

## **6. STRATEGIES FOR MINE CLOSURE IN INDIA**

### **6.1 Introduction**

Today, the concepts and standards underlying mine closure are much more stringent and demanding than they were just a few years ago. It also reflects changing public priorities and environmental imperatives. The mining industry of India not fully accepts the concept and responsibility of mine site rehabilitation and decommissioning. The issue is to develop an effective and efficient approach to the funding of closure that enables rehabilitation and other environmental objectives to be achieved.

Today, the emphasis for management of the environmental aspects of mine closure and decommissioning has shifted towards the idea of planning for closure. Because, the objective of mine closure is to prevent and minimize adverse long-term environmental impacts, and to create a self-sustaining natural ecosystem or alternate land use based on an agreed set of objectives.

**Aim:** Strategies for mine closure in India has aim in encouraging the development of comprehensive closure plans that return all mine sites to viable and wherever practicable, self-sustaining eco systems and that these plans are adequately financed, implemented and monitored within all jurisdictions.

Strategies for mine closure have evolved as a cooperative development between the Indian Mining Industry and Government of India (GOI). It is anticipated that both government and industry will develop complementary regulations and guidelines to further advance the process of effective mine closure.

**Structure:** Strategies for mine closure is structured around asset of objectives and principles grouped under following key areas: planning, implementation, review process, financial provision, standards, stakeholder involvement and relinquishment.

### **6.2 Regulatory Setting**

Regulations to meet community expectations of environmental management are increasing in India. Rules framed and Notifications issued under the Environment (Protection) Act 1986, the Forest (Conservation) Act 1980, the water (Prevention and Control of Pollution) Act 1974, the Air (Prevention and Control of Pollution) Act 1981, the Wildlife (Protection) Act 1972 and the Mines and Minerals (Development and

Regulations) act 1957 provide the procedural framework of activities required for environmental preservation and pollution control.

As a follow-up-measure the Industrial Policy Resolution of 1956, the MMRD Act 1946 was repealed and MMRD act 1957 was enacted. Under this act Mineral Concession Rules 1960 and MCDR 1958 were framed. As environmental protection became increasingly important the MMRD Act was thoroughly amended in 1987. The amended MMDR Act was followed by significant modifications of MCR 1988. The revised MCR now requires that 'mining plans' to be submitted to IBM for approval. It must incorporate a plan of the area showing watercourses, the forest areas, density of trees, etc. The mining plan should also contain an assement of impact of mining activity on environment including land, air, water and forest. MCR, amended in 2003, is known as Mineral Concession (Amendment) Rules 2003. Minimum size of the mining lease and provision for mine closure are two important rules came into focus within this amendment.

Another step forward was repealing MCDR 1958 and promulgation of MCDR 1988. Provisions of eleven rules (Fifth Chapter) are intended for environmental protection. MCDR was amended in 2003. The amended MCDR now requires the submission of progressive mine closure plan and final mine closure plan. The modifications of mine closure plan, responsibility of the holder of the mining lease, financial assurance and notice of temporary discontinuance of work are the parts, which come into picture through MCDR 2003.

### **6.3 Preparation of Mine Closure Plan**

All the existing mining lessees are required to submit the "Progressive Mine Closure Plan" along with prescribed financial sureties within 180 days from date of notification. Further, the mining lessee is required to submit "Final Mines Closure Plan" one year prior to the proposed closure of the mine. In the notification it has been enumerated that the "Progressive Closure Plan" and "Final Closure Plan" should be in the format and as per the guidelines issued by the Indian Bureau of Mines.

Mine closure operation is a continuous series of activities starting from day one of the initiation of mining project. Therefore, **progressive mine closure plan** will be an additional chapter in the present mining plan and will be reviewed every five years in the Scheme of Mining. As progressive mine closure is a continuous series of activities, it is

obvious that the proposals of scientific mining have had included most of the activities to be included in the progressive mine closure plan.

**Final mine closure plan** as per statute, shall be considered to have its approval at least nine months before the date of proposed closure of mine. This period of nine months is reckoned as preparatory period for final mine closure operations. Therefore, all proposals for activities which have to be carried out after production of mineral from the mine or mining is ceased, shall be included in the final mine closure plan.

The mine closure plan will be prepared as per the guidelines. The guidelines include the specific activities both in progressive mine closure plan and final mine closure plan.

The guideline is intended to assist proponents, managers and environmental personnel within industry to plan for closure. It is designed to serve as a framework for closing minerals industry operations to ensure the company does not leave themselves and subsequent landowners with unacceptable ongoing liability. The guideline provides advice on the range of issues that may be considered by an operation in determining its responsibilities for the management of land before, during and after operations.

## **6.4 Guidelines**

### **6.4.1 Introduction:**

(a) Project Description:

The name of the lessee, the location and extent of lease area, the type of lease area (forest, non-forest etc), the present land use pattern, the method of mining and mineral-processing operations, should be given.

(b) Reasons for closure:

The reasons for closure of mining operations in relation to: i) exhaustion of mineral, ii) uneconomic operations, iii) lack of demand, iv) natural calamity, directives from statutory organization or v) court etc. should be specified.

(c) Statutory obligations:

The legal obligations, if any which the lessee is bound to implement like special conditions imposed while execution of lease deed, approval of mining plan, directives issued by the Indian Bureau of Mines, conditions imposed by the Ministry of Environment and Forests, State of Central Pollution Control Board or by any other

organization describing the nature of conditions and compliance position thereof should be indicated here (the copies of relevant documents may be attached as Annexure).

(d) Closure plan preparation:

The names and addresses of the applicant and recognized qualified person who prepared the Mine Closure Plan and the name of the existing agency should be furnished. A copy of the resolution of the Board of Directors or any other appropriate administrative authority as the case may be on the decision of closure of mine should be submitted.

#### **6.4.2 Mine Description:**

(a) Geology:

A brief description of the topography and general geology indicating rock types available, the chemical constituents of the rocks / minerals including toxic elements if any, at the mine site should be given.

(b) Reserves:

The mineral reserves available category wise in the lease area estimated in the last mining plan / mining scheme approved along with the balance mineral reserves at the proposed mine closure including its quality available (for final mine closure plan only) should be indicated.

(c) Mining Method:

A brief description of the mining method followed to win the mineral, extent of mechanization, mining machinery deployed, production level etc should be given.

(d) Mineral Beneficiation:

The mineral beneficiation practice if any, indicates the process description in short. Indicate discharge details of any tailings/middling and their disposal / utilization practice followed should be described in brief.

#### **6.4.3 Review of Implementation of Mining Plan:**

The various proposals committed with special emphasis on the proposals for protection of environment in the approved Mining Plan / Scheme of Mining including five years Progressive Closure Plan upto the closure of mine vis-à-vis their status of implementation should be indicated in detail. The areas, which might have been contaminated by mining activities and type of contaminants that might be found there should be highlighted. The

reasons for deviation from the proposals if any with corrective measures taken should also be given.

#### **6.4.4 Closure Plan:**

##### **(a) Mined-Out Land:**

The proposals to be implemented for reclamation and rehabilitation of mined-out land including the manner in which the actual site of the pit will be restored for future use should be described. The proposals should be supported with relevant plans and sections depicting the method of land restoration/ reclamation/ rehabilitation.

##### **(b) Water Quality Management:**

A detail description of the existing surface and ground water bodies available in the lease areas and the measures to be taken for protection of the same including control of erosion, sedimentation, siltation, water treatment, diversion of water courses, if any, measures for protection of contamination of ground water from leaching etc should be given. Quantity and quality of surface water bodies should also be indicated and corrective measures proposed to meet the water quality conforming the permissible limits should also be described. Report of hydrological study carried out in the area may also be submitted. The water balance chart should be given. If there is potential of Acid Mine Drainage the treatment method should be given.

##### **(c) Air Quality Management:**

The existing air quality status and the corrective measures to be taken for prevention of pollution of air should be described.

##### **(d) Waste Management:**

A description of the type, quality and quantity of overburden, mineral reject etc. available and their disposal practice should be given. If no utilization of waste material is proposed, the manner in which the waste material will be stabilized should be described. The protective measures to be taken for prevention of siltation, erosion and dust generation from these waste materials should also be described. If toxic and hazardous elements are present in the waste material the protective measures to be taken for prevention of their dispersal in the air environment, leaching in the surface and ground water etc. should be described.

(e) Top Soil Management:

The topsoil available at the site and its utilization should be described.

(f) Tailing Dam Management:

The steps to be taken for protection and stability of tailing dam, stabilization of tailing material and its utilization, measures to prevent water pollution from tailings etc., arrangement for surplus water overflow along with detail design, structural stability studies, the embankment seepage loss into the receiving environment and ground water contaminant if any should be given.

(g) Infrastructure:

The existing infrastructural facilities available such as roads, aerial ropeways, conveyer belts, railways, power lines, buildings & structures, water treatment plant, transport, water supply sources in the area etc. and their future utilization should be evaluated on case-to-case basis. If retained, the measures to be taken for their physical stability and maintenance should be described. If decommissioning proposed, dismantling and disposal of building structures, support facilities and other infrastructure like electric transmission line, water line, gas pipeline, water works, sewer line, telephone cables, underground tanks, transportation infrastructure like roads, rails, bridges, culverts etc., electrical equipments and infrastructures like electric cables, transformers to be described in connection with restoring land for further use.

(h) Disposal of Mining Machinery:

The decommissioning of mining machineries and their possible post mining utilization, if any, to be described.

(i) Safety and Security:

The safety measures implemented to prevent access to surface openings, excavations etc., and arrangements proposed during the mine abandonment plan and upto the site being opened for general public should be described.

(j) Disaster Management and Risk Assessment:

This should deal with action plan for high risk accidents like landslides, subsidence flood, inundation in underground mines, fire, seismic activities, tailing dam failure etc. and emergency plan proposed for quick evacuation, ameliorative measures to be taken etc.

The capability of lessee to meet such eventualities and the assistance to be required from the local authority should also be described.

(k) Care and maintenance during temporary discontinuance:

For every five yearly review (as given in the mining scheme), an emergency plan for the situation of temporary discontinuance or incomplete programme due to court order or due to statutory requirements or any other unforeseen circumstances, should include a plan indicating measures of care, maintenance and monitoring of status of unplanned discontinued mining operations expected to re-open in near future. This should detail item wise status monitoring and maintenance with periodicity and objective.

#### **6.4.5 Economic Repercussions and Manpower Retrenchments:**

Manpower retrenchment, compensation to be given, socio-economic repercussions and remedial measures consequent to the closure of mines should be described, specifically stating the following.

- § Number of local residents employed in the mine, status of the continuation of family occupation and scope of joining the occupation back.
- § Compensation given or to be given to the employees connecting with sustenance of himself and their family members.
- § Satellite occupations connected to the mining industry - number of persons engaged therein - continuance of such business after mine closes.
- § Continued engagement of employees in the rehabilitated status of mining lease area and any other remnant activities.
- § Envisaged repercussions on the expectation of the society around due to closure of mine.

#### **6.4.6 Time Scheduling for Abandonment:**

The details of time schedule of all abandonment operations should be described here. The manpower and other resources required for completion of proposed job should be described. The schedule of such operations should also be supplemented by PERT (Programme Evaluation & Review Technique), bar chart etc.

#### **6.4.7 Abandonment Cost:**

Cost to be estimated based on the activities required for implementing the protective and rehabilitation measures including their maintenance and monitoring programme.

#### **6.4.8 Financial Assurance:**

The financial assurance can be submitted in different forms as stated in Rule 23(F) (2) of Mineral Conservation and Development (amendment) Rules, 2003. Financial assurance has to be furnished by every lease holder in terms of Rs.25, 000/- for category A and Rs. 15, 000/- for category B mines, per hectare of mining lease area. The minimum amount for category A shall be of rupees two lakh and the minimum amount for category B shall be of rupees one lakh.

The financial assurance should be submitted through performance or surety bond or letter or credit from any scheduled bank or trust fund build up through annual contributions from the revenue generated by mine and based on expected amount sum required for abandonment of mine or any other form of security or any other guarantees acceptable to the authority to Regional Controller of Mines or the officer authorized by the State Government.

Before executing the mining lease deeds, the leaseholder should submit the financial assurance to the Regional Controller of Mines or the officer authorized by the State Government. But for existing mining lease, the financial assurance along with progressive mine closure plan should be submitted.

#### **6.4.9 Certificate:**

The above-mentioned actions should be stated clearly in the mine closure plan. A certificate duly signed by the lessee to the effect that said closure plan complies all statutory rules, regulations, orders made by the Central or State Government, statutory organizations, court etc. have been taken into consideration and wherever any specific permission is required the lessee will approach the concerned authorities. The lessee should also give an undertaking to the effect that all the measures proposed in this closure plan will be implemented in a time bound manner as proposed.

#### **6.4.10 Plans and Sections:**

The above things should be supported with Plans and Sections. The Closure Plan may also be submitted depicting photographs, satellite images on compact disc etc. wherever possible.



**NOTE:** The mine closure plan in progressive stage will be prepared by paragraphs where sub-paragraphs may be added for detailed items whereas the final mine closure plan will be prepared in chapters with sub-chapters as necessary with adequate details.