

1 Indian Mineral Industry & National Economy

NATIONAL ECONOMY

The Indian economy grew robustly in the current financial year, i.e. 2010-11, and was on a firmer footing. With growth in 2010-11 estimated at 8.6% (as per the advance estimates released on 7 February 2011) and 8.0% in 2009-10 (as per quick estimates released on 31.1.2011), the turnaround from the slowdown caused by the global financial crisis of 2007-09 has been fast and strong. Growth in 2010-11 is strong with a rebound in agriculture and continued momentum in manufacturing.

Gross Domestic Product (GDP) is an important key indicator by which a nation's economic performance is gauged. Economic policies bring about pronounced changes in the industrial climate, foreign trade, domestic and international taxation policies, monetary exchange rates, etc., that have overarching effects on the overall growth of an economy. As per advance estimates, India's GDP growth rate at factor cost (at constant 2004-05 prices) touched 8.6% in 2010-11 as against 9.3% in 2007-08, 6.8% in 2008-09 and as per quick estimates 8.0% in 2009-10.

Economic parameters as per advance estimates published in Economic Survey 2010-11 reveal that the GDP in 2010-11 at current market prices and at factor cost at constant 2004-05 prices was Rs. 7877,947 crore and Rs. 4879,232 crore, respectively. The estimated level of growth in the GDP at constant 2004-05 prices at factor cost (real GDP) in 2010-11 was composed of growth of 5.4% in agriculture which rebounded from a downturn in the previous year; growth of 8.1% in industry which had a growth of 8.0% in 2009-10; and a decelerated growth of 9.6% in services as against 10.1% in 2009-10.

Growth in the industrial sector as per the Index of Industrial Production (IIP) was buoyant during the first two quarters of 2010-11. The manufacturing sector, in particular, showed a remarkable robust growth at rates of 12.6% and 9.9%, respectively, during these two quarters. Thereafter, industrial output growth has begun

to moderate. India's post recovery industrial output growth has been largely driven by a few sectors such as the automotive sector along with a revival in cotton textiles, leather, food products and metal products. Some sectors have shown extreme month-on-month output volatility. Weighted contribution of manufacturing, mining and electricity sector during April-December 2010 was 90%, 6% and 4% as against their weight of 88%, 7% and 5%, respectively, in the IIP.

Six core industries namely, crude oil, petroleum refinery products, coal, electricity, cement and finished carbon steel that have a combined weight of 26.7% in the IIP have a large bearing on infrastructure. They registered a growth of 5.3% (provisional) during April-December 2010-11 as against 4.7% during the corresponding period of the previous year.

Electricity generation by power utilities during 2010-11 was targeted to go up by 7.7% to 830.757 billion kWh. The growth of power generation during April-December 2010 was about 4.5% as compared to about 6.2% during April-December 2009. The generation from nuclear, hydro and thermal units registered growth of 33%, 8% and 3%, respectively, during April-December 2010. During this period, the peak and total energy deficits came down to 10.2% and 8.8%, respectively, from 12.6% and 9.8% during the corresponding period in the previous year, mainly due to growth of availability of power exceeding the growth in its requirement.

India's trade growth (in US dollar terms) has been robust at 20% plus since 2002-03. While India's trade growth has a strong correlation with world trade growth, it has been significantly higher than world trade growth following the 1990 reforms and then after 2003. The global recession only slightly jolted the continued upward growth in India's export sector with exports rising at a reasonable rate of 13.6% in 2008-09. The compound annual growth rate (CAGR) for India's merchandise exports for the five-year period 2004-05 to 2008-09 increased to 22% from the 14%

of the preceding five-year period. However, in 2009-10 export growth was negative at (-) 3.5%. Despite this negative growth, India's ranking in the leading exporters in merchandise trade which slipped marginally to 27th in 2008 improved to 21st in 2009. India's merchandise imports, also affected by global recession, fell to US\$ 288.4 billion with a negative growth of (-) 5.0% in 2009-10. This was due to the fall in growth of petroleum, oil and lubricant (POL) imports by 7.0% and non-POL imports by 4.2%. POL import growth was low mainly due to decline in import price of the Indian crude oil import basket by 16.5% despite the increase in quantity by 7.7%.

Trade deficit (on Customs basis) increased by 2.4% to US \$ 82 billion in 2010-11 (April-December) from US \$ 80.1 billion in the corresponding period of the previous year. Trade deficit reached a peak of US \$ 118.4 billion in 2008-09 and moderated to US \$ 109.6 billion in 2009-10. Net POL import growth, which has been positive since 2002-03, became negative at (-)10.9% in 2009-10 after a gap of seven years. However, during 2010-11 (April-September), it turned positive again with a growth of 15.1%. The current account balance in external trade as a proportion of GDP was (-)1.0% in 2006-07, (-)1.3% in 2007-08, (-) 2.3% in 2008-09 and (-) 2.8% in 2009-10. The figure for 2010-11 is not presently available.

Foreign Direct Investment (FDI) is expected to bring in capital flow, latest technology and enhance production capabilities. There has been tremendous growth in FDI inflows to India since 2003-04. Equity inflows have risen nearly thirteen-fold, from US\$ 2.23 billion in 2003-04 to US \$ 27.31 billion in 2008-09 and US \$ 25.89 billion in 2009-10. Total FDI inflow into India since the onset of the liberalisation process (August 1991-May 2010) is nearly US\$ 136.86 billion. This represents only the equity capital component. While the FDI inflows have somewhat flattened out over the course of the last three years, the pace of inflows has been stable, including during 2009-10. This is despite the fact that the United Nations Conference on Trade and Development (UNCTAD) World Investment Report (WIR), 2009 had noted a fall in global FDI inflows from a historic high of US \$ 1.979 trillion in 2007 to US\$ 1.697 trillion in 2008, a decline of 14%. The WIR, 2010, in its analysis of global trends and

sustained growth of FDI inflows, has ranked India as the second most attractive location for FDI for 2010-12. According to it, the top five most attractive locations for FDI for 2009-11 are China, India, Brazil, the United States and the Russian Federation.

MINING INDUSTRY

Mineral production in the country maintained an upward swing. The index of mineral production (base 1993-94=100) for all minerals (excluding atomic minerals) stood at 194.38 points in 2009-10 as against 177.29 points in 2008-09 registering an increase of 9.64%.

In the mineral fuel sector, index for coal mining including lignite and petroleum & natural gas increased by 15.47 points (7.84%) and 23.12 points (16.12%), respectively, over 2008-09. Index for non-metallic minerals rose by 7.49 points (3.19%) whereas that for metallic minerals decreased by 6.91 points (2.31%).

The total value of mineral production (including minor minerals but excluding atomic minerals) showed an increase of about 8% in 2009-10 at Rs. 1,87,717 crore over that recorded in 2008-09 at Rs. 1,73,482 crore. This was due to overall rise in the production of coal, lignite, natural gas (utilised), petroleum crude, silver, diamond, garnet (abrasive), lead concentrate, zinc concentrate, barytes, magnesite, kaolin, limestone, quartz, marl, ochre, etc. (Table-1).

In metallic ore mining sector, production increased in respect of silver (32%), zinc concentrate (4%), iron ore (3%) and lead concentrate (2%). However, drop in production was observed in case of chromite (16%), gold (14%), manganese ore (13%), bauxite (10%), copper concentrate (9%) and tin concentrate (1%).

Among the important non-metallic minerals, rise in production in 2009-10 was observed in diamond (31 times), garnet (abrasive) (36%), fluorite conc. (29%), barytes (27%), kaolin (24%), magnesite (13%) and limestone (3%) while substantial fall in production was noticed in the case of silica sand (19%), mica (crude) (17%), phosphorite/rock phosphate (14%), gypsum (12%), graphite (r.o.m.) (8%), talc/steatite and dolomite (6% each).

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Table – 1 : Indian Mineral Industry : Value of Production*
2007-08 to 2009-10

(In Rs. million)

Sector	2007-08 (R)	2008-09 (R)	2009-10 (P)	% change between		Sectoral contribution to the total value in %	
				2007-08 and 2008-09	2008-09 and 2009-10	2008-09	2009-10
Total : All Sectors	1540319	1734823	1877169	+12.63	+8.21	100.0	100.0
Fuels	1021188	1147156	1315317	+12.33	+14.66	66.12	70.07
(a) Solid fuel	414254	492248	529601	+18.83	+7.59	28.37	28.21
(b) Liquid & gaseous fuels	606934	654908	785716	+7.90	+19.97	37.75	41.86
Metallic minerals	291821	350760	322743	+20.20	(-)7.99	20.22	17.19
Non-metallic minerals	33713	40668	42869	+20.63	+5.41	2.34	2.28
Minor minerals**	193597	196239	196239	+1.36	-	11.31	10.45

Figures rounded off individually.

* Excluding the minerals declared as prescribed substances under Atomic Energy Act, 1962.

** Earlier year's figure has been taken as estimate for 2009-10 because of non-receipt of data.

The value distribution of mineral production in 2009-10 showed that fuels accounted for about 70%, metallic minerals about 17%, non-metallic minerals about 2% and minor minerals more than 10%. In the production value of metallic minerals, iron ore accounted for about 83%, lead (conc.) and zinc (conc.) together 5%, chromite and manganese ore (4% each), copper (conc.), primary gold, silver and bauxite (1% each) and tin concentrates accounted for the remaining.

Amongst the non-metallic minerals, about 96% value was shared by 12 minerals namely, limestone (70%), phosphorite/rock phosphate (7%), barytes (5%), dolomite (3%), kaolin, mineral gypsum & garnet (abrasive) (2% each), talc/soapstone/steatite, magnesite, marl, sillimanite and silica sand (1% each). The remaining 4% value was contributed by other non-metallic minerals. The production

in respect of emerald, corundum (ruby and sapphire), garnet (gem) and pyrites was not reported.

India produced as many as 86 minerals which included 4 fuel minerals, 10 metallic minerals, 46 non-metallic (industrial minerals), 3 atomic minerals and 23 minor minerals (building and other materials) in 2009-10.

Indian Mining Industry is characterised by a large number of small operational mines. The total number of working mines, (excluding atomic minerals, minor minerals, petroleum (crude) and natural gas) in the country was 2999 in 2009-10 as against 3150 in 2008-09. Among them, 574 mines belonged to coal and lignite, 700 mines to metallic minerals and 1,725 mines to non-metallic minerals (Table-2). There were 770 mines in public sector and the remaining 2,229 mines in private sector.

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**Table – 2 : Number of Operating Mines
2008-09 and 2009-10**

Sector	2008-09 (R)	2009-10 (P)
All Minerals*	3150	2999
Coal (including lignite)	574	574
Metallic minerals	719	700
Non-metallic minerals	1857	1725

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

The public sector continued to play a dominant role in mineral production in 2009-10 accounting for 64% or Rs.1,20,444 crore in the total value. Small mines, which were mostly in the private sector, continued to be operated manually either as proprietary or partnership ventures. The minerals which were wholly mined/recovered by the public/joint sector were copper ore, diamond, dunite, fluorite (conc.), fluorite (graded), phosphorite/rock phosphate, rock salt, sand (others), selenite and sulphur. By and large, almost the entire production of lignite, gold (primary), barytes and gypsum was from public sector. In 2009-10, the public sector accounted for sizeable 91% production of coal, 84% of petroleum (crude) and kyanite, 74% of sillimanite and 59% of magnesite.

In 2009-10, the mining and quarrying sector accounted for about 2.52% of the total GDP. The contribution of Mining and Quarrying sector in the total GDP in 2009-10 was Rs.1,54,269 crore indicating an increase of 11.27% over that in the preceding year. This was mainly due to rise in the value of coal, natural gas (utilised), lead and zinc concentrates, gold among metallic minerals and barytes, diamond, dolomite, garnet (abrasive) and magnesite & dunite among non-metallic minerals in 2009-10.

The contribution of minerals covered under MCDR, 1988 (which include metallic and non-metallic minerals but exclude petroleum, natural gas, coal lignite, sand for stowing, atomic minerals and minor minerals) was Rs. 30,308 crore i.e. about 20%, to the GDP accrued from Mining & Quarrying sector in 2009-10. Of this, share of metallic minerals was 18% and that of non-metallic minerals was about 2%. Among metallic minerals, iron ore accounted for 15% while chromite, lead & zinc concentrates and manganese ore accounted for about 1% each in 2009-10. Among the non-metallic minerals, the share of limestone was about 1%. A negligible share was contributed by the remaining minerals.

In 2009-10, production of minerals covered under MCDR, 1988 was reported from 20 States. Accrual to GDP from Mining & Quarrying sector by minerals covered under MCDR, 1988 was accounted for mainly by Odisha (34%), Goa (18%), Karnataka (15%), Chhattisgarh (14%), Rajasthan (7%), Andhra Pradesh (5%), Madhya Pradesh (3%), Maharashtra (2%) and Tamil Nadu & Gujarat (1% each).

The average daily employment in mining sector in 2009-10 was estimated at 5,21,425 persons. The public sector accounted for 4,19,925 persons (81%) and the remaining 101,500 persons (19%) accounted in the private sector.

India's ranking in 2009 in world production was 2nd in barytes, chromite and talc/steatite/pyrophyllite, 3rd in coal & lignite and steel (crude), 4th in iron ore and kyanite/sillimanite, 5th in manganese ore and zinc, 6th in bauxite, 7th in aluminium, 8th in copper refined and 11th in magnesite. The statistics on indigenous and world production of principal minerals and metals are given in Table-3.

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Table – 3 : Contribution and Rank of India in World Production of Principal Minerals & Metals, 2009

Commodity	Unit of quantity	Production		Contribution (Percentage)	India's rank in order of quantum of production
		World	India*		
Mineral Fuels					
Coal & lignite	Million tonnes	6938	566	8.2	3rd
Petroleum (crude)	Million tonnes	3714	34	0.9	25th
Metallic Minerals					
Bauxite	'000 tonnes	199000	13952	7.0	6th
Chromite	'000 tonnes	18700	3413	18.2	2nd
Iron ore	Million tonnes	2248	219	9.7	4th
Manganese ore	'000 tonnes	33400	2440	7.3	5th
Industrial Minerals					
Barytes	'000 tonnes	7100	2138	30.1	2nd
Kyanite, andalusite & sillimanite	'000 tonnes	440 ^(e) **	36	8.2	4th
Magnesite	'000 tonnes	24300	286	1.2	11th
Apatite & rock phosphate	'000 tonnes	159000	1552	0.9	14th
Talc/steatite/pyrophyllite	'000 tonnes	7400	1077	14.5	2nd
Mica (crude)	tonne	300000	1213	0.4	15th
Metals					
Aluminium	'000 tonnes	36900	1481	4.0	7th
Copper (refined)	'000 tonnes	18300	533	2.9	8th
Steel (crude/liquid)	Million tonnes	1224	65@	5.3	3rd
Lead (refined)	'000 tonnes	8900	64	0.7	21st
Zinc (slab)	'000 tonnes	11400	614	5.4	5th

Source: World mineral production data compiled from World Mineral Production, 2005-2009, British Geological Survey.

* Figures relate to 2009-10

** Mineral Commodity Summaries, 2010, US Geological Survey.

@ Annual Report, 2010-11, Ministry of Steel.

MINERAL-RELATED POLICIES

The significant developments relating to National Mineral Policy and other mineral related policies that took place in 2009-10 are given below:

National Mineral Policy, 2008

The new National Mineral Policy 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 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.

In line with the new National Mineral Policy, 2008, the Ministry of Mines has prepared a new draft Mines and Minerals (Development & Regulation) Act in consultation with all the stakeholders including State Governments, industries and concerned Ministries/Departments of Central Government, and representatives of civil society concerned with environmental/societal impact. The draft Mines and Minerals (Development and Regulation) Act, was circulated to all the stakeholders in July, 2009 for comments. Subsequently, follow up meetings and workshops were held with the various stakeholders in the months of August, September, October, 2009 and January & April, 2010. Four rounds of discussions were also held by the Group of Ministers. The successive versions of the draft Act were also circulated/uploaded on the website of the Ministry for obtaining the comments of the stakeholders. The Cabinet has taken a decision to place the proposed Mines and Minerals (Development & Regulation) Bill, 2011 (MMDR Bill) before Parliament for approval.

Internal Committee for drafting Sub-legislation

An Internal Committee was constituted in the Ministry of Mines under the Chairmanship of Joint Secretary (M&R) for drafting Sub-legislation in terms of draft Mines and Mineral (Development

& Regulation) Act, 2011. As decided in the first meeting of the committee, two sub-committees were constituted in IBM and their work is in progress.

Mining Tenement & Registry System

In cue with the Hoda Committee's recommendation for creation of an internet-based Mining Tenement Registry to enable stakeholders to know the status of an area in terms of concessions along with facility for tendering online application, Indian Bureau of Mines in coordination with Geological Survey of India has been authorised to maintain a database in digitised form comprising both Resource Inventory and Tenement Registry in accordance with the latest version of the UNFC system. The Tenement Registry additionally will provide information on both Leasehold Areas as well as Freehold Areas in terms of greenfield, brownfield and relinquished areas including areas given up by GSI and reconnaissance permit/prospecting licence holders. It is envisaged that the online data would serve as a ready reckoner for all prospective investors desirous of seeking information on reconnaissance, prospecting and mining along with details of work done by public agencies that would be kept in the form of metadata in the public domain.

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 Governments. A pilot project for Durg and Bellary districts has been developed and successfully demonstrated.

In respect of 'Registry component' of the project, IBM and National Informatics Centre (NIC) have jointly finalised the 'Terms of Reference' (ToR) for preparation of 'Detail Project Report' (DPR). A pre-bid meeting was held at NIC, New Delhi for selection of consultant for preparation of DPR.

Once the DPR is prepared and accepted, it will pave the way for next step for calling the bid for selection of consultant for development of application software for the project. In respect of the tenement part of the system, the matter is being followed up with the State Governments to

complete digitisation of the cadastral maps under the National Land Records computerisation programme enabling Geo-referencing of the maps for tenement purpose.

Forest & Environment Issues

The Hoda Committee, set up to review the National Mineral Policy, had held that some 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 impacts. 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 had recommended development of a Sustainable Development Framework specially tailored to Indian context.

In this regard, the Ministry of Mines has initiated action to prepare a Sustainable Development Framework for the Indian Mining sector. The Sustainable Development Framework would address important issues relating to rehabilitation & resettlement, environment, mine closure, etc. The Ministry has selected a Consultant M/s. ERM in this regard through a bidding process. The Consultant has prepared and submitted a draft Sustainable Development Document, consisting of principles, reporting initiatives and good practice guidelines for the Indian Mining sector. The draft document has been hosted on the website of the Ministry for obtaining the comments of the public concerned. The draft Sustainable Development Document is likely to be finalised shortly.

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

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. 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, Controller General, IBM, constituted a committee 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 and uploaded on the IBM's website for perusal of stakeholders and State Governments to seek their views /comments.

Offshore Exploration

To ensure that India's exclusive economic zone is explored and exploited to the maximum possible extent, the Ministry of Earth Sciences (MoES) and its agencies are entrusted with the task of sea-bed exploration and mining. Cooperation between MoES and GSI will be institutionalised so as to achieve this objective within a time bound framework.

The Ministry has set up a Committee headed by Controller General, IBM, including officers from National Institute of Oceanography, MoES and GSI Marine Wing to coordinate and evolve an exploration plan to identify new areas of mineral deposits in the offshore areas of the country.

An Act to provide for development and regulation of mineral resources in the territorial waters, continental shelf, exclusive economic zone and other maritime zones of India and to provide for matters connected therewith or incidental thereto was notified on 31st January, 2003. The Act titled Offshore Minerals (Development and Regulation) Act has come into force w.e.f. 15.1.2010. The Controller General, Indian Bureau of Mines, has been appointed as the Administering Authority for the purpose of the Act.

The Controller General, IBM, has notified mineral bearing areas off the Eastern and Western coasts for grant of exploration licence on 7th June, 2010. Of the 377 applications received, 62 blocks were recommended for grant of exploration licences in the offshore waters of Bay of Bengal and Arabian Sea.

Coordination-cum-Empowered Committee

The Ministry of Mines has set up Coordination-cum-Empowered Committee in order to monitor and minimise the delays in grant of various approvals by the Ministries/Departments concerned in the Central Government for grant of mineral concessions. The Committee has so far held five rounds of meetings on 24.7.2009, 22.12.2009, 18.6.2010, 22.12.2010 and 3.5.2011, wherein important decisions aimed at minimising delays for processing of mineral concession applications at various levels and improving the overall mineral concession regime and controlling illegal mining were taken.

Measures to Control Illegal Mining

To curb the menace of illegal mining, the Ministry of Mines has taken up various steps with the co-operation of the State Governments comprising matters related to royalty passes, curbs on overloading, putting in place in-motion weigh-bridges, modernisation of checkgates, constitution of coordination-cum-empowered committees, among others.

Ministry of Mines has 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.

The State Governments are also planning to set up special camps at sites and deployment of Border Home Guards in the areas where there have been complaints about illegal mining.

Rule 45 of Mineral Conservation and Development Rules, 1988 has been amended on 9 February, 2011 to bring traders, stockists, exporters and end-users dealing with minerals under the purview of regulation. This will ensure end-to-end accounting of minerals, thus obviating scope for illegal mining.

Justice M.B. Shah Commission of Inquiry set up by Ministry of Mines

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 S.O. 2817 dated 22 November, 2010 to inquire into the large scale illegal mining of iron ore and manganese ore. The terms of reference of the Commission are as follows:

(i) to inquire into and determine the nature and extent of mining, 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 Government.

The Commission is to submit its report to the Central Government as soon as possible but not later than 18 months from the date of its first sitting.

Standing Scientific Advisory Group (SSAG)

The Standing Scientific Advisory Group of the Ministry of Mines has been re-constituted under the Chairmanship of Secretary, Ministry of Mines, vide Office Memorandum of Ministry of Mines dated 28.2.2011.

Terms of reference of SSAG are as follows:

- (i) to finalise the project proposals recommended by Project Evaluation and Review Committee (PERC);
- (ii) to consider recommendations of PERC on promotion of R&D for the mineral sector;
- (iii) to consider R&D issues relating to acquisition of technology assets in relation to mineral and mining sector;
- (iv) to consider strategies for coordination and strengthening of Research Organisations in the sector and for their better coordination; and
- (v) to consider HR development strategies for the sector to promote R&D.

Project Evaluation and Review Committee (PERC)

A Project Evaluation and Review Committee (PERC) under Standing Scientific Advisory Group (SSAG) of the Ministry of Mines has been reconstituted vide Office Memorandum of Ministry of Mines dated 28.2.2011 under the Chairmanship of Joint Secretary, Ministry of Mines. Terms of reference of PERC are: to advise the Ministry of Mines on project proposals so as to advance the objectives of R&D recorded in the National Mineral Policy, 2008; to evaluate/ appraise S&T project proposals before consideration of SSAG; to review and monitor progress of projects and nearing completion/ recently completed projects as regards targeted deliverables before considering release of the last installment of the grant-in-aid; to identify potential area for applied R&D in furtherance of the National Mineral Policy; and to periodically review status of follow up on completed projects in terms of follow on projects or industry applications.

Mineral Advisory Council

The Government of India reconstituted the Mineral Advisory Council with immediate effect vide Gazette of India, Ministry of Mines, Resolution No.12(1)/2007-M-VI dated 1.7.2010 under the Chairmanship of the Minister in-charge of Ministry of Mines. The tenure of the Council is

four years from the date of notification. As per the terms of reference, the Council shall advise on matters relating to:

- (a) Mineral policy and legislation in land and in offshore areas.
- (b) Policies of sustainable mining and maintenance of ecological balance.
- (c) Issues of community and local area development in mining areas and inclusiveness of host population in mining activities.
- (d) Infrastructure support, including transportation for the mineral sector and policies for financing the projects through Public Private Partnership (PPP) models and viability gap funding.
- (e) Financial support for mining activities including institutional finance, and risk funds for exploration.
- (f) Policies for domestic and foreign trade and investments in mineral sector keeping in view techno-economic and strategic considerations.
- (g) Issues relating to human resource development.
- (h) Research and development in the mineral sector including exploration, mining methods, beneficiation, mining equipment and development of new materials, energy saving and waste reduction.
- (i) Taxation measures and incentives to promote value addition and setting up of downstream industries as forward linkage of mining.
- (j) Policies on import of technology and equipment for mining and exploration.

Foreign Trade Policy, 2009-2014

The new Foreign Trade Policy 2009-2014 (FTP) announced by the Government came into force with effect from 27 August, 2009. A number of Special Focus Initiatives have been announced through Market Diversification and Export Promotion Capital Goods (EPCG) Scheme. Under the Market diversification Initiatives, the focus is on diversification of Indian exports to other markets, specially those located in Latin America,

Africa and major Asian markets like China and Japan, parts of Asia and Oceania. Subsequently, with the coming into force of the annual supplement to the FTP, there has been a significant increase in the outlay under "Market Linked Focus Product Scheme" by inclusion of more markets and products. Additional engineering items, namely, cast articles of iron & steel, ferro-manganese and ferro-silicon will now be entitled to benefit @ 2% under Focus Product Scheme.

The export of Sand and Soil (ITC (HS) Code 25051011, 25051012, 25051019, 25051020, 25059000, 25309099) is restricted. However, export to Maldives is permitted as per ceiling mentioned below subject to issue of No Objection Certificate (NOC) within the annual ceiling by CAPEXIL:

The ceiling on export of Stone Aggregate for the financial year 2010-11 is 1,026,550 tonnes.

Import Policy of ITC (HS) Code 73269099 (others - articles of iron and steel) has been declared free vide MC & I (DC) Notification No. 52/2009-14 dated 8.7.2010.

Basic custom duty on gems & jewellery machinery, ferro-nickel, vanadium pentoxide & vanadium sludge, mineral gypsum, rhodium is being reduced while that on silver, platinum, gold bars (serially numbered) (other than tola bar) is increased. Gold ores & concentrates are fully exempted from basic custom duty while iron ore pellets are fully exempted from export duty. On the other hand, statutory rate of export duty on iron ores is raised from 20% to 30% while the effective rate of export duty on iron ore fines and lumps is unified at 20%.

New Exploration Licensing Policy (NELP)-IX for Oil and Gas Exploration

Under the New Exploration Licensing Policy (NELP) for exploration of oil and natural gas, the Government of India announced ninth offer of exploration blocks on 15th October, 2010. Companies are invited to bid for 34 exploration blocks on offer. A total of 19 Onland blocks of which 8 are Type S blocks, 7 Shallow water blocks and 8 Deepwater blocks (beyond 400 metre bathymetry) are on offer. Companies may bid for one or more blocks, singly or in association with

other companies, through an unincorporated or incorporated venture. For onland small size blocks with area of less than 200 sq km categorised as Type S blocks, technical capability will neither be a pre-qualification criterion nor a bid evaluation criterion. For onland and shallow water blocks, technical capability will be a pre-qualification criterion. For deepwater blocks, technical capability will be a bid evaluation criterion.

Allocation of Coal and Lignite Blocks

There are 229 (148 existing and 81 newly identified) coal blocks for allocation to specified end-users and Government companies on display on the website of Ministry of Coal. A total of 208 coal blocks have been allocated to various private sector/public sector companies including Ultra Mega Power Projects of 4,000 MW each being set up in Madhya Pradesh, Odisha and Jharkhand. During the year 2009-10 (Up to 31st December, 2009), 13 coal blocks with total geological reserves of about 3591.32 million tonnes were allocated to eligible public and private sector companies. Out of these, 6 coal blocks with geological reserves of about 1674.60 million tonnes of coal were allocated for generation of power.

International Co-operation

During 2010-11, Ministry of Mines signed Memoranda of Understanding with Canada, Republic of Mozambique and Republic of Malawi to enhance the bilateral co-operation in the field of Geology and Mineral Resources.

LEGISLATION

Offshore Areas Mineral (Development and Regulation) Act, 2002

The Offshore Areas Mineral (Development and Regulation) Act, 2002, aimed at providing fillip to the Government's Policy vis-a-vis development and regulation of mineral resources in the territorial waters, continental shelf, exclusive economic zone and other maritime zones of India and to provide for matters connected therewith or incidental thereto was notified on 31 January, 2003. The Provisions of the Act came

into force w.e.f. 15.1.2010 vide S.O.338(E) dated 11.2.2010 published in Gazette of India on 12.2.2010.

Under different Sections of Offshore Areas Mineral (Development and Regulation) Act, 2002, notifications have been issued on 11 February 2010 and 7 June 2010. The Controller General, Indian Bureau of Mines, is the Administering Authority and also Authorised Officer, for grant of Exploration Licence. Similarly, Secretary, Ministry of Mines, is designated as the Authorised Officer to hear and decide cases relating to Clauses (a) and (b) of Section 28(1) of the Act.

The mineral bearing areas off the Eastern and Western coasts were notified vide S.O. 1341 (E) dated 7.6.2010 for grant of exploration licence. A total 377 applications were received and 62 blocks were recommended for grant of exploration licences in the offshore waters of Bay of Bengal and Arabian Sea.

Mines and Minerals (Development & Regulation) Act, 1957

The MMDR Act, 1957, was amended vide Notification No. 43 dated 8.9.2010, whereby a new Section "11A" is inserted relating to grant of reconnaissance permit, prospecting licence or mining lease in respect of an area, containing coal or lignite. A company engaged in production of iron and steel, generation of power, washing of coal obtained from a mine; or such other end-use as notified by Central Government in the Official Gazette may be selected through auction by competitive bidding for grant of the mineral concession subject to certain exceptions.

Mineral Concession Rules, 1960

The Central Government, in exercise of the powers granted under Rule 27 (3) of the MCR, 1960, has directed all the state Governments to impose a special condition to ensure that prospecting work is carried out in the lease area at the lessee's own cost in all the existing and future leases of major minerals (excluding coal minerals), including reserved areas where mining leases would be granted in future.

Mineral Conservation and Development Rules, 1988

Rule 45 of the MCDR, 1988, is amended vide Notification No.GSR 75 (E), dated 9.2.2011 requiring the owner, agent, mining engineer or manager of every mine or any person or company engaged in trading or storage or end-use or export of minerals mined in the country, to be registered with the IBM for all purposes of submission of statutory Monthly and Annual Returns.

EXPLORATION & DEVELOPMENT

GSI, AMD, DGMs of various States, public sector companies like NMDC, MECL, MOIL, etc. continued their efforts for surveying, mapping and exploration of new deposits and reassessment of old deposits/mines during 2009-10. In oil sector, ONGC, OIL and a few joint venture and private companies were engaged in exploration of onshore and offshore areas in 2009-10. Exploration conducted by various organisations during 2009-10 is highlighted below:

Geological Survey of India (GSI)

The GSI is vested with the responsibility of maintaining broad-based and uniform national approach to data generation in respect of mineral resources. With the near exhaustion of resources to the proximity of surface, it has become imperative to have multidisciplinary approach to mineral exploration which comprises large-scale and detailed geological mapping aided by interpretative analysis of aerogeophysical and remotely sensed data, ground geophysical survey, geochemical prospecting and surface and subsurface exploration through pitting, trenching and drilling. During 2009-10, about 1,659 sq km large-scale mapping, 35.75 sq km detailed mapping and 55,988 m drilling were carried out in comparison to 1,109 sq km large-scale mapping, 25.31 sq km detailed mapping and 63,078 m drilling carried out in the previous year. Out of the total mappable areas of 3.146 million sq km of the country, 3.093 million sq km has been covered so far by systematic mapping bringing the total coverage to 98.31%. Additional resources were estimated for coal, gold, base metal, iron ore and

manganese ore. The highlights of the resources assessed are given below in brief:

During 2009-10, GSI estimated about 3,421 million tonnes of coal resources in various coalfields of Chhattisgarh and Jharkhand; about 34.73 million tonnes of gold ore resources (1.87 g/t Au) in Delwara West block and 1.932 million tonnes gold ore resources (3.978g/t Au) in Gundelapara block, Bhukia gold belt, Banswara district, Rajasthan; about 4.5 million tonnes gold ore resources (0.25 g/t Au) in Bharkundi block, Dungarpur district, Rajasthan; about 4.61 million tonnes of iron ore resources (55% Fe cut off) at an average grade of 61.97% Fe in Ghoraburhani block, Sundergarh district, Odisha; about 0.07 million tonnes of manganese ore resources in Damurda (South) block, Keonjhar district, Odisha and about 235.28 million tonnes of SMS grade limestone and 336.07 million tonnes of cement grade limestone in Miniyam-ki-Dhani area, Jaisalmer district, Rajasthan.

GSI continued its offshore geo-scientific studies both in Exclusive Economic Zone (EEZ) and Territorial Waters (TW) along the East and West Coasts of India. During 2009-10, a total of 18 cruises were undertaken using three vessels; six cruises aboard R.S. Samundra Manthan within EEZ, seven cruises aboard R.V. Samundra Kaustubh within the TW off the East Coast and five cruises aboard R.V. Samundra Shaudhikama within the TW off the West Coast. Surveys in the near shore zones were carried out using hired small mechanised boats.

GSI pursued its airborne geophysical surveys for generating database employing magnetic and gamma ray spectrometric techniques. During 2009-10, aerogeophysical multi-sensor data was acquired by surveying over an area of 30,975 sq km involving 14,761 line km in Hosadurg-Vengurla areas over Western offshore falling between 12° N-16° N latitude using Twin Otter Air-borne Survey System (TOASS) by GSI.

MECL

During 2009-10, MECL established about 1,691 million tonnes of coal reserves. Promotional & contractual drilling was carried out in Andhra

Pradesh, Chhattisgarh and Maharashtra. About 458 million tonnes, 241 million tonnes and 1,574 million tonnes lignite reserves were established in Gujarat, Rajasthan and Tamil Nadu, respectively. MECL assessed about 1.241 million tonnes of basemetal resources (0.70% Cu, 0.35% Pb and 0.56% Zn) in Bajta North block (Phase-I) in Ajmer district, Rajasthan; 0.973 million tonnes of lead zinc ore resources (1.33% Pb & 1.44% Zn) in Ganeshpura block, Ajmer district, Rajasthan and 2.65 million tonnes of lead-zinc resources (3.42% Pb, 0.66% Zn & 0.38% Cu) in Rewara block, Chittorgarh district, Rajasthan. MECL also established about 3.486 million tonnes gold resources (1.05 g/t Au) and 1.67 million tonnes gold resources (1.72 g/t Au) in Parasi-Central (Phase-I) block and 7.467 million tonnes (0.995 g/t Au) and 3.714 million tonnes (1.65 g/t Au) gold ore resources in Parsi-Central (Phase-II) block in Ranchi district, Jharkhand. MECL also estimated about 320.53 million tonnes resource of friable quartzite/glass sand in Assam.

State Directorates of Geology and Mining

DGM, Chhattisgarh, established about 0.22 million tonnes and 0.2 million tonnes bauxite resources in Kabirdham and Sarguja districts; about 20 million tonnes coal reserves in Raigarh Coalfields; 5 million tonnes of iron ore resources in Rawghat area, Narayanpur and Kanker districts; about 12.22 million tonnes of cement-grade, 18.58 million tonnes of low-grade and 3.076 million tonnes of blendable grade limestone resources in Raipur and Bastar districts.

DMG, Karnataka, established about 6.2 million tonnes of iron ore resources under inferred category in Shimoga district; about 1.58 million cubic metres of granite, granitic gneisses and dolerite resources in Chitradurga district; about 15,000 tonnes of quartz resources in Mandya district; and about 0.20 million tonnes of talc/steatite were estimated in Davangere district.

DGM, Maharashtra, estimated about 276.01 million tonnes of coal resources in Chandrapur, Nagpur, Wardha and Yavatmal districts;

and about 0.16 million tonnes resources of pyrophyllite/sillimanite in Chandrapur district.

DMG, Rajasthan, estimated about 1.5 million tonnes gypsum resources in Bikaner district; 43.51 million tonnes of laterite resources (inferred) in Jhalawar district; 116 million tonnes of SMS grade and 186.5 million tonnes cement and other grades of limestone resources in Jaisalmer, Banswara and Nagaur districts; about 0.23 million tonnes of silica sand and 0.27 million tonnes of red ochre resources in Bharatpur district; about 25.64 million tonnes of sandstone resources in Dhaulpur and 303.5 million tonnes of sandstone resources (inferred) for masonry purpose in Bundi and Kota districts.

DGM, Madhya Pradesh, established about 9.39 million tonnes dolomite resources in Chhattarpur district; about 47.25 million tonnes of laterite resources in Mandsaur and Neemuch districts; and about 45 million tonnes of limestone resources in Satna district.

Oil and Natural Gas Corporation Ltd (ONGC)

ONGC continued its operations for exploration of oil and gas and acquired a total of 24,993 GLK/LK of 2D and 21,741 sq km of 3D seismic data during 2009-10. A total of 128 exploratory wells with cumulative meterage of 368,669 m and 249 development wells with cumulative metreage of 509,078 were drilled. ONGC established 21 new oil prospects in 2009-10 in Assam, Assam Arakan basin, Western offshore, Krishna-Godavari onland and offshore, Cambay basin, Cauvery onland and Assam-Arakan Fold Belt. The ultimate reserve accretion of oil & oil equivalent gas (O+OEG) in 2009-10 in domestic assets of ONGC was 82.98 million tonnes. The total ultimate reserve of O+OEG as on 1.4.2010 was 2,511.36 million tonnes.

Oil India Ltd (OIL)

OIL continued its operations for exploration of crude oil and natural gas in 2009-10 and acquired a total of about 1,308 GLK of 2D and 984 sq km 3D seismic data. Exploration resulted

in significant discoveries of oil/gas within Tipam Formation, Narpuh, Lakadong & Therria and Langpar Formation, Tipam and Barail Formation, Umatara Structure, Dhulijan Structure and towards north-west of Jaipur Structure of Nahorkotiya Extension in Assam.

Indian Bureau of Mines (IBM)

IBM as a facilitator to mineral industry (a) provided technical consultancy services in feasibility study, environmental impact assessment, environmental management plan, etc.; (b) carried out mining research on need-based aspects of mining; (c) conducted mineral beneficiation studies, including mineralogical testing and chemical analysis; and (d) prepared mineral maps. Besides, preparation of National Inventory of mineral resources is IBM's designated responsibility. The National Mineral Inventory (NMI) is brought out by IBM quinquennially—the work on NMI as on 1.4.2010 is presently underway. UNFC system has been adopted by IBM for resource classification. IBM has taken up updation of mineral resources in respect of 70 minerals based on UNFC system as on 1.4.2010.

IBM is entrusted with preparation of multimineral maps. About 100 multimineral maps with forest outlays on 1:50,000 scale were prepared in respect of Gujarat and part of Rajasthan during 2009-10 in collaboration with Forest Survey of India. IBM has also conducted 66 ore dressing investigations, 50,519 chemical analysis, 2,388 mineralogical studies and 6 in-plant studies during the year.

Other Agencies

GMDC estimated a total of 16 million tonnes of lignite resources in Kachchh district, Gujarat; about 69 million tonnes of proved resources of limestone and 41 million tonnes of geological resources of limestone in Surat and Kachchh districts, respectively.

Exploration by HGML has established 9.93 million tonnes gold ore reserves (3.36 - 5.68 g/t Au) in Hutti and Hira-Buddini in Raichur district of Karnataka.

Singareni Collieries Company Ltd (SCCL) proved 74.57 million tonnes of coal reserves in Godavari Valley Coalfield, Andhra Pradesh, during 2009-10.

SAIL estimated 74.02 million tonnes of iron ore resources in Rajhara, Dalli, Jharandalli mines in Durg district, Chhattisgarh.

Reliance Industries Limited (RIL) has successfully drilled 4 appraisal wells in the southern and deeper parts of the NEC-25 block. Appraisal activities are currently underway in KG-D4, CY-D5, KG-III-5, KG-III-6, KG-V-D3 and GS-01 blocks. Currently, RIL's portfolio consists of 29 exploration blocks. The company has submitted a proposal for commerciality of the discoveries made in KG-III-5, CY-D5, NEC-25, and KG-D6 blocks. The development plan of RIL for Sohagpur Coal Bed Methane (CBM) blocks has been approved by the Government and development activities have been planned to commence in 2010-11 by drilling and completion of additional wells. Prolonged production testing was undertaken in the wells drilled in Sohagpur CBM blocks with favourable results. During 2009-10, two CBM blocks BS-1 and BS-2 were relinquished. With this, RIL currently holds a total of 3 CBM blocks.

Cairn India Ltd is engaged in production and exploration of hydrocarbon and has made one of the largest oil discoveries in Mangla Field of Rajasthan. Presently oil is being produced at the rate of 125 thousand barrels of oil per day (bopd).

RESEARCH & DEVELOPMENT

The Science and Technology (S&T) programmes of the Ministry of Mines, Government of India, cover the disciplines of Geology, Exploration, Mining and Environment, Bioleaching, Beneficiation, Rock Mechanics, Ground Control and Non-ferrous Metallurgy. During 2009-10, a total of five new projects have been approved and three more have been scrutinised by Project Evaluation and Review Committee.

The highlights of the work carried out by various research organisations and industries

relating to mineral beneficiation and mining & environment during 2009-10 are furnished below:

Beneficiation

Bauxite

Bench scale beneficiation studies on Bauxite Sample from Sabarkantha area (IBM): The as-received sample assayed 35.47% Al_2O_3 , 4.44% $SiO_2(T)$, 32.90% Fe_2O_3 & 18.44% LOI. Dry high intensity magnetic separation produced a non-magnetic fraction assaying 44.81% Al_2O_3 , 19.77% Fe_2O_3 , 3.62% $SiO_2(T)$ and 23.58% LOI with 18.60% Al_2O_3 recovery (wt% yield 14.7). This non-magnetic bauxite fraction may find application in Metallurgical industry.

Chromite

Beneficiation studies and development of flow sheet on low grade chromite ore lumps (M/s Ashapura Minechem Ltd, Mumbai, Maharashtra) (IMMT): Results of mineral separator studies on different feed sizes and operating timings indicate that a feed containing 31% Cr_2O_3 was enriched to 37% Cr_2O_3 . This product was enriched to 39.84% Cr_2O_3 when the mineral separator product was subjected to magnetic separation. Alternately, a product can be obtained with 40.25% Cr_2O_3 from feed containing 36.35% Cr_2O_3 by using dispersant during the mineral separator studies. It is further observed that 40% Cr_2O_3 grade can be obtained by either calcination or reduction roasting with recoveries 51% and 57% at 45% and 63% yields, respectively, from a feed of 35.7% Cr_2O_3 .

Typical test results of continuous semi autogenous ball mill grinding followed by sieve bend classification yielded a product containing 40.74% Cr_2O_3 from a feed containing 30.0% Cr_2O_3 . However, the recovery was limited to 11% only.

Iron Ore

Beneficiation of an Iron Ore Sample from Haraginodar mines, Bellary, Karnataka (IBM): The as-received sample assaying 58.25% Fe(T), 6.73% FeO, 6.52% SiO_2 , 1.82% Al_2O_3 , 2.16% LOI, 1.04% CaO, 3.30% MgO, 0.25% P & 0.10% S(T) was to be upgraded to +66% Fe(T) with $SiO_2 < 1%$, $P < 0.06%$ and $S(T) < 0.06%$ with

maximum Fe(T) recovery. Grinding, magnetic separation, tabling and flotation yielded an iron ore concentrate assaying 70.43% Fe(T), 8.69% FeO, 0.71% SiO₂, 0.035% P, 0.008% S with 69.3% Fe(T) recovery (Wt% yield 57.8).

Beneficiation and pelletisation studies on low-grade iron ore fines (M/s Yazdani International (P) Ltd, Bhubaneswar, Odisha) (IMMT): The low grade iron ore fines sample supplied contains on an average 57.4% Fe, 6.3% SiO₂, 6.84% Al₂O₃ and 4.5% LOI. Different alternative flow sheets have been suggested to recover the iron values suitable for both sintering and pelletisation. Detailed investigations have indicated that iron ore concentrate with 63.7% Fe at 68% yield could be obtained by combination of screening, jigging hydrocyclone and magnetic separation techniques. The concentrates thus obtained can be used for sintering and pelletisation purpose. The pelletisation studies reveal that it is possible to prepare quality pellets with Jig concentrate using 0.8% bentonite as binder and Wet High Intensity Magnetic Separation (WHIMS) concentrate can also be pelletised with basicity of around 0.5.

Pelletisation studies on blue dust and combination of iron ore fine concentrate (M/s Yazdani International (P) Ltd, Bhubaneswar, Odisha) (IMMT): A project, sponsored by M/s Yazdani International (P) Ltd, for beneficiation of 58-60% Fe available in Odisha to produce a concentrate with more than 64.0% Fe for use in pelletisation plant has been successfully completed. The studies indicated that it is possible to prepare quality pellets from blue dust using bentonite as binder. Bentonite addition of 1.0% wt/wt of concentrate is adequate for obtaining pellets with acceptable drop strength and CCS after heat hardening. Induration temperature of 1200°C - 1250°C is required to get the required pellet strength. It is also possible to prepare pellets having 0.5 basicity, from blue dust, using limestone and coke. Higher induration temperature is required in absence of coke

to compensate for endothermic reactions of limestone calcination. It is also possible to prepare quality pellets from the 50:50 mixture or 60:40 mixture of blue dust and concentrate (65.96% Fe) using bentonite as binder.

Beneficiation of low grade iron ore fines by Jigging (M/s Rungta Mines Limited, Barbil, Odisha) (IMMT): The low-grade iron ore fines on an average contain 60.87% Fe, 3.22% SiO₂ and 4.27% Al₂O₃. Detailed investigations carried out by adopting various beneficiation techniques indicate that the combination of screw classification, screening, jigging, hydrocyclone and magnetic separation route can be applied to recover most of the iron values present in the low grade iron ore fines. Two products can be generated by jigging and Wet high intensity magnetic separation. Jig product can be used directly in sintering, whereas combined product can be used either for sintering or pelletisation based on requirement. A jig product with 65.9% Fe at 45% yield can be generated. Magnetic product contains 62% Fe with at 30.4% yield. It is possible to produce iron concentrate with 64.3% Fe at 75.4% weight recovery.

Beneficiation of low grade iron ore fines for sintering and pelletisation (M/s Bhushan Power and Steel Limited, Sambalpur, Odisha) (IMMT): Two low grade iron ore fines samples designated as A & B were supplied which contain an average 59.74% Fe, 3.48% - 4.6% SiO₂ and 3.48% - 4.7% Al₂O₃. The average hematite in the bulk sample is 46.30%. Various beneficiation techniques such as scrubbing, jigging, spiralling and magnetic separation have been applied to recover the iron values. Different alternative flow sheets have been suggested to recover the iron values suitable for sintering and pelletisation. The investigations on sample 'A' have indicated that iron concentrate with 65% Fe at 71.8% yield could be obtained by combination of scrubbing, screening, jigging, hydrocyclone and magnetic separation techniques. More or less similar results were obtained for sample 'B'.

Lignite

Beneficiation of Lignite Sample from Mata-no-Madh mines of Kachchh area for GMDC Science & Research Centre, Ahmedabad, Gujarat

(IBM): The as-received sample assayed 14.40% S(T), 26.80% ash, 39.89% V.M., 29.53% F.C., 3.78% moisture, 0.29% SO₄, 13.65% Pyritic Sulphur & 0.47% Organic Sulphur. By adopting flotation to separate pyrite from lignite and subjecting tails to gravity operation yielded a lignite concentrate assaying 3.52% S(T), 13.22% ash, 43.06% V.M., 34.94% F.C., 8.78% Moisture with 79.0% F.C. recovery (overall Wt% yield 64.50).

Limestone

A ferruginous Limestone sample from PNR mines Arayalur District, Tamil Nadu sent by M/s Dalmia Cement (Bharat) Ltd

(IBM): The as-received sample assayed 40.46% CaO, 5.44% SiO₂, 13.01% Fe₂O₃, 2.00% Al₂O₃, 0.38% MgO and 36.63% LOI. By adopting flotation route a concentrate assaying 50.11% CaO, 1.00% SiO₂, 2.76% Fe₂O₃ with CaO recovery of 65.1% (Wt% yield of 53.1) could be obtained.

Beneficiation studies on low grade limestone from polished stone mines (M/s Associated Stone Industries (Kota) Limited, Rajasthan (IMMT):

Low-grade materials are generated during preparation of polished Kota stones and contain roughly 37-39% CaO and 23-25% SiO₂ as the major chemical constituents. Froth flotation technique was employed to recover the CaO values after grinding the material to below 100 micron size. The results reveal that the limestone sample is amenable to beneficiation by flotation techniques with oleic acid or commercial grade sodium oleate as the collector. The sample can be well floated by grinding to below 100 micron particle size, where the liberation of calcite particles occurs as evidenced from the mineralogical studies. It is possible to obtain a concentrate with 44% CaO at 80% recovery. Taking all the experiments into consideration, it has been concluded that at least concentrate with CaO grade of 44% with more than 65% yield can be obtained.

Manganese

Production of Marketable grade Manganese concentrate from rejects of Netra Mine, Balaghat, Madhya Pradesh (IBM):

The as-received sample assayed 26.52% Mn, 6.93% Fe(T), 33.03% SiO₂, 5.68% Al₂O₃. Gravity separation followed by magnetic separation yielded a concentrate assaying 40.12% Mn, 9.01% Fe(T), 15.00% SiO₂ with 76.3% Mn recovery (Wt% yield 50.5). It is appreciable that the marketable grade concentrate was obtained from rejects.

Rock Phosphate

Upgradation of Carbonaceous & Siliceous Rock Phosphate after blending (IBM):

The primary ore received from Jhamarkota works of RSMML, Rajasthan assayed 14.22% P₂O₅, 39.39% CaO, 12.93% MgO, 25.92% LOI, 5.34% SiO₂, 0.85 Fe₂O₃. The secondary ore assayed 14.23% P₂O₅, 23.42% CaO, 1.15% MgO, 1.96% LOI, 50.14% SiO₂, 4.53 Fe₂O₃. After studying various blends, it was observed that the concentrate obtained from flotation of 70:30 blend assayed 34.88% P₂O₅, 49.76% CaO, 1.98% MgO, 4.72% LOI, 4.91% SiO₂, 1.38% Fe₂O₃ with 71.7% P₂O₅ recovery (Wt% yield 30.4). The concentrate obtained finds application in fertilizer industry.

Sandstone

Upgradation of ROM Sandstone sample for Glass Grade Concentrate (IBM):

A sandstone sample from Chotila Mines, Surendra Nagar, Gujarat sent by M/s HNG Float Glass Limited, Halol, Gujarat assaying 98.28% SiO₂, 0.758% Al₂O₃, 0.093% Fe₂O₃, 0.093% TiO₂. The object was to obtain a glass grade silica sand concentrate in the size range of -30+120 mesh and assaying 98.5% SiO₂(min), 0.04% Fe₂O₃ (max), ~1% Al₂O₃ and 0.02% TiO₂ (max). A table concentrate assaying 99.07% SiO₂, 0.300% Al₂O₃, 0.041% Fe₂O₃ and 0.004% TiO₂ with wt% yield of 80.9 in the size range of -30+150 mesh was obtained. The sample is amenable to beneficiation. The final concentrate meets the stipulated size chemical specification (including -120 mesh ~10%) for glass industry.

Silica sand

Beneficiation Studies on a Silica Sand sample from Ratnagiri district, Maharashtra (IBM): The as-received sample sent by M/s Hind Aluminium Industries Ltd, Mumbai assayed 98.312% SiO₂, 0.28% Fe₂O₃, 0.028% TiO₂, 0.61% Al₂O₃, 79 ppm Cr₂O₃, 0.023% CaO, 0.01% MgO, 0.077% K₂O and 0.23% LOI. A simple process route comprising (i) desliming, attrition scrubbing, sieving followed by magnetic separation produced a non-magnetic concentrate assaying 99.51% SiO₂, 0.052% Fe₂O₃ (wt% yield 78.1); and (ii) sieving, attrition scrubbing and then magnetic separation of deslimed sand fraction produced a silica sand concentrate (non-magnetic) assaying 99.422% SiO₂, 0.042% Fe₂O₃ (wt% yield 86.3).

Upgradation of Silica Sand sample from Rama Nuj Jhanwar, Chotila Area, Gujarat (IBM): The as-received sample from HNG Float Glass Limited, Phase –III, Chotila Area, GIDC, Gujarat assayed 90.91% SiO₂, 0.46% Fe₂O₃, 5.79% Al₂O₃, 0.085% TiO₂ and 2.29% LOI. Grinding followed by sieving, tabling and wet high intensity magnetic separation and scrubbing yielded a composite concentrate -30+120 mesh size assaying 99.1% SiO₂, 0.034% Fe₂O₃, 0.40% Al₂O₃, 0.003% TiO₂ and 0.18% LOI with over all wt% yield of 34.1.

Titano-Magnetite ore

Upgradation of a Lumpy Titano-magnetite ore sample from Khursapar Mines, Gondia, Maharashtra (IBM): The as-received sample from Maharashtra State Mining Corporation Ltd assayed 51.74% Fe(T), 8.84% FeO, 5.05% Al₂O₃, 4.28% SiO₂, 14.44% TiO₂, 0.290% CaO, 0.400% MgO, 0.54% LOI. The process adopted for upgradation was crushing, grinding and Wet High Intensity Magnetic Separation (WHIMS). The final magnetic concentrate assayed 54.68% Fe(T), 4.52% Al₂O₃, 2.35% SiO₂ & 13.30% TiO₂ with weight recovery of 83.4%. The magnetic mineral concentrate is having a specific gravity of 4.4, bulk density of 2.14 t/m³ and particle size of -300 +325 mesh size around 15% and -500 mesh around 40%. This concentrate may find utility as heavy media in HMS process. The non-magnetic fraction assayed 36.09% Fe(T), 8.58% FeO, 8.03%

Al₂O₃, 14.24% SiO₂ and 19.89% TiO₂ with per cent weight yield of 16.6. This titanium rich by-product can be used in ferro-titanium alloy or allied industry after suitably blending with ilmenite or rutile.

Bench scale beneficiation studies on a Titano – Magnetite ore (Fines) sample from Khursapar Mines for M/s Maharashtra State Mining Corporation Ltd, Nagpur, Maharashtra (IBM): The as-received sample assayed 49.11% Fe(T), 8.45% FeO, 6.43% Al₂O₃, 7.92% SiO₂, 14.37% TiO₂ and 0.70% LOI. Preliminary beneficiation studies indicated that the sample is complex in nature and hence it is difficult to produce marketable grade iron concentrate with Fe >62% or ferro-titanium grade titanium concentrate with TiO₂ 45% (min). However, a magnetic concentrate (around 90% magnetic mineral content) having specific gravity of plus 4.4 as desired and bulk density of 2.05 t/m³ and necessary particle size could be produced which finds utility as heavy media in HMS process.

Others

In addition to the above, significant R&D work was carried out by Central Institute of Mining and Fuel Research, Dhanbad (CIMFR) on coal and by IBM on fly ash. Besides, beneficiation studies were also conducted on beach sand, iron ore and limestone by IMMT.

MINING & ENVIRONMENT

National Institute of Rock Mechanics (NIRM)

National Institute of Rock Mechanics (NIRM) is a premier research centre in the field of applied and basic Rock Mechanics & Rock Engineering. It provides specialised technical services to several industrial sectors like mining - coal & non-coal; civil-hydroelectric & tunneling projects, nuclear power projects, underground storage cavern projects and to other construction industries within India and abroad, stressing upon the need to achieve improved production and productivity, with utmost safety and economy.

During 2009-10, NIRM was involved in 71 projects out of which 45 were completed successfully and 26 projects were in progress. During this period, Environmental Engineering department was also involved in one S&T project, one in-house project and one sponsored project, out of which one project titled "Water and sediment quality analysis of Malshej Ghat Project, NPCIL" was completed.

Indian Bureau of Mines (IBM)

During the year 2009-10, Indian Bureau of Mines carried out studies on ground vibration due to blasting in mines and environmental quality monitoring.

Environmental Quality Monitoring study at Copila Gaichem Paul Shigao and Sanjem, Iron Ore Mine of M/s Fomento Industries, Goa, was carried out for all the four seasons to monitor environmental parameters such as air, water, soil and noise at the mines which indicated that all the environmental parameters monitored are within the prescribed limits as per MoEF standards.

Study for monitoring of ground vibration due to blasting in four limestone mines of M/s Tata Chemicals near Adityana and Zinzerka village, district Porbandar, Gujarat was carried out to assess the impact of blast induced vibrations in the area, particularly in the nearby Jambuvanti Cave, which is a place of worship for local villagers as also archaeologically significant. These four limestone mines namely Adityana (12.6 ha), Adityana (9.21 ha), Adityana-Bhimkot (16.8755 ha) and Zinzarka (14.27 ha) are located near the cave. It was found that peak particle velocity at all the four mines was below the permissible limit and hence adverse impact on the Jambuvanti Caves was unlikely.

Similarly, the study of Adityana Limestone Mines of Shri Hamir Harji Kutana (H.S. Minerals), near Amardal village, district Porbandar, Gujarat was also carried out to assess the impact of blast induced vibrations particularly in the nearby Jambuvanti Cave. The observed peak particle velocity was found to be well within the safe limit prescribed by DGMS for Archeological & Historical Monuments.

Another study for monitoring of ground vibrations due to blasting in Billi Markundi (Julgul) Limestone Mine of M/s Jaiprakash Associates Ltd (Dalla Cement) in district Sonbhadra (Uttar Pradesh) was carried out at Dalla Cement in Uttar Pradesh. Here, in the study area, the high tension lines coming from the Obra Power Plant are passing very near to the mining lease area and two towers on southern side are very near to present working faces at a distance of 100 m. The study was carried out to suggest control blasting techniques for controlling specially fly-rock and ground vibrations to be followed in this mine. Overhead high voltage power transmission lines can induce currents (eddy currents) in blasting circuits. It was recommended that electrical firing should not be allowed closer to these transmission lines. It was observed that calculated peak particle velocity is within permissible limits for structures belonging to the owner, viz, Mine Office.

INFRASTRUCTURE

One of the major requirements for sustainable and inclusive economic growth is an extensive and efficient infrastructure network. It is critical for the effective functioning of the economy and industry. The developments in Infrastructure Sector, such as, energy, transport, iron & steel and cement hold the key to the success of economic reforms in the country. International competitiveness of our industry and export promotion strategies are dependent critically on efficient performance and internal demand of these sectors. This calls for greater efficiency and accountability for infrastructure industries most of which are based on minerals.

Infrastructure which has direct bearing on sustainability of growth and overall development, generates considerable background and forward linkages and hence its development is central to the growth of the other sectors of the economy. The prospects of our country's socio-economic development depend crucially on the performance of infrastructure, such as, power, roads, railways, ports, irrigation and telecommunications.

Overall, the infrastructure sector has had a mixed bag of performances; some have done exceedingly well and in some others there has been less than targeted achievement. During 2007-08 to 2009-10, capacity addition has been lower than target in power, roads (National Highways Development Project) (NHDP), new railway lines and doubling of railway lines. The sub-sectors where physical achievements have been above or close to targets are telecommunications, villages electrified under the Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY), railway lines electrification, railway gauge conversion, and new and renewal of roads construction under the Pradhan Mantri Gram Sadak Yojana (PMGSY). The investment in infrastructure has reached 7.18% of the GDP in 2008-09 and is expected to increase to 8.37% in the terminal year of the Eleventh Plan. Rapid reduction of the infrastructure deficit holds the key to competitiveness in an increasingly globalised economic environment. To accelerate the pace of infrastructure development and reduce the infrastructure deficit, the Government has initiated a host of projects and schemes to upgrade physical infrastructure in all crucial sectors. Despite several challenges, the positive results of the Government's initiatives are showing in some sectors.

Coal

Coal production at about 532 million tonnes in 2009-10 was higher by 8% from that of 493 million tonnes in 2008-09. In 2009-10, out of the total production of coal, 8.3% (44.3 million tonnes) was of coking coal and the remaining 91.7% (487.8 million tonnes) was of non-coking coal. Of the 514 million tonnes despatches of raw coal in 2009-10, about 73.6% despatches were to electricity sector, 3.6% to the steel industry, 3.4% to sponge iron industry and 2.8% to cement industry.

Electricity

Electricity generation by power utilities during 2010-11 has been targeted to go up by 7.7%

to 830.757 billion KWh. The growth in power generation during April-December 2010 was about 4.5% as compared to about 6.17% during April-December 2009, with nuclear, hydro and thermal power generation registering growth of 33%, 8% and 3%, respectively.

The Eleventh Plan envisaged capacity addition of 78,700 MW in the power sector, of which 19.9% was hydro, 75.8% thermal and the rest nuclear power. This has been revised to 62,374 MW now comprising 8,237 MW hydro, 50,757 MW thermal and 3,380 MW nuclear power. Capacity addition of 32,032 MW has been achieved till 31 December 2010 and projects with a capacity of 30,725 MW are under construction for commissioning during the remaining period of Eleventh Plan.

The Ministry of Power had launched an initiative for development of coal-based super critical Ultra Mega Power Projects (UMPPs) each of about 4000 MW capacity under Case II bidding route. Four UMPPs, i.e Sasan in Madhya Pradesh, Mundra in Gujarat, Krishnapatnam in Andhra Pradesh and Tilaiya in Jharkhand have already been transferred to the identified developers and are at different stages of implementation. Two units of 800 MW each of the Mundra UMPP are expected to be commissioned in the Eleventh Five Year Plan.

Transport

Railways

Indian Railways consist of an extensive network spread over 63,221 route km (Rkm) comprising broad gauge (46,807 Rkm), metre gauge (13,290 Rkm) and narrow gauge (3,124 Rkm). During 2010 (April-November), the total revenue-earning freight traffic moved by Indian Railways grew at 3.3% to 593.4 million tonnes as compared to 574.4 million tonnes in 2009 (April - November). This was short of the proportionate target of 605.11 million tonnes by 11.68 million tonnes. The low growth was primarily on account of negative growth in iron ore. Iron ore loading has been primarily affected in the current year due

to the restrictions imposed by the State Governments of Odisha and Karnataka. Frequent bandhs by Naxalites adversely affected loading, particularly in the Bailadila sector on East Coast Railway. Major portion of this traffic in April to November 2010 (i.e. about 45.6% in physical terms) was accounted by coal (270.4 million tonnes), iron ore (76.5 million tonnes), cement (63.1 million tonnes), fertilizers (33.2 million tonnes), POL (26.4 million tonnes) and raw material (excluding iron ore) for steel plants (8.3 million tonnes).

Ports

India's coastline of 7,517 km, spread over 13 States/Union Territories, is studded with 12 major ports and about 200 non-major ports of which about 66 handle traffic. Twelve major ports of the country handle about 75% traffic.

Cargo handling capacity at major ports was 574.77 million tpy as on 31.3.2009. Traffic handled by major ports was 569.90 million tonnes in 2010-11 as compared to 562.74 million tonnes in 2009-10. Traffic handled at major ports relating to minerals/mineral products during 2009-10 was: POL - 175.5 million tonnes, iron ore - 99.9 million tonnes, coal - 71.6 million tonnes and fertilizer & raw materials - 17.7 million tonnes.

Roads

India has more than 3.34 million km road network making it one of the largest in the world, comprising 66,754 km National Highways, 128,000 km State Highways, 470,000 km major district roads and about 2,650,000 km other district and rural roads. National Highways are the prime arterial routes throughout the country and cater to about 40% road transport traffic although they comprise only 2% of the total road length. About 25% of the total length of National Highways (NHs) is single lane/ intermediate lane, about 52% is two lane

standard, and the balance 23% is four lane standard or more. In 2010-11, the achievement under various phases of the National Highways Development Project (NHDP) up to November 2010 has been about 1,007 km and projects have been awarded for a total length of about 3,780 km.

The Ministry of Road Transport & Highways has set a target to expedite the progress of the NHDP and accordingly the National Highways Authority of India (NHAI) formulated Work Plans (Work Plan I and II) for awarding of about 12,000 km each during the years 2009-10 and 2010-11. These plans lay down a specific time frame for various activities and are being monitored very closely at various levels. Under Work Plan I, 73 projects of 6,426 km length have been awarded so far and bids for a further nine are at various stages of process. Under Work Plan II, one project of 170 km length was awarded and bids for five more projects are under various stages of process. Initiatives have been taken to develop National Highways having less than two lanes to minimum acceptable 2-lane standards by December 2014 by proposing fund generation via World Bank Loan and also through budgetary allocations.

Under Annual Plan 2010-11, an allocation of Rs.1000 crore has been made for development of roads in Left Wing Extremism (LWE) affected areas. The project covers 1,126 km of National Highways and 4,351 km of State roads spread over 34 districts in eight states, namely, Andhra Pradesh, Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Maharashtra, Odisha and Uttar Pradesh. As against the total target till December 2010, projects for a total length of 4,897 km at an estimated cost of Rs.5,998 crore have been sanctioned/processed till November 2010. Of these, projects for a length of 3,012 km at an estimated cost of Rs. 3,537 crore have been awarded till November 2010 and an expenditure of Rs. 256 crore incurred.

PERFORMANCE OF SELECTED MINERAL-BASED INDUSTRIES

Steel

Production of finished steel (including C.R. sheets) in 2010-11 at 71.78 million tonnes was higher by about 20.3% from 65.43 million tonnes achieved in 2009-10. The total production of pig iron was 5.7 million tonnes and 5.5 million tonnes in 2009-10 and 2010-11, respectively. Exports of finished steel (total) was 2.07 million tonnes in 2010-11 (April-December) as compared to 3.24 million tonnes reported in 2009-10 (April-March). Also, 1.86 lakh tonnes and 2.78 lakh tonnes pig iron was exported in the corresponding periods.

Cement

Production of cement in 2010-11 estimated at 246 million tonnes (including mini cement plants) registered an increase of about 19% over the previous year's production of 207 million tonnes. Cement industry was going ahead with modernisation and upgradation of technology in particular to conserve energy. The country is self-sufficient in cement. India exports cement including white cement and clinker. The exports in 2008-09 and 2009-10 including clinker were about 3.3 million tonnes and 2.7 million tonnes, respectively.

Petroleum Oil and Refineries

Crude oil production in 2010-11 at 38.0 million tonnes was 12.7% higher than 33.7 million tonnes produced in the previous year. The projected gross domestic natural gas production including coal bed methane (CBM) was at 53.6 billion cubic metres in 2010-11, 12.8% higher than 47.5 billion cubic metres in 2009-10. The refinery crude throughput of 192.77 million tonnes in 2009-10 was 20% higher than 160.77 million tonnes processed in 2008-09. The crude throughput processed in 2010-11 (excluding RPL's SEZ refinery for which data is not available) was 164.85 million tonnes. The total refining capacity in the country at around

187.39 million tpy as on 1.4.2011 was about 2.7% higher over preceding year and was 4% of the world refining capacity. Production of petroleum products (including LPG production from natural gas) was 182.01 million tonnes in 2009-10 compared to 152.68 million tonnes reported in 2008-09. It was 154.66 million tonnes in 2010-11 (excluding RPL's SEZ refinery).

SELF-RELIANCE IN MINERALS & MINERAL-BASED PRODUCTS

India continued to be wholly or largely self-sufficient in minerals which constitute primary mineral raw materials that are supplied 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 & 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 ball clay 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 semi-precious stones by the domestic cutting and polishing industry, India is dependent 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 Table-4.

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Table – 4 : Degree of Self-sufficiency in Principal Minerals & Metals, 2009-10 (P)

Sl. No.	Commodity	Demand/Domestic consumption ('000 tonnes)	Supply/Domestic supply ('000 tonnes)	Order of self-sufficiency (%)
Minerals				
1	Asbestos (Chrysotile)	109	++	++
2	Barytes	185	2138	100
3	Bauxite	9886	13952	100
4	Chromite	2344	3413	100
5	Dolomite	6085	5182	85
6	Felspar	422	456	100
7	Fireclay	524	520(e)	99
8	Fluorite	72	14	19
9	Gypsum	6923	5232 ^{1/}	76
10	Ilmenite	268	767	100
11	Iron ore	90617	218639	100
12	Kyanite	8	6	75
13	Limestone & other calcareous minerals	173558	233958 ^{2/}	100
14	Magnesite	282	286	100
15	Manganese ore	3025	2440	80
16	Rock phosphate (including apatite)	3129	1552	50
17	Rutile	13	19	100
18	Sillimanite	14	31	100
19	Silica minerals	1789	2898	100
20	Sulphur	1650	535 ^{3/}	32
21	Talc/Steatite/Pyrophyllite	404	1077	100
Metals^{4/}				
22	Aluminium	1766	1481	84
23	Copper (refined)	390	533	100
24	Lead (primary)	201	64	32
25	Zinc	561	614	100
Ferro-alloys^{5/}				
26	Ferro-chrome	274	892	100
27	Ferro-manganese	130	389	100
28	Ferro-silicon	45	102	100

Note: Even in cases where almost entire domestic demand is satisfied by domestic supplies, some quantities of certain special quality/types of minerals and metals/ferro-alloys are imported to meet the requirement in certain specific end-uses.

^{1/} Includes mineral gypsum, by-product marine gypsum and estimated production of by-product phospho-gypsum, based on available information besides selenite.

^{2/} Excludes production of limestone as a minor mineral, calcite and chalk.

^{3/} Includes recovery of by-product sulphur from petroleum refineries and sulphur equivalent of by-product sulphuric acid recovered from copper & zinc smelters consuming indigenous ores and concentrates.

^{4/} Apparent demand.

^{5/} Excludes production in small-scale sector.

FOREIGN TRADE

External trade growth collapsed in different countries in the tumultuous recession-ridden years of 2008 and 2009. The fall in trade, which was steeper than the decline in real GDP, was arrested in 2010, with trade growth recovering faster than real GDP growth. The recovery in trade growth has been made possible, in part, by the fiscal stimulus imparted by the governments and the low base of the preceding years. However, the extent of recovery differs substantially across countries and world trade remains below its pre-crisis level. India, which weathered the global crisis well, seems poised to be among the few countries to surpass the earlier peak and even reach or surpass the pre-crisis trends in trade.

Exports

According to the data available, the total exports (including re-exports) of all merchandise in 2008-09 and 2009-10 were Rs. 8,40,755 crore and Rs. 8,45,534 crore, respectively. The ores and minerals group (including diamond, precious and semi-precious stones) earned foreign exchange worth Rs.1,09,296 crore and Rs. 1,27,831 crore in 2008-09 and 2009-10 thereby posting an increase of about 17%. Contribution of cut diamonds in 2008-09 & 2009-10 was Rs. 72,092 crore and Rs. 85,126 crore while that of iron ore was Rs. 21,725 crore and Rs. 28,366 crore, respectively.

The principal ores and minerals exported from India in order of value contribution are diamond (mostly cut), iron ore, granite, precious & semi-precious stones and alumina. Rough diamonds imported into the country are cut and re-exported and these diamonds contributed 67.2% to the total exports of ores and minerals in 2009-10. Iron ore contributed 22.2%, followed by granite 3.91%. The individual share of remaining minerals was less than 1% in the total value of exports of ores and minerals from India in 2009-10.

The exports of petroleum products, e.g., light distillates (naphtha and others), middle distillates and heavy ends, earned foreign exchange of Rs. 1,21,086 crore and Rs. 1,44,037 crore in 2008-09 and 2009-10, respectively, with 97.8% and 98% share in the export of selected mineral-based products.

India also exported metals and alloys, such as, iron and steel with a share of about 59.2% in the total value of exports of metals and alloys of Rs. 57,975 crore in 2009-10 followed by copper & alloys (including brass & bronze) 14.7%, aluminium, alloys & scrap 8.5%, ferro-alloys 7.1% zinc & alloys (including scrap) 3.3%, pig & cast iron (including spiegeleisen) 1.9%, gold (non-monetary & monetary) 1.7% and precious metals/metal clad with precious metal 1.2%.

Imports

The total imports of all merchandise in 2008-09 and 2009-10 were Rs. 13,74,436 crore and Rs. 13,63,736 crore, respectively. The value of imports of ores and minerals in 2009-10 increased by 2% to Rs. 5,24,830 crore from Rs. 5,14,509 crore in 2008-09. Petroleum (crude) continued to be the largest constituent item of imports sharing 69.7% in 2009-10 in the total value of mineral imports. Its imports in 2009-10 at Rs. 3,65,901 crore have risen by more than 5% over 2008-09. Next in order of importance was diamond which had a share of about 14.2%, followed by coal (excluding lignite) 7.5%, copper ore & concentrates 3.6% and natural gas 2.1%.

The imports of petroleum products in 2009-10 decreased by 47.5% in value over the preceding year to Rs. 33,753 crore and had a share of 59.8% in the value of imports of selected mineral-based products during 2008-09.

The value of imports of metals and alloys at Rs. 2,14,425 crore showed an increase of 7.5% in 2009-10 from Rs. 1,99,489 crore in 2008-09. Share of gold imports was about 63.4% in terms of value, followed by iron & steel (23.9%), aluminium alloys & scrap (3.4%) copper & alloys (2.6%), silver (2.1%) and lead and alloys & scrap (1%).

VALUE-ADDED EXPORT TRADE

India's foreign trade includes exports of minerals, both in the raw form and semi-processed & processed forms like mineral-based primary manufactured products.

Minerals contributed significantly to India's exports trade in 2009-10 with a share of 15% (i.e., Rs. 1,27,831 crore) in the total value of

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all merchandise. The contribution of minerals in exports in raw/unprocessed forms was about Rs. 35,417 crore and in semi-processed/processed forms was about Rs. 92,414 crore. The manufactured mineral-based products contributed about Rs. 2,03,924 crore in 2009-10 to the total value of exports of all merchandise. The value-added semi-processed/processed minerals figuring in India's foreign trade included cut and polished diamonds/emerald, etc., pulverised barytes, steatite, felspar (cut), garnet, calcined magnesite, magnesia (fused), magnesite (dead-burnt), magnesium oxide, slate (worked), processed mica and manufactured mica products, coke, cut

and polished dimension stones, alumina, etc. The manufactured mineral-based commodities included metals and alloys and products thereof, cement, firebricks and other refractory materials, clay-bonded graphite crucibles and silicon carbide crucibles, manganese dioxide, asbestos-cement products, inorganic chemicals like lime and fluorine chemicals, refined borax and borates, elemental phosphorus and phosphoric acid, titanium dioxide, petroleum products, phosphatic and potash fertilizers, etc. Table-5 provides data on contribution of various value-added minerals and mineral-based products to India's exports during 2007-08 to 2009-10.

Table – 5 : Contribution of Value-added (Processed) Minerals & Mineral-based Products in India's Export Trade, 2007-08 to 2009-10

Sl. No.	Commodity group	Value of exports (Rs. million)			Contribution (percentage)		
		2007-08	2008-09	2009-10	2007-08	2008-09	2009-10
1.	All Merchandise*	6558640	8407550	8455336	100.00	100.00	100.00
2.	Minerals	950225	1092964	1278311	14.5	13.0	15.1
	2.1 Raw/Unprocessed form	283223	282519	354175	4.3	3.4	4.2
	2.2 Semi-processed/processed forms (preliminary and intermediate stages of processing)	667002	810445	924136	10.2	9.6	10.9
3.	Manufactured Mineral-based Commodities (final stage of transformation)	1788671	2055167	2039239	27.3	24.4	24.1
	3.1 Metals/Alloys	663608	822391	579754	10.1	9.8	6.8
	3.2 Others	1125063	1232776	1459485	17.2	14.6	17.3

Figures rounded off.

** Including re-exports.*