

EVOLUTION OF ENVIRONMENTAL MANAGEMENT IN MINING INDUSTRY IN INDIA

India – a Profile:

India is the biggest democracy in the world having seventh largest geographical area and a steadily growing nation of over one hundred and three million people. The country is Asia's second largest nation supporting approximately 16% of the world's human and 18% of the livestock population on 2.5% of its geographical area (328.73 million ha.). There is much diversity in geographical features; Himalayas in the North; Thar desert, Aravalli Hills, and semi-arid plains in the West; Vindhya mountains in the Centre; Deccan plateau in the South; Western and Eastern ghats with vast coastal plains to the East and the West; and North-Eastern region with variety of bio-diversity. The country's coastline is 7,500 km long. There are 14 major rivers besides numerous smaller perennial water bodies and a great diversity of natural eco-systems. In addition, there are also Lakshadweep Islands in the Arabian Sea and the Andaman & Nicobar Islands in the Bay of Bengal. There are also diverse climatic zones varying from tropical monsoon in the South to temperate in the North. The country is considered to be rich in terms of annual rainfall and total water resources available. Total estimated replenishable ground water reserves are 432 km³. The total river water resources have been estimated at approx. 1953 km³. However, their distribution is uneven. The forests of India cover approx. 23.3% of the country's total geographical area. Over 47,000 plant species and 89,000 animal species have been recorded in the country of which several thousands are unique.

The Indian Constitution has provided a basis for firm federal structure by providing the division of power and responsibility between the Centre and the States. Presently, there are 29 States and 6 Union Territories in the country. Issues requiring national perspective like defence, external affairs and election to the legislature are with the Central Government while economic, social and environmental issues are shared responsibility.

2. **Natural resources and mining history** :

India is endowed with significant mineral resources, which include fossil fuels, ferrous and non-ferrous ores and industrial minerals. Even the coastal tracts contain beach sand rich in rare earth and heavy minerals. These non-renewable resources are finite. Many of these resources are located in environmentally sensitive areas. Our best iron ore and bauxite deposits in eastern, central and southern India are located in forests.

History of Indian mining industry indicates that mining of coal dates back to 1774 when shallow mines were developed in Raniganj Coalfield along the west bank of river Damodar. Iron ore mines were opened in 1878, gold mining from Kolar Goldfields was started in an organized way in 1880, the first mechanised iron ore mine was commissioned in 1958 at Noamundi by a private sector company, and main shaft in Jaduguda uranium mine was commissioned in 1968. The mining industry has achieved significant development in the country during the last five and half decades since 1947. As a result of the concerted and planned exploration activities carried out through the various Five Year Plans, today the country is comfortably placed in respect of many minerals essential for core sector industries like iron & steel, cement, aluminum, refractory, ferro-alloys, etc.

Minerals provided by the mining industry are indispensable components of the national economy of any country. There are about 20,000 known mineral deposits in India and as many as 89 minerals [4 fuels, 11 metallic, 52 non-metallic and 22 minor minerals] are produced. The total value of mineral production in 2000 – 2001 was Rs. 568070 million, of which value of minerals other than petroleum and natural gas was Rs. 306751 million. The metallic production is accounted for by iron ore, copper ore, chromite and/or zinc concentrates, gold, manganese ore, bauxite, lead concentrates. More than 90% of non-metallic minerals produced were limestone, magnesite, dolomite, barytes, kaolin, gypsum, apatite, phosphorite, steatite, and fluorite. There were 3100 working mines in 1999-2000 [excluding crude petroleum, natural gas, atomic and minor minerals], of which 566 were of coal and lignite, 561

of metallic, and the balance 1973 of non-metallic minerals. A year before, there were 2602 operating mines.

India is the world's largest producer of mica blocks and mica splitting. With the recent spurt in world demand for chromite, India has stepped up its production to reach the 3rd rank among the chromite producers of the world. Besides, India ranks 3rd in production of coal & lignite and barytes, 4th in iron ore, 6th in bauxite and manganese ore in the world.

3. Global challenge and mechanisation trend :

Today, it is difficult to compete in the global market if cost of production is not competitive and timely delivery of quality products is not ensured. To meet this challenge, there is need to optimize size of indigenous mining operations which at present in most of the mines is scattered and environmentally incompatible; amalgamate small mineral concessions; develop matching infrastructure; upgrade technology adopting best mining practices, promote research and development in exploration, exploitation and process performance. For environmentally sustainable development, mineral resources are not to be exploited recklessly as in the past. The concept of mine closure planning has also to be an integral part of mining plan, which at present is in an embryonic stage in India.

Limestone, iron ore mines along with coal together account for a major share in deployment of mining machinery. There are around 350 opencast mechanised mines in the country of which two thirds belong to limestone and iron ore. There is a progressive increase in average size of mine due to adoption of heavy earth moving machinery. As blasting operations are not allowed in the proximity of settlements or eco-sensitive areas, high capacity continuous mining systems are becoming more popular. In some Goa iron ore mines, bulldozers with ripper attachment are being increasingly used. Backhoes are also finding more and more use.

There was appreciable technology upgradation in large number of mines extracting coal, lead-zinc, copper, iron ore etc. R&D in public sector units played increasingly significant role in rock mechanics, beneficiation, and metal extraction.

4. Environmental movement in India :

Constitutional Provisions

The constitutional provisions to protect and improve the environment and to safeguard the forests and wildlife of the country dates back to 1950. The Constitution of India calls upon the State (Article 48A) "to protect and improve the environment and to safeguard the forests and wildlife of the country". It also imposes a duty on every citizen (Article 51A) "to protect and improve the natural environment including forests, lakes, rivers and wildlife, and to have compassion for living creatures". The Constitution (42nd Amendment) Act was passed, which expressly incorporated into the Indian Constitution provisions for environmental protection and improvement in the form of Fundamental, Duties and the Directive Principles of State Policy. Large number of Acts, Rules and Notifications back the constitutional provisions. The Eleventh Schedule of the 73rd Constitutional Amendment in 1992 empowered Panchayat bodies and bestowed them with responsibilities in the areas of soil conservation, water management, watershed development, social and farm forestry, drinking water, fuel and fodder, non conventional energy sources and maintenance of community assets. Urban local bodies are empowered under the 74th Constitutional Amendment in 1992 to protect the environment and promotion of ecological effects.

Institutional mechanism

Issues relating to protection of environment and sustainable use of natural resources, first received due attention in the planning process in early seventies. Even before India's independence in 1947, several environmental legislations existed but the real momentum for bringing about a well-developed framework was made only after the Stockholm UN Conference on Human Environment (1972). This was the first attempt to address relationships between environment and development at the global level. The conference created an important impetus in recognizing and addressing emerging environmental problems. Under the influence of this conference, the National Committee on Environmental Planning and Coordination (NCEPC) within the then Department of Science & Technology was set up in 1972.

This was the turning point in national policies in integration of environmental dimensions into economic and developmental objectives. There was focus on improving air and water quality, control of chemicals and conservation of forests and wildlife. A number of important acts like the Wildlife (Protection) Act, the Water (Prevention & Control of Pollution) Act, the Forest (Conservation) Act and the Air (Prevention & Control of Pollution) Act were enacted in 1972, 1974, 1980 and 1981 respectively. NCEPC later evolved into a full fledged Ministry of Environment & Forests (MoEF) in 1985, which is the nodal administrative body in the Central Government for protection and management of environment in the country. MoEF is entrusted with the planning, promotion, coordination and overseeing of the implementation of environmental and forestry programmes. The Central Pollution Control Board (CPCB) and the State Pollution Control Boards (SPCBs) were constituted as autonomous institutes under the provisions of The Water (Prevention & Control of Pollution) Act, 1974 for control and monitoring environmental pollution. The National Environmental Appellate Authority (NEAA) set up in 1997 deals with the representations, complaints and appeals made against granting environmental clearance by MoEF.

MoEF has been designated as the nodal agency in the country for the United Nations Environment Programme. MoEF is also signatory to a number of international Conventions and Declarations. The United Nations Framework Classification (UNFC) for mineral resources has been adopted. The Commission on Sustainable Development (CSD) was created to implement the Agenda 21 at the national, regional and international level, which includes vital mine related issues.

Power to develop & regulate mines and minerals is shared by the Central and State Governments. The Ministry of Coal and Mines is the primary agency in the Central Government for formulating and implementing policies for exploration, development and operations in respect of all mines and minerals other than natural gas, petroleum and atomic minerals. Environmental clearance to major minerals mining projects having mining lease area more than 5 ha. and forestry clearance to all mining proposals [major as well as minor minerals] involving forest land irrespective of the size of mining lease are granted by MoEF.

The main functions of the Central Pollution Control Board, as spelt out in the Water (Prevention and Control of Pollution) Act, 1974, and the Air (Prevention and Control of Pollution) Act, 1981, are: (i) to promote cleanliness of streams and wells in different areas of the States through prevention, control and abatement of water pollution; and (ii) to improve the quality of air and to prevent, control or abate air pollution in the country. CPCB also advises the Central Government on any matter concerning prevention and control of water and air pollution and improvement of the quality of air; plan and cause to be executed a nation wide programme for the prevention, control or abatement of water and air pollution; co-ordinates the activities of the State Pollution Control Boards and resolves disputes among them; provides technical assistance and guidance to the State Boards, and carries out all related environmental activities.

The State Pollution Control Boards are implementing various environmental legislations in their states including the Water (Prevention and Control of Pollution) Act, 1974, the Air (Prevention and Control of Pollution) Act, 1981, the Water (Cess) Act, 1977 and some of the provisions under the Environmental (Protection) Act, 1986 and the rules framed there under like, the Biomedical Waste (M&H) Rules, 1998, the Hazardous Waste (M&H) Rules, 2000, the Municipal Solid Waste Rules, 2000 etc. These Boards function under the administrative control of the Environment Department of respective State Governments.

Different Ministries, Boards and Organisations responsible for the protection and management of environment, development and regulation of minerals and mines safety are shown in Figure 1. The Ministry of Environment and Forests, the Central Pollution Control Board and the State Pollution Control Boards form the regulatory and administrative core, while other Ministries and Bodies are also involved through various functions, policies and schemes to promote environmental management.

The MoEF has identified a total of 25 centres throughout the country under its Environmental Information System (ENVIS) network for the collection, collation, storage, retrieval and dissemination of information on various subject-specific areas

of environment. Centre for Mining Environment (CME) at Indian School of Mines, Dhanbad deals exclusively with mining and associated environmental issues. These centres are actively involved in strengthening the environmental database and responding to national and international queries relating to their specific subject areas. Centres of Excellence have also been set up to carry out research, training and awareness programmes in priority areas of environmental science and management at seven different locations. CME is one such centre working in mining subject.

As a result of increased consciousness, the network of national parks and sanctuaries in the country has gradually increased from 10 national parks and 127 sanctuaries covering about 25,000 sq. km. in 1970 to 89 national parks and 497 sanctuaries covering an area of 183,000 sq. km in 2001. There are 13 notified biosphere reserves. Under the World Heritage Convention, five natural sites have been declared as World Heritage sites.

5. **Environmental Regulatory Framework:**

It is estimated that there are nearly 200 enactments in the country, which deals with the protection of forests, wildlife, land use, and prevention and control of water, air and noise pollution. Most countries in the world, both developed and developing, already have comprehensive legislation and monitoring system to regulate mining activities from the environmental angle.

Mining of minerals other than coal, lignite, natural gas and petroleum is regulated under the Mines and Minerals (Development & Regulation) Act, 1957, amended in 1994; Mineral Concession Rules, 1960; and the Mineral Conservation and Development Rules, 1988. These acts and rules have provisions for environment preservation and protection while carrying out mining operations. In addition, there are following five main environmental acts which cover the mining industry:

1. The Water (Prevention and Control of Pollution) Act, 1974 (amended in 1988)
2. The Air (Prevention and Control of Pollution) Act, 1981 (amended in 1988)
3. The Environment (Protection) Act, 1986 (with rules 1986 and 1987)

4. The Forest (Conservation) Act, 1980 (amended in 1988)
5. The Wildlife (Protection) Act, 1972 (amended in 1991)

The important features of the some of the Acts and Rules concerning mine environment are as follows:

- The Mines and Minerals (Development & Regulations) Act, 1957 (amended in 1999CC)

This act provides for general restriction on undertaking prospecting and mining operations; procedure for obtaining prospecting licenses or mining leases; and conservation and systematic development of minerals.

- The Mineral Concession Rules (MCR), 1960 (amended in 2000)

These rules framed under the MMDR Act, 1957 and subsequent amendments stipulate that a "Mining Plan" shall incorporate, amongst others, a plan of the area indicating water sources, limits of forest areas, density of trees, impact of mining activity on forest, land surface and environment including air and water pollution; scheme for restoration of the area by afforestation, adoption of pollution control device and such measures as may be directed by the concerned Central and State Government agencies. Environmental management plan therefore forms a part of the mining plan.

- The Mineral Conservation & Development Rules (MCDR), 1988 (amended in 2000)

These rules contain a chapter devoted to environment. There are 11 provisions in this chapter pertaining to storage and utilisation of top soil, storage of overburden, waste rock, reclamation and rehabilitation of land, measures against ground vibrations, control of surface subsidence, measures against air and noise pollution, discharge of toxic liquids, and restoration of flora.

- The Water (Prevention and Control of Pollution) Act, 1974 amended in 1988 and The Air (Prevention and Control of Pollution) Act, 1981 amended in 1988

These two acts provide for the control of water and air pollution and to tackle environmental problems in an integrated way by the establishment of one Central

Board and individual State Boards. The acts prohibit waste emissions without written consent and payment of fees to the State Pollution Control Board.

- The Environment (Protection) Act, 1986 (EPA)

This is an umbrella legislation. The act has precedence over the previous pollution control acts and provides for overall protection and improvement of the environment. The Government of India is empowered by EPA to take all measures deemed necessary for protection and improving the quality of the environment, and preventing, controlling and abating environmental pollution including authority to direct closure of any industry or operation. The powers of Government of India under the act provide for laying down of standards for emissions and discharge of pollutants from all sources.

The Ministry of Environment and Forests has notified the Hazardous Waste (Management & Handling) Rules in 1989 under EPA. These rules provide for control on generation, collection, treatment, transport, import, storage and disposal of hazardous wastes. The rules clearly state that import of waste for dumping is completely prohibited. The implementation of these rules is through the State Pollution Control Boards and the State Departments of Environment.

- The Forest (Conservation) Act, 1980

This act provides for the protection of two classes of forest; reserved and protected forests. Prior approval of Government of India is required for any change in status of reserved forest or non-forest use of protected forest land. Reserved forest has the highest conservation status and the area so classified cannot be used for any non-forest purpose. Surface and underground mining are deemed non-forest activities and, therefore, MoEF approval is required for mineral concessions in any forest area.

The act stipulates that, for any area of forest lost due to development, the developers have to pay for purchase of an equivalent area of non-forest land as near as possible to the site of diversion, or twice the degraded forest area, for transfer to

the State Forest Department with sufficient funds for compensatory afforestation, which is then declared as protected forest.

The Safety zone for mining operations cannot form part of the replacement forest area. The developers have to provide funds to the State Department for one and half times the forested area of the safety zone. The act has now been modified with respect to underground mining so that only the area actually damaged by subsidence need be replaced by duly afforested non-forest land.

- The Wildlife (Protection) Act, 1972

This act provides power to the authorities for regulating hunting of wild animals, declaration of any area to be a sanctuary, national park or closed area, protection of specified plants, sanctuaries, national parks and closed areas and miscellaneous matters.

- The National Conservation Strategy and Policy Statement on Environment and Development(1992)

This strategy cum statement was brought out in 1992 recognising the role of the government, NGOs, industries and public to preserve resources and protect the environment while ensuring developmental activities. This provides the basis for the integration and internalisation on environmental considerations in the policies and programmes of different sectors.

- The Policy Statement for Abatement of Pollution(1992)

This policy statement was also declared in 1992 to promote voluntary initiatives for the protection and improvement of the environment, through the use of fiscal or financial incentives, in addition to the development of a regulatory and legislative framework.

- The Coastal Regulation Zones(1991)

In 1991, coastal areas of the country were classified into four Coastal Regulation Zones (CRZ) namely CRZ - I: Areas, which are ecologically sensitive, of

outstanding natural beauty, historical heritage, genetic diversity; CRZ - II : Areas that have already been developed close to the shoreline; CRZ - III : Areas that are relatively undisturbed; and CRZ - IV : Coastal stretches in the Andaman & Nicobar Islands, Lakshadweep and other small Islands except those designated as CRZ - I, II & III for better environmental management. The CRZ notification puts limits on the types of construction and development activities that can take place along the coastline. It also prohibits certain activities in different CRZ, such as setting up of new industries, expansion of existing industrial units etc. Mining of minerals is not a permissible activity, but rare minerals, not found elsewhere can be mined in areas that are relatively undisturbed i.e. in CRZ – III with prior approval of MoEF.

- The Environment Action Programme

This programme was initiated in 1993 to prepare a 'blueprint' for integrating environmental concerns into the development process. Emphasis was given to the promotion of a decentralised system and organisational strengthening for better environmental management.

A list of environment related laws is presented in Annexure - I.

6. Liberalisation measures and the National Mineral Policy

The Government of India made the Mineral Development Policy statement in 1993 to achieve business excellence in the mineral sector opening up exploration and mining for minerals. This was followed by further liberalisation process through amendments in the mining law and the Foreign Direct Investment Policy. Today, the State Governments are fully empowered to grant mineral concessions for most non-fuel and non-atomic minerals and can also review, transfer or amalgamate minerals concessions without reference to the Central Government. Time frames have been fixed for conveying decision on mineral concessions applications and proposals for approval of mining plans. Foreign Direct Investment is possible in all sectors of non-fuel and non-atomic minerals through the automatic route. While the cap for automatic approval is 74% for diamond and other precious stones, even 100% approval is available for all other non-fuel and non-atomic minerals including

gold and silver. Reconnaissance surveys have been identified as a distinct activity prior to prospecting and provisions has been made in the law for granting of reconnaissance permit.

The National Mineral Policy for non-atomic and non-fuel minerals prohibits mining operations in identified ecologically fragile and biologically rich areas and strip mining in forest areas. Opencast mining could be permitted only when accompanied by a comprehensive time bound reclamation. It states further that the environmental management plan should have adequate measures for minimising environmental damage, restoration of mined out areas and plantation as per prescribed norms. As far as possible, reclamation and afforestation have to proceed concurrently with mineral extraction.

7. Mining and environmental concerns:

i. Environmental concerns

Mining industry is one core economic activity, which has literally “deep” relationship with the Mother Earth. More than 0.8 million hectares of lands is under mining, a substantial portion of which lies in forest areas. Important coal, bauxite, iron ore and chromite deposits in India are found in forests. Good limestone deposits are also available near the wildlife sanctuaries, national parks and coastal areas. Mineral production is often not in consonance with conservation of forests since at many places commercial reserves exist below thick forests. In the site-specific mining activity, there are large numbers of environmental issues. The main concerns include the following:

- The existing terrestrial configuration gets disturbed. The magnitude of disturbance varies depending on surface topography, geology, geometry and depth of deposit from the surface, size of operation, excavation methodology, chemical properties of the ore and beneficiation.
- Generation of huge volumes of overburden. If not planned properly, topsoil also gets completely lost during removal of overburden.

- Uncontrolled runoff from the surface and waste dumps, rolling down of materials especially from steep slopes and loss of vegetation increase sediments deposition in surface water bodies.
- The exposed excavations and abandoned mines are capable of polluting the surface and ground waters and raise harmful air-borne dust.
- Minerals often in sulphide, sulphate, phosphate or halide forms often give rise to environmentally undesirable gangue materials at the mine and bio-toxic mineral wastes at beneficiation plant. Structural stability of tailings ponds.
- Acid mine drainage.
- Drilling, blasting, removal, storage, re-handling of topsoil, overburden and ore and transportation of material contribute to particulates and gaseous emissions.
- Effect on wildlife population and their behaviour. Sometimes increased human activities coupled with mining operations in and around eco-sensitive regions do disrupt migratory route(s) of animals, fragment connectivity between important eco-systems, damage vegetation on large scale and wildlife habitat.
- In case of an underground mine, caving of the roof material causes abrupt collapse of the overlying strata leading to subsidence of surface. Subsidence features can be small, shallow depressions or deep pits gradually sloping troughs or steep offsets, cracks or fissures or combination of these.
- Often acquisition of private land for mining activities and development of township involves displacement of people.
- Construction of long embankment to prevent entry of flood water into the mine modifies existing high flood line which could further lead to entry of

water into nearby settlements, if any, necessitating additional displacement of families.

ii. Associated health concerns

The main health hazards in metal and non-metal mines are those associated with the poor quality of mine air and presence of poisonous gases or other airborne contaminants. Fine dust particles in the respirable range are dangerous due to their ability to penetrate the lungs. Continuous exposure to excessive dust can lead to development of pneumoconiotic lung diseases. Also, dust with high concentration of toxic metals can lead to metal intoxication. Other occupational health hazards include excessive noise from equipment and machinery, blasting operations as well as exposure to extreme weather conditions. Mining of radioactive ores can result in exposure to radiation. Surface mining is less hazardous than the underground mining.

The flow chart given in Figure 2 indicates various mining processes, wastes and associated potential impacts.

8. Environmental clearance :

Initially, the development projects from the public sector undertakings of the Central Government requiring approval of the Public Investment Board of the Ministry of Finance were normally considered for environmental clearances. For example, the multi-purpose river valley projects were cleared by the Planning Commission, Government of India in consultation with NCEPC in regard to environmental aspects. Environmental impact assessment based environmental clearance procedure was adopted as an administrative measures in late seventies for the river valley projects. The procedure was later extended to cover other sectors like industry, thermal power, nuclear power, and mining. India has over 24 years of experience in conducting environmental impact assessment of development projects. On 27th January, 1994 the Ministry of Environment & Forests had issued the Environmental Impact Assessment [EIA] Notification under EPA, 1986 imposing certain restrictions on undertaking new development projects or expansion and modernization of existing ones, unless prior environmental clearance has been

obtained from the Ministry. Environmental clearance is mandatory for 30 development projects including the mining.

(a) Applicability of the EIA notification:

Environmental clearance is mandatory for new mining projects (major minerals) with mining lease area greater than 5 ha. or expansion / modernization of existing operations irrespective of the quantum of increase in size of mining lease - area / production or investment involved, besides other 29 development projects. The EIA notification provides for two-stage clearance for the mining projects. Site clearance is also mandatory for proposals for prospecting and exploration of major minerals when area is more than 500 ha. However, for carrying out test drilling on a scale not exceeding 10 bore holes per 100 sq km for prospecting and exploration purpose no site clearance is required. The site clearance is given in the first stage and environmental clearance in the second stage. Besides the environmental clearance, forestry clearance under the provisions of the Forest (Conservation) Act, 1980 is also mandatory for all the mining proposals involving diversion of forest land for non-forest purpose. The forestry clearance is again accorded in two-stages. In the first stage, the proposal is agreed "in principle" subject to certain conditions. The second stage approval is given after receipt of compliance report from the concerned State Government regarding transfer and mutation of non-forest area identified for compensatory afforestation etc.

(b) Stakeholders participation:

The opening of mines besides impacting the physical environmental in general, has social and economic consequences at local level including displacement of people from the project site in some cases affecting their environment, health and culture. Learning from the experience of other countries, public hearing procedure was introduced in the decision-making process in India from 10th April, 1997. Public hearing has been made mandatory for all the development projects attracting the provisions of the EIA Notification. This has helped in the consideration of concerns of the affected local communities. The large mines, which are generally in organized sector, address the communities concerns in much better manner than small mining

companies owners. However, exception are always there, a few small mining companies have also responded better with regard to environment and their relationship with the local people setting a working model for others to follow.

The project proponents seeking site / environmental clearance first apply to the concerned State Pollution Control Board (SPCB) for arranging public hearing. As per procedure laid down in the EIA notification, SPCB constitute public hearing panel for the project and publishes a notice indicating date, time and place for the public hearing in at least two local newspapers widely circulated in the region around the project, one of which in the vernacular language. Public hearing is to be conducted not less than 30 days after the publication of the notice. During this period, all relevant documents are made available for public inspection at a designated place. The public can send suggestions, views and objections to the Board within thirty days from the date of the public notice. All the persons including bonafied residents, environmental groups and others located at the project site(s) / site(s) of displacement / sites likely to be affected can participate in the hearing. They can also give oral suggestions to the State Pollution Control Board. The project proponent is invited to give presentation at the public hearing on salient features of the project, associated environmental issues, environmental protection measures, social welfare programme for the local community and provide clarifications / answer to queries. Commitments to comply with certain suggestions are made by the project authorities. Thereafter, the State Pollution Control Board sends detailed report of the public hearing panel to MoEF.

A time frame of 60 days for completion of public hearing has been set. The public hearing procedure is not applicable to site clearance and prospecting and exploration proposals.

(c) Documentation requirement:

The proposal requiring site clearance or environmental clearance under the EIA notification are to be forwarded to the Ministry of Environment & Forests for consideration by the State Government Department dealing with the mining subject. In case of Public Sector Undertakings, proposals are to be forwarded by the

respective Administrative Ministry/Department in the Central Government. The following documents are required for environmental appraisal of the projects:

i. Prospecting & Exploration proposal – Site clearance

- Information as per format for mineral prospecting

ii. New mining proposal – Site clearance

- Information as per site clearance format
- NOC from the concerned State Pollution Control Board (Desirable)

iii. New mining proposal – Environmental clearance

- Application as per schedule-II of the EIA notification
- Information as per format for environmental appraisal (Annexure-II)
- Rapid environmental impact assessment* and environmental management plan (EIA/EMP) report
[* Based on one full season baseline environmental data except for monsoon period]
- Details of Public hearing
- “Consent to Establish” from the concerned State Pollution Control Board
- A copy of approved mining plan***
[*** In case of public sector coal / lignite companies, a copy of approval of project report is only required].
- A comprehensive rehabilitation plan if more than 1000 people are to be displaced from the project site otherwise a summary plan.
- Commitment regarding availability of water and power from the concerned State authorities when supply is to be met from the public source. In case the project site falls in an area notified by the Central Ground Water Authority, a copy of their approval to abstract ground water is to be furnished.

- Detailed hydro-geological report if ground water pumping including mine water discharge is heavy or mine site falls in a water scare / drought prone region.
- A copy of forestry clearance in case the mining lease includes forest land.
- In case of strategic minerals, No Objection Certificate from the Atomic Energy Department, Hyderabad

iv. Mining (Operating mine) - Environmental clearance

Expansion or modernization of the existing operating mine requires environmental clearance. Documents required are the same as for the new proposals. In addition, the project proponent has to submit the following:

- i. A detailed report on compliance with the conditions of the clearance letter issued by the Ministry of Environment & Forests, if any.
- ii. Compliance status report in respect of the conditions of the "Consent to Operate" issued by the State Pollution Control Board.
- iii. Last one year environmental statement
- iv. A report on implementation of resettlement & rehabilitation of project affected people, if any.

(d) Environmental appraisal procedure:

The proposals for site and / or environmental clearance, when received in the Ministry are scrutinized initially to check whether all the requisite documents have been furnished by the proponent or not and whether proposal has been forwarded by the concerned Government Department or not. The proposal is returned or kept in abeyance if the application has not been routed through proper channel. Further, if any of the following documents are not submitted, environmental scrutiny is not

carried out unless the required reports / documents are made available by the project authority:

- Public hearing report
- "Consent to Establish" from the State Pollution Control Board
- Rapid EIA / EMP report
- Information in relevant questionnaire
- Mining plan approval

(i) Site clearance:

The Impact Assessment Division of the Ministry examines the proposals for prospecting and exploration or site clearance internally without any reference to the Expert Committee. Discrepancies, gaps in information and issues requiring clarifications, if any, are communicated to the project authorities. After receipt of information, decision regarding suitability or otherwise of the project site is communicated to the proponent. In case the requisite details are not received in the Ministry in a reasonable time period inspite of reminders, the files of such cases are closed. Such files are reopened as and when the information and justification for delay in submitting the details are received.

(ii) Environmental clearance:

The proposals for environment clearance are first subjected to internal screening in the Impact Assessment Division. Discrepancies, gaps in information and issues requiring clarifications, if any, are conveyed to the project authorities. After receipt of information, the proposals are referred to the Expert Committee (Mining) of MoEF. The Committee is chaired by a non-official and comprises experts in various fields and representative(s) of non-government organization(s). The terms of reference of the Committee are – (i) Scrutinise the environmental impact of mining projects and environmental management plan prepared and submitted by the project authorities; (ii) Suggest safeguards including installation of pollution control devices and choice of appropriate technologies to mitigate adverse environmental impacts in respect of projects recommended for approval; (iii) Recommend clearance

or rejection of the project from environmental angle with specific safeguards, if any. The Committee meets normally every month to consider the matured proposals. The project proponents and their consultants are invited to make a detailed presentation before the Committee on salient features of the project, associated environmental and social issues, public opinion and their potential concerns, commitments made by the company, environmental management plan, estimate for environmental protection measures and post-project monitoring. After hearing the proponent, the Committee may ask for additional information or studies and also may decide to visit the site for on-the-spot assessment of the issues. Based on such examination, the Committee makes recommendation for approval or rejection of the project after usually not more than two sittings. On receipt of the recommendations of the Expert Committee and any further clarifications from the project proponent, the cases are processed for obtaining approval of the Minister-in charge of the Ministry.

(e) Time limit for decision - making

(i) Environmental clearance

The EIA notification prescribes ninety days time limit to complete assessment of the project after receipt of requisite data and documents from the proponent and decision is to be communicated within thirty days thereafter.

(ii) Site clearance

Decision regarding suitability or other-wise of the proposed site is to be taken within a period of thirty days provided requisite information has been furnished.

(f) What does the experience indicate?

The chances of getting environmental clearance for a project expeditiously depend largely on quality of EIA / EMP report. It has been noticed that environmental clearance has often been delayed in several cases because of inadequately addressed environmental and social issues, old baseline data and poor quality of EIA reports. In general, the environmental issues which need examination

in detail are not properly covered in the EIA / EMP reports. This is because scoping process is currently not a part of the EIA studies.

The factors that cause delay in decision-making can be grouped in the following heads:

- ❖ Incomplete baseline data and information
- ❖ Old baseline data
- ❖ Inadequate maps
- ❖ Inconsistency in data
- ❖ Inadequately covered issues

- Incomplete baseline data

It is important that the EIA report should have information adequate for a realistic assessment of impacts on environment. Generally, one full season (other than the monsoon season) baseline and micro-meteorological data are not generated. Information on topsoil and subsoil chemical properties is either missing or incomplete. It should cover parameters like pH, salinity, total P, total N, PO₄ & NO₃. Other parameters worth considering include C : N ratio, Cu, Zn, Pb, Fe and any other nutrients or metals which may be important in ensuring successful rehabilitation. Sometimes very sketchy surface and ground water details are furnished. In case of surface water bodies falling within mining lease area, details of pre and post monsoon discharge rate are needed. A detailed hydro-geological report is required whenever a project requires drawl of large quantity of ground water or storage of water etc. Greenbelt development plan should cover information on year-wise and area-wise plantation programme, area to be covered, species to be planted, number of saplings, requirement of water and its source. Information on occupational health aspects is either not provided or inadequately covered. It is also important to furnish mineralogical composition of particulates. Wildlife conservation plan for scheduled species, if any, present in and around the mine site is not furnished unless called for

- UUEIA based on old baseline data

Fresh data should be generated to verify representativeness of the old data. If it is observed that environmental scenario / trend has changed then the EIA / EMP report needs revision based on fresh one complete season baseline data.

- Inadequate maps

Lithological section based on boreholes is normally not provided. Information on pit design, waste dump design and their location, a long-term conceptual plan, cross sections reflecting geological, and structural features cross section of mine working, geo-morphological contour map, authenticated map indicating distance of National Park / sanctuary [falling within 10 km from the project site] from the nearest fringe of the ML boundary is not normally furnished in one go. When mining is along a steep slope, some sections, across the geomorphic layout visualizing opencast progress, are also needed to understand slope stability and associated problem.

- Inconsistency in data

Data furnished in the environmental appraisal questionnaire, EIA report and mining plan some times do not tally e.g. break-up of mining lease area, stripping ratio, number of project affected people, quantum of solid waste generation, water quality data, mine water discharge, ground water table, flora and fauna, plantation area etc. There should be no discrepancy in the applied production capacity of the mineral and production permitted by the State Pollution Control Board.

- Impacts either not assessed or inadequately covered

Impacts are either not discussed in detail or not assessed due to loss of vegetation on soil erosion, mine dewatering on salinity and hydrology; diversion of water bodies on downstream water bodies; hydrological changes on local water resource, its completing users and vegetation, habitat or aquatic eco-system; lying of pipeline, conveyor, transmission line,

construction of roads and setting up of booster pump stations; sedimentation load on important water bodies; construction of embankment on high flood line and intern on settlements falling within the zone of influence, if any; disruption of migratory route of wildlife and fragmentation of connectivity between important eco-systems.

9. Forestry clearance - mining projects involving forest area:

The Forest (Conservation) Act, 1980 has made it obligatory for the State Governments or any other authority to obtain prior approval of the Central Government for diversion of any forest land for any non-forest purpose.

Though mining is a site-specific operation whether by opencast or underground method, it is considered as a non-forestry activity. Prior approval of the MoEF is essential before a mining lease is granted in respect of any forest area. The Forest (Conservation) Act applies not only to the surface area, which is used in the mining but also to the entire underground mining area beneath the forest. A renewal of an existing mining lease in a forest area also requires prior approval of the Central Government. Continuation or resumption of mining operations on expiry of a mining lease without prior approval amounts to contravention of the Act.

For projects requiring both the forestry and environmental clearances, two separate applications are to be submitted. Separate clearance letters are issued. A project is deemed to be cleared only after issuance of both the clearances. Like the Expert Committee (Mining) which considers proposals for environmental clearance, Forest Advisory Committee (FAC) of the Ministry of Environment & Forests considers the forestry clearance proposals. Cases are refereed to the Wildlife wing of the Ministry wherever a National Park or a Sanctuary is involved for their opinion about the project. Forestry clearance is given in two stages. In first stage, the proposal is agreed to "in principle" subject to certain conditions and after receipt of compliance report from the State Government in respect of compliance of the stipulated conditions regarding transfer and mutation of non-forest area identified for compensatory afforestation, if any, and transfer of funds in favour of the State

Forest Department etc., final approval i.e. stage two clearance under the Act is issued.

Exploration projects do not attract the provisions of the Forest (Conservation) Act, 1980 as long as these surveys do not involve any clearing of forest or cutting of trees, and operations are restricted to clearing of bushes and lopping of tree branches for the purpose sighting. In case operations involve clearing of forest area or felling of trees, prior permission of the Central Government is mandatory. Further, exploration should not be carried out in wildlife sanctuaries, national parks and sample plots demarcated by the Forest Department without obtaining prior approval of the Central Government, whether felling of trees is involved or not.

Renewal of a mining lease is considered as a grant of fresh lease. Therefore, prior approval is required when a mining lease granted before the commencement of the Forest (Conservation) Act, 1980 is renewed after its coming into force. In respect of the mining operations being carried out on forest lands leased before the commencement of the Forest (Conservation) Act, 1980 during the continuance of the lease period, the approval under the provisions of the said Act is not required. Prior approval under the provisions of Forest (Conservation) Act, 1980 is not required for mining and winning any new mineral from a forest land leased for mining before the commencement of the said Act during the leased period originally granted, if the said land is already broken up or cleared before the commencement of the Act. Otherwise, prior approval of the Central Government i.e. MoEF under the said Act is required.

In respect of renewal of mining lease, temporary working permission is granted by the Central Government up to maximum period of one year extendable by one more year subject to certain conditions to continue working in areas already broken up prior to the expiry of the lease, even without formal approval for the renewal, provided – The user agency has submitted the required proposal with complete details to the State Forest Department at least one year prior to the expiry of existing lease period and the State Government has sent the formal proposal to the Central Government prior to the expiry of the existing lease, along with

particulars and reports as are required to be furnished in the normal course of renewal.

Where projects involve use of forest land as well as non- forest land, the project authorities sometimes start work on non-forest lands in anticipation of the approval of the Central Government for release of the forest land required for the projects. Though starting of work on non-forest lands may not have technically violated the provisions of the Act, expenditure incurred on works on non-forest lands may prove to be infructuous if diversion of forest land involved is not approved. It is, therefore, advisable that if a project involves forest as well as non-forest land, work should not be started on non-forest land till the approval of the Central Government for release of forest land under the Act has been obtained.

10. Specific measures already taken by MoEF to cut down delays in the environmental clearance process:

- Separate questionnaires for prospecting and exploration projects, site clearance and environmental clearance have been brought out. Format for furnishing information for environmental clearance has been recently revised (Annexure – I) to replace the earlier one of 1997.
- Manual for EIA appraisal was brought out in January, 2001, which is a useful reference for appraising agencies, regulatory authorities, entrepreneurs and consultants. The manual is displayed in the Web Site of the Ministry of Environment & Forests.
- Scrutiny of proposals has been made time bound. Preliminary scrutiny of the project is made within three-four weeks of receipt of the proposal and comments conveyed to the project proponent. Continuous interaction is maintained with the project authorities in identifying the shortfalls in the EIA / EMP reports. Project-wise information is displayed on MoEF's Web Site so that the project proponent is aware of the reasons for pendency and can submit additional information wherever necessary in an expeditious manner. The Web Site is updated every week.

- Decision is taken on an individual project in maximum two sittings of the Expert Committee (Mining). In specific cases, where more detailed studies are required, the project is subjected to further consideration.
- Under the provisions of EIA Notification, the Ministry has to complete the assessment of the proposal within a period of 90 days after receipt of complete information and requisite documents and decision conveyed within 30 days thereafter. The Ministry has taken several steps and initiatives to simplify and rationalize the procedures of assessment so that proper decisions on the clearance / rejection of the proposal can be arrived at within the stipulated time frame. In case the decision is not communicated within this time frame, the proposal is considered to have deemed clearance. However, this provision of deemed clearance has not been invoked so far in any case.
- The Environmental Impact Assessment Notification of 1994 has been amended to dispense with the requirement of public hearing in respect of the mining projects (major minerals) with lease area up to 25 ha.
- A time frame of 60 days for completion of public hearing has been stipulated.
- Keeping in view that a large number of marble and granite mines operating in the country in unscientific and uneco-friendly manner, the Ministry of Coal and Mines, the Department of Mines has made approval of the mining plan mandatory before mining of these two minor minerals.
- To facilitate exclusion of any mining activity in the out of bound areas like National Park, Sanctuary, thick forests overlays of the mineralized areas in these eco sensitive zones are being prepared for benefit of all stakeholders.

11. Tasks ahead for further streamlining environmental appraisal procedure and strengthening existing framework:

- Scoping EIA: It is seen that currently, screening and scoping are not a part of the EIA studies for the mining projects. Consequently, some of the environmental issues, which need to be discussed in detail, are not properly covered in the EIA / EMP reports. Experience has shown that project scoping

is an essential preliminary step. The purpose of the scoping process is to define the key issues and resources to be analysed in the EIA for determining potential impacts.

- EIA/EMP Process: The Ministry, under the World Bank assisted Environmental Management Capacity Building mining project has also obtained recommendations of the international consultant on changes required to be made in the EIA mechanism in India, keeping in view the practices being followed in other countries.
 - i. Guidelines and timetable for a formal process to determine the scope of EIA / EMP for each project need to be evolved.
 - ii. Guidelines for collection and documentation of environmental baseline data for the key resources like surface water, ground water, flora & fauna, land use, meteorology and air quality including socio-economics shall also be developed along with standardised format for preparation and submission of EIA / EMPs.
 - iii. Today, proper coverage is not given to occupational and community health aspects in the EIA / EMP reports. Guidelines for inclusion of full operation, mitigation, reclamation, mine closure and monitoring in the EIA / EMP also need to be developed.
- Emphasis on Mine Closure: The mining method used to extract minerals from the earth determines many aspects of post-mining topography. Disturbances depend on the geological structure associated with the mineral, depth of the deposit from the surface, surface character and method of mining. The natural land surface is drastically changed through removal and placement of materials and dumping of overburden, waste rock or tailings. Adequate amount of material is not normally available to fill the final pit created due to mining. Therefore, proper reclamation of

the mined out areas is a must. Proper guidelines need to be developed for this purpose. A Committee has already been set up to go into various issues relating to mine closure aspects of mining.

- Size of mining lease: In India, the State Governments grant mining leases as small as 0.5 ha. for mining of certain minerals. In such a situation, scientific working and compliance with environmental protection measures and standards is not feasible. Unscientific mining practices have altered landscapes, natural drainage pattern, soil productivity, water regime, and air & water quality. Really, the small size mines can never function in an environmentally friendly manner nor can comply with the regulations regarding mine safety and conservation. When such small sized mines operate in clusters, damage to the environment is quite serious. A two fold approach is being adopted to tackle the problem. First is to rationalize the size of new leaseholds (except in case of gemstones). For the existing mines, amalgamation of small leaseholds wherever feasible or permission to go in for a collective EIA / EMP for a cluster of mines is the second alternative. In extreme cases, where scientific and systematic working is not possible, cancellation of the leases may be the only option. For realistic assessment of environmental implications of such clusters, there is a need to adopt a regional planning strategy. While carrying out environmental appraisal, emphasis is given to predict cumulative impacts of the proposed and existing activities.

A decision has been taken to discourage such small-scale mining operations from the environmental management point of view. Recently, a Committee has been constituted to look into the issues and make recommendations about the minimum size of mining lease that should be followed in the interest of systematic and scientific mining.

- Environmental Standards: The existing environmental standards applicable to the mining industry are a composite of general environmental standards except for coal. These standards are inadequate

in certain respects for effective environmental protection and management of minerals sector when compared to international norms. Very recently, the Ministry of Coal & Mines, the Department of Mines based on the recommendations made by the Indian Bureau of Mines has come out with a set of mineral-wise air quality and effluent standards for nine minerals in a suggestive form for a period of one year. These standards are for chromite, copper, iron and manganese ore, lead and zinc, bauxite, limestone and dolomite mines.

- Demonstration of best management practices: Two demo sites having different topographic features and environmental management issues have been selected in Goa and Himachal Pradesh to demonstrate best management practices involving international consultants. The purpose is to demonstrate actual implementation of specific mitigation measures in a time bound and cost effective manner for replication at other mine sites. This would offer advantages like –
 - i. Develop feasible mitigation measures and techniques for mining projects
 - ii. Train mine operators in principles of mining, designing, implementing and monitoring the mitigation measures
 - iii. The projects will generate information that could be used for policy making and standards setting processes
 - iv. Development of technical and management guidelines for different minerals mining projects
- R&D Efforts: The Ministry of Environment & Forests has funded 14 research projects in the following identified priority areas to develop indigenous know-how:
 - ❖ Management of solid wastes
 - ❖ Optimisation of tailing pond /settling pond designs

- ❖ Application of EPA models to predict pollution levels
 - ❖ Utilisation of industrial wastes, fly ash etc
 - ❖ Stabilisation and control of OB dumps
 - ❖ Study of air borne respirable dust concentrations at work places
 - ❖ Digital modeling of contamination of ground water
 - ❖ Development of fugitive dust dispersion model for mining areas
 - ❖ Determination of emission rates of dust and validation of air quality models
 - ❖ Methodology for cumulative impact assessment in non-coal mining projects
- Data bank and networking: There are many organizations in the country, which could effectively serve as a resource in select areas of mining environment issues. However, because of inefficient networking capabilities, coordination among them often does not take place. An effective database management system and networking among the concerned institutions and the selected Central and State Government Departments and Pollution Control Boards is being established for facilitating dissemination and sharing of information on various aspects of mining and environmental data. The Ministry of Environment & Forests has also initiated a project to establish and operate a pilot Environmental Information Centre (EIC) in three States (Andhra Pradesh, Gujarat and Maharashtra) to act as a repository of validated environmental data which can be accessed and used by the stakeholders in the environmental clearance process, to evolve a suitable mechanism for net working with data providers / generators and to identify constraints and develop a blue print for up scaling the scope of the Centre at the national level. The mining data base Centre would be finally hooked to EIC.
 - Institutional Strengthening: Institutional capacity of Government Departments who are responsible for policy making, legislating, standard setting and enforcing compliance is being enhanced to ensure effective monitoring of EMPs and observation of the prescribed environmental standards by mine operators. It has also been planned to develop expertise

Uttaranchal and Rajasthan] and Shillong [Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, and Tripura,]. The seventh Regional Office is yet to start functioning at Ranchi to cover three states namely Bihar, Jharkhand and West Bengal.

The project authorities are responsible for sending periodical reports (six monthly and annual and any other specific report if asked for) on compliance with conditions of clearance letters to the Ministry, its concerned Regional Office and other concerned agencies. Site inspection is carried out by the Regional Offices under whose jurisdiction the mine falls to oversee enforcement of environmental safeguards. Interactions are held with the project representatives and the concerned State Pollution Control Boards. The Regional Offices send their feed back reports to the Ministry for further follow up action. In specific cases, officers from the Ministry also visit the mines and associated facilities to assess environmental performance of the project. Besides this, Special Monitoring Committee(s) are constituted for sensitive projects to monitor compliance with the environmental protection measures and give advice to the company in the matter. Midterm corrective measures, if required, are also stipulated for environmental protection. However, non-compliance, deficiencies and violations, if any, are brought to the notice of the company. Time is given to them to ensure compliance with the stipulations and standards. In case of serious violation, action is taken under the provisions of the relevant Acts. Analysis of the past compliance reports indicates that the following are the main areas where compliance is not satisfactory:

- i. Construction of garland drains and check-dams including periodic desiltation and maintenance.
- ii. Plantation on inactive waste dumps.
- iii. Fugitive dust control.
- iv. Rehabilitation of project affected families
- v. Particulate matters higher than ambient air quality standards.
- vi. Stabilisation of dumps slopes
- vii. Treatment of water before discharge.
- viii. Green belt development

Even achievements in terms of restoration / reclamation of the forest area are not very encouraging. This calls for much greater attention to environmental matters on the part of the mine management. Most of the remediation measures are well within the competence and capabilities of the mine operators and all that needs to be ensured is a definite commitment to compliance of the measures set out in the EMP. Though the position has improved over a period of time, enforcement of legislation is not satisfactory.

Besides the above monitoring by the Ministry and its Regional Offices, the State Pollution Control Boards, which grant "Consent to Operate" to the mines falling in their jurisdiction under the Water (Prevention & Control of Pollution) Act and the Air (Prevention & Control of Pollution) Act monitor compliance with the stipulated conditions of the consent letters. Similarly, the Indian Bureau of Mines, which approves the mining plan of minerals other than coal, lignite, natural gas, petroleum and atomic minerals, also monitors the measures concerning conservation of minerals and environmental management as per approved mining scheme through their Regional Offices. As regards the atomic minerals, the Directorate of Atomic Minerals, Department of Atomic Energy approves the mining plan and they ensure compliance with the conditions of No Objection Certificate issued by them for such minerals. To some extent in the present system, there is duplication in efforts being made by various regulatory agencies in monitoring compliance with the environmental management plan and regulations. The Directorate General of Mines and Safety, a subordinate office of the Ministry of Labour, oversees compliance with the mine and workers safety regulations and standards.

13. Concluding remarks:

Every nation in the world is aware of its resources availability, present and projected demands. The fact that we have an average population density of 284 persons per sq km, creates an imbalance between population and resources. The past rapid and mostly unplanned developmental activities have been detrimental to the goal of sustainable development. In the mining sector, a wide-ranging framework for environmental management is now in place in the country. However, compliance has been slow and uneven. The enabling framework needs more focused

strengthening to ensure that the principles of best mining and environmental management practices are adopted. Efforts made in this direction during the last two years have resulted in a major shift in focus of the mining –environmental policy in India. The mining sector faces a critical challenge in the coming years – Measuring up to the challenges of economic liberalisation, and at the same time, not to pose a threat to ecological integrity of the nation. A general consensus among the stakeholders, policy makers, and regulators has been reached and there is also political commitment at the highest level on development and environment. We have come a long way but a lot more needs to be done.

Figure 2 : Mining processes, wastes and related environmental concerns & issues

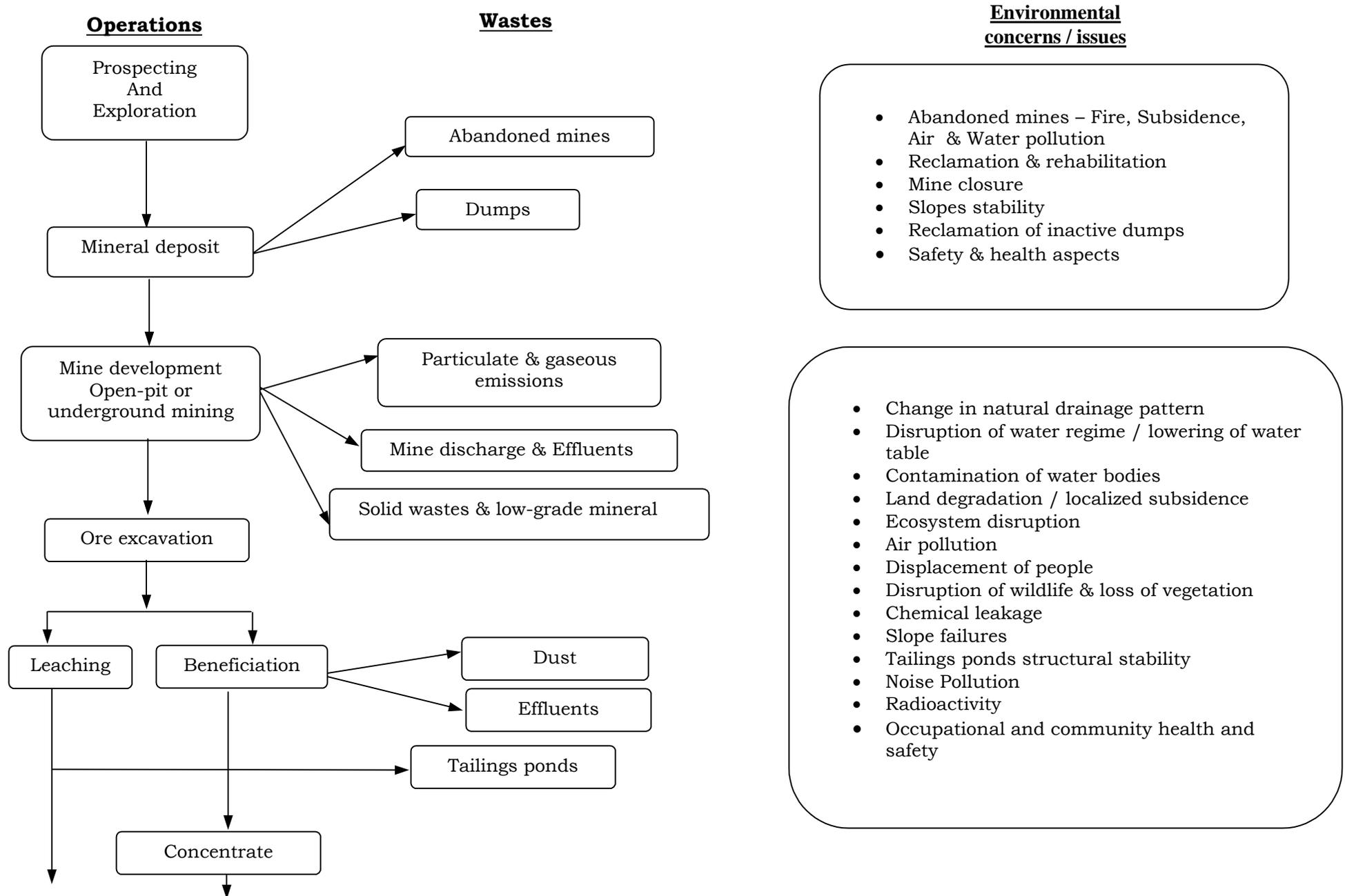
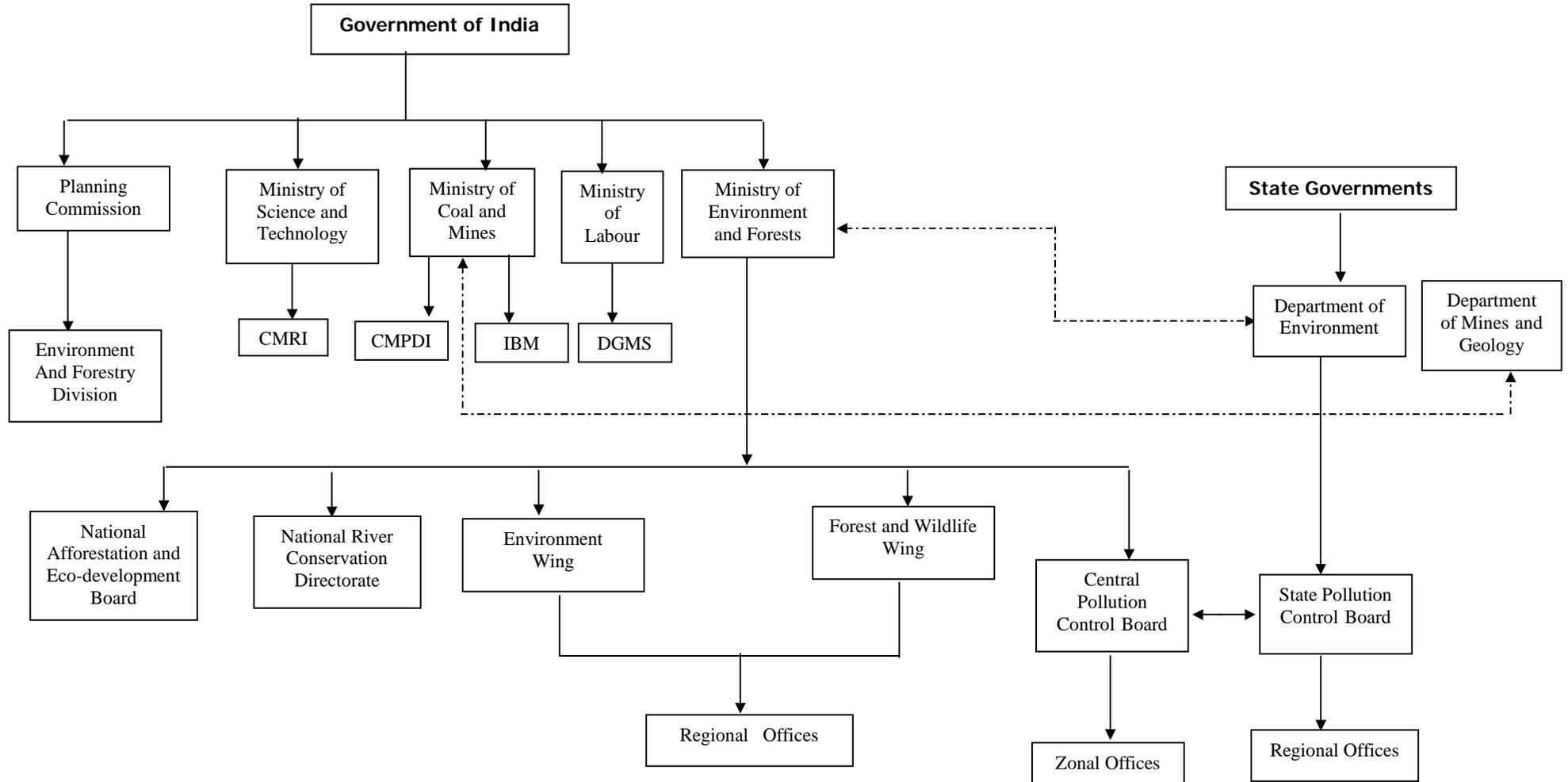


Figure 1 : INSTITUTIONAL MECHANISM : MINING AND ENVIRONMENT



CMRI : Central Mining Research Institute, Dhanbad

CMPTDI : Central mine Planning Design Institute, Ranchi

IBM : Indian Bureau of Mines, Nagpur

DGMS : Directorate General of Mines Safety, Dhanbad

