

**Government of India**  
**Ministry of Mines**

**NATIONAL MINERAL POLICY, 2008**  
**(For non - fuel and non - coal minerals)**

**1. PREAMBLE**

Minerals are a valuable natural resource being the vital raw material for infrastructure, capital goods and basic industries. As a major resource for development the extraction and management of minerals has to be integrated into the overall strategy of the country's economic development. The exploitation of minerals has to be guided by long-term national goals and perspectives. Just as these goals and perspectives are dynamic and responsive to the changing global economic scenario so also the national mineral policy has to be dynamic taking into consideration the changing needs of industry in the context of the domestic and global economic environment. It is, therefore, necessary to revisit the National Mineral Policy, 1993, as provided in para 4 of the same, and to spell out in a revised statement the different elements of policy, including elements newly evolved, for the development of the mineral resources of the country.

**2. BASIC FEATURES**

2.1 The country is blessed with ample resources of a number of minerals and has the geological environment for many others. To exploit the country's geological potential it is important that scientific and detailed prospecting is carried out in search of its mineral resources. It will be ensured that regional and detailed exploration is carried out systematically in the entire geologically conducive mineral bearing area of the country using state-of-the-art techniques in a time bound manner. Minerals being a valuable resource the extraction of mineral resources located through exploration and prospecting has to be maximised through scientific methods of mining, beneficiation and economic utilisation. Zero waste mining will be the national goal and mining technology will be upgraded to ensure extraction and utilisation of the entire run-of-mines.

2.2 To achieve both these goals of large scale prospecting and optimal mining large investments will be required together with the latest technologies in prospecting and mining. The regulatory environment will be improved to make it more conducive to investment and technology flows. Capital market structures will be developed to attract risk investment into survey and prospecting. Transparency in allocation of concessions will be assured. Preference may be given to a value addition industry in grant of mineral concession. However, this will

not in any way undermine the security of tenure to a holder of a concessionaire. The development of a proper inventory of resources and reserves, a mining tenement registry and a mineral atlas will be given priority. Enforcement of mining plans for adoption of proper mining methods and optimum utilisation of minerals will be ensured. For these purposes the Geological Survey of India (GSI), the Indian Bureau of Mines (IBM) and the State Directorates of Mining & Geology will be strengthened with man power, equipment and skill sets upgraded to the level of state of the art.

2.3. Mining is closely linked with forestry and environment issues. A significant part of the nation's known reserves of some important minerals are in areas which are under forest cover. Further, mining activity is an intervention in the environment and has the potential to disturb the ecological balance of an area. However, the needs of economic development make the extraction of the nation's mineral resources an important priority. A framework of sustainable development will be designed which takes care of bio diversity issues and to ensure that mining activity takes place along with suitable measures for restoration of the ecological balance. Special care will be taken to protect the interest of host and indigenous (tribal) populations through developing models of stakeholder interest based on international best practice. Project affected persons will be protected through comprehensive relief and rehabilitation packages in line with the National Rehabilitation and Resettlement Policy.

2.4 As the country develops and industry grows assured availability and proximity of mineral resources will play an important role in giving a competitive edge to Indian industry. The multiplier effect of minerals processed into metals on downstream industrialisation cannot be over emphasised. Value addition will, therefore, be actively encouraged. However, such value addition will go hand in hand with the growth of the mineral sector as a stand alone industrial activity. While, appropriate linkages between exploitation of minerals and their end use including the development of industry based on the minerals will be established wherever feasible, a downward curve in an industrial sector using a particular mineral within the country need not be allowed to effect the growth of mining activity for that mineral. Hence employment and tertiary sector spin offs from both value addition as well as from mining will be encouraged so as to maximise the contribution of the mineral sector to the country's gross domestic product.

2.5 Mining infrastructure requires a special thrust as the economic efficiency of evacuation of minerals from pit mouth to user point or port or rail head is closely linked to the end use value of the mineral and of the viability of the industry using the mineral. Innovative structures will be devised for developing and financing the infrastructure needs of the mining sector. While assistance through viability gap funding will be extended where required the principle of user charges and Private Public Participation will be the basis on which mining infrastructure will be built.

2.6 India is a federal structure with a single economic space. Nevertheless, the legitimate fiscal interests of States which are mineral rich need to be protected. The revenues from minerals will be rationalised to ensure that the mineral bearing States get a fair share of the value of the minerals extracted from their grounds. New sources of revenue will be developed for the States and State agencies involved in mineral sector development and regulation will be encouraged to modernise in the areas of prospecting as well as regulation. The States will be assisted to overcome the problem of illegal mining through operational and financial linkages with the Indian Bureau of Mines.

2.7 To enable the use of state of the art exploration techniques, scientific mining and optimal use of minerals through ore dressing and beneficiation technologies it is necessary not only to promote research and development in minerals but to simultaneously establish appropriate educational and training facilities for human resources development to meet the manpower requirements of the mineral industry. These matters will receive prime importance and a comprehensive institutional framework for Research & Development, and Training will be developed.

2.8 These aspects constitute the essentials of the new National Mineral Policy, 2008. A more detailed approach towards putting these essentials into practice and details of other associated features of the Policy are spelt out in the following paragraphs.

### **3. REGULATION OF MINERALS**

3.1. Management of mineral resources is the responsibility of both the Central Government and the State Governments in terms of Entry 54 of the Union List (List I) and Entry 23 of the State List (List II) of the Seventh Schedule of the Constitution of India. The Mines and Minerals (Development and Regulation) Act, 1957 (MMDR Act), lays down the legal frame-work for the regulation of mines and development of all minerals other than petroleum and natural gas. The Central Government has framed the Mineral Concession Rules, 1960 (MCR) for regulating grant of reconnaissance permits (RP), prospecting licences (PL) and mining leases (ML) in respect of all minerals other than atomic minerals and minor minerals. The State Governments have framed the rules in regard to minor minerals. The Central Government have also framed the Mineral Conservation and Development Rules, 1988 (MCDR), for conservation and systematic development of minerals. These are applicable to all minerals except coal, atomic minerals and minor minerals

3.2. The Central Government in consultation with State Governments shall formulate the legal measures necessary for giving effect to the new National Mineral Policy, 2008, to ensure basic uniformity in mineral administration across the country and to ensure that the development of mineral resources keeps pace, and is in consonance with the

national policy goals. The MMDR Act, the MCR and the MCDR will be amended in line with the policy. The regulation of mines and development of mineral resources in accordance with the national goals and priorities as spelt out in the policy and the legal framework shall be the responsibility of both the Central and the State Governments.

3.3 In order to make the regulatory environment conducive to private investment the procedures for grant of mineral concessions of all types, such as Reconnaissance Permits, Prospecting Licenses and Mining Leases, shall be transparent and seamless and security of tenure shall be guaranteed to the concessionaries. The first-in-time principle in the case of sole applicants and the selection criteria in the case of multiple applicants will be appropriately elaborated. Prospecting and mining shall be recognized as independent activities with transferability of concessions playing a key role in mineral sector development.

#### **4. ROLE OF THE STATE IN MINERAL DEVELOPMENT**

The role to be played by the Central and State Governments in regard to mineral development has been extensively dealt in the Mines and Minerals (Development and Regulation) Act, 1957 and Rules made under the Act by the Central Government and the State Governments in their respective domains. The provisions of the Act and the Rules will be reviewed and harmonised with the basic features of the new National Mineral Policy. In future the core functions of the State in mining will be facilitation and regulation of exploration and mining activities of investors and entrepreneurs, provision of infrastructure and tax collection. In mining activities, there shall be arms length distance between State agencies (Public Sector Undertakings) that mine and those that regulate. There shall be transparency and fair play in the reservation of ore bodies to State agencies on such areas where private players are not holding or have not applied for exploration or mining, unless security considerations or specific public interests are involved.

#### **5. SURVEY AND EXPLORATION**

5.1. The Geological Survey of India is the principal agency for geological mapping and regional mineral resources assessment of the country. It shall be responsible for drawing up action oriented plans towards these ends in close cooperation with all other agencies engaged in this task. Detailed exploration on land is done by the Mineral Exploration Corporation, Directorates of Mining and Geology of the State Governments and various Central and State Public Sector Organisations. In conducting exploration for minerals special attention will be given by these government agencies to the development of strategic minerals through systematic investigation of potential sources which are difficult to otherwise access.

5.2 While these Government agencies will continue to perform the tasks assigned to them for exploration and survey, the private sector would in future be the main source of investment in reconnaissance and exploration and government agencies will expend public funds primarily in areas where private sector investments are not forthcoming despite the desirability of programmes due to reasons such as high uncertainties. To expedite completion of reconnaissance work for the entire country as early as possible an open sky policy of non-exclusivity for reconnaissance work will be adopted. At the same time to attract large investments and high technology a new instrument to be known as Large Area Prospecting License will be introduced. However such bulk minerals which do not need risk investment and high technology will not be eligible for Large Area Prospecting License. The durations of all concessions will be rationalised and areas of operations enlarged suitably within each state.

5.3 It is necessary 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 task of mapping out the extended economic zone will be expedited and completed within the time prescribed by the International Sea Convention so that no area of sea bed mining is lost to the country.

5.4 Particular attention will be given to the survey and exploration of minerals in which the country has a poor resource-cum-reserve base despite having the geological potential for large resources. Minerals for which there is demand within the country either for use or for export after processing will be prioritised. Exploration for lower grade hematite, magnetite, base metals, noble metals, diamonds and high grade Ilmenite will be put on the fast track.

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

## **6. DATA BASE OF MINERAL RESOURCES AND TENEMENTS**

6.1. The national inventory of mineral resources will be based on a comprehensive and up to date review of exploration data. In coordination with Geological Survey of India, the Indian Bureau of Mines will maintain a database in digitised form comprising both a Resource Inventory and a Tenement Registry. The resource inventory will be in accordance with the latest

version of the UNFC system showing reserves and remaining resources as well in the traditional IBM form of resources and probable and proven reserves. The Tenement Registry will give information of both Leasehold Areas as well as Freehold Areas in terms of green field, brown field and relinquished areas including areas given up by the GSI and other RP/PL holders as not pursued. The data would be maintained online giving instant information to prospective investors on what is available for reconnaissance, prospecting and mining. Summaries of work done by public agencies will be kept in the form of meta-data in the public domain and detailed reports will be made available to interested investors on cost recovery basis.

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

## **7. STRATEGY OF MINERAL DEVELOPMENT**

### ***7.1 General Strategy***

The Strategy for development of any mineral should naturally keep in view its ultimate end uses in terms of demand and supply in the short, medium and long terms. The guiding principle in the strategy of development of any mineral or mineral deposit at any location shall ordinarily be the economic cost of recovery i.e extraction cost relative to market price and will hence be determined by the market. However, a disaggregated approach in respect of each mineral will be adopted and a mineral specific strategy will be developed. To maximise gains from the comparative advantage which the country enjoys intra se mineral development will be prioritised in terms of import substitution, value addition and export, in that order.

### ***7.2. Conservation and Mineral Development***

Conservation of minerals shall be construed not in the restrictive sense of abstinence from consumption or preservation for use in the distant future but as a positive concept leading to augmentation of reserve base through improvement in mining methods, beneficiation and utilisation of low grade ore and rejects and recovery of associated minerals. There shall be an adequate and effective legal and institutional framework mandating zero-waste mining as the ultimate goal and a commitment to prevent sub-optimal and unscientific mining. Non-adherence to the Mining Plan based on these parameters will carry repercussions. Mineral sectoral value addition through latest techniques of beneficiation, calibration, blending, sizing, concentration, pelletisation, purification and general customisation of product will be encouraged. This is particularly important in iron ore mining as about 80% of the iron ore produced in the country is in the form of Fines and to promote such value addition fiscal and non fiscal incentives will be considered. A thrust will be given to exploitation of

mineral resources in which the country is well endowed so that the needs of domestic industry are fully met keeping in mind both present and future needs, while at the same time exploiting the external markets for such minerals.

### ***7.3 Scientific Methods of Mining***

Mine development and mineral conservation as governed by the rules and regulations will be on sound scientific basis, with the regulatory agencies, viz. IBM and the State Directorates, closely interacting with R&D organisation, and scientific and professional bodies to ensure optimal Mining Plans. Conditions of mining leases regarding size, shape, disposition with reference to geological boundaries and other mining conditions shall be such as to favourably predispose the leased areas to systematic and complete extraction of minerals. The regulatory agencies, namely the Indian Bureau of Mines and the State Directorates will be suitably strengthened through capacity building measures.

### ***7.4 Mining as an Industry with Linkages***

Mining contributes to the generation of wealth and creation of employment independently and should therefore be treated as an economic activity in its own right and not merely as an ancillary activity of manufacturing industry. Domestic processing industry receives supplies of mineral resources produced by the mining industry at market prices prevailing from time to time. In order to be assured of uninterrupted supply of the mineral raw material from domestic sources the user industry will be encouraged to develop long-term linkages with the mineral producing units including equity participation in such mining companies. The mineral processing unit should not only get an assured supply of the mineral raw material but should also have close links with the production and marketing agencies of the mineral based end products. Mining as a backward linkage and Value addition within the same state as a forward linkage will, therefore, be encouraged.

### ***7.5 Mining Equipment and Machinery***

Indigenous industry for manufacture of mining equipment and machinery shall be strengthened. Induction of foreign technology and participation for this purpose will be encouraged. Use of equipment and machinery which improve the efficiency, productivity and economics of mining operations and safety and health of persons working in the mines and surrounding areas shall be encouraged. Import of such equipment and machinery shall be freely allowed.

### ***7.6. Manpower Development***

Existing facilities for basic and specialised training shall be constantly reviewed and upgraded from time to time to ensure that adequately trained manpower at all levels is available for the development of mines and minerals.

In order to improve the competitive edge of the national mining industry, emphasis shall be laid on mechanisation, computerisation and automation of the existing and new mining units. The man power development programme shall be suitably reoriented for the purpose.

As the mining sector takes off, the country will need more and more mining engineers, geologists, geo-physicists, geo-chemists and geo-instrumentation specialists. A comprehensive review of the sector's man power needs will be undertaken and educational institutions will be geared to meeting these needs in the medium and long term.

### ***7.7. Infrastructure Development***

Mineral deposits generally occur in remote and backward areas with poor infrastructural facilities which often inhibit their optimum development. A major thrust needs to be given to development of infrastructural facilities in mineral bearing areas with special emphasis on Linking Infrastructure. Financial resources available with government will be leveraged to the maximum extent possible through recourse to user charge based public-private-partnership arrangements wherever possible by providing an institutional framework. An enabling environment will be created to motivate large capacity mining companies to undertake construction of transportation net works (road and rail) on their own.

The contribution of mineral development to regional and more specifically peripheral development, commensurate with the huge investment in large mining projects, is substantial. In so far as public funding of infrastructure is concerned a much greater thrust will be given to development of health, education, drinking water, road and other related facilities and infrastructure in mineral bearing areas so that an integrated approach emerges, encompassing mineral development, regional development and the social and economic well being of the local, and particularly, tribal population.

### ***7.8 Financial Support for Mining***

Mining is an eligible activity for obtaining financial support from financial institutions. However, at present only those mining projects which have a substantial component of mining machinery, equipment and buildings are being financed. Steps shall be taken to facilitate financing of mine development and also of exploration integral to the mining project.

Prospecting being a high risk venture, access to “risk funds” from capital markets and venture funds will be facilitated. Early stage Exploration and Mining companies will be encouraged and differential listing requirements through segmented exchanges will be explored. Induction of foreign technology and foreign participation in exploration and mining for high value and scarce minerals shall be pursued. Foreign equity investment in joint ventures for exploration and mining promoted by Indian Companies will be encouraged.

### **7.9 *Small Deposits***

Small and isolated deposits of minerals are scattered all over the country. These often lend themselves to economic exploitation through small scale mining. With modest demand on capital expenditure and short lead-time, they provide employment opportunities for the local population. However, due to diseconomies of scale they can also lead to sub-optimal mining and ecological disturbance. Efforts will be made to promote small scale mining of small deposits in a scientific and efficient manner while safeguarding vital environmental and ecological imperatives. Regulation of these conditionalities will be tightened so as to control and prevent the growth of illegal mining

Where small deposits are not susceptible to viable mining a cluster approach will be adopted by granting the deposits together as a single lease within a geographically defined boundary. Efforts would be made to grant such mineral concessions to consortia of small scale miners so that such clusters of small deposits will enable them to reap the benefits of economies of scale.

In grant of mineral concessions for small deposits in Scheduled Areas, preference shall be given to Scheduled Tribes singly or as cooperatives.

### **7.10. *Mineral Development & Protection of Environment***

Extraction of minerals closely impacts other natural resources like land, water, air and forest. The areas in which minerals occur often have other resources presenting a choice of utilisation of the resources. Some such areas are ecologically fragile and some are biologically rich. It is necessary to take a comprehensive view to facilitate the choice or order of land use keeping in view the needs of development as well as needs of protecting the forests, environment and ecology. Both aspects have to be properly coordinated to facilitate and ensure a sustainable development of mineral resources in harmony with environment.

Mining activity often leads to environmental problems like land degradation in opencast mining and land subsidence in underground mining, deforestation, atmospheric pollution, pollution of rivers and streams, soil erosion due disposal of solid wastes like overburden and so on, all affecting the ecological balance of the area. Open-cast mining in areas with actual forest cover leads to deforestation. Prevention and mitigation of adverse environmental effects due to mining of minerals and repairing and re-vegetation of the affected forest area and land covered by trees in accordance with the latest internationally acceptable norms and modern afforestation practices shall form integral part of mine development strategy in every instance. All mining shall be undertaken within the parameters of a comprehensive Sustainable Development Framework which will be so devised as to take all these aspects into consideration. The guiding principle shall be that a miner shall leave the mining area in better ecological shape than he found it.

Mining operations shall not ordinarily be taken up in identified ecologically fragile and biologically rich areas. Strip mining in forest areas should be avoided and it should be permitted only when accompanied with comprehensive time-bound reclamation programme.

No mining lease would be granted to any party, private or public, without a proper mining plan including the environmental management plan approved and enforced by statutory authorities. The environmental management plan should adequately provide for controlling the environmental damage, restoration of mined areas and for planting of trees according to the prescribed norms. As far as possible, reclamation and afforestation will proceed concurrently with mineral extraction.

Efforts would be made to convert old disused mining sites into forests and other appropriate forms of land use.

### ***7.11 Relief & Rehabilitation of Displaced and Affected Persons***

Mining operations often involve acquisition of land held by individuals including those belonging to the weaker sections. In all such cases a social impact assessment will be undertaken to ensure that suitable Relief and Rehabilitation packages are evolved. While compensation is generally paid to the owner for his acquired land, rehabilitation of affected persons in the form of substitute land, land for housing and jobs is not always adequate. Appropriate compensation will form an important aspect of the Sustainable Development Framework mentioned in para 2.3 and 7.10 above. In so far as indigenous (tribal) populations are concerned the Framework shall incorporate models of stakeholder interest for them in the mining operation, especially in situations where the weaker sections like the local tribal populations are likely to be deprived of their means of livelihood as a result of the mining intervention.

In areas in which minerals occur and which are inhabited by tribal communities and weaker sections it is imperative to recognize resettlement and rehabilitation issues as intrinsic to the development process of the affected zone. Thus all measures proposed to be taken will be formulated with the active participation of the affected persons, rather than externally imposed. A careful assessment of the economic, environmental and social impact on the affected persons will be made. A mechanism will be evolved which would actually improve the living standards of the affected population and ensure for them a sustainable income above the poverty line. For this purpose, all the provisions of the National Rehabilitation and Resettlement Policy or any revised Policy or Statute that may come into operation, will be followed.

### ***7.12 Mine Closures***

Once the process of economical extraction of a mine is complete there is need for scientific mine closure which will not only restore ecology and regenerate bio mass but also take into account the socio-economic aspects of such closure. Where mining activities have been spread over a few decades, mining communities get established and closure of the mine means not only loss of jobs but also disruption of community life. Whenever mine closure becomes necessary, it should be orderly and systematic and so planned as to help the workers and the dependent community rehabilitate themselves without undue hardship.

### ***7.13. Mine Safety***

Mining operations are hazardous in nature. Accidents happen and often result in the loss of life or limb of persons engaged in it. Efforts must be directed towards the development and adoption of mining methods which would increase the safety of workers and reduce the accidents. Towards this end, participation and cooperation of mine workers shall be secured. Steps will also be taken to minimise the adverse impact of mining on the health of workers and the surrounding population.

## **8. FOREIGN TRADE**

Minerals continue to be an important source of foreign exchange earnings. The policy of export shall keep in view the dynamics of mineral inventories as well as the short, medium and long term needs of the country. Efforts shall be made to export minerals in value added form as far as possible. The indigenous mineral industry shall be attuned to the international economic situation in order to derive maximum advantage from foreign trade by carefully anticipating technology and demand changes in the international market for minerals.

The import of mineral based material shall be coordinated as far as possible with the indigenous development of mineral based industries. Areas of cooperation with countries with complementary resource base shall be developed for mutual advantage. The approach shall be to make available mineral based materials to domestic users at reasonable prices as determined by market forces.

A long term export policy would provide stability and prove to be an incentive for investing in large scale commercial mining activity. To develop mining as a modern stand alone industry substantial investment is required. Assurances on export of minerals will be a key factor for investment decisions particularly on FDI in the sector. The Export Policy should be based on a clear long term strategy for export of minerals taking these aspects into consideration.

## **9. FISCAL ASPECTS**

It will be the endeavour of government, within the context of the budget, to design fiscal measures conducive to the promotion of mineral exploration and development including beneficiation and other forms of product refinement. In the context of the changing mineral scenario and the economies of mineral development and products, both at the national and international level fiscal changes will be examined from time to time consistent with the general tax structure and through the normal budgetary process. Mineral prices should reflect their value and the royalty structures will be designed to ensure that the producer earns and the consumer pays the true value of the minerals produced and consumed. The fiscal dispensation will generally aim to ensure that adequate compensation is forthcoming to the state in return for the concessions it grants.

## **10. RESEARCH AND DEVELOPMENT**

### ***10.1. General Approach***

Research and development in the mineral sector has to cover the entire gamut of activities from geological survey, exploration, mining, beneficiation, concentration of minerals to development of materials. Efforts will be directed towards the development of new technologies for conversion of existing mineral resources into viable economic resources. Appropriate technologies shall be developed to enable indigenous industries to utilise the mineral resources with which the country is abundantly endowed and as substitutes for minerals whose reserves are poor. R&D efforts shall be directed to find new and alternative uses for minerals whose traditional demand is on the wane. Indigenous technology has to be upgraded through research and appropriate absorption and adoption of technological innovations abroad. Research and development efforts shall be made to improve efficiency in process, operations and also the recovery of by-products and

reduction in specification and consumption norms. Efforts will also be directed to evolve low capital and energy saving processing systems.

### ***10.2. Research in Mining Methods***

Mining methods determine the safety, economy, speed and the percentage of extraction of the ore reserves from a mine. Research and development thrust shall be directed specially in the areas of rock mechanics, ground control, mine design engineering, equipment deployment and maintenance, energy conservation, environmental protection, safety of operations and human engineering.

### ***10.3 Mineral Processing and Beneficiation***

Attention will be given to beneficiation and agglomeration techniques to bring lower grades and finer size material into use. Research organisations, including the National Mineral Processing Laboratories of the Indian Bureau of Mines will be strengthened for development of processes for beneficiation and mineral and elemental analysis of ores and ore dressing products. There shall be cooperation between and coordination among all organisations in public and private sector engaged in this task. Research and development shall be oriented to ensure maximum economic recovery of the associated minerals and valuable metals.

### ***10.4 Development Of Automated Equipment***

To meet the objective of safety and economic production attention will be given to the development of robotics, automated equipment and system for mining, especially for deep mining and transportation to surface.

### ***10.5. Deep Sea Mining***

India is a pioneer investor and has been allocated a mine site of 150,000 square kilometres in Indian Ocean for exclusive survey and exploration. Deep ocean resources represent an exceptionally large and potentially important mineral resource. Integrated systems for exploration, exploitation, mining and processing of these resources shall be expedited with the development/acquisition of necessary technologies. Appropriate mechanism for coordinating the survey and exploration of Deep Sea Bed Area will be established by the Ministry of Earth Sciences.

### ***10.6 Production Of Materials Of High Purity***

Research will be directed towards raw materials required for production of materials of high purity for use in advanced technology applications such as semi-conductors, photo-voltaic, lasers, special sensors, high temperature new ceramics, hard and high temperature materials, superconductors, insulators, very thin films, glasses and liquid crystals and metal and mineral fibres.

### ***10.7. Coordination Of Research Organisations***

Research and development activities in the mineral sector are carried out in the national laboratories, educational institutions and R&D units of public and private sector enterprises. Pooling of resources and expertise available in the various R&D Organisations is imperative to meet the challenges and to fulfil the tasks ahead in the mineral sector. Linkages and interaction between the various institutions engaged in R&D in the mineral sector shall be strengthened to derive the maximum benefit. Interchange of scientists between institutions shall be encouraged to accelerate the pace of interaction. It shall also be ensured that the research findings are made available to users expeditiously. There shall be cooperation between and coordination among all organisations in the public and private sectors engaged in this task.

Mining methods determine the safety, economy, speed and the percentage of extraction of the ore reserves from a mine. Research and development thrust needs to be directed in areas of such as rock mechanics, ground control, mine design engineering, equipment deployment and maintenance, energy conservation, environmental protection, safety of operations and human engineering. This has to be done in a holistic way so that inter-linkages are established to the advantage of each segment. To this end the diverse research, development and training initiatives within the public domain shall be reorganised into a single and cohesive R & D and Training institution of excellence to be known as the National Institute of Mineral Development. Organizations such as the National Mineral Processing Laboratories of the Indian Bureau of Mines, the National Institute of Rock mechanics, the Jawaharlal National Institute of Aluminium Research and Development, the R & D initiatives of the Geological Survey of India will be joined to provide a collective thrust.

## **11. CONCLUSIONS**

Mineral wealth, though finite and non-renewable in the long term, is a major resource for development. The need for a well planned programme of survey and exploration, management of resources which have already been discovered and those which are in the process of discovery and their optimal, economical and timely use are matters of national importance.

The success of the second national mineral policy will depend largely on a national consensus to fulfil its underlying principles and objectives.

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