

## CHAPTER-XVIII

## MINE CLOSURE PLAN

## 18.1 Closure Planning details of mine

Chhal OC (Seam III) (6.0Mty) is an extension/recasting project of three existing projects. The project comprises mostly (i.e. 981.288Ha, 73.07 % tenancy land. The block area is involved with industrial and mining activities for which regular environmental monitoring/audit are being done. The core & Buffer zone environmental data for Chhal OC (Seam III) Expansion Project in respect of air quality, water quality, noise level, flora fauna, socio economical data etc. are available for preparation of this Chapter.

CMPDI on behalf of SECL carried out environmental base line data generation by Govt. approved labs at different locations in core & buffer zone of Chhal OC (Seam III) Project.

The project has been planned for a target capacity of 6.0 Mty for 30 years life, to meet power grade coal. Beyond this life, the mine will be closed if no further expansion towards the above adjoining blocks is considered. The closure details are described below.

## 18.1.1 Mined out Land &amp; proposed final land use;--

Present and conceptual post mining land use is given in tables 18.1 & 18.2 below respectively.

Table - 18.1

SL. NO.	REQUIREMENT OF LAND	TENANCY / AGRICULTURE LAND			FOREST LAND			GOVT. LAND			TOTAL LAND		
		ALREADY ACQUIRED	TO BE ACQUIRED	TOTAL	ALREADY ACQUIRED	TO BE ACQUIRED	TOTAL	ALREADY ACQUIRED	TO BE ACQUIRED	TOTAL	ALREADY ACQUIRED	TO BE ACQUIRED	TOTAL
1	LAND FOR QUARRY	516.79	16.643	16.643	0	185.155	185.155	0.00	156.417	156.417	0	358.215	875.01
2	FOR EXTERNAL DUMP	0	110.73	110.73	0	0	0	0	20	20	0	130.73	130.73
3	SURFACE INDUSTRIAL DEVELOPMENT RLY. SIDING, COLONY, APPROACH ROAD, ETC.	0	50	50	0	0	0	0	10	10	0	50	50
4	RESIDENTIAL COLONY	0	0	0	0	0	0	0	0	0	0	0	0
5	LAND FOR HOMESTEAD/FAMILY	0	50	50	0	0	0	0	0	0	0	50	50
6	SAFETY ZONE	0	144.47	144.47	0	0	0	0	50	50	0	144.47	144.47
7	LAND REQUIRED FOR ENVIRONMENT AND SAFETY	0	92.65	92.65	0	0	0	0	0	0	0	92.65	92.65
	TOTAL LAND	516.79	464.493	464.493	0	185.155	185.155	0	176.417	176.417	0	826.065	1342.855
	TOTAL LAND TO BE ACQUIRED	0	464.493	464.493	0	185.155	185.155	0	176.417	176.417	0	826.065	1342.855

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Job No. 504024

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Table 18.2 Post- Mining Land Use

Figures in Ha.

Sl. No.	Particulars	Quarry Area (After backfilling & reclamation)	External Dump (After Reclamation)	Safety zone as green belt	Infrastructure, Explosive magazine etc.	R&R site	Others	Grand Total
1.	Afforested area	794.01	130.73	144.47	5.00	0.00	0.00	1074.21
2.	Cultivable land	0.00	0.00	0.00	0.00	0.00	92.65	92.65
3.	Final Void / Water Body	81.00	0.00	0.00	0.00	0.00	0.00	81.00
4.	Built-Up Area.	0.00	0.00	0.00	45.00	50	0.00	95.00
<b>Total Land for the project</b>		<b>875.01</b>	<b>130.73</b>	<b>144.47</b>	<b>50.00</b>	<b>50</b>	<b>92.65</b>	<b>1342.855</b>

**18.2 Water quality management:****a) Physiography and drainage**

The general topography of the block is plain. The elevation above MSL varies from 231m to 267m in the north-eastern part of the block. The elevation of the ground varies between 255m to 267m along a linear patch running NE-SW in the central part of the property. The ground has general slope towards NW, SE and SW. Except a few outcrops of sandstone occurring along the banks of Mand River, the area is covered by soil and cultivated land. The south-eastern part of the block is covered by Lath protected forest and Edu reserve forest.

The southerly flowing Mand River and westerly flowing Kurket River with their tributaries form the main drainage of the Block. A small earthen dam has been constructed for the purpose of irrigation near Khedapali village in the eastern part of the block.

- b) Details of Locations:** For base line environmental data generation, following locations were selected in the core and buffer zone of the project covering mine effluent, surface water, and ground water of the area. The details of locations are given below in table – 18.3(a).

Table-18.3(a)

Sl. No.	Location	Direction (w.r.t. centre of core zone)	Distance (km)	Reasons for selection
1.0	Bore well , Lat village (CW1)	East	0.5	To assess the well water quality within mine area
2.0	Mand river water U/S (CW2)	North	1.0	To assess the river water quality before contamination with mine discharge
3.0	Mand river water D/S (CW3)	Sourh west	1.0	To assess the river water quality after contamination with mine discharge
4.0	Mine water (CW4)	West	0.5	To assess the mine water quality

- c) **Water quality status;** The summarised water quality data generated for the period Apr. – June 2012 is given below in tables 18.3(b), 18.3(c), 18.3(d) & 18.3(e) respectively. The water quality data of different locations are found to be within the permissible limit of CPCB.

**SUMMARISED WATER QUALITY DATA**

Table 18.3(b) Period-Apr. 12 to June.12

Location	Parameters	Result	Permissible as per IS 10500
Bore well water , Lat village (CW1)	pH	6.40 – 6.52	6.5 to 8.5
	Fluoride (mg / l )	0.34 - 0.39	1.0
	Dissolved solids (mg / l )	230 - 250	500
	Nitrates (mg / l )	5.65 – 5.81	45
	Iron(mg / l )	0.22 – 0.24	0.0
	Chlorides (mg / l )	22 - 26	250
	Sulphates (mg / l )	38 - 47	200

Table 18.3(c) Period-Apr. 12 to June.12

Location	Parameters As per GSR 742(E) dated 25.9.2000	Result	Permissible limit as per GSR 422(E) (Inland surface water)
River water U/S ( CW 2)	pH	7.127- 7.37	5.5-9.0
	Total suspended solids (mg/l)	47 - 52	100
	COD(mg/l)	50 - 67	250
	Oil & Grease (mg/l)	Nil	10

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Table 18.3(d) Period-Apr. 12 to June.12

Location	Parameters As per GSR 742(E) dated 25.9.2000	Result	Permissible limit as per GSR 422(E) (Inland surface water)
River water D/S ( CW 3)	pH	7.56 - 7.65	5.5-9.0
	Total suspended solids (mg/l)	50 - 63	100
	COD(mg/l)	105 - 115	250
	Oil & Grease trap(mg/l)	Nil	10

Table 18.3(e) Period-Apr. 12 to June.12

Location	Parameters As per GSR 742(E) dated 25.9.2000	Result	Permissible limit As per GSR 742(E) dated 25.9.2000
Mine water ( CW 4)	pH	7.18 - 7.25	5.5-9.0
	Total suspended solids (mg/l)	34 - 45	100
	COD(mg/l)	35 - 58	250
	Oil & Grease trap(mg/l)	Nil	10

Ground water quality in all the two locations found to be conforming drinking water standard as per IS 10500 and the quality of river water which receives treated mine discharge water through nearby local streams satisfies the standards as per GSR 742(E).

#### d) Measures for control of pollution

##### Management of surface water drainage:-

Garland drainage will be made around the periphery of the quarry. These drains will be connected to local nala which are not likely to be disturbed by mining operation. In the workings, heavy duty pumps will be deployed in rainy season which after passing through settling ponds will throw the accumulated water from the working face into these garland drains.

##### Mine Water Discharge

The collected water at the floor of mine sump (351551cum capacity) will be pumped to the settling tank where suspended solids will get settled. The clear water after sedimentation & treatment will be reused for water sprinkling, plantation & agriculture purpose, ground water recharge & for use by the local villagers etc. Workshop effluents will be discharged through Oil and Grease trap and sedimentation tank.

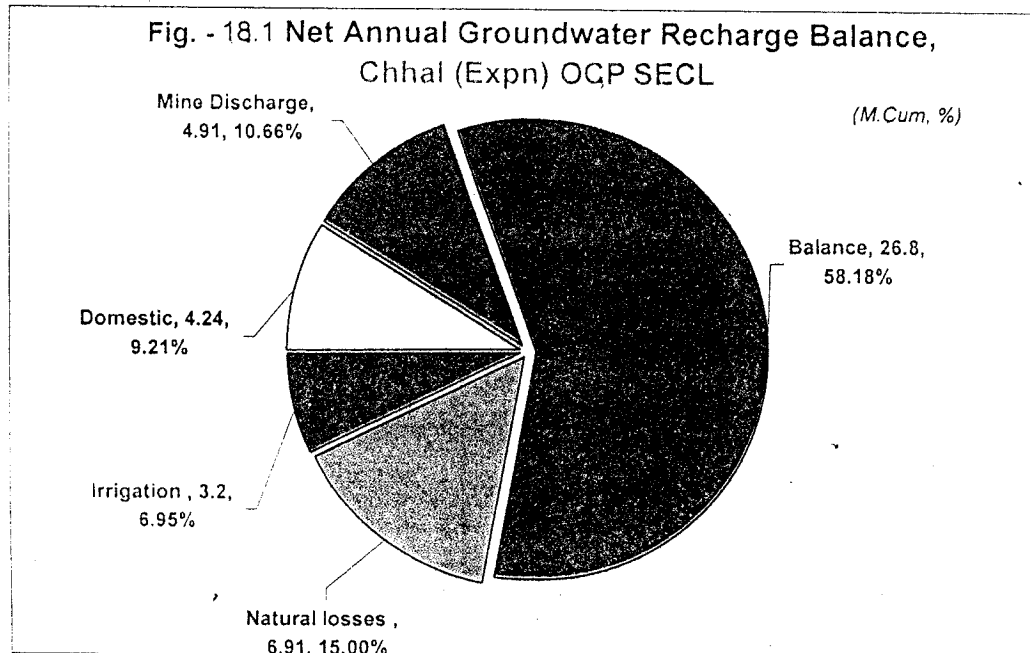
Domestic effluent from the colony will be treated in a conventional septic tank and soak pit arrangement.

Water Conservation: -

The waste water recycling after due treatment for the purpose mentioned above will enable conservation of water. Storage of conserved water in mine pits will be given due emphasis to provide water round the year and quality of water will be maintained.

e) **Water balance of the area (from EMP)**

**Groundwater Recharge Balance:** The net groundwater recharge and draft for the buffer zone were estimated as **39.15 M.Cum** and **12.35 M.Cum** respectively. Thus, about **26.80 M.Cum** groundwater recharge would be available annually in the area to meet any future demand. The detailed groundwater balance is shown in the following pie diagram in figure – 18.1.



f) **Acid mine drainage source (if any), the existing practice of control and future plan.**

The existing mine water quality of the nearby mines are not acidic and it is expected the acid mine drainage problem will not arise in this project also. If however acid mine drainage problem arises suitable measures will be taken as per standard prevailing practice.

- g) Underground water/ quarry water management after closure (specify its usage like domestic water supply, irrigation, pisciculture or stabilizing the ground water regime).

- Already discussed in para 18.1.1 d above.

- h) Water quality monitoring for three years after closure (specify the monitoring sampling station and frequency). The sampling stations shall be one no. mine water with quarterly frequency and two numbers ground water samples in core and buffer zone with quarterly frequency.

Regular monitoring is being done in & around the mine on the following monitoring stations and will continue up to 3 years after closure of the mine. Presently, water quality monitoring is being done on six locations. These locations were selected in the core and buffer zone of the project covering mine effluent, surface water, and ground water of the area. The details of locations are given below in table – 18.4.

Table – 18.4

Sl. No.	Details of Location
1	Mine Discharge water
2	Jamunia Nala (Up-stream)
3	Jamunia Nala (Down-stream)
4	Drinking water of Chhal GH
5	WTP Water of Dharam UG
6	Bijari Village Hand pump water

Three sampling points will be utilized for water quality monitoring for three years after closure of the mine. Frequency will be as per guide line.

### 18.3 Air quality management:-

- a) Air quality (Monitored data) Monitoring for next three years will be done. 3 samples at quarterly frequency for 3 years. One sample will be at core zone and one sample each in upwind and downwind directions of the project.

Regular environment monitoring is being done in & around the mine on the above monitoring stations and will continue up to 3 years after closure of the mine.

Presently, the following six monitoring stations are fixed on the basis of physiography of the area, meteorological parameters like predominant wind direction, wind speed etc.

Table – 18.5

Sl. No.	Details of Location
1	Manager's Office, Chhal OC
2	Primary School at Lat village
3	Loading point at Chhal OC
4	Manager's Office, Chhal UG
5	Near tippler, Chhal UG
6	Nawapara Village

On the above, three sampling points will be utilized for air quality monitoring for three years after closure of the mine. Frequency will be as per guide line.

**b) Ambient Air quality in core and buffer zone**

Base line environmental data generated for the period April, 12 to June, 12 in respect of SPM, RPM, SO<sub>2</sub>, & NO<sub>x</sub> for different locations are shown in the following tables 18.6 (a) & 18.6 (b). The locations were selected on the basis of physiography of the area, meteorological parameters like predominant wind direction, wind speed etc. This data will enable to obtain a comprehensive idea of air quality in and around the mining area. The data under different category are within the permissible limit of CPCB.

Table 18.6 (a)

Sl. No.	Location	Distance (km)	Direction	Reasons for selection
		(W.r.t. centre of core zone)		
1.0	Mine office (CA <sub>1</sub> )	-	Core zone	To assess pollution levels in the mining area.
2.0	Chhal village (CA <sub>2</sub> )	3.5	North-northeast	To assess pollution levels in the village area
3.0	Khedapali village (CA <sub>3</sub> )	2.5	East - south east	To assess the pollution levels in the village area.
4.0	Eidu village (CA <sub>4</sub> )	3.5	South - south east	To assess the pollution levels in the village area in the down-wind direction.
5.0	Lat village (CA <sub>5</sub> )	0.5	Within mine area	To assess pollution levels in the village within mining area.
6.0	Nandgaon village (CA <sub>6</sub> )	2.0	North west	To assess the pollution levels in the village area in the up-wind direction as control station.



**Table 18.6(b) Summerised Air Quality Data**  
**Period: Oct, 12 – Dec, 12**  
**(Values are in  $\mu\text{gm}/\text{m}^3$ )**

			SPM			RPM			SO <sub>2</sub>			NO <sub>x</sub>			Pb**		
Name of monitoring equipment used			Respirable Dust Sampler			Respirable Dust Sampler			Respirable Dust Sampler			Respirable Dust Sampler					
Equipment sensitivity																	
Permissible AAQ standard (CPCB)																	
	R			200			100			80			80				
	I			500			250			120			120				
	S			100			75			30			30				
Monitoring Location	No. of samples Drawn	Category* (R,I, S)	Min	Max	98 % tile	Min	Max	98 % tile	Min	Max	98 % tile	Min	Max	98 % tile	Min	Max	98 % tile
Core zone																	
(1)CA1	***	I	245	269	268	107	116	114	17	24	23	18	25	24	-	-	-
Buffer Zone																	
(2)CA2	***	R	157	169	168	72	79	78	15	19	19	17	20	20	-	-	-
(3)CA3	***	R	160	169	169	78	87	75	16	19	18	15	20	19	-	-	-
(4)CA4	***	R	162	169	169	78	85	82	17	20	19	17	22	22	-	-	-
(5)CA5	***	R	158	167	167	76	85	83	16	19	19	15	20	19	-	-	-
(6)CA6	***	R	152	163	163	64	76	76	13	17	17	15	19	19	-	-	-

\*\*\* 24 samples for SPM / RPM and 72 samples for SO<sub>2</sub> / NO<sub>x</sub>.

\*R = Residential; I = Industrial;

In general, all SPM, RPM SO<sub>2</sub> and NO<sub>x</sub> values are found to be well within the prescribed limits of CPCB for Residential and rural area.

### c) Proposed Air Quality Management (if needed)

Following air pollution control measures will be practiced within the mining area and at coal handling plants and railway siding site.

1. Water spraying will be done regularly on approach roads within the mining area to minimise the dust generation.
2. Water sprinkling arrangement will be provided at the transfer point of coal.
3. Intensive plantation of adequate width all along the haul road and other road will be raised to minimise transport generated pollutants.
4. CHP will be provided with dust extraction arrangements.
5. Minimising the transport of coal from the crusher house to silo loading system, belt conveyor has been provided.
6. Coal transportation to railway siding will be done in covered trucks.
7. Exposed overburden dumps will be covered through an appropriate plantation
8. Optimum blast hole geometry will be followed to reduce the dust during blasting.
9. Regular monitoring of ambient air quality of project area.

**18.4 Waste disposal :--**

- a) External OB dump & internal backfilling details (specify the reclaimed backfilled area, area of voids for water reservoir and also the OB dump area height and volume) prior to closure of mine or during progressive mine closure (as the case be).

The total volume of OB has been estimated as 849.50 Mcum, out of which 780.55 MCum is planned to place in internal dump and 71.52 MCum in external dump. The external and internal dumps involve 130.73Ha and 677.82Ha. of land. The balance left out mine area will be 81.00 Ha. which will act as water reservoir and will be utilised as water resource by the local population after mine closure.

Maximum height of internal dump will be upto 90m (above ground level)

Slope of waste bench of internal dump	-	37 degrees
Height of individual bench	-	30 m
Width of berm.	-	30 m

- b) Stabilization of external O.B. dumps and backfilled area (Technical Reclamation)

Technical reclamation would involve breaking and levelling the top of OB dumps, filling of gulleys and terracing etc. The maximum depth of the project will be 300 m. Initially, upto 6<sup>th</sup> year OB (71.52MCum) will be dumped externally in 130.73 Ha. land. Internal dumping will continue from 6<sup>th</sup> year onwards. The technical reclamation of backfilled dump will start from 4<sup>th</sup> year onwards. It involves levelling of backfilled dump by means of dozers keeping a mild slope of about 1 in 200 for surface water drainage for plantation and other recreational purposes.

Initially, to the extent possible, top soil will be removed and stored separately. Subsequently this soil will be directly spread over the leveled graded backfilled spoil for reclamation of the quarried out land. Biological reclamation work will follow in next progressive year.

The estimated life of the mine is 30 years. Maximum height of the external & internal dump, would be 90m from the ground level. Final depth of the quarry would be about 300m from ground level. Approximate total no. of plants are estimated as 2685525 Nos. in which about 1985025 nos. of plants would be planted in internal dump. An area of 81 Ha. would be left as final void/water body after mine closure.

The final stage reclamation plan & cross-section thereof are shown in figures – 16.2 & 16.3 respectively of Chapter – XVI.

Year wise programme of OB removal, dumping, & plantation has been given in table 16.16 of Chapter – XVI.

**c) Top soil / soil amendment application**

The stock piling of top soil will be as follows:

- i) Top soil and other materials removed shall be stock-piled only when it is impractical to promptly redistribute such materials on regraded areas.
- ii) Stock-piled materials shall be selectively placed on a stable area, not disturbed, and protected from wind and water erosion, unnecessary compaction, and contaminants which lessen the capability of the materials to support vegetation when redistributed.
- iii) After the final grading the topsoil would be redistributed in a manner that achieves an approximate uniform stable thickness consistent with the post mining land uses, contours, and surface water drainage system.
- d) Plantation on external & backfilled area, avenue and block plantation with type of plantation i.e. local/native species. Name the local species for plantation.

**Green belt on dumps:-**

After technical reclamation of OB dumps and redistribution of top soil over it, the dumps will be biologically reclaimed followed by plantation as details shown in table 18.5 above. About 1841075 nos. of plants would be planted over internal dump and plantation will continue after mine closure for 3 years.

**Green Belt Around Mine: -**

In the directions where natural forest does not exist, there is need for creating green belt of adequate width as an effective dust and sight curtain in the periphery of mining area. The trees planted in the green belt area shall act as buffers and shock absorber against dusts, noise and stone flying. The trees in the green belt will be tall, wind firm, broad leaved and evergreen.

**Haul Roads: -**

A green belt of adequate width on either side of the haul road will be raised and the existing vegetation will be protected. The plants will be raised at spacing of 2.0x2.0 m.

**All other roads: -**

Along the roads other than the haul roads also, dust resistant plants will be planted.

**Infrastructural Facilities (Nursery):-**

A nursery is a prerequisite for supply of seedlings of suitable species of right size to the extent required. Rajya Van Vikas Nigam may be contracted the above supply.

**Species for plantation.-**

- **Fruit bearing trees**
  - Jamun, Mango, Imli, Sitaphal, Bel, Ganga Imli, etc.
- **Medicinal trees**
  - Neem, Karanj, Harra, Behara, Aonla, Arjun, Shikakai, Mahua, Kusum.
- **Timber value trees**
  - Teak, Shivan / Ghamar, Sissoo, Sisham, Safed Sirus, Bamboo, Peltaforum, Babool.
- **Ornamental trees**
  - Gulmohur, Kachnar, Amaltas, Saptaparni, Grevelia, Peepal, Palm tree.

**o) Disposal of Coal beneficiation process reject.**

There is no coal beneficiation except silo proposed in Chhal OC (Seam III) Expansion Project.

**18.5 Details of surface structures proposed for dismantling (brief description) ( Unless used in a gainful way )****a) Industrial / mine structures**

The CHP, Workshop, Managers & Pit Offices will be dismantled unless otherwise gainfully utilized by company, State Govt. /Local Body.

**b) Residential Buildings**

Will be handed over to closest project.

**c) Service buildings**

Dispensary, telephone exchange, sub area Managers Office, Store will be handed over to closest project.

**d) Telephone Cables**

Telephone cables will be removed for re-use in other projects of the area, as far as practicable.

**e) Sub-stations**

Will be dismantled and equipment will be gainfully utilized in other projects.

**f) Transformers**

Will be dismantled and equipment will be gainfully utilized in other projects.

**g) Community Services:** Will be handed over to the local authorities.

**h) Water line:** Will be handed over to the local authorities.

**i) Water Treatment Plants:** Will be handed over to the local authorities.

**j) Rly. Siding:** There is no Rly. siding in the mine area.

**k) ETP/STP:** Will be handed over to the local authorities.

**l) Power line:** Will be dismantled.

**18.6 Disposal of Plants & Machineries.**

Table-18.7

S No.	Particulars	Proposed Disposal Practice
a	Disposal or reuse of existing HEMM, CHP, workshop and railway siding for OC.	HEMM and other equipments will be transferred to other project as per requirement.
b	Disposal or reuse of haulage system, ventilation, CHP, workshop, and railway siding for UG.	Structure Will be dismantled & its equipment will be gainfully reused in other project

c	Disposal or reuse of transmission and sub-station.	- Do -
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## 18.7 Safety and security arrangement

Table- 18.8

S No.	Particulars	Proposed Disposal Practice
a	Details of fencing around abandoned quarry indicating the length of the fencing.	in the last there will be a void of 197.19 Ha.
b	Mine entry sealing arrangements and subsidence management for UG mines. Sealing details and dimensions shall also be provided.	- Not applicable.
c	Providing one time lighting arrangement.	Will be provided.
d	Slope stability arrangement for high wall and back filled dumps.	Not applicable.

**NOTE:** However, possibility shall be explored for handing over the residential & non-residential buildings and other infrastructures including the reclaimed land to state govt. for the benefit of local villagers and strengthening the area infrastructures. The end use of these facilities shall be decided by State Govt. with the help of local govt. and Village Panchayat.

## 18.8 Economic Repercussions of closure of mine

**18.8.1 Manpower of the Project-** Proposed manpower requirement of the extension project for different options are as under,

- Departmental option – 1916 Nos.
- Outsourcing option – 296 Nos.

## 18.8.2 Assessment of Income Scenario of Local People

Table – 18.9

Sl. No.	Particulars	Proposed Disposal Practice
a	Number of local employees redeployed in other projects of the company till their superannuation	All manpower including local employees in the role of SECL will be engaged in other projects of SECL till their superannuation.
b	Approximate no. of people engaged in indirect employment / ancillary activities.	This number would vary. It would be about 3 to 4 times of departmental employees. They would find no financial loss due to the mine closure as their activities will be shifted in the new or expansion mines located in the same or other coalfield area.
c	Resettlement / Redeployment of a & b.	(i) Decided by the company. (ii) Will be decided in consultation with local authority if required.
d	If no redeployment is possible then sustenance plan. i) Compensation for losing employment or income. ii) Vocational training for continuance / sustenance of income level	Affected persons would be given vocational and skill development training for continuance / sustenance of income level.
e	Views of society and expectation on closure of mine.	Society's anxiety is limited to assurance about continuation of employment opportunities and availability of civic amenities presently provided by mine management. The employment opportunities will remain available, albeit in other nearby projects. Civic amenities will also be available as the infrastructure for same will be handed over to State Government for future use of society.

NOTE: It is proposed that reclaimed and afforested land will be handed over to State Forest Dept for the benefit of local ecosystem. The forest wealth can also be utilized by local people or tribal in the form of fruits and fodders. The water reservoir in the mine voids will be utilized for pisciculture, irrigation, domestic drinking water or stabilizing the ground water regime. Landscaping during closure of mine will make the spot for tourist attraction.

### 18.9 Time Schedule

The closure of mines involves environmental, technical, social aspect and financial assurance for implementing the post closure activities as per guidelines of Ministry of Coal. The post closure implementing activities will run for three years. The following activities will be implemented as per bar chart. The manpower for implementing the above activities with time bound manner will be provided.

Figure- 18.2

Sl. No.	Activities	Time Frame	Half Yearly					
			1	2	3	4	5	6
1.	Preparation of Survey & Disposal Report	6 months						
2.	Slope Stability study for high walls and internal backfilled dumps	-	Not Applicable					
3.	Disposal of P&M including HEMM, CHP, W/S, Siding	2 and half years						
4.	Backfilling of mined out Area ( OC )	2 years						
5.	Dismantling of Industrial structure	2 years						
6.	Grading & dozing of high walls for OC	2 years						
7.	Fencing of quarry	2 years						
8.	Clearing of Coal Stock and Infrastructural Area.	2 years						
9.	Disposal / Dismantling of Residential colony	2 & 1/2 years						
10.	Plantation & landscaping on backfilled area.	3 years						
11.	Plantation over cleaned land of Infrastructure.	from 2 <sup>nd</sup> year						
12.	Sealing of mine entries for UG mine	from 2 <sup>nd</sup> year	Not Applicable					
13.	Environmental Monitoring	3 years						
14.	Subsidence Management for U/G	3 years	Not Applicable					
15.	Post closure subsidence monitoring for UG	3 years	Not Applicable					
16.	Any project specific activities	Nil						

NOTE: The progressive mine closure will be done as per the calendar plan of the project for technical and biological reclamation of dumps and internal voids.

### 18.10 Mine Closure Cost

18.10.1 The mine closure cost will cover the following activities for which a corpus escrow account @ Rs. 6.0 lakhs per Ha. for OCP & @ Rs. 1.0 lakh per Ha for UG mine of the project area shall be opened with the coal controller organization. In case of mines having acid mine drainage, post closure acid mine drainage management cost shall also be included in the total closure cost.



**18.10.2 Mine Closure Cost for OC mine**

As per the guidelines of the MoC, the cost of the mine closure is to be computed based on the basis of project area involved in the project. In Chhal OC (Seam III), the total mining lease area is 1226.67 Ha. So, the closure cost is to be computed considering a total project area of 1342.86 Ha. Considering the wholesale price index as 171.6 as on May 2013, the updated cost of the mine closure is estimated to be Rs. 7.94 lakhs per hectare considering the admissible escalation over Rs. 6.00 lakh per Ha as on August 2009 when wholesale price index was 129.60.

Total Final mine closure cost (@ Rs.7.94/Ha.): **Rs. 10662.31 lakhs** upto two decimal place.

**18.10.3 The detail of escrow account**

The current value of corpus is **Rs. 10662.31 Lakhs** (as on May. 2013). This corpus is to be divided by balance life of mine. Since, this is a running mine and the balance life after expansion is estimated as 30 years as on 01/04/2013, the annual corpus comes to **Rs. 355.41 Lakhs** (up to two decimal place) by dividing 30 years. This amount is to be deposited in escrow account every year.

**Fund to be deposited in escrow account:** Year wise amount to be deposited has been given below in table 18.10.

Table – 18.10

Year	Fund Deposited in Escrow Fund	Fund to be Reimbursed (Maximum)	
1	355.41	Nil	(+ ) accrued interest as applicable
2	373.18	Nil	
3	391.84	Nil	
4	411.43	Nil	
5	432.00	Nil	
<b>Phase-1 Total</b>	<b>1963.86</b>	<b>1571.09</b>	
6	453.60	Nil	
7	476.28	Nil	
8	500.10	Nil	
9	525.10	Nil	
10	551.36	Nil	
<b>Phase-2 Total</b>	<b>2506.44</b>	<b>2005.16</b>	
11	578.93	Nil	
12	607.87	Nil	
13	638.27	Nil	
14	670.18	Nil	
15	703.69	Nil	
<b>Phase-3 Total</b>	<b>3198.93</b>	<b>2559.14</b>	
16	738.87	Nil	
17	775.82	Nil	
18	814.61	Nil	
19	855.34	Nil	
20	898.10	Nil	
<b>Phase-4 Total</b>	<b>4082.73</b>	<b>3266.19</b>	
21	943.01	Nil	
22	990.16	Nil	
23	1039.67	Nil	
24	1091.65	Nil	
25	1146.23	Nil	
<b>Phase-5 Total</b>	<b>5210.72</b>	<b>4168.57</b>	
26	1203.54	Nil	
27	1263.72	Nil	
28	1326.91	Nil	
29	1393.25	Nil	
30	1462.92	Nil	
<b>Final Stage-Total</b>	<b>6650.34</b>	<b>5320.27</b>	
<b>Grand Total</b>	<b>23613.03</b>		

**18.10.3 Tentative Final Mine Closure Activities & Cost Break-up:**

The break-up of some major mine closure activities alongwith their tentative estimation of cost in terms of percentages of the total mine closure cost has been indicated in Table-18.11 below. The detailed activity schedule for the 'Final Mine Closure Plan' would be prepared five years before the intended final closure of the mine along with the detailed mine closure cost break-up.

**Table 18.11**  
**TENTATIVE MINE CLOSURE ACTIVITIES & COST BREAK-UP**  
 Type of mine: Open cast      Production Capacity: 6.0 MTY  
 Mining Lease Area: 1226.67Ha.      Depth of the mine: 300m

Sl. No.	Major Closure Activities	Quantity	% of Total Closure Cost
<b>A</b>	<b>Dismantling of Structures</b>		
	Service Buildings		0.20
	Residential Buildings,		2.67
	Industrial Structures i.e. workshop complex, 33kv/3.3kv Sub-Station, Unit Stores, Security Barrack		0.30
<b>B</b>	<b>Permanent fencing of mine void &amp; other dangerous areas</b>		
	Random rubble masonry of height 1.2m including levelling up in cement concrete 1:6:12 in mud mortar.		1.50
<b>C</b>	<b>Grading of highwall slopes</b>		
	Levelling & grading of highwall slopes		1.77
<b>D</b>	<b>OB Dump Reclamation</b>		
	Handling/Dozing of external OB dump into mine void.		88.66
	Bio-reclamation including soil spreading, plantation & maintenance.		0.00
<b>E</b>	<b>Landscaping</b>		
	Landscaping of the cleared land for improving its esthetic		0.30
<b>F</b>	<b>Plantation</b>		
	Plantation over area obtained after dismantling.		0.50
	Plantation around fencing		0.20
	Plantation over the cleared off external OB dump.		0.00
<b>G</b>	<b>Monitoring / testing of environmental parameters for three years.</b>		
	Air quality		0.22
	Water quality		0.20
<b>H</b>	<b>Entrepreneurship development (vocational and skill development training for sustainable income of affected people)</b>		0.26
<b>I</b>	<b>Miscellaneous &amp; other mitigative measures</b>		2.60
<b>J</b>	<b>Manpower Cost for supervision</b>		0.80
<b>Total (%)</b>			<b>100.00</b>

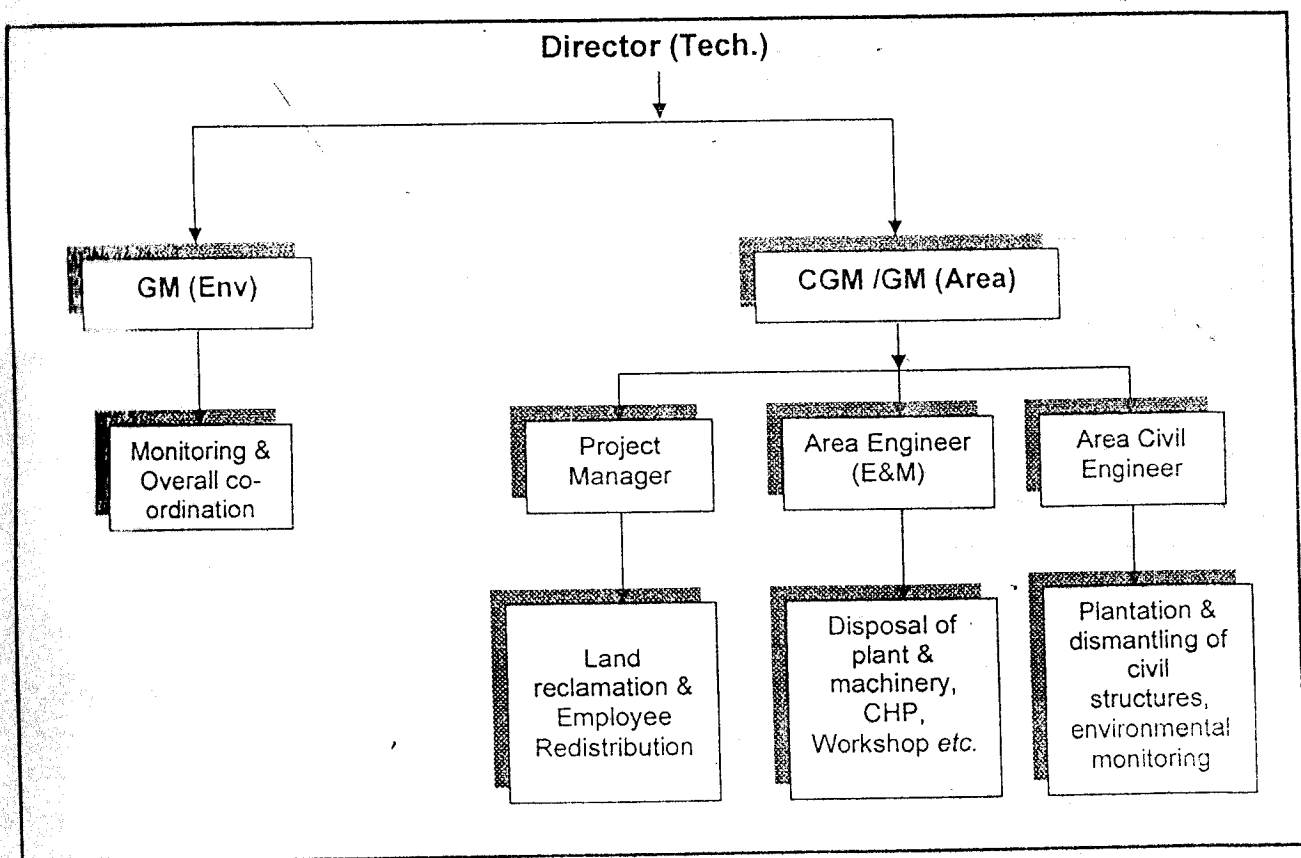
**NOTE:** The above cost expenditure will be met from the corpus escrow account deposited by the mine operator. In case of mines having acid mine drainage, post closure acid mine drainage management cost shall also be included in the total closure cost.

However, the additional amount beyond the escrow account will be provided by the mine operator after estimating the final mine closure cost five years prior to mine closure (as per the mine closure guideline).

### 18.11 Implementation Protocol

For implementing the mine closure activities, the following organisational structure has been proposed:

Figure 18.3



Environmental monitoring for three years after closure of mine will be carried out to evaluate the environmental quality of the area. If needed, proper mitigation measures will be taken up after evaluating the environmental quality. The funds for this have been provided in the cost estimate. Before closure of the mine, Area GM will prepare survey and disposal report and the same will be submitted to DGMS for acceptance.