore dust can lead to siderosis. Siderosis is an occupational lung disease also known as Iron Ore pneumoconiosis caused by inhalation of dust or fumes containing iron or oxides of iron particles. There is evidence to suggest that persons working in Iron Ore mines are at higher risk of lung cancer and other respiratory diseases. There may also be some adverse effect on the health of general population living nearby Iron Ore mines.

The proposed project will be carried out in Iron ore mines of west Singbhum District of Jharkhand. Objectives of the project:
• Evaluation of dust exposure profile of selected workers in iron ore mines.
• Qualitative Evaluation of potability of drinking water in and around iron ore mines.
• Prevalence of Iron ore pneumoconiosis amongst selected mine workers.
• Health status evaluation of school children and general population residing near iron ore mines.

As proposed in the project an exploratory visit to the district has been made to select the study mines and area. NIMH has planned to carry out the study in Meghatburu iron ore mine and Kiriburi iron ore mines of SAIL located in West Singbhum district of Jharkhand.

The funds to the tune of ₹ 31.73 Lakh as first installment have been released by the Ministry of Mines.

13.29 New Project proposals

Science and Technology Projects
• Studies on Health Status of women workers in Manganese Mines
• Study of dust exposure profile and Prevalence of Silicosis in Stone Mines.
• Training and Certification in ILO Classification of Chest Radiographs for Pneumoconiosis
• Development of a Noise mapping model in opencast mine using GIS and GPS

• Exploration of biomarkers for prediction and early detection of silicosis.

13.30 Collaborative Projects
• Investigation & studies on effects of mineral based dust specially Coal, Iron Ore Mines
• Investigation & studies on effects of continuous operations of HEMMs including effects of vibration, noise & ergonomic health risk to operators.

13.31 Clientele sponsored projects
• Work Place Monitoring in Steel Authority of India Limited
• Workplace monitoring in Mangense Ore India Limited (MOIL)
• Periodic Medical Examination at GMDC Limited
• Workplace monitoring in Neyveli Lignite Corporation Limited
• Respirable dust & noise study in Mysore Minerals Limited
• Respirable dust & noise study in Sesa Goa Limited
• Respirable dust & noise study in J K Cements Limited
• Respirable dust & noise study in Associated Cement Company Limited (ACC)

13.32 Capacity building at NIMH

The institute is in the process of submitting a project proposal on “Capacity Building at National Institute...
of Miners’ Health” to create and strengthen infrastructure facilities at NIMH and develop state-of-the-art centre of excellence on health issues relating to miners and mining community and provide technical support services to Indian mining industry and regulatory agencies to meet national and international obligations.

13.33 Financial Performance of Institute

Over last few years, the Institute has improved its financial performance. ₹30.00 Lakh against IEBR for the year 2011-12 is anticipated.

13.34 Important events/achievements

National Institute of Miners’ Health has signed the Memorandum of Agreement on Academic Exchange with Faculty of Medicine, University of Fukui, Japan and Central Chest Institute of Thailand for sustained academic exchange and cooperation in education and research on chest medicine and occupational health for the purpose of preventing occupational respiratory diseases. The Memorandum also envisages organization of workshops on ILO Classification of Chest Radiographs of Pneumoconiosis for training and certification of medical officers of mining industry in detection and prevention of Pneumoconiosis. The first workshop under the agreement is proposed to be held in September 2012 in collaboration with International Labour Organization.

13.35 NIMH stall at ISC EXPO-2011 in 98th Indian Science Congress 2011:

National Institute of Miners’ Health participated in Pride of India Exhibition in the 98th Indian National Science Congress from January 3-7, 2011 held at SRM University, Chennai. The five-day long congress was inaugurated by Prime Minister Dr. Manmohan Singh on January 3. The congress was attended by over 7,000 delegates from India and abroad, including six Nobel laureates and several eminent scientists from across the world. The stall of National Institute of Miners’ Health attracted a large number of visitors. NIMH newsletter “Arogya Khanik” was highly in demand throughout the exhibition. NIMH showcased the infrastructural facilities available for workplace monitoring, occupational health surveillance and various research projects undertaken by the institute. Students, researchers, government officials found this institute...
unique in its objectives and desired to interact with the institute in future.

13.36 Visit of Dr. Sunita Hirani for rotational training under NIMH-UCSF Educational programme:

Dr. Sunita Hirani, a resident in Occupational Medicine completed a one month Rotational Training programme at NIMH in January, 2011 under NIMH-UCSF educational programme signed between the institute and School of Medicine, University of California, San Fransisco, USA. During the training programme she was familiarized with the working of NIMH, the role and function of DGMS and enforcement of Occupational Health statute in Mines. She visited Kandri Manganese Ore and Kamptee Opencast Coal Mine & PME Center & Regional Hospital. She also participated in various programmes conducted by NIMH during her visit.

13.37 Aarogya Khanik software:

NIMH has developed software named “Aarogya Khanik” for Health Surveillance of persons employed in mines as per Rule 29(b) of Mines Rule, 1955 and recommendations of 10th Conference on Safety in Mines. The software has enormous potential as a tool in health evaluation studies, generating reports as per Form “O” under Mines Rules and statistical analysis of the data. The software is compatible with thumb scanner and web cam and storing medical records of individual miner. The software also has search facility so that records of individuals can be researched through his name, ID or any other parameters. The Aarogya Khanik software not only reduces manual labour but also helps maintain a secure database that can be utilized as and when needed. The Institute plans to patent the software.

13.38 Paper Publication/Presentation

(a) Sishodiya P. K., Miners’ Health in India: Present Status and Future Priorities. In the proceedings of Fifth India-EU Seminar on Employment and Social Policy “Occupational Safety and Health”, New Delhi

(b) Shri Mandal B. B., Sarkar K., Chatterjee D., Sishodiya P. K., Health risk assessment of operators of HEMMs exposed to whole body vibration in Indian mines. In the proceedings of International Conference on Molecules to Systems Physiology (ICMSP 100), Kolkata

(c) Soni P., Pingle S. K., Tumane R. G., Jawade A. A. Study on Protein Biomarkers in Municipal Solid Waste exposed Workers. In the proceedings of International Conference on Molecules to Systems Physiology (ICMSP 100), Kolkata

(d) Mandal B. B., Sarkar K., Chatterjee D., “Classification of mining equipments used in India according to their vibration hazard potential”
13.39 The Jawaharlal Nehru Aluminium Research Development and Design Centre, (JNARDDC), Nagpur

JNARDDC an Autonomous Body of Ministry of Mines is a “Centre of Excellence” set up in 1989 as a joint venture of Ministry of Mines, and UNDP with a view to provide major R&D support system for the emerging modern aluminium industry in India.

The objective of the Centre is to assimilate the technology available in the country and abroad for the production of alumina & aluminum including aluminium alloys as well as develop technical know-how for the basic engineering process and downstream areas and to provide training to the personnel employed in the Indian aluminium industries.

The centre also provides technological support for setting up Alumina refinery in the country. In the process the Centre caters R&D needs of both Primary and Secondary Producers.

13.40 Major activities

With a total strength of 48 employees (including 18 Scientists), during April-December, 2011, the Centre has six ongoing projects of National Aluminium Company Ltd. (NALCO) and one project of DRDO / DMRL, Hyderabad.

The Centre successfully completed three major S&T projects awarded by Ministry of Mines and final report is under preparation. Several projects are under negotiation with NALCO, DST, Gujarat Mining Development Corporation (GMDC, Ahmedabad), Hindustan Zinc Ltd., Ministry of Environment & Forests (MoEF), ABS&T Co., HINDALCO VEDANTA etc and also with international companies such as CANMET-Canada, CISRO-Australia etc.

13.41 Ongoing projects of Industry / Others are given at Table 13.4.

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Agency</th>
<th>Project title</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i)</td>
<td>NALCO, Angul</td>
<td>Development of a probe for Liquidus Temperature Determination of Electrolysis Bath</td>
</tr>
<tr>
<td>(ii)</td>
<td>NALCO, Angul</td>
<td>Techniques and tools for PFC measurements in aluminium electrolysis cells on lab. Scale</td>
</tr>
<tr>
<td>(iii)</td>
<td>NALCO, Angul</td>
<td>Study of effect of alumina quality on solubility in Electrolytic bath on lab. Scale</td>
</tr>
<tr>
<td>(iv)</td>
<td>NALCO, Angul</td>
<td>Development of high speed extrusion alloys for the Indian Aluminium Industry</td>
</tr>
<tr>
<td>(v)</td>
<td>NALCO, Damanjodi</td>
<td>Infrared thermography studies at Alumina Plant [2011-12]</td>
</tr>
<tr>
<td>(vi)</td>
<td>DRDO / DMRL, Hyderabad</td>
<td>Indigenization and development of wrought Aluminium Alloys for Indian Defence,(Under approval)</td>
</tr>
<tr>
<td>(vii)</td>
<td>NALCO, Bhunaneswar</td>
<td>Management of Bauxite Residue (AP-7)</td>
</tr>
</tbody>
</table>
13.42 Science & Technology Projects

- Bauxite Technical Data Bank Phase-III, Western Ghat Deposits
- Preparation & Certification of Aluminium Alloy Reference Materials
- Simulation and Computer aided die design for complex profiles of Aluminium Extrudes
- Development of Friction Stir Welding Technique for Aluminium-Steel Joint
- Development of rapid analytical procedures for Nickel, Chromium and Cobalt

13.43 Publication and Awards

- The Scientists of the Centre presented / published 11 technical papers in international & national seminars/journals in 2010-11. JNARDDC scientists won the prestigious “Dr. P.D. Sethi Annual Award - 2010” for best research paper on application of TLC / HPTLC. Similarly, the research paper on Quantitative Determination of Al3+ in Bauxite by Ocular Thin Layer Chromatography is under review for publication in The Arabian Journal of Chemistry (Production and Hosting by Elsevier B.V. Amsterdam, on behalf of King Saud University, Saudi Arabia). Similarly two other research papers of TLC / HPTLC are under communication for publication in “Separation Science and Technology”, (Taylor & Francis, Inc., 325 Chestnut Street, Suite 800, Philadelphia, PA 19106, USA) and “Journal of Chromatography” A, Elsevier B.V. Amsterdam USA.
- The project on Pilot scale development of process technology for manufacturing of constructional blocks / bricks and artificial ceramic stone chips utilizing red mud undertaken by JNARDDC, NALCO & MRCPL was nominated as one of the best project for “India Innovation Initiative-i3 National Fair 2011” by Department of Science & Technology (DST), and Confederation of Indian Industry (CII) after clearing the regional level at IIT, Kharagpur.

Finances:

An internal revenue of ₹ 1.85 crore was generated in 2010-11 through various external projects and testing work.

Centre for Techno Economic Mineral policy Options (C-TEMPO)

13.44 Centre for Techno Economic Mineral policy Options (C-TEMPO) has been set up as a society under the aegis of Ministry of Mines with an objective to address the technology and management gaps for non ferrous and ferrous minerals and to facilitate effective interaction between the investors, entrepreneurs, mining industry and the Central and State Governments and evolve non binding techno economic advice in relation to mineral sector. In tune with its objective the centre undertook activities as under
(a) Technology Sub-Sector

13.45 Strategy for exploration and development of nickel and Platinum Group Elements resources in India. No production and rising demand, makes India a total importer of Nickel. Centre is assessing the possibilities of indigenous production of Nickel from Chromite overburden, Sukinda Valley based on the available technologies with the involvement of the stakeholders.

13.46 Exploration techniques and technology for location and development of deep seated metals in India.

13.47 With the exhaustion / fast decline of the mineral deposits within shallow depths and for meeting the increasing demand of metals, Centre has prepared technical publications on Location & development of Deep Seated Metalliferous Deposits in India.

(b) Paper on Rare Earth Metals

13.48 The technological advances of the past few decades are bringing demand for rare earth metals which is influencing the mining industry. A Steering Committee has been constituted in the Ministry of Mines with Secretary (Mines) as Chairman and Chairman CSTEP as Co-Chairman. Based on the inputs provided by the steering committee members, approach paper will be finalized by CSTEP and C-TEMPO.

An initiative has been taken by Ministry of Mines to review the status of availability of Rare Earth Elements (REE) and Energy Critical Elements (ECE) in the country. A Steering Committee Chaired by Secretary (Mines) and Co-Chaired by Chairman, Center for Study of Science, Technology and Policy (CSTEP), with representation from DST, BARC, MNRE, DRDO, CSIR, DAE, GSI IREL and C-TEMPO has been constituted in the Ministry to Identify all the techno-economic issues for long term national raw materials strategy and preparing a strategy paper for the Government providing short, medium and long term options along with proposals for specific policy and legislative interventions.

(c) Economic Sub-Sector

Preparation of Country Dossiers on Geology and Mineral Resources of mineral rich countries and MoU country.

13.49 Updated knowledge of the geology, mineral commodities in terms of their production, exports, and investment opportunities in mineral rich countries is vital in view of the growing demand of minerals in India to sustain the GDP and also from the view of strategic planning. The Centre has prepared Country Dossiers on Australia, China, Canada, Iran, South Africa, Chile and Colombia in respect of their geology, mineral resources, export import potential, MoUs signed with India, bilateral Visits of delegation etc & uploaded on the website of C-Tempo.

(d) Techno Economic Policy Sub-Sector

13.50 Study on Pelletization of Iron Ore Fines in India and utilization of low grade
iron ore and fines. The National Steel Policy envisages investment in modern mining and beneficiation methods for value addition and utilization of iron ore fines. There is need to focus on utilization of low grade iron ore, iron ore fines and iron ore tailings/slimes accumulated over the years. Centre has brought out technical paper entitled “Relevance of Iron Ore Pelletisation Industry in India-A Perspective” which has been uploaded on its website.

13.51 In addition to above C-Tempo is also assisting in preparation of Aluminum Mission Plan 2010-20, and evolving a model CSR action plan and its implementation methodology which can be applied across to Mining PSU’s in consultation with Federation of Mineral Industries (FIMI.)
Sustainable Development Framework

14.1 Historically, the extraction of mineral reserves has always resulted in varying degrees of environmental resource degradation and social impacts, including displacement, all across the globe. The Indian mining sector has been facing severe criticism on several issues relating to its performance vis-à-vis sustainable development.

14.2 A High Level Committee which was set up under the Chairmanship of Shri Anwarul Hoda, Member, Planning Commission in the year 2005, to review the National Mineral Policy recommended that apart from introducing best practices in implementation of environment management, there was also a need to take into account the global trends in sustainable developments. The High Level Committee, specifically, studied the impact of mineral development with the need to develop principles in mining, best practices, and reporting standards which may be measured objectively.

14.3 The Committee recommended development of a Sustainable Development Framework (SDF) specially tailored to Indian context taking into account the work done and being done in International Council of Mining and Metals (ICMM and International Union for the Conservation of Nature and Natural Resources (IUCN). The SDF was to comprise principles, reporting initiatives and good practice guidelines.

14.4 ERM India Pvt. Ltd. was commissioned by Ministry of Mines to develop a Sustainable Development Framework for the Mining Sector (Non Coal, Non Fuel) in India. The development of the SDF followed through on the commitment of the committee.

Process of developing the SDF

14.5 A participatory approach involving consultation and discussions with different stakeholder groups, support of the concerned line departments at the state and central level, feedback and representation from the industry and the civil society groups were the key highlights of the approach adopted for the study. The SDF is informed by ground realities, conflicts, issues, expectations and perceptions with regard to the mining and the different activities associated with it. The key highlights of the consultation process were:

- Several rounds of consultations with the agencies at the national
level including Ministry of Mines (MoM), Ministry of Environment and Forests (MoEF), Ministry of tribal affairs, Ministry of Rural Development (MoRD), Planning Commission, Water Resources Department (WRD) and other agencies;

- Extensive state level consultations with all relevant stakeholders in Goa, Karnataka, Gujarat, Rajasthan, Meghalaya, Odisha and Tamil Nadu, with a focus on consultations around mining areas with the local communities;

- Regional workshops at Bhubaneswar (Odisha), Goa, Shillong (Meghalaya), Udaipur (Rajasthan), Bangalore (Karnataka) involving representatives from the line departments, Indian Bureau of Mines (IBM), industry, civil society groups, media, district administration etc;

- Consultations with the neighbouring community (living close to the mine), sub contractors, mine workers, transport agencies and other groups;

- Discussions with representatives of the research institutions (ISM), Geological Survey of India (GSI), Mining Engineers Association of India, Mining and Business Associations (FIMI, CII) etc.

Approach to the SDF

14.6 A working definition for ‘Sustainable Development’ in the mining sector was outlined, based on consultation with sector experts, secondary sources on the subject and the Indian context. The definition provided the framework and boundaries for the ERM team to analyse and prioritise issues while developing the SDF.

14.7 “Mining that is financially viable; socially responsible; environmentally, technically and scientifically sound; with a long term view of development; uses mineral resources optimally; and ensures sustainable post-closure land uses. Also one based on creating long-term, genuine, mutually beneficial partnerships between government, communities and miners, based on integrity, cooperation and transparency”.

14.8 The SDF framework incorporates not only regulatory requirements, but goes beyond that and recommends practices and best in class aspects to address the challenges of sustainable development more fully. It provides a path towards achieving sustainable development aided by guidance steps, measurable outcomes and reporting and assurance.

14.9 Since continual improvement is the key, the framework approach allows for players in the mining sector at different levels of performance to become compliant over a period of time and continue to improve thereafter. This is significant given the wide diversity in the mining sector’s profile and performance in different parts of the country.
14.10 The approach anticipates the incorporation of some of the key elements not already in the regulatory regime to become law in the near future, raising the bar on the sector’s performance in terms of sustainable development.

14.11 The framework approach is a flexible one in that allows for the achievement of sustainable development objectives without being too prescriptive and formulaic. It takes into account the biggest issues facing the sector in the context of existing laws and regulations and defines a set of principles that collectively progress the sector towards sustainable development.

Key Principles of the SDF

14.12 The following seven principles form the core of the Sustainable Development Framework for India.

(i) Incorporating Environmental and Social Sensitivities in decisions on leases: This principle integrates sustainable development concepts at the earliest phase of the mining life cycle. The underlying philosophy of the principle is to categorise mineral bearing areas based on an environmental and social analysis taking a risk based approach. At the bidding stage the categorisation of lease areas into High and Low risk will allow the investors to take business decision with the knowledge that the cost and uncertainties of getting approvals as well as operations in high risk areas will be significantly higher than the low risk areas. It will also allow regulators to put additional commitments at an early stage for environmental and social performance. This principle allows for the government to balance environmental and social interests of the nation, with mining priorities in the longer term;

(ii) Strategic Assessment in Key Mining regions: Understanding that mining activities occurs in clusters which have impacts at a regional level, undertake a strategic assessment of regional and cumulative impacts and develop a Regional Mineral Development Plan based on as assessment of the regional “capacity” at periodic intervals. Creating an institutional structure to own and implement such plans in key mining regions and taking critical decisions on mining, new leases, allocation of resources, and even possible moratorium on mining to ensure more sustainable planning and development in such regions;

(iii) Managing impacts at the Mine level impact through sound management systems. The key elements of this principle are impact assessment of key environmental, social, health and safety issues, development of management framework and systems at the mine level and continual improvement of the
same on the basis of international standards on a self-driven basis. A key element is disclosing performance on environmental and social parameters to external stakeholders at every stage of the project lifecycle;

(iv) Addressing Land, Resettlement and Other Social Impacts. This principle demands a comprehensive assessment of social impacts and displacement of mining projects at the household, community, and mining region level, and management commitment to address those impacts through mitigation measures and management plans;

(v) Community engagement, benefit sharing and contribution to socio-economic development. This principle seeks commitment to regular engagement with the local community as well as sharing of project benefits with the affected families. It is rooted in the principle of sharing profits with the affected communities already provisioned for in the draft MMDR Act awaiting approval. It dovetails the social impact management of project operations with the CSR initiatives being undertaken and looks at an integrated approach to mitigate impacts and improve local livelihoods and living conditions in the neighbourhood areas/communities.

(vi) Mine Closure and Post Closure Mining operations must prepare, manage, and progressively work on a process for eventual mine closure. This process must cover all relevant aspects and impacts of closure in an integrated and multi-disciplinary way. This must be an auditable document and include a fully scoped and accurate estimate of planned cost of closure to the company. The cost estimates must be adequately provisioned to cover national, regional, and local legal and regulatory requirements for closure; and must also include the cost of servicing all agreements/commitments made with stakeholders towards post-closure use;

(vii) Assurance and Reporting. This principle seeks mining sector stakeholders to assess their performance against this SDF and demonstrate continual improvement on this performance over the life of the project. It requires this performance to be reported in a structured manner in a Sustainable Development Report to be disclosed in the public domain as well as to regulatory agencies to consider during approval processes.

How can the SDF be used?

14.13 At the very least, the SDF provides guidance for the mining companies to improve performance on environmental and social aspects, however, over time it can also become the common
benchmark against which all mining operations may be evaluated in terms of their comparative performance on sustainable development terms.

14.14 The SDF will need to be used by mining companies to demonstrate commitment to sustainable development, and may be submitted to regulators at the time of seeking clearance or renewal or extension. It should also be used by regulators to evaluate the mining company’s commitment to achieving environmental and social goals. Investors and financiers may use this to assess risk and could additionally use it to demand better performance of the associated mining operations. Once this SDF is accepted, its use can be determined through more focussed consultations and seeking consensus.

14.15 The Ministry of Mines (MoM) will be engaging with other permitting agencies to integrate this more fully with their existing processes.

Who is it for?

14.16 This document has been prepared on behalf of the Ministry of Mines, Government of India, for all concerned stakeholders in the mining sector (non coal, non-fuel, non-atomic minerals, not covering off-shore mining). It is intended to be in the public domain for anyone to access freely. Even as it has a wide audience, the principles are clearly directed at key stakeholder categories involved in the sector, with focused guidance notes for each.

Who will drive the SDF process?

14.17 The SDF is a document owned by the Ministry Mines, who will undertake to ensure its up-take with the mining sector covering major and minor mineral categories and be the agency in-charge of driving it.

The process of driving the SDF will include several initiatives:

- Inclusion of some elements of the SDF into regulation;
- Inter-departmental cooperation for jointly reviewing performance against the SDF; and
- Evaluating applications and bids using additional criteria from the SDF for environmental and other clearances.

14.18 It is expected that the industry could, over time, choose to drive the wider adoption of the SDF as demonstration of performance and commitment to sustainable development goals.

14.19 Civil society and the local community could use the SDF to drive mining companies and regulators for increased accountability and mining performance related disclosure.

Expected Outcomes in the long term

- Reduced environmental and social conflicts in areas awarded for mining;
- Greater clarity for all concerned stakeholders, on risk levels of mining lease areas;
- Potentially reduced delays in obtaining clearances (environmental, forest) for mines;
- Improved protection of high risk areas in terms of environment and social considerations;
- A Regional Mineral Development Plan for selected mining areas and addressing key regional and cumulative impacts of mining through coordinated and collective action;
- Opportunity for clustering of small operators to become more competitive, and compliant;
- A robust E&S Management framework in mining companies enabled with continual improvement systems guiding sustainable development of mine and which is commensurate to risk category of mineral bearing area as enunciated under Principle;
- A disclosure process that provides stakeholders with relevant and timely information, and allows issues to be raised in engagement forums;
- Opening up of illegal mining activities to intensive stakeholder scrutiny as geo-spatial information regarding mining activity will be a published periodically;
- Intensive use of geo-spatial and geo-scientific information at mine level for assessment, planning, management and monitoring of the mining sector; and
- Stronger monitoring and assurance systems and processes.

14.20 The draft Sustainable Development Framework finalised by the Ministry is now being taken up for wider dissemination before the final roll out.

Corporate Social Responsibility (CSR)

National Aluminium Company Limited (NALCO)

14.21 Periphery Development & CSR initiatives
All along NALCO was allocating 1% of its net profit for periphery development (PD) programme. During 2010-11, NALCO Board decided to set up a NALCO Foundation for its Corporate Social Responsibility (CSR) activities. Among other things, the Board decided to allocate an additional 1% of NALCO’s net profit every year to fund the projects to be undertaken by this Foundation. With the setting up of NALCO Foundation, the CSR budget of the Company now stands doubled i.e. 2% of the net profit. For 2011-12, ₹ 21.38 crore was allocated by NALCO for its PD & CSR activities, which is 2% of the Company’s net profit in the previous year.

NALCO Foundation

14.22 NALCO Foundation was registered on 28th July, 2010, under the Indian Trusts Act, 1882. It is focused on development of villages located within 15 kms radius of NALCO’s mines & refinery complex, Damanjodi and smelter & power complex, Angul, as also the proposed mining areas at Pottangi (Koraput) and Gudem & KR Konda
(Visakhapatnam & East Godavari districts of Andhra Pradesh).

Community mobilization by NALCO Foundation

**Manpower**

14.23 Three senior officers of NALCO have been assigned the additional responsibilities of NALCO Foundation. The Foundation has built a professional team of 5 project managers, with the induction of graduates from Institute of Rural Management, Anand (IRMA), the premier institute in the country for rural management and research. Subsequently, an advisor was appointed to lead the team of these project managers.

**Approach**

14.24 NALCO Foundation has adopted a project-based accountability approach (as against a donor-based approach adopted earlier), by ensuring participation of the primary stakeholders, at the grassroots, in the decision making process. The broad methodology adopted is:

- Need assessment & baseline surveys
- Identification of projects
- Selection of implementing agencies
- Monitoring and evaluation
- Social auditing by independent bodies
- Documentation of experience

14.25 A project appraisal committee (PAC) has been constituted for evaluation of projects submitted by the project managers.

**Focus on healthcare**

14.26 The Company has four mobile health units, which organized 1357 camps in 2010-11 and treated 65340 patients with free medicines. During 2011-12, till December 2011, 769 camps have been organized and 36043 patients have been treated with free medicines.
Some major projects taken up during the year :-

14.27 NALCO Foundation has come forward to set up an Industrial Training Institute (ITI) at Marichamal village in the tribal-dominated Koraput, under the aegis of district administration.

14.28 To run the mobile health units more professionally, the organization has taken up a project with Wockhardt Foundation.

14.29 Similarly, for the formal education of tribal children, NALCO Foundation is sponsoring 250 children to Kalinga Institute of Social Sciences (KISS), Bhubaneswar.

14.30 To mitigate the menace of malaria and many water-borne diseases, projects have been taken up to distribute mosquito nets and water filters in 18 villages of Damanjodi sector.

Accolade

14.31 In recognition of its CSR initiatives, NALCO received the PSE Excellence Award, 2011, in the Maharatna and Navratna category, instituted by the Department of Public Enterprises (DPE), Govt. of India and Indian Chamber of Commerce, New Delhi on 19th September, 2011.

HINDUSTAN COPPER LIMITED (HCL)

14.32 For HCL, Corporate Social Responsibility (CSR) is a planned set of activities, taking into consideration company’s capabilities, and expectations of the communities living in and around the areas of its operations. Objective of HCL is to play a catalytic role in the socio-economic development in the region, where the industry is located, aiming to create an enabling working environment for HCL, as well as income generation opportunities for the community.

14.33 HCL’s CSR Policy is based on the guidelines circulated by Department of Public Enterprises (DPE). The DPE Guidelines essentially embrace the principles of United Nations Global Compact (UNGC) as laid down in the Millennium Development Goals (MDGs) and Targets. Accordingly, CSR approach of the company was refreshed, stressing on visible impact from long term objectives, identifying intervention areas based on Need Assessment Survey, focus on bridging gaps and facilitation/ mutual collaboration with State Govt. Projects.

14.34 CSR plan for the financial year 2011-12 has been prepared on the basis of Need Assessment Survey carried out by National Institute of Rural Development (NIRD), an autonomous organization under the Ministry of Rural development, Govt. of India, for 15 villages, 5 each at KCC, MCP and ICC. The plan was duly approved at the 330th Board meeting with budget consideration to the extent of ₹ 2.95 crore comprising of the following projects:
14.34.1 Livelihood

- Vermicomposting, Mushroom cultivation, Potato chips making, Dona Pattal making, bamboo item making, Bee keeping, Women group for stitching/tailoring/embroidery, chatai making - MCP.
- SRI method for paddy harvesting and for wheat & vegetable cropping - ICC
- Vermi compost and Bio-fertilizer production - ICC
- Tasar thread production & spinning units - ICC
- Safety Industrial Hand gloves training cum production centre - ICC

14.34.2 Livestock husbandry Development Program & Veterinary Services

- Animal health treatment cum vaccination camp (one camp in every year) at village level - KCC
- Construction of Drinking water Hodge for animals in villages - KCC & MCP.

14.34.3 Agriculture/Horticulture/Plantation

- Plantation of Fruit Bearing seeds, vegetable seeds & kit - MCP
- Promoting sprinkler system for field/horticulture crops with desired specification (50-60% subsidy according to land holding) - KCC
- Assistance for free supply of seeds & diesel engine pump set to user groups for rabi crops - ICC.
- Plantation of Arjun, asana trees at the vacant space available around township & road side along with individual bamboo fencing - ICC.
- Boring of irrigation well in the rabi field - ICC

14.34.4 Improved Health, Hygiene and sanitary practices

- IEC & awareness generation activities - KCC
- Construction of individual improved toilets - KCC
- Construction of community toilets - KCC
- Regular health camp in project village through mobile medical unit (MMU) - ICC
- Eye - camps - ICC

14.34.5 Infrastructure Development

- Construction of tube wells - digging with installation of 1.5 HP single phase motor - MCP
- Deepening & lining of existing 2 nos. wells - MCP
- Construction of village road (interlocking blocks) with drainage system - KCC.
- Connection of existing hand pumps with existing water tank in Govt. School.
- Beautification of temple hill area with plantation and drip irrigation facility - KCC.
14.34.6 Water (drinking water & water resource development program)

- Installation of TATA SWACCH water filter - MCP
- Safe drinking water facility - KCC
- Construction of drinking water overhead tank connected to existing water line - KCC.
- Digging and installation of hand pump (150 m depth) - KCC.
- Renovation of feeder channel for existing pond - KCC.
- Digging and installation of tube well (150 m depth) with 1.5 HP single phase motor - KCC
- Demonstration of well recharge structure - KCC.
- Tube well for drinking water purpose - ICC.

14.35 All the above projects have been commissioned and are presently being carried out in the selected villages, adjusting them to the practical needs of the community. Latest DPE guidelines on CSR mandates for a size of PSU, like HCL has to spend on CSR 2-3% of net profit subject to a minimum of ₹ 3.0 crore annually.

14.36 Sustainable Development Framework

Hindustan Copper Limited is in the process of implementing the following environment measures as per norms/guidelines issued by the State/Central Pollution Control Boards authority for prevention and control of pollution toward ecological balance and upliftment of environment:

14.36.1 Waste Management

- The solid waste rocks generated from open pit mine are being dumped regularly in well planned dumps. Tailing solids are disposed off in well designed tailing dam. Slopes of dumps and tailing embankments are afforested to prevent soil and sand erosion.
- 2.458 Million m³ top soils generated till 31st March, 2011 during the mining operation. A total of 0.373 Million m³ top soil has been utilized for biological reclamation out of 2.458 Million m³ and 2.085 Million m³ has been stored and preserved for biological reclamation. Slopes to soil dump have been afforested.

14.36.2 Water Quality Management

- Regular water sampling is being done by departmental and outside agencies Madhya Pradesh Pollution Control Board (MPPCB) and Indian Bureau of Mines (IBM) to ascertain the quality of water. All parameters are within permissible limits as specified by MPPCB, CPCB & IBM.
- Ground water tables are being monitored through open wells located at 3-5 KM radius of MCP to find out any changes in the behavior of ground water table after the start of mining activities and tailing slurry disposal at Malanjkhand.
The entire mine water is being treated by lime dozing through lime feeder and recycled regularly to Concentrator plant for use in the process. Thus no water is being discharged outside the premises.

Garland drains and Silt arrestors/bunds have already been made all along the periphery of waste dumps since beginning of the project to arrest the wash-off etc. Garland drains are being maintained/repaired periodically each year before monsoon. These drains are connected with run-off collection ponds of 18,000 m³ and 27000 m³ capacity below south and north dumps for prevention and recirculation of waste dump seepage. Diesel and Electric pumps were installed at South and North ponds of waste dumps during the month of April and May 2011 for regular recycling of seepage water in plant process.

A movable reclaim water pump installed at tailing dam since inception for regular recycling of tailing dam water for its re-use in the plant process.

Tailing dam seepage is being controlled by construction of Earthen embankments at East, North West and South West parts of tailing dam with proper sand filters, stone pitching, toe drains, toe bunds, reservoir (at South part of T/dam). Three permanent electric pumps were installed at Borekhera pond (near 45 T Magazine), Chhinditola North pond and 2.4 KM Point pond of tailing dam during Feb 2011, March 2011 and April 2011 for pumping back the seepage water on tailing dam for seepage control. Spillways constructed at tailing dam to stop the flow of slurry out sides the premises. Zero discharge is being maintained.

14.36.3 Treatment and Reclamation of Workshop/Industrial water

Industrial effluent generated during washing of dumpers and other Heavy Earth Moving Equipment is treated in mud setters and oil skimmer. The treated water is accumulated into environment sump made near the main gate. This water is regularly recycled to concentrator plant for use in the process. Thus zero discharge is being maintained.

14.36.4 Domestic Sewage

The domestic sewage generated from colony is being discharged regularly in two number of oxidation ponds for biodegradation.

14.36.5 Turfing on tailing dam:

A total 60,500 m² areas of tailing dam has been covered by turfing (8” layer of soil and manure) and dub grass planted on turfed area for green belt development and prevention of dust erosion due to rain and wind. Malanjkhand has also planned to turf another 37,500 m² area on tailing dam.
14.36.6 Phytoremediation research work
It has been carried out for biological reclamation of tailing dam under the guidance of MPPCB for its stability. Further, this project work has also been extended up to 31st March, 2012 and Malanjkhand has remitted ₹ 1.93 lakh to MPPCB.

14.36.7 Air Quality Management
Ambient Air Monitoring quality is being monitored for SPM (PM10 and PM2.5), SO2, NOx and CO parameters at 11 locations during the month of Feb., May and Nov’11. The results are within permissible limits as specified by State Pollution Control Board, Central Pollution Control Board, Ministry of Environment & Forest, Govt. of India.

14.36.8 De-dusting System
• Dust suppression through constant water sprinkling on haul roads. Dust collectors are installed in blast hole drills, wet drilling by water injection method. Dust masks are also provided to workmen.
• Suppression of dust by constant water sprinkling on conveyor and crushing area. In secondary crushing unit all dust collectors with exhaust fans, ventilation fans with dry filters are in operation.

14.36.9 Noise Control
Around mine dumps and plant periphery about 20 meters wide strips has been afforested. The noise levels are within permissible limit [75 dB (A)]. Ear plugs & Ear muffs are being provided to the workmen wherever required. Every year tree plantations are being taken up for noise control. The heavy earth moving equipment are being well maintained.

14.36.10 Vibration Control
Controlled blasting is being practiced at MCP.

14.36.11 Soil Sampling
Soil samples are being taken from nearby villages of the project to examine the fertility of the soil and analyze the possibility of pollution of soil. The samples are studied for the precipitation of metal like Copper, Iron, Zinc, Nickel, Lead, Cadmium, Manganese etc. and other parameters such as pH, Organic carbon, Organic matter, Nitrogen and Phosphorus content etc.

14.36.12 Municipal wastes
Municipal wastes are being disposed off as per municipal solid waste rules, 2000.

14.36.13 Bio-Medical Wastes
Bio medical wastes are being collected, stored & disposed in deep burial pit.

14.36.14 Hazardous wastes
Waste Oil, Scrap Lead batteries & Scrap Insulated copper wire are being properly collected and disposed as per MPPCB and CPCB norms.
14.36.15 Afforestation

A total of 25,000 saplings (10,000 bamboo and 15,000 mixed species) planted during 2011 monsoon. Till date 800,652 trees were planted. All the ultimate benches, slopes of waste dumps and tailing dam, township, both sides of roads and buildings have been afforested for green belt development. The Project has proposed to plant 10,000 saplings during 2012 monsoon. The Horticulture section of MCP is preparing 3000 saplings every year in Company’s well planned Nursery for green belt development.

Mineral Exploration Corporation Limited

14.37 MECL has drawn a long term Corporate Social Responsibility Policy;

(i) to enhance education, health, socio economic and living conditions of communities around MECL Projects & Establishments.

(ii) To work with communities in the vicinity of MECL projects as partners for sustainable development.

(iii) To take up sustainable development projects to support education, health, drinking water & basic amenities along with income generation programme.

14.38 Under the CSR activity during 2011-12, three projects have been identified for sanitation and public health under which toilets for female children are being constructed in three Government Schools around these projects. Similarly, for providing drinking water facilities to the weaker section around the MECL project, two number each bore wells are being constructed near seven identified MECL projects.
15 Welfare Measures

MINISTRY OF MINES

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

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

15.2 For the Welfare of Persons with Disabilities in the Ministry, due attention was given to Section 33 on reservation vacancies for Persons with Disabilities.

15.3 Protection of Rights and Full Participation), Act 1995, which provides that Government shall appoint in every establishment such percentage of vacancies not less than three per cent for persons or class of persons with disability, of which one per cent shall each shall be reserved for persons suffering from (i) blindness or low vision; (ii) hearing impairment; and (iii) locomotor disability or cerebral palsy; in the posts identified for each disability.

Vigilance Cases of the Ministry of Mines:-

15.4 During the year 2011-12 (upto December, 2011), 37 complaints were received. After examination, 20 complaints were brought to their logical conclusion and 17 complaints are still under investigation. Vigilance Awareness Week was observed during 31st October, 2011 to 5th November, 2011. During this week, Essay Competition related to vigilance activities was organized in the Ministry.

Right to Information

15.5 Ministry of Mines, Attached Office, Subordinate Office and Public Sector Undertakings (PSUs) under the charge of the Ministry had appointed Central Public Information Officers (CPIO) and Appellate Authorities. The
Ministry has also set up a Facilitation Counter for applicants and constituted a ‘Public Information Cell’ for processing of the requests and their monitoring in the Ministry. The Ministry alongwith its Attached Office, Subordinate Office and PSUs has been receiving various requests under RTI Act, which are properly and timely responded to. In 2011-2012 (1\textsuperscript{st} April, 2011 to 31\textsuperscript{st} December, 2011), 352 applications were received in Ministry of Mines, which were timely responded. Out of 27 Appeals received from the applicants against the decision of the CPIOs, 27 Appeals were disposed of by the concerned Appellate Authorities within the stipulated time frame.

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

15.7 The status regarding receipt and disposal of RTI Applications/ Appeals is given at Annexure 15.1, 15.2 and 15.3, respectively.

Redressal of Public Grievances

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

15.9 The Ministry of Mines has, under its administrative control, one Attached office, one Subordinate Office, three Public Sector Undertakings and three Autonomous Bodies. The Chief Executives of the PSUs, the Heads of the Subordinate Office, Attached Office and the Autonomous Bodies 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 the PSUs, Attached Office, Subordinate Office and the Autonomous Bodies of the Ministry. During the year, 2011-2012, 30 cases of IBM, MECL, NALCO and JNARDDC were received, which were referred to these Organisations for taking necessary action in the matter.

15.10 During the month of June, 2010, GSI has been granted individual status for direct lodging of the grievance redressal cases. Accordingly, a separate drop down box for lodging grievances directly with GSI has been created.
Accordingly, GSI has been directed to dispose of the cases on their own.

15.11 The Department of Administrative Reforms & Public Grievances (DAR&PG) has developed the Centralised Public Grievances Redressal & Monitoring System (CPGRAMS) launched for prompt and effective redressal of grievances of citizens. The system is a single window grievance portal for the Ministries/Departments/Organisations to record and receive the grievances online and redress them indicating actions at different levels. The portal also facilitates to receive the grievances lodged online through Internet by the citizens from any geographical location. Moreover, the system effectively helps to monitor the grievances across the PSUs, Subordinate Offices and Attached Organizations and provides the overall scenario of grievances in the Ministry and its Organisations. The system enables the Ministry and its Organisations to settle grievances online and the system eliminates/reduces correspondence and curtails time for settling grievances. The Joint Secretary (Mines) reviews the pending cases of Public Grievances on quarterly basis. The grievance cases are also being reviewed by Secretary (Mines) in Quarterly Performance Review Meetings of these Organisations.

15.12 In order to obviate the need 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 adequately with the grievances relating to service matters, like fair promotion, proper medical facilities, granting timely pensionary benefits, etc. The Ministry and the Subordinate Offices including the PSUs under its administrative control have accordingly designated such Staff Grievance Officers.

**Geological Survey of India (GSI)**

**Welfare measure for SC, ST, OBC and physically handicapped**

15.13 Government policies formulated for welfare for SC/ST and OBC employees related to recruitment and promotion are being followed in the Geological Survey of India. The Liaison Officers have been nominated in each Region of GSI to ensure proper compliance in the matter of representation of SC/ST and OBC. The detail of employment of SC, ST, OBC, Women and physically handicapped in GSI is given at Table 15.1.

15.14 Reservation for persons with disabilities as per Government policies are being followed in case of direct recruitment and promotion.

15.15 Grievance Officers have been nominated in Central Headquarters / Regions of GSI to deal with the public grievances.
Table 15.1
Sanctioned and filled up strength in GSI as on 31st December, 2011.

<table>
<thead>
<tr>
<th>Class</th>
<th>Sanctioned Strength</th>
<th>Total No. of Employees in Position</th>
<th>SC</th>
<th>ST</th>
<th>OBC</th>
<th>No. of Women</th>
<th>PH</th>
<th>Total [SC, ST, OBC, Women, PH]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group ‘A’</td>
<td>4080</td>
<td>1985</td>
<td>316</td>
<td>120</td>
<td>340</td>
<td>326</td>
<td>3</td>
<td>1105</td>
</tr>
<tr>
<td>Group ‘B’</td>
<td>786</td>
<td>258</td>
<td>55</td>
<td>32</td>
<td>9</td>
<td>25</td>
<td>-</td>
<td>121</td>
</tr>
<tr>
<td>Group ‘B’ (NG)(Min)</td>
<td>1130</td>
<td>860</td>
<td>157</td>
<td>71</td>
<td>13</td>
<td>144</td>
<td>11</td>
<td>396</td>
</tr>
<tr>
<td>Group ‘B’ (NG)(Tech.)</td>
<td>1524</td>
<td>711</td>
<td>154</td>
<td>93</td>
<td>20</td>
<td>50</td>
<td>5</td>
<td>322</td>
</tr>
<tr>
<td>Group ‘C’ (Min)</td>
<td>925</td>
<td>747</td>
<td>127</td>
<td>67</td>
<td>81</td>
<td>130</td>
<td>8</td>
<td>413</td>
</tr>
<tr>
<td>Group ‘C’ (Tech.)</td>
<td>1924</td>
<td>1375</td>
<td>277</td>
<td>149</td>
<td>55</td>
<td>9</td>
<td>5</td>
<td>495</td>
</tr>
<tr>
<td>Group ‘D’ (erstwhile)</td>
<td>2000</td>
<td>1987</td>
<td>466</td>
<td>215</td>
<td>194</td>
<td>236</td>
<td>31</td>
<td>1142</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>12369</strong></td>
<td><strong>7923</strong></td>
<td><strong>1552</strong></td>
<td><strong>747</strong></td>
<td><strong>712</strong></td>
<td><strong>920</strong></td>
<td><strong>63</strong></td>
<td><strong>3994</strong></td>
</tr>
</tbody>
</table>

Note:Sanctioned strength of GSI before HPC was 11420. After approval of HPC recommendation by the Cabinet the revised strength is 12369. The recruitment action will be taken shortly to fill up vacancies and new posts.

Indian Bureau of Mines

Reservation of Vacancies for persons with Disabilities

15.16 IBM is strictly following the various instructions of the Government from time to time regarding reservation of vacancies for persons with physical disabilities. As on 31st December, 2011, 21 physically handicapped persons were under employment in IBM, of which 06 are visually handicapped 1 is hearing impaired and 14 are orthopedically handicapped.

Perspective Plan for Women Welfare

15.17 Indian Bureau of Mines work on principle of equal opportunity to all and based on this, out of a total strength of employees, women employees constitute about 12.12%. Training is imparted to women employees in the field of technical as well as administrative matters.

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

15.19 A Committee has already been constituted in IBM for the purpose of CCS Rules, 1964 to redress the complaints made by the victims of sexual harassment at work place in a time bound manner.

Redressal of Public Grievances

15.20 At the beginning of the year, 12 Grievance cases were pending. During the year 2011-12 (upto Dec., 2011), 01 case was filed and 07 cases were disposed of and Remaining 06 cases are under processing at various stages. Online facility for Registration of Public
Grievances has already been provided by linking IBM website with the Grievance Portal of DoPT “Central PGRAMS”.

**Vigilance cases**

15.21 During the year 2011-12 (up to December, 2011), 12 complaints were received, of which 04 were brought to the logical conclusion and closed after investigation. Besides, 05 complaints were sent to the Administration for necessary action and the remaining 03 cases were under investigation. In addition to this, 4 cases are under investigation with Inquiry Officer, IBM/Ministry, Out of which one inquiry report has been submitted to Government of India and remaining 3 cases are under investigation with Inquiry Officer, IBM/Ministry of Mines, New Delhi.

15.22 Vigilance Awareness Week was observed in the IBM HQs at Nagpur and in all the Regional Offices during 31\textsuperscript{st} October, 2011 to 5\textsuperscript{th} November, 2011. During the Week, essay and debate competitions for vigilance awareness were conducted.

15.23 The employment position in IBM as on 31\textsuperscript{st} December, 2011 is given at Table 15.2.

<table>
<thead>
<tr>
<th>Group</th>
<th>Total No. of employees in position</th>
<th>Number of</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>SC</td>
</tr>
<tr>
<td>A</td>
<td>161</td>
<td>28</td>
</tr>
<tr>
<td>B(Gaz)</td>
<td>147</td>
<td>22</td>
</tr>
<tr>
<td>B (NG)</td>
<td>285</td>
<td>40</td>
</tr>
<tr>
<td>C</td>
<td>537</td>
<td>142</td>
</tr>
<tr>
<td>Total</td>
<td>1130</td>
<td>232</td>
</tr>
</tbody>
</table>

**Table 15.2**

**National Aluminium Company Limited (NALCO)**

**Perspective Plan for Women Welfare:**

15.24 The Company has adopted the principle of equal opportunity to the women employees in the matter of employment and the Company has 356 women employees at different levels and categories.

15.25 Need based developmental and functional training programmes are provided to the women employees. Institutional mechanism through conduct rules has also been put in place to avoid sexual harassment of women. As a mark of development in their individual leadership, women executives of the Company have got a place as coordinator/member of national organizations like women in public sector (WIPS).

15.26 The ladies clubs are extended
necessary assistance for carrying out their various activities which in turn enhances their leadership and organizing capabilities.

Welfare of SC/ST.

15.27 The Presidential directives issued from time to time on reservation of SC/ST persons in employment has been scrupulously followed by the Company. There are exclusive cells constituted for the welfare of the SC/ST employees. The SC/ST Employees Welfare Associations meet and discuss their view points at regular intervals both at complex level as well as corporate level. The employment position in NALCO as on 31st December, 2011 is given at Table 15.3.

15.28 The alumina and mines units of the Company are located in the midst of a predominantly Tribal area at Damanjodi. In Damanjodi sector, 600 families who were displaced for the establishment of the projects, have since been resettled in rehabilitation colonies named as Ambedkar Nagar rehabilitation colony and Sahid Laxman Nayak rehabilitation colony with provision of various amenities. Direct employment in NALCO has been provided to 598 persons on the basis of one able bodied person from each displaced family based on availability of vacancy and suitability of the candidate.

15.29 Development of roads, school, college, library, recreation center, ponds, wells and agricultural land, etc. have been the hallmark of the development programme on the peripheral Tribal dominated villages. As a part of the peripheral development plan, an amount of ₹ 1069.30 lakh has been allocated for Angul, Damanjodi and other places for the year 2011-12.

15.30 Besides, the Company has taken efforts for development of the contract labour colonies mostly inhabited by Tribal groups and working under various contractor’s establishments both at Angul and Damanjodi sectors.

Minority Welfare

15.31 A member of the minority community is associated in the selection committees for recruitment in order to give a fair deal to the minority community. The Company takes due care towards the sentiment of various minority community with a greater objective of communal harmony.

<table>
<thead>
<tr>
<th>Group</th>
<th>Total No of Employees</th>
<th>SC</th>
<th>ST</th>
<th>EX-SM</th>
<th>PWD</th>
<th>LDP</th>
<th>Minority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Executives</td>
<td>1863</td>
<td>233</td>
<td>123</td>
<td>6</td>
<td>9</td>
<td>23</td>
<td>78</td>
</tr>
<tr>
<td>Non-executives</td>
<td>5510</td>
<td>945</td>
<td>1161</td>
<td>25</td>
<td>64</td>
<td>1962</td>
<td>195</td>
</tr>
<tr>
<td>Trainees</td>
<td>363</td>
<td>67</td>
<td>98</td>
<td>6</td>
<td>4</td>
<td>112</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>7736</td>
<td>1245</td>
<td>1382</td>
<td>37</td>
<td>77</td>
<td>2097</td>
<td>280</td>
</tr>
</tbody>
</table>

EX-SM=Ex-servicemen, PWD=Person with disability, LDP=Land displaced persons
N.B.: It may be noted that every third employee of the organisation belongs to SC or ST community.
15.36 Participative Management has been the highlight of industrial relations in the Company during the year. Apart from the structured system of regular participation at shop level, long term wage settlement for unionised employees of the Company was reached on 5th September, 2011 in a peaceful atmosphere. The high degrees of morale of the employees helped the Company in meeting the challenges of sustained growth.

15.37 Besides, continuous training and development programmes, industrial visits, workers education programmes, keep the workforce up-dated to take up future challenges.

15.32 The Company has a contributory scheme for post retirement medical facilities to the superannuated employees and also their spouse besides other statutory retirement benefits viz. provident fund, gratuity, pension, etc.

15.33 The Company continues to provide financial assistance to old age homes. During the year, an amount of ₹2.50 lakh has been sanctioned in favour of Lok Shakti Trust, Bhubaneswar for construction of old age home.

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

15.35 As on 31st December, 2011 there are 77 persons with disability in employment of the Company in various identified posts.
Perspective Plan for Women Welfare

15.39 In pursuance to the judgment of the Supreme Court, HCL has set up committees in all the units/offices of the company for the prevention of sexual harassment of women in work place. A provision in this regard has also been incorporated in the Conduct, Discipline and Appeal Rules of HCL. During the year under report, no incidence of discrimination amongst employees on the basis of gender has come to light.

15.40 The Group wise strength of female employees as on 30th December 2011 vis-a-vis the total strength of HCL is given Table 15.4.

<table>
<thead>
<tr>
<th>Group</th>
<th>Total Strength</th>
<th>No. of female Employees</th>
<th>% of female Employees to total Strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group-A</td>
<td>668</td>
<td>36</td>
<td>5.39</td>
</tr>
<tr>
<td>Group-B</td>
<td>71</td>
<td>3</td>
<td>4.23</td>
</tr>
<tr>
<td>Group-C</td>
<td>3335</td>
<td>102</td>
<td>3.06</td>
</tr>
<tr>
<td>Group-D</td>
<td>819</td>
<td>142</td>
<td>17.34</td>
</tr>
<tr>
<td>Total</td>
<td>4893</td>
<td>283</td>
<td>5.78</td>
</tr>
</tbody>
</table>

Employment

15.41 The employment of personnel as on 31st December, 2011 in Hindustan Copper Limited is given at Table 15.5.

<table>
<thead>
<tr>
<th>Group</th>
<th>Man power</th>
<th>SC</th>
<th>ST</th>
<th>Land Displaced Person</th>
<th>Minorities</th>
<th>OBC</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>668</td>
<td>91</td>
<td>17</td>
<td>-</td>
<td>33</td>
<td>51</td>
<td>36</td>
</tr>
<tr>
<td>B</td>
<td>71</td>
<td>12</td>
<td>7</td>
<td>-</td>
<td>3</td>
<td>18</td>
<td>3</td>
</tr>
<tr>
<td>C</td>
<td>3335</td>
<td>506</td>
<td>477</td>
<td>178</td>
<td>236</td>
<td>508</td>
<td>102</td>
</tr>
<tr>
<td>D</td>
<td>819</td>
<td>196</td>
<td>117</td>
<td>209</td>
<td>28</td>
<td>23</td>
<td>142</td>
</tr>
<tr>
<td>Total</td>
<td>4893</td>
<td>805</td>
<td>618</td>
<td>387</td>
<td>300</td>
<td>600</td>
<td>283</td>
</tr>
</tbody>
</table>

15.42 The representation of SC, ST and OBC employees out of the total manpower of 4893 as on 31st December, 2011 is 16.45%, 12.63% and 12.26% respectively.

15.43 The retired employees of the Company and their spouse are extended medical treatment at the Company’s own Hospitals at the Projects. Company also extends support to ‘Mahila Samity’ and other institutions/NGOs in their endeavour to run ‘Health camps’ for the local population under CSR programme.

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

INDUSTRIAL RELATIONS

15.45 Industrial Relations situation in all the Units of the Company continued to be harmonious and peaceful during the year 2011-12.
THE STATUS OF IMPLEMENTATION OF THE PERSONS WITH DISABILITY ACT, 1985

15.46 During last few years, there has been limited recruitment in the company. Therefore, there was hardly any scope of fresh inductions of physically challenged persons. In addition, the mining operations of the Company being hazardous in nature, the scope of engagement of physically challenged persons is limited. The number of physically challenged persons employed in the Company as on 31st December, 2011 is given at Table 15.6.

Table 15.6

<table>
<thead>
<tr>
<th>Group</th>
<th>Number of physically challenged persons</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>2</td>
</tr>
<tr>
<td>B</td>
<td>0</td>
</tr>
<tr>
<td>C</td>
<td>32</td>
</tr>
<tr>
<td>D</td>
<td>17</td>
</tr>
<tr>
<td>Total</td>
<td>51</td>
</tr>
</tbody>
</table>

HUMAN RESOURCE DEVELOPMENT

15.47 Training and Development of all levels of employees is given due priority by the Company to increase effectiveness. Special emphasis was given to organization building and shaping right attitudes, team building and work culture besides preparing employees to understand the trends in fast changing technology/switching over to latest technology for achieving higher results in production, productivity and profitability.

REDRESSAL OF PUBLIC GRIEVANCES MACHINERY

15.48 With a view to redress the grievance/complaints of the members of public, Complaint Officers have been appointed at corporate office as well as in all the projects/offices of the company who have been authorized to receive the members of the public who have any grievance/complaint. Notice to this effect has been displayed on the prominent places wherein the members of public have been requested to meet the concerned Complaint Officers with regard to their complaint/grievance. Complaint boxes have been placed at proRFinent places in all the units/offices of the Company where the members of public can put their complaint in writing. These boxes are opened by the Competent Officers periodically and if there is any complaint/grievance, necessary remedial action is taken. SC/ST grievance cells have been constituted in all the units/offices of the company to redress the grievance of SC/ST employees as also other members of the public belonging to weaker sections of the society. Grievance/complaints received from the women employees as also members of the public are given immediate attention with a view to redress their grievance.

15.49 All complaints so received are registered in the Govt. web-site and accordingly disposed off. These are being regularly monitored. All public grievances received during the period from April 2011 to December, 2011, were
disposed of except seven pending public grievances as on 31st December, 2011.

15.50 A link to public grievances site on Govt. of India www.pgportal.gov.in is provided in company’s website www.hindustancopper.com main page as ‘public grievance’ in other information section at the bottom. Public grievances can be lodged through this link on main page of company’s website www.hindustancopper.com.

Mineral Exploration & Corporation Limited (MECL)

Perspective Plan for Women Welfare & Weaker Section:-

15.51 MECL, being a CPSU is committed for raising and improving the Socio-economic status of women and weaker section of the society. For this purpose, MECL provides training to women employees for their career development etc.

15.52 In order to avoid gender harassment of women at work places, a Grievance Committee on ‘gender Harassment’ on women at work place has already been constituted and is functioning in the Company.

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

15.54 During the year 2011-12, six projects have been identified to promote education of children belonging to SC/ST/weaker section of the society and the rural villages under which five computers each have been provided to Government Middle School around identified projects.

15.55 MECL gives due importance to meet the socio-economic needs of the SC & ST communities. During the year 2011-12, 20% of the total scholarship are kept reserved for children of SC/ST employees under the MECL Employees Grant of Scholarship Scheme.

15.56 MECL has also drawn a long-term scheme for

i) Promotion of livelihood for economically weaker sections / SC/ST/Backward community in and around MECL project through its skilled development.

ii) To empower children, differently abled persons (including physically and / or mentally challenged), old and destitute persons for dignified living.

iii) To promote art culture, heritage and sports with emphasis on tribal art and culture in vicinity of MECL Projects.

Redressal of Public Grievance

15.57 No public grievance as defined under letter No. K-11011/17/2000-PG dated 26th June, 2000 of Ministry of Personal, Public Grievances & Pension, New Delhi was received during the period under review. However, MECL received 4 grievance cases relating to service matter through PG website during the period from 1st January, 2011 to 31st
March, 2011. The position was examined and individual concerned were suitably replied through letters as well as the position also uploaded in the PG webstie pg_portal.gov.in. Thereafter, another 4 grievance cases relating to service matter were also received through PG website during the period from 1st April, 2011 to 31st December, 2011. Presently only 2 cases are pending as the information sought from the individuals are awaited.

INDUSTRIAL RELATIONS

15.58 During the period under review, the industrial relations in the Corporation remained cordial, harmonious and peaceful in all the establishments of the Company.

EMPLOYMENT

15.59 The category wise employment position including General/SC/ST/OBC/Minorities/Women as on 31st December, 2011 in the MECL is given at Table-15.7.

Table - 15.7
Employment of Personnel

<table>
<thead>
<tr>
<th>Group</th>
<th>Total No. of employees</th>
<th>SC</th>
<th>ST</th>
<th>O.B.C</th>
<th>Minorities</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>230</td>
<td>43</td>
<td>14</td>
<td>14</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>B</td>
<td>30</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>C</td>
<td>1467</td>
<td>212</td>
<td>104</td>
<td>78</td>
<td>117</td>
<td>29</td>
</tr>
<tr>
<td>D</td>
<td>43</td>
<td>14</td>
<td>3</td>
<td>-</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>1770</td>
<td>271</td>
<td>123</td>
<td>95</td>
<td>136</td>
<td>49</td>
</tr>
</tbody>
</table>

Jawaharlal Nehru Aluminium Research Development and Design Centre (JNARDDC)

Welfare for Persons with Disabilities (PWD)

15.60 The Centre is following the various government guidelines with reference to PWD reservation. The Centre provided indirect employment to a Physically Handicapped (OH) person on contract basis.
MINISTRY OF MINES

Introduction

16.1 The Ministry of Mines continues to take various steps to ensure compliance of the Official Languages Policy of the Union of India in the Ministry as well as in its Attached/Subordinate Offices/PSUs.

16.2 Utmost efforts have been made for due compliance of Section 3(3) of Official Languages Act, 1963 during the period under report. Letters received in Hindi were replied to in Hindi. The progressive use of Hindi is monitored through the quarterly meetings of the Official Language Implementation Committee Chaired by Joint Secretary.

Hindi Training

16.3 Under Hindi Teaching Scheme of Ministry of Home Affairs, Deptt. Of Official Language the officers/employees are nominated for training in Hindi Language (Prabodh, Praveen & Pragya), Hindi stenography and Hindi typing. Three employees were nominated for training in Hindi during the year.

Hindi Salahakar Samiti

16.4 Hindi Salahakar Samiti is a high powered Committee which reviews the progress of Hindi in the Ministry and in Attached/Subordinate Offices/PSUs under its administrative control. It also recommends effective measures to promote the use of Hindi and to ensure the compliance of Official Language Policy. During the year 2011-12, two meetings; first on 15th June, 2011 in Vigyan Bhawan, New Delhi and the second on 17th October, 2011 in Bengaluru were held under the Chairmanship of Hon’ble Minister of State for Mines (Independent Charge) Shri Dinsha Patel.

Meetings of Official Language Implementation Committee

16.5 The Official Language Implementation Committee has been constituted in the Ministry headed by the Joint Secretary. All Officers of the
rank of Under Secretary and above up to the rank of Director are members of the Committee. The Quarterly Hindi Progress Reports received from the Sections of the Ministry are reviewed in the meetings of the Committee and remedial measures are suggested to remove the shortcomings. The quarterly meetings of the Committee are held regularly.

**Official Language Inspection**

16.6 In order to assess the progress made in the use of Hindi in Attached/Subordinate Offices/Public Sector undertakings under the administrative control of the Ministry of Mines, Officers from Ministry, mainly from Hindi Unit, conducted Inspections regarding progressive use of Hindi in Official work in Attached/Subordinate offices of the Ministry from time to time. The shortcomings detected during the course of inspection are brought to the notice of the concerned offices and measures for overcoming the shortcomings are also suggested.

**Hindi Translation of website of the Ministry**

16.7 The website of the Ministry serves as a vital link with the masses. Hence, during the year under view, the website was translated into Hindi and is available in bilingual form. Material available on website is updated from time to time.

**Measures for Implementation of Official Language Policy**

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

**Inspection of Parliamentary Committee of Official Language**


**Hindi Workshops**

16.10 In order to encourage officials/employees to perform their official work in Hindi, Hindi workshops are organized.

**Hindi Fortnight**

16.11 With a view to create a conducive atmosphere for the progressive use of Hindi in the Ministry, Hindi fortnight is organized on occasion of Hindi Divas on 14th September every year.
This year also Hindi fortnight was observed from 14-28th September, 2011. Various Hindi competitions i.e. Hindi Essay Writing Competition, Hindi Noting/Drafting competition, Hindi translation, Hindi Sulekh and Dictation and Quiz Competition, were held during Hindi fortnight. The winners of the competitions were given Certificates and cash award.

Publication of ‘Khan Sampada’

16.12 Ministry of Mines has been publishing its Hindi house journal ‘Khan Sampada’ since 1998. Articles pertaining to Technical subjects, propagation of Hindi and literary topics are published in the said journal. Articles for 36th issue of ‘Khan Sampda’ have been invited.

Translation Work

16.13 During the period, all translation work relating to Standing Committee, CAG audit paras, Cabinet Notes, Minister’s Speeches, Citizen Charter of the Ministry and MoUs for International Cooperation in the field of mines & mineral with various countries was attended to with full efficiency and dedication. Besides these, day-to-day material received from the various Sections/Officers of the Ministry, Parliament Questions and other important material received during Parliament Session and interim report of Hon’ble Justice M.B. Shah Commission of Enquiry was also translated into Hindi during the year.

Geological Survey of India (GSI)

16.14 The Geological Survey of India occupies a prestigious position amongst the Geological Surveys of the world. This is a premier scientific and technical organization of the country. In this organization the scientific and drilling work relating to all geological streams specifically is carried out. In spite of being a scientific and technical organization all out efforts are being made to do the scientific, technical and administrative work in Hindi to the maximum with a view to implement the official language policy of the Government in this organization. The following are the main achievements of Geological Survey of India while promoting and encouraging Hindi as an official language.

16.15 The extensive work carried out in GSI during its annual programme 2010-2012 has been brought out as the ‘Annual Report’. The volume incorporated summary of the work carried out under each of the annual programmes of GSI during Field Season 2010-12 up to the month of March 2011. The volume has been published as ‘Records of the Geological Survey of India’ Volume 145, Part 9. The Hindi version of the book ‘Annual Report’ was presented at the 49th CGPB meeting at New Delhi.
Papers of meeting of Parliamentary Consultative Committee of MoM on functioning of GSI held on 6th July, 2011.

16.16 A meeting of Parliamentary Consultative Committee of Ministry of Mines on functioning of GSI was held on 6th July, 2011 in Sansad Bhawan, New Delhi. Shri Dinsha Patel, Hon’ble Minister of State for Mines (I/C). Chaired the Meeting.

Technical Investigation Reports & In House Magazines

16.17 The abstracts of 245 Technical Investigation reports were also brought out in Hindi by the Southern Regional Office, Hyderabad, State Unit Karnataka & Goa, Bengaluru, State Unit Bihar & Jharkhand, Patna & State Unit Orissa, Bhubneshwar, Northern Regional Office, Lucknow, Marine & Coastal Survey Division, Kolkata and Mission-IIB, Kolkata during the year 2011. The latest issues of Narmada, Bhugaurav, Indradhanush, Chetna, Vihang, Smarika, Bhusandes (Chandigarh Edition) and Dhauli, the Hindi in-house magazines of Central Region, Western Region, North Eastern Region, Training Institute, Remote Sensing & Aerial Survey, Operation Madhya Pradesh & Chhattisgarh, Operation Panjab, Haryana & Himachal Pradesh, Chandigarh and Operation Odisha, respectively, were also brought out. Besides this, the 2nd issue of the in-house Hindi magazine ‘Bhoomanthan’ of Central Headquarters is presently also under process.

Translation work

16.18 The following English scientific material has been translated into Hindi by the Central Headquarter and subordinate offices:-

(i) The complete report of High Powered Committee for restructure of Geological Survey of India has been translated in Hindi and at present it is under scrutiny of a three member’s scrutiny committee.

(ii) One brief Travelogue (from beginning to present) showing the contribution of Geophysics in the multi dimensional development of the GSI was prepared in Hindi and presented in the meeting of CGPB held on 24th & 25th August, 2011.

(iii) Annual Plan 2011-12 of Geological Survey of India (under process)

Implementation of Hindi Incentive Schemes

16.19 The Hindi Incentive Scheme of Government of India for doing their official work originally in Hindi by the officers and staff has been implemented in the Central Headquarters as well as in the Subordinate Offices. About forty-five officers and employees were awarded under this scheme in the year 2011.

Inspection of Subordinate Offices.

16.20 In order to assess the progress made in use of Hindi in the Subordinate
Offices of the Geological Survey of India, Deputy Director (Official Language) inspected six Subordinate Offices, which include Camp Office of Director General, GSI, New Delhi, State Unit Jammu & Kashmir, Jammu, Operation Panjab, Haryana & Himachal Pradesh, Chandigarh, State Unit of Manipur & Nagaland, Dimapur, State Unit Gujarat, Gandhinagar and Central Regional Office, Nagpur. Apart from above, two more offices are also proposed to be inspected up to 31st March, 2012.

**Hindi workshops**

16.21 As per directives of the Department of Official Language, twenty two Hindi Workshops were organized at the level of Southern Region, at Hyderabad, Bengaluru & Thiruvannathapuram, Western Region at Jaipur & Gandhinagar, North Eastern Region at Shillong, Itangar & Dimapur, Central Regional Office at Nagpur, Northern Region at Lucknow, Jammu, Faridabad & Chandigarh, Training Institute Hyderabad, Marine & Coastal Survey Division, Kolkata & Vishakhapatnam and Camp Office of Director General (DG), GSI at New Delhi. The participants were apprised of the various provisions of Official Language Act, Official Language Rules and important orders on Official Language. They practised writing of noting and drafting in Hindi. About 750 officers and staff were imparted training through these workshops for writing noting and drafting in Hindi.

16.22 In addition to the above workshops, an all India Orientation Programme for the Administrative Officers working in GSI to apprise them with the implementation of the Official Language Policy is proposed to be held in the month of March 2012.

**To make the GSI Portal in bilingual form**

16.23 As per the policy of the Govt. of India, the necessary steps have been taken to make the Portal of GSI available in Hindi also. Initially the Home Page of the Website has been made available in Hindi. Efforts are being made to prepare the link pages of the website also in Hindi.

**Hindi Fortnight**

16.24 With a view to awaken the staff and officers to do their official work in Hindi and increase the progressive use of the official language in the organization a Hindi Fortnight was celebrated by the Geological Survey of India, Central Headquarters (CHQ) and its Subordinate Offices from 14th to 30th September, 2011. During this period, various competitions i.e., Hindi Essay competition, Hindi Noting and Drafting competition, Hindi debate, Hindi typing competition and Administrative terminology competition were also organized.

16.25 The Central Headquarter, Kolkata, Central Regional Office, Nagpur and Operation Arunachal Pradesh Office, Itanagar have also been entrusted with the Chairmanship of Town Official Language Implementation Committees
of the respective cities. The Geological Survey of India, Central Headquarter, Kolkata arranged four Inter-Departmental Hindi Competitions from 10th to 14th October, 2011. The Competitors from twenty-six Central Govt. offices including Geological Survey of India based at Kolkata actively participated in these competitions. The Central Regional Office and Operation Arunachal Pradesh Office organised several Hindi programmes actively at the level of Town Official Language Implementation Committee. Besides this, the above said offices also organised two successful half-yearly meetings of the Town Official Language Implementation Committees of the respective towns.

Review of Quarterly Progress Reports

16.26 At present six Regional Offices, Training Institute, Hyderabad, Remote Sensing & Aerial Survey, Bengaluru and the Camp Office of Director General, GSI at New Delhi are directly under the administrative control of the Central Headquarter for the purpose of implementation of Official Language Policy in GSI. The quarterly progress reports of these offices were reviewed at the level of Central Headquarter.

Indian Bureau of Mines (IBM)

16.27 Hindi Fortnight was observed at Headquarters and all regional offices of IBM during 02-15 September 2011. Message received from Hon’ble Home Minister, Government of India was read out in a function organized to observe Hindi Day on 14th September, 2011. During the fortnight, various competitions on essay competition, Hindi noting and drafting, typing, debate and Quiz were conducted to encourage the implementation of Official Language and prizes were distributed to the winners on the concluding day.

16.28 Hindi Salahkar Samiti meeting of Ministry of Mines was held under the Chairmanship of Hon’ble Minister of Mines at New Delhi on 15th June, 2011. Shri C.S. Gundewar, Controller General and Shri M.V. Sahasrabudhe, Regional Controller of Mines & Rajabhasha Adhikari attended the meeting.

16.29 Shri C.S. Gundewar, Controller General and Shri R.K. Sinha, Controller of Mines (SZ) participated in another Hindi Salahkar Samiti meeting held on 17th October, 2011 at Bengaluru.

16.30 86th meeting of the Departmental Official Language Implementation Committee was held under the Chairmanship of Shri C.S. Gundewar, Controller General, IBM on 6th June, 2011. During the meeting, progress reports for the quarter ending December 2010 and March 2011 were reviewed and the shortcomings detected were brought to the notice of concerned Division/Office for rectification.

16.31 16 Officials, who have been appointed/promoted from Group ‘D’ posts to Group ‘C’ have been given training from July 2011 to November 2011 on Pragya classes. All the participants passed the examination.
PROGRESSIVE USE OF HINDI

NATIONAL ALUMINIUM COMPANY LIMITED (NALCO)

Progressive use of Hindi in Official Work

16.32 Under Hindi Teaching Scheme, Govt. of India, Deptt. of Official Language, 27 employees and officers passed Praveen Examination and 49 employees and officers passed Pragya Examination held in the month of May and November, 2011. Three Hindi workshops were organised during the year for the employees those have acquired working knowledge in Hindi after passing Praveen and Pragya Examinations. NALCO participated in Hindi Salahakar Samiti meeting of Ministry of Mines, Govt. of India at Bengaluru on 17th October, 2011. Hon’ble Minister of State for Mines (Independent Charge) chaired the meeting. Members of Parliament and other officials nominated by Ministry of Mines participated in this meeting. Committee of Parliament on Official Language (3rd Sub Committee) inspected NALCO Corporate Office, Bhubaneswar on 30th September, 2011. Deputy Director (Implementation), Eastern Region, Kolkata also inspected NALCO smelter & power complex, Angul on 12th November, 2011. Hindi week and Hindi Day was observed at Corporate Office, Bhubaneswar from 14th September, 2011 to 20th September, 2011. Besides this a Hindi Kavi Sammelan was also organised on the concluding day on 20th September, 2011. Like wise Hindi Fortnight was also celebrated at smelter & power complex, Angul during 14th to 29th September, 2011. At Mines & Refinery Complex, Damanjodi ‘Hindi Week’ was also celebrated with much enthusiasm during 8th to 14th September, 2011. Several competitions were organised amongst Hindi speaking and Non-Hindi speaking employees during Hindi Week. Two meetings of Town Official Language Implementation Committee, Angul were held in June and November, 2011. Similarly, Town Official Language Implementation Committee meeting for Bhubaneswar-II was held at Corporate Office on 22nd October, 2011. Correspondences in Hindi were also done as per the norms of the Official Language Implementation Policy of Govt. of India. “THE PARICHAYA” quarterly house journal of NALCO was published in Hindi regularly.
NORTH EASTERN REGION

17.1 The North-Eastern Region (NER) of India comprise a unique agglomeration, with a diversified geological set-up. The spectacular physiographic set up includes the stunning Himalayan mountain belt in the North, the Indo-Myanmar Range in the east and the mighty Brahmaputra, forming the extensive Assam plains. The diverse lithologic and tectonic ensemble calls for integrated geoscientific studies to identify and outline target areas pertaining to mineral resource evaluation, mitigation of natural hazards, environmental issues and water resources development projects.

17.2 The North Eastern Region represents varied, geomorphological and geological setup which is ranging from Precambrian to Recent age. It is manifested by spectacular Himalayan Mountain Belt in the north; Shillong Massif Plateau in the south and mighty Brahmaputra forming the extensive Assam plain in between and Indo-Myanmar Range in the east.

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

17.3 A total of 45 (excluding items of Regional Training Institute) investigations were carried out from the beginning of field season in NER (including Sikkim). A brief summary of the highlights pertaining to that period is given below:

MISSION-I: BASELINE GEOSCIENCE DATA GENERATION

SURVEY & MAPPING

Regional Survey

17.4 Systematic Geological Mapping (scale: 1:50,000)

- Two items of Systematic Geological Mapping are pursued in the State of Assam and Nagaland.
- An area of 230 sq. km. has been covered between April and December 2011 in parts of Zunheboto, Mon, Kiphire, Tuensang and Phek districts, Nagaland. The area covered by mapping exposes lower Tertiary sediments belonging to Disang Formation and Laisong Formation of Barail Group of rocks. The contact between the Disang and Barail is gradational. Both the units have been folded into a series of anticlines and synclines. Excepting some coal bands at places, no other indication of metallic or non metallic mineralization recorded in the area. The sandstones of Barail Formation are being quarried for building material.
• Systematic Geological Mapping in parts of Toposheets no. 83I/15 and 78J/14 in Dibrugarh, Kamrup and Goalpara districts, Assam was taken up where an area of 390 sq. km. has been covered between April and December 2011. The lower reaches of the area are occupied by Hauli Formation of Younger Alluvium Group whereas upper reaches are occupied by Sorbhog and Kukulong Formations of Older Alluvium Group. Some clay pockets have been recorded within sand-silt dominated Kukulong Formation.

17.5 Specialised Thematic Studies (scale: 1:25,000)

In North Eastern Region four items (one continuous, three new) of Specialized Thematic Mapping were taken up in the states of Arunachal Pradesh, Meghalaya and Mizoram with a total coverage of 801 sq km between April and December 2011.

- Specialized Thematic Mapping and tectono metamorphic studies of the gneiss quartzite/schist contact and their stratigraphic relation along the eastern margin of Shillong Basin in parts of East Khasi Hills and Jaintia Hills Districts, Meghalaya has been continued. The oldest rocks of the area include of quartzites, conglomerates and schists of Shillong Group. The metasediments and granites are overlain by horizontally disposed coarse-grained to gritty Eocene arkosic to ferruginous sandstones with or without claystone/pebbly/conglomerate horizons of Shella Formation of Jaintia Group, which are well exposed around Mukhla, Nongbah, Mawpyut and Nartiang.

- The item of Specialised thematic mapping and tectono- magmatic and metamorphic studies of high grade granulite rocks and associated mineralization, if any, between Hahim and Mawdongkiang (Nongdiankian); their contact and stratigraphic relation with enclosing gneiss in parts of west Khasi Hills District, Meghalaya has been taken up. The rocks exposed in the area have been classified under three main groups depending upon the mode of occurrences and their associated rock types as follows: Pre-Tectonic basic intrusives; Post-Tectonic acid intrusives and Chemogenic deposits. The granite gneiss is the most dominant rock type in the area and is occurring in Nongkrem, Ramkyunshi and in and around Rambrai area.

- The item of Specialised Thematic Mapping in parts of West Siang
and Upper Subansiri Districts, Arunachal Pradesh and appraisal of associated carbonate rocks has been taken up. The area exposes the rocks of Siyom, Ragidoke and Miri Formations. The Siyom Formation mainly comprises of garnet mica schist, schistose quartzite, phyllite (at places carbonaceous or graphitic, carrying sulphide minerals), mica schist and dolomite. The Ragidoke Formation comprise of grey to pale brown quartzite, magnetite-quartzite, carbonaceous/graphytic phyllite, dark grey phyllite, black to grey slate and dolomite. The Miri Formation dominantly comprises of purple to white quartzite, feldspathic sandstone, shales and intraformational conglomerate. The rocks of Miri Formation unconformably overlie the Ragidoke Formation. The contact is marked by a 50m thick conglomerate. A number of faults have also been identified in the area of which Bame Fault trending N-S has brought the rocks of Siyom Formation in juxtaposition with Miri Formation. Sulfide mineralization has been observed in carbonaceous/graphitic phyllite of Siyom Formation and magnetite quartzite and quartz veins of Ragidoke Formation. The entire sequence of Ragidoke Formation show yellowish limonitic alteration stains.

• The item of Specialized Thematic Mapping across Thinglian, Buchang and Bilkhawthlir, Kolasib District, Mizoram has been taken up. The area exposes the rocks of Bhuban formation and Bokabil formations of Surma Group, Tipam and Dupitilla Group rocks of Tertiary age. A thin pebble/conglomerate bed recorded between Tipam and Dupitilla Group of rocks. Two members of Bhuban formation—the middle and upper Bhuban members are present in the area. The Bokabil Formation conformably overlies Upper Bhuban rocks which is predominantly argillaceous and is represented by shale with pockets of silt and sand. The Bokabil Formation is overlain conformably by Tipam Group rocks. The Tipam Group of rocks, in turn, is also conformably overlain by the younger Dupitila Group, which occupies the core of the syncline.

17.6 Geochemical Mapping (GCM)

The following eight programmes were taken up with a total coverage of 2530 sq km between April and December 2011:

• Geochemical mapping in toposheet nos. 82P/3 & 4, covering parts of East Siang District of Arunachal Pradesh.

• Regional geochemical mapping on 1:50,000 scale in parts of toposheets no. 78J/3 & 7, 78N/15 & 16 in Kamrup, Darang, Nagaon, Goalpara and Kokrajhar Districts, Assam.

• Regional geochemical mapping in parts of East Khasi Hills District, Meghalaya.
• Regional geochemical mapping in parts of Ri-Bhoi District, Meghalaya and Karbi Anglong District, Assam.

• Regional geochemical mapping in parts of Kiphire, Tuensang and Zunheboto Districts, Nagaland.

• Geochemical mapping in toposheet no. 78 A/3 & 4 covering parts of West and South Districts, Sikkim and Darjeeling District of West Bengal.

• Geochemical mapping in northern part of Toposheet No. 78 A/3 covering parts of West and South Districts, Sikkim - on expedition basis.

• Regional geochemical mapping in parts of West Tripura and South Tripura Districts, Tripura [79M/6]

17.7 Geophysical Mapping (GPM)

Gravity-magnetic surveys in parts of East Khasi hills and Ri-Bhoi districts, Meghalaya falling in two toposheets 78O/14 & 15 has been carried out. An area of 450 sq km has been covered between April and December 2011. Gravity value varies from -38 mGal in the northwest to -12 mGals in the south. Moderate to high gravity (red) values in Northeast of Khrang area may be due to the underlying basic intrusive like meta basalts. The magnetic anomalies enabled to delineate three different geologic domains representing the exposed granitic and gneissic basement in north, and southeast part, Tertiary formation in southern part and central and other parts of study area underlain by basic and ultra basic intrusive. The high anomaly in central part indicates the presence of un weathered basic intrusive bodies including meta basalts at shallow depth and the low intensive anomalies falling in southern part of the area is due to sedimentary rocks including sandstone, shale with alternate layers of coal beds.

17.8 Photo Geology & Remote Sensing

Work carried out in parts of Toposheets No. 84B/15 in parts of Kolodyne Hydroelectric Project in Mizoram. A prominent E - W striking fault, controlling a drainage, was marked 2 km south of Zero/New Maubawk on Zero - Kawlchaw Road.

Mission-II: Natural Resource Assessment
(MINERAL EXPLORATION)

17.9 Basemetal

In Meghalaya, Reconnaissance stage investigation (G-4) was taken up in Archaean Gneissic Complex near Simsang Diwa village of East Garo Hills district to assess basemetal potential in the area. Lamprophyre dykes are exposed near Simsang Diwa.

In Sikkim, reconnaissance stage investigation (G-4) was continued in Lesser Himalayan zone in Chakung-Jugdum area covering parts of West district, to assess the basemetal and gold potentiality of the area. The item was taken up on the request of DMMG, Sikkim with a geoscientific partnership.
Sulphide minerals are mainly pyrite and chalcopyrite which occur as fine dissemination within the quartz veins. In Buxa Formation, mineralization occurs in the form of malachite stains in the lower unit which consists of phyllite and thinly bedded quartzite.

### 17.10 Platinum Group of Elements (PGE)

In Manipur, reconnaissance stage investigation (G-4) was continued for Platinum Group of elements in ophiolite belt to assess the potential of PGE mineralization in the favourable host rocks in ultramafic suite comprising chromiferous dunite, peridotite and pyroxenite. Reconnoitory geological traverse mapping on 1:50,000 have been carried out in the ophiolite belt of Manipur and an area of 100 sq. km was covered in parts of Siruhi, Gamnom & Pushing areas in Ukhrul district. Ultramafic clan of rocks with chromitite layers were identified. The ultramafic suites were emplaced into the pelagic-sediments of Tertiary age. A total of eighteen chromite bands / lenses containing massive chromite with maximum dimension of 20m x 2m have been delineated within the serpentinitised peridotite which are parallel to the regional trend. The chromite samples analysed Cr2O3 content varying from 44% to 59% and is akin to the Alpine Type Podiform Chromite.

### 17.11 Rare Earth Elements (REE)

In Meghalaya, reconnaissance stage investigation (G-4) was taken up in the peripheral part of Sung ultramafic-alkaline-carbonatite complex of East Khasi Hills district to evaluate REE potential.

### 17.12 Industrial Minerals

In Meghalaya, prospection stage investigation (G-3) was taken up in Umphyrluh Block of Jaintia Hills district to explore limestone resources in the peripheral area of the Litang valley limestone deposit. The deposit is bedded type striking NNE-SSW with horizontal to sub-horizontal dip of about 3° to 5° towards ESE.
Mission-IV: Fundamental & Multidisciplinary Geosciences and Special studies (Specialized Investigations)

17.15 Geotechnical Investigations

Following is the list of investigations taken up:

- Geotechnical evaluation of water resource development projects in Arunachal Pradesh
- Kameng Hydro-electric Project
- Pare H. E. Project
- Geotechnical evaluation of water resource development & other projects in Assam
- Lower Kopili HE Project, Dima Hasao & Karbi Anglong districts
- Geotechnical evaluation of water resource development projects in Meghalaya
- New Umtru H.E Project, Ri-Bhoi district
- Upper Khri H.E.Project, W. Khasi hills district
- Mawblei HE Project, W. Khasi hills district
- Myntdu Leshka H.E.Project, Stage-II, Jaintia hills district
- Tuipui HE Project

Geotechnical evaluation of water resource development projects in Mizoram

- Tuichang H.E. Project

- Geotechnical evaluation of water resource development projects in Sikkim
- Kalez Khola Hydroelectric Project, West Sikkim District
- Suntale khola Hydel Project, West Sikkim District

Miscellaneous Projects

Sikkim

- Geotechnical investigation for evaluation of the stability aspects of the jail complex, Omchung, West District

17.16 Landslide Hazard Studies

Arunachal Pradesh: (i) Landslide hazard zonation of a 2 km wide strip in the catchment area for Dibang multipurpose project, Lower Dibang valley district.

(ii) Landslide Hazard Zonation on macro scale of one Km wide strip along NH-
52A between Bhalukpong and Bomdilla, West Kameng District, Arunachal Pradesh— an area of 55 sq km is covered during the period along Bhalukpong to Bomdilla of West Kameng district along NH-52A. The area is divided in to 615 facets. The landslide incidence map is also updated and very prominent “more than one active landslide” category landslides found to occur very close to each other at 3 places near Nag Mandir, Dedja.

Meghalaya : Meso Scale Landslide Hazard Zonation of Shillong Town, East Khasi Hills District: Meso scale landslide hazard zonation which is a semi quantitative classification scheme is taken up considering 12 geoenvironmental parameters and the area has been classified into different landslide hazard classes. It is found that LHZ (low hazard zone) covers major part of the area, which is followed by MHZ (moderate hazard zone). HHZ (High hazard zone) areas are mainly located along the Umshirpi, Wah Umkhra River in the western part of the study area and also in parts of the central part. During the period, a total of 17nos. of active landslides and 5 nos. dormant landslides have been studied in the area / along road section.

Sikkim: (i) Detailed geological mapping and evaluation of Theng landslide at 87.2 Km on North Sikkim Highway (NSH), North District was taken up. The detailed mapping (1:1000) of of 0.1 sq km area reveals that the Theng rockslide (at 87.2 Km on NSH), occurs within highly-folded, hard, competent and jointed quartzofeldspathic gneiss, quartzite sequence of Central Crystalline. present geological investigation at Theng rockslide confirmed the fact that diverting NSH road bench through a small road tunnel, as envisaged by road maintaining authorities would be the appropriate alternative. The detailed-scale mapping revealed that the proposed tunnel length would be around 600 m, which appears to be feasible from geological point of view. However, a modified shorter tunnel alignment has been suggested by GSI, which is expected to save about 100-150 m tunnel length

(ii) Detailed geotechnical investigation of Manvir slide, has been taken up through Geological mapping of 0.31 sq km area on 1:1000 scale of the Manvir Colony landslide situated on the Indira Bye Pass Road, East Sikkim. The area mapped is covered with overburden/ slope wash materials, whereas mica schist intersected by four sets of joints is exposed at places. The area is drained by six nalas, which join together at lower elevation and ultimately meets the Rani Khola through one main nala near Jakri falls. There are a number of seepage zones identified within the slide area. Ground cracks and slide scars have been noticed mainly near the nalas. Piping out of finer particles and toe cutting by the nalas in the area appears to be the main causes of sinking of this area. Remedial measures in the form of bolting and shotcreting with chain link mesh of rock slide portion, hill side toe drain at road level, repairing of trained chute
drains, construction of contour drains interlinked by chute drains, etc., have been recommended to control the slide.

(iii) Detailed geological mapping and evaluation of Lanta Khola landslide at 72.1 Km on North Sikkim Highway (NSH), North District has been taken up through detailed mapping and evaluation of the slide zone. Lanta Khola landslide is a debris flow that initiated way back in 1978 and has remained a major trouble spot on NSH in North district, Sikkim. An area of 0.3 sq km is mapped on 1:1000 scale to delineate the scars (active and dormant), nalas/streams, debris run out, accumulation zones and exposed bedrock etc.

(iv) Detailed geotechnical investigation of 9th Mile slide- Three newly developed scars are identified. A total of 112 survey pillars could be located and observations on 92 pillars are taken.

(v) Reconnoitory visit to Zeema landslide at 1.5 Km on Chungthang-Lachen road, North District- Preliminary studies of the slide mass indicate that the debris slide is a result of a cloud burst during the monsoon of 2010. A huge debris slide and flow at that location affecting about 200 m of road bench and responsible for causing significant change in the morphometry of the slope and diversion of nala course. The studies further indicated that the possible sliding surface is aligned mostly along the valley-dipping bedrock-overburden interface and due to the removal of huge amount of debris; the well foliated quartzo-feldspathic gneiss got exposed on slope from ~100m above the road bench level up to near the crown. The slope length of the present Zeema landslide may be around 1 Km. As a remedial measures based on the observation it is suggested at site that the slope of accumulated debris mass on Thangu side need to be dressed further by constructing at least three levels of wide benches to ensure better stability.

17.17 Seismic Studies (Earthquake Geology)

The continued item on Active fault studies around foothills of Mishmi block of Arunachal Himalaya has been taken up to identify the effects of the 1950 earthquakes preserved in the geologic records in the form of Erosion surfaces, Active faults, Seismic induced landslides, and Change in geomorphology etc. The study area lies to the southwest of the Mishmi Hills block and exposes the meta-sediments and sediments of Proterozoic and Quaternary age respectively. It is noted that the foothill region is occupied by piedmont fan deposits which has been traversed by mostly westerly flowing drainages with development of river terrace only in away from mountain front.

Seismic Hazard Assessment and Risk Evaluation of Jorhat Urban Agglomeration has been taken up as a new item in FS 2010-12 and studies carried out. On the basis of available data borehole layout plan is prepared and SPT is started.
response study by measuring ambient noise using short period Seismograph at every 1 km station spacing is already initiated. A total of 88 Seismograph stations with an average station spacing of 1 km are installed and recording of micro tremor (ambient noise) data has been conducted.

17.18 Climate Change

Glaciology

Updation of glacier inventory of Sikkim Himalaya has been undertaken. The compilation of glacier inventory of two basins, viz. East Rathong and Changme Khangpu, which contain 19 and 43 glaciers, respectively is taken up.

17.19 Fundamental Geosciences

Tectonism, Magmatism and crustal evolution of the northeastern Himalayas in parts of Tawang and West Kameng Districts, Arunachal Pradesh– Traverses have been taken to cover Bomdila gneiss and many sites have been selected for magnetic susceptibility measurements.

Mineral Chemistry and Fluid Inclusion studies of Rongjeng and Sindhuli granites, Meghalaya– Two types of Granitoids characterize the Rongjeng Pluton. These are porphyritic, megacrystic with abundances of melanocratic microgranular enclaves (MME) (Granite 1) and the other one is coarse, non-porphyritic types (Granite 2).

Systematics, diversity and biogeography of some major group of macro-invertebrates from the Upper Cretaceous - Tertiary sediments of Meghalaya Basin with a special emphasis on diversity dynamics– The research project has been taken up, with the objective of taxonomic study of the invertebrates, their palaeoenvironmental interpretation and biogeographic analysis. Field investigation is carried out around Cherrapunjee and Pynursla area to study the fossiliferous units of the Mahadek and Langpar Formations.

Pertaining to the pilot project on Geospeleological studies, Syndai Cave of Meghalaya has been identified as suitable for sampling. Stalagmite samples have been collected from the cave for petrographic studies.

Electrical imaging of deep crustal structure by magneto-telluric (MT) survey in Sikkim-Darjeeling Himalaya’ The objective of the study has been to decipher deep vertical succession in Silliguri- Gangtok transect and demarcate zones of mid-crustal conductors and also prepare a meaningful crustal model of the area. The study area falls in Degree Sheets 78A & 78B in West Bengal and Sikkim.

Gravity - Magnetic Evidences across Meghalaya Massif from Guwahati to Cherrapunjee has been taken up with the objective of interpreting the G-M data already acquired across Meghalaya massif from Guwahati-Cherrapunjee using the state of the art software package to delineate subsurface geology. The GM data set has been
compiled, processed and validated for interpretation to know the subsurface geology along the transects from Guwahati to Cherrapunji.

17.20 Special assistance programme for NER

GSI has initiated procurement action for geoscientific equipments to be provided to all the State DGMs of NER under the Special Programme. In the Financial Year 2011-12 a total amount of ₹ 30.00 lakh has been allocated for procurement of some selected equipments. The procurement process is under progress.

State Dept. of Mines, Minerals & Geology, Govt. of Sikkim shall be provided with one each of Point load Testing Machine, Hot Air Oven and pH Meter, 5 nos. Hand held GPS, 5 nos. Geological Hammer and 4 nos. Brunton compass as soon as GSI gets in possession of all the equipments. The procurement of other sophisticated instruments required for Geotechnical Laboratory will be taken up in the next financial year.

17.21 Assistance in Capacity Building of State officials of NER

It has been decided that GSI will grant TA/DA to all the participating officials of NER States as well as Course fee will be exempted for attending training courses conducted by the GSI Training Institute at any part of India.

<table>
<thead>
<tr>
<th>SCHEMES</th>
<th>BE</th>
<th>Actual Expnd. Upto Dec.2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Survey &amp; Mapping</td>
<td>6.46</td>
<td>6.24</td>
</tr>
<tr>
<td>2 Mineral Exploration</td>
<td>2.16</td>
<td>1.99</td>
</tr>
<tr>
<td>3 Special Investigation &amp; Antarctica Expl.</td>
<td>3.55</td>
<td>3.34</td>
</tr>
<tr>
<td>4 R &amp; D &amp; Other Exploration</td>
<td>0.95</td>
<td>0.67</td>
</tr>
<tr>
<td>5 Information Dissemination</td>
<td>1.52</td>
<td>0.80</td>
</tr>
<tr>
<td>6 Human Resource Development (Training)</td>
<td>0.15</td>
<td>0.07</td>
</tr>
<tr>
<td>7 Modernisation &amp; Replacement</td>
<td>3.30</td>
<td>0.41</td>
</tr>
<tr>
<td>8 TSP</td>
<td>0.00</td>
<td>0.08</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>18.09</td>
<td>13.60</td>
</tr>
</tbody>
</table>

Work Done by Indian Bureau of Mines in North Eastern Region

17.22 The Sub-regional office of IBM at Guwahati continued to undertake inspection of mines and studies on development of resources in North-Eastern region. During the year 2011-12 (upto December 2011) 15 mines / areas were inspected for enforcement
of provisions of MCDR 1988 and for processing & disposal of mining plan / scheme of mining.

17.23 Two training programmes viz. (i) Workshop-cum-Meeting on North Eastern Special Assistance Programme at Imphal and (ii) Workshop-cum-Training on Statutory Returns & Notices under MCDR 1988 under NER Development of Mineral Industry Programme at Itanagar (Arunachal Pradesh) were conducted, in which 27 Industry personnel/ Govt. officials from North-Eastern region participated.

Work Done by MECL in North Eastern Region

17.24 MECL has been associated with mineral exploration activities and geo-technical studies for the development of mineral industry in the North Eastern Region in last 30 years. It has completed exploration for coal in 15 blocks in the states of Assam, Arunachal Pradesh, Nagaland and Meghalaya on behalf of Ministry of Coal, North Eastern Council and CMPDIL. Under its promotional programme funded by Ministry of Mines, it has completed nine schemes which include copper, sillimanite, glass sand, shell limestone and Ferro-Silicon grade quartzite in the states of Assam, Meghalaya, Mizoram, Sikkim and Arunachal Pradesh. In addition, it has carried out geo-technical studies on behalf of Brahmaputra Flood Control Board in the state of Assam and Arunachal Pradesh and consultancy work for remote sensing studies at Tripura on behalf of Ministry of Mines. Exploration services were also rendered to Atomic Mineral division involving survey, drilling & mining in Umarangaon / Domiaset block, West Kasi Hill district.

17.25 During the year 2011-12, MECL completed the field investigations for dolomite at Rupa in West Kameng district Arunachal Pradesh and analytical studies, interpretation and report writing work are in progress. The investigations and report writing work for detailed exploration for limestone carried out in Tongnub South East Sub Block, Litang River Valley in Jaintia hills dist. of Meghalaya is also under progress.

17.26 In addition to above, detailed exploration of limestone at Nimi-Pyakatsu block, district Kiphire, Nagaland at an estimated cost of ₹ 113.57 lakh has also been taken up in which field work is being carried out by DGM, Nagaland and laboratory & report writing work will be taken up by MECL.

17.27 Further to above, on behalf of Directorate General of Hydrocarbon, Govt. of India, MECL with BRGM France has completed studies for resource estimation in respect of oil shale deposit in an area of 254 sq.km. of Assam & Arunachal Pradesh. The physical work includes input of 2818 m of drilling in 8 nos. of borehole along with associated geological activities. The detailed project report has been submitted as scheduled wherein a total of 932 million tonnes of oil shale resources have been established.
17.28 The brief account of exploration by MECL in the North Eastern Region is as under:

**Tongnub South East Sub Block (Limestone), Distt. Jaintia Hills, Meghalaya:**

The exploration proposal of Tongnub block was approved in the 21st SCPP held on 4th August, 2009 with 1310m of drilling in 8 boreholes with associated geological & laboratory work. MECL commenced the physical work in January 2010 and completed in March 2011. A total of 1148.50m of drilling in 8 closed boreholes along with associated geological work has been carried out. The analytical / laboratory work & geological report preparation is in progress.

**Rupa Dolomite Block, Distt. West Kameng, Arunachal Pradesh:**

The exploration proposal of Rupa block was approved in the 19th SCPP meeting held on 10th September, 2008 with 800m of drilling in 8 boreholes and associated geological & laboratory studies.

MECL could commence the physical work in the block in July 2010 after receipt of Forest clearance from the State Government in May 2010. The drilling work was completed in October 2011.

During the period from April 2011 to October 2011, a total of 327.50m of drilling and associated geological work in 4 boreholes has been completed. Since inception a total of 594.00m of drilling in 6 boreholes and associated geological work has been completed in the block.

Sampling and laboratory work is in progress.

**Nimi Pyakatasu Limestone Exploration Block, District- Kiphire, Nagaland:**

The detailed exploration proposal for Nimi-Pyakatasu block was approved in 12th SCPP held on 28th February, 2005 involving 1000m of drilling in 9 boreholes with associated geological & laboratory work. Accordingly MECL mobilised its resources to project site but could not carry out the work on account of Law & Order problem.

In the joint meeting of DGM, Nagaland and MECL under chairmanship of Additional Secretary (Mines) on July 4, 2008 keeping in view thrust given by Govt of India/MoM for development of Mineral resources in NER and importance of project, it was decided that the project should be taken up jointly by DGM, Nagaland and MECL. The matter was discussed in 20th SCPP held on 18th February, 2009 and it was decided that field work like drilling, geological mapping and sampling work will be carried out by DGM, Nagaland and the laboratory studies and report preparation shall be carried out by MECL.

DGM, Nagaland could commence field work in the month of April 2011 due to hostile nature of terrain. Upto December 2011, a total of 110m of drilling has been carried out in 1 (one) running borehole by DGM, Nagaland. Sampling work is yet to be commenced. The field investigations have been re-commenced after a gap of 4 months due to non field season.