Overview on Reclamation and Rehabilitation of Mines

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Controller General,
Indian Bureau of Mines
Overview: Indian Mineral Sector

Minerals produced in India

4 Fuel

4th Coal, Iron ore & Aluminum

5 Atomic

3rd Kyanite/Sillimanite, Chromite, Limestone & Steel Crude

10 Metallic

5th Bauxite, Zinc

6th Mn Ore

71 Non-Metallic including Minor

India’s Rank in World Mineral Production 2015
(As per Mineral Commodity Summaries 2016)

2nd Barytes, Talc/ Steatite/ Pyrophyllite
Overview: Performance of Indian Mining Sector 2015-16

Value of Mineral Production: Rs. 268955 Cr

% contribution to GVA: 2.58

Value of Export of Ores & Minerals (14-15): Rs. 178077 Cr

Value of Import of Ores & Minerals (14-15): Rs. 1071689 Cr

Value of Import of Metals & Alloys (14-15): Rs. 401259 Cr

Value of Export of Metals & Alloys (14-15): Rs. 167120 Cr

Number of mining Leases: 3868

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

Index of Mineral Production (Base Year 2004-05): 129.2
Mining Lease Area: India & State wise
As per ML Directory as on 31.3.2015

Total Geographical Area

Net Area Sown (Crop Area) 43%
Permanent Pastures & Grazing Land 3%
Forest 21%
Fallow Lands 8%
Land Not Available for cultivation 18%
Other Area 7%
Mining Lease Area 0.1%

Odisha 20.28
Rajasthan 13.90
Karnataka 13.16
M.P. 9.45
A.P. 7.42
Jharkhand 6.96
Chhattis-Garh 6.76
Gujarat 6.52
Mahara-shtra 3.69
Telangana 3.23
Tamil Nadu 2.76
Goa 2.18

Mining Lease Area (Excluding Coal, Lignite, Petroleum, Natural Gas, Atomic Minerals and All Minor Minerals)
3,39,972 Ha (approx. 0.10% of India’s GA)
**Mining Lease Areas : Some Peculiarities**

No. of ML as on 31.3.2015 : 3,868 for 40 minerals (Area - 339,972 Ha)

Mineral-bearing districts : 212 in 24 states.

High mineral potential districts : 8 districts in 5 states, constitute 29% of Total ML & 24% of Total lease area

<table>
<thead>
<tr>
<th>S. No</th>
<th>State</th>
<th>District</th>
<th>No. of Leases</th>
<th>No. of minerals</th>
<th>Area in Ha.</th>
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<td>Frequency Group (Area in Hect.)</td>
<td>No. of Mining Leases</td>
<td>% of Total Leases</td>
<td>Lease Area in Hect.</td>
<td>% of Total Lease Area</td>
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BRINGING A MINE TO LIFE

Exploration
From land permits to mapping and drilling, nothing gets started unless the grades coming out of the ground, work in their respective metals price environment.

Mine Design
A wide range of permitting and studies are required, including community relations, environmental impacts and how the metals will be extracted.

Mine Construction
Depending on the country and region, construction could include anything from power grids to roads to small aircraft landing strips.

Production
Once built, a ramp-up period is needed to get the mine rolling. During the mine life, exploration can be continued around the area, adding to existing reserves.

End Game
At the end of its lifecycle, ramp down of operations begins as equipment is dismantled and the mine is prepped for the reclamation process. This usually takes place with the local governments with an eye on environmental sustainability.

Reclamation
It's become standard practice to establish an environmentally safe area where the mine used to be. That may come in the form of reforestation, adding vegetation and ensuring no environmentally unfriendly agents remain.

- **Bauxite (000' ton)**
  - 1947: 20
  - 1955: 92
  - 1965: 707
  - 1975: 1274
  - 1985: 2341
  - 1995: 5443
  - 2005: 12595
  - 2015: 28133

- **Iron Ore (000' ton)**
  - 1947: 3417
  - 1955: 7485
  - 1965: 19957
  - 1975: 26519
  - 1985: 49306
  - 1995: 94038
  - 2005: 170029
  - 2015: 303815

- **Limestone (000' ton)**
  - 1947: 415
  - 1955: 715
  - 1965: 19957
  - 1975: 26519
  - 1985: 49306
  - 1995: 94038
  - 2005: 170029
  - 2015: 303815
Exponential growth in mineral production since 1980

Mining activities cause physical, chemical, biological and socio-economic changes in the area.

Surface mining activities disturb the original land profile

In India mineral production comes mostly from opencast mines & hence Land degradation problems is of serious concern

An intricate, in-depth and site-specific techniques involving integrated approach is necessary.
Overview:
Evolution of legislation for Environment Protection

1974

1980
- The Water (Prevention & Control Of Pollution) Act, 1974 & Rules

1981
- The Air (Prevention & Control Of Pollution) Act, 1981 & Rules

1986
- The Air (Prevention & Control Of Pollution) Act, 1981 & Rules

2002
- The Biological Diversity Act 2002
- The Water (Prevention & Control Of Pollution) Cess Act, 1977 & Rules

Policies influencing the eco-restoration activities:
National Forest Policy (NFP), 1988,
National Wildlife Action Plan (NWAP), 2002,
Wildlife Conservation Strategy 2002
Overview:
Evolution of Provisions for Environment Protection in Mining legislation

- **MCDR, 1988**: Concept of Mining Plan & Provisions for restoration, reclamation and rehabilitation of lands affected by mining operations (Rule 31 to 41)
- **Amendment in MCDR, 1988**: Incorporating MCP & E.A.
- **MMDR Amendment Act, 2015**: DMF (9B) & SDF (20A)
- **NMP, 1993**: Emphasized for orderly and systematic mine closure
- **NMP 2008**: Envisaged time-bound reclamation to regenerate the better ecosystem, concurrent with extraction, international norms to be integral part of mine development strategy
- **SDF Roll out & SRS for Mines**
Brief Outline of FMCP

- **Introduction**: Brief introduction of the mine
- **Mine description**: Geology, Reserves, Mining methods, Mineral beneficiation
- **Review of Implementation of MP/SOM/PMCP**
- **Closure plan**: Mines-out land, Water quality management, Air quality management, Waste management, Topsoil management, Tailing dam management, Infrastructure, Disposal of mining machinery, Safety & security, Disaster management & risk assessment, Care & maintenance during temporary discontinuance
- **Economic repercussions of closure of mine and manpower retrenchments**
- **Time schedule for abandonment**
- **Abandonment cost**
- **Financial assurance**
- **Certificates**
- **Relevant plans & sections**
Overview:
Environmental Jurisprudence in Mining

1988: Closure of mining in Doon Valley, Monitoring Committee for afforestation


2009: Suspension of mining operations in Aravalli area for non-compliance of statutory R&R provisions

2011: Oblapuram case Differential rate of Royalty could be deployed for rehabilitation purpose of area concerned

2012: Deepak Kumar SG directed for separate corpus for R&R of mined out areas for minor minerals

2013: Bellary Karnataka, CEC chalked guidelines for R&R

2014: Goa Foundation- termination of leases,
3-R & Future Land Use

- **Reclamation** - Reclamation means *return the mined out land with useful life*. It implies restoring the land to a form and productivity that is useful and inconformity with a prior land use. Reclamation always may not be a single-phase operation.

- **Rehabilitation** - Rehabilitation is to *bring back the degraded land to a normal stage by a special treatment*. It is a process of taking some mitigation measures for disturbed environmental condition created through mining activities.

- **Restoration** - Restoration is the process of *returning the mined out land being fit to an acceptable environmental condition*. However, the general acceptable meaning of the term is bringing the disturbed land to its original form. Restoration is often used to indicate that biological properties of soil are put back to what they were. This is a rare phenomenon.

**Future Land Use: Backfilling/Stabilization/ Afforestation/Reservoir**

- Forestry
- Recreation
- Water Reservoir
- Crop Land
- Residential/ Commercial
- Fish & wildlife Habitat
- Undeveloped Land
- Grazing/ Pasture Land
Issues to be focused for R&R……

Improve affected Land for beneficial, sustainable & productive use

No further deterioration of Environmental resources

No compromise for Public Health

Safety of surrounding habitat

Maximize benefits for sustainable existence

Conservation of valuable attributes & aesthetics
Overview: Results so far ....

- Afforestation: 113 Million saplings in 46873 Ha Area with 68% Survival Rate
- FMCP: 285 approved so far since inception
- Financial Assurance: Bank Guarantees for a value of Rs.217,37,30,874/- excluding expired guarantees.

In 2966 Mines 17019 Ha. Area reclaimed

Simultaneous R/R

Best Practices

Certificate issued in 126 cases for partial or full surrender

Certificate issued under 29 A of Erstwhile MCR 1960
Successful implementation of closure activity dependent on both regulation (Govt.) & self-regulation (by mining company and industry).

Public disclosure of mining enterprises on sustainable issues and a greater transparency in the industry needed to avoid negative consequences.

For mines abandoned prior to 2003, data base is not available either with State Govt. or IBM.

There is no proper feedback on mines closed as per FMCP whether the desired benefits are enjoyed by the concerned society or not.

Post closure monitoring mechanism is not available and these post closure activities are beyond the purview of existing statues.
Way Forward.....

Minerals play a decisive role in the growing economy.

The debate 'Mining or Environment' is now over.

India is heading toward sustainable development with carefully drafted environmental legislation.

Recent Reforms featuring greater transparency, procedural simplification, SDF & Star Rating System will definitely mark a new milestone in the evolutionary process of Indian Mining.
Thank you