

MINISTRY OF MINES
INDIAN BUREAU OF MINES
NAGPUR REGIONAL OFFICE

No. NGP / MN/ MPLN - 257 / NGP

Dated : 16 / 04 / 2013

To : M/S MOIL Limited
MOIL Bhavan, 1-A,
Katol Nagar, Nagpur - 440013. (M.S.)

Subject : Approval of combine Scheme of Mining alongwith Progressive Mine Closure Plan in respect of your Munsar Manganese Ore mine over an area of 108.63 Hect. & 25.15 Hect. in Nagpur District of Maharashtra State submitted under rule 12(3) & 23B(2) of Mineral Conservation and Development Rules,1988.

- Ref :-
1. Your letter No. SDGM(Tech.)/SOM/11-12/469, dated 26/12/2011, & No. GM(Mines.)/MP-SOM/12-13/348, dated 14/02/2013 & 22/03/2013.
 2. This office letter of even No. dated 25/07/2012, 11/12/2012 & 26/02/2013.

Sir,

In exercise of the power conferred by Sub-Rule (4) of Rule 12 of the Mineral Conservation & Development Rules, 1988, I hereby approve the "Scheme of Mining along with Progressive Mine Closure Plan" of your above referred mine. This approval is subject to the following conditions :

1. This "Scheme of Mining" is approved without prejudice to any other laws applicable to the mine/area from time to time whether made by the Central Govt., State Govt. or any other authority.
2. It is clarified that this approval of the "Scheme of Mining" does not in any way imply the approval of the Government in terms of any other provisions of the Mines & Minerals (Development & Regulation) Act, 1957 or the Mineral Concession Rules, 1960 or any other laws including Forest (Conservation) Act, 1980, Environment Protection Act, 1986 and the rules made there under.
3. It is further clarified that this approval of the "Scheme of Mining" is subject to the provision of Forest (Conservation) Act, 1980, Forest Conservation Rules, 1981 and other relevant statutes, order and guidelines as may be applicable to the lease area from time to time.
4. The "Scheme of Mining" is approved without prejudice to any other order or direction from any court of competent jurisdiction.
5. The provisions of the Mines Act, 1952 and Rules and Regulations made there under including submission of notice of opening/reopening, appointment of manager and other statutory officials as required by the Mines Act, 1952 shall be complied with.
6. The execution of Scheme of Mining shall be subject to vacation of prohibitory orders / notices, if any.
7. If anything found to be concealed as required by the Mines Act in the contents of the Scheme of Mining and the proposal for rectification has not been made, the approval shall be deemed to have been withdrawn with immediate effect.
8. The financial assurance submitted by you for Rs. 16,90,000/- and 2,00,000/- (Rs. Sixteen Lakh Ninety Thousand and Two Lakh) only is valid up to 31/03/2017 and that you will submit a fresh financial assurance for subsequent period.

11. The approval of proposed mining operations and associated activities are restricted to the mining lease area only. The mining lease area as shown on the statutory plan under Rule 28 of Mineral Conservation and Development Rules, 1988 is by the lessee/ RQP/applicant.
12. The department does not undertake any responsibility regarding correctness of the boundaries of the lease/applied area shown on the ground with reference to lease map & other plans furnished by the lessee.
13. Your attention is invited to the Supreme Court interim order in W.P. (C) No.202 dated 12/12/96 for compliance. The approval of Scheme of Mining is therefore, issued without prejudice to and is subject to the said direction of the Supreme Court as applicable.
14. At any stage, if it is observed that the information furnished in the document are incorrect or misrepresent facts, the approval of the document shall be revoked with immediate effect.
15. The approval of Scheme of Mining is subject to the compliance of CCOM's circular No. 2/2010 regarding submission of Geo-referenced cadastral map showing disposition of lease area certified by competent authority of state government within six month from the date of recognition of the agency by the state Government to undertake such survey failing which the approval of Scheme of Mining shall be deemed to have been withdrawn with immediate effect.
16. This approval is given for the received proposals as applicable from this date.
17. The approval of the above scheme of mining is subject to the compliance of CCOM's Circular No. 7/2011 and to fulfill the requirement of precise area as mentioned in para 4.2 of the letter No. F.No.7/60/2006/MIV, dated 24/06/2009 of the Ministry of Mines. The mineral reserves / resources for which the scheme of mining is approved shall be converted into proved reserves as per UNFC system at an appropriate cut of grade with the new threshold values within one year of the scheme period equivalent to minimum five years planned production, failing which no mining operations will be carried out / commence further . The feasibility studies for the area shall be undertaken to convert the resources into mineral reserves. For the remaining unexplored part of the mining lease areas, assessment of mineral reserves / resources under UNFC shall be as per the letter No. 10/75/2008-MV, dated 23/12/2010 of the Ministry of Mines.

The Scheme of Mining for subsequent period of Mining Lease will due for submission on 01/12/2016.

Encl. : One copy of approved Combine
Scheme of Mining document



Yours faithfully,

(Signature)
16/11/13

(IVAN KHESS)

REGIONAL CONTROLLER OF MINES



MOIL LIMITED
(Formerly Manganese Ore (India) Limited)

MUNSAR MINE

2nd

Scheme of Mining

Category of Mine - 'A' (OTFM)

OVER AN AREA OF 108.63 Ha. & 25.15 Ha

Area	Forest land	Revenue land	Pvt. land
108.63 ha	12.15 ha	80.73 ha	15.75 ha
25.15 ha	3.40 ha	2.08 ha	19.67 ha

SUBMITTED UNDER RULE 12 OF MCDR 1988

&

PROGRESSIVE MINE CLOSURE PLAN

SUBMITTED UNDER RULE 23 (B) OF MCDR 1988

Period

2012- 13 TO 2016 – 17

Prepared by-

MOIL Limited

(Formerly Manganese ore (India) Limited)

RQP No.-RQP/NGP/206/98/B

Valid up to 14.7.2020.

MOIL LIMITED
(Formerly Manganese Ore (India) Limited)

MUNSAR MINE

2nd SCHEME OF MINING

OVER AN AREA OF 108.63 Ha & 25.15 Ha.

SUBMITTED UNDER RULE 12 OF MCDR 1988

2012- 13 TO 2016 – 17

Prepared by-

MOIL Limited

(Formerly Manganese ore (India) Limited)

RQP No.-RQP/NGP/206/98/B

Valid up to 14.7.2020.

MOIL LIMITED
(formerly Manganese Ore (India) Limited)
MUNSAR MINE

1.0 INTRODUCTION

This 2nd Scheme of Mining has been prepared under Rule - 12 of M.C.D.R 1988 and the guide lines applicable to Scheme of Mining for 'A' –OTFM category mines has been followed.

The ML area 108.93 hecets. was earlier sanctioned under ML for 20 years period w.e.f. 01.07.1982 to 30.06.2002. This has been further renewed for 20 years period from 1st July 2002 to 30th July 2022 vide grant order No. MMN-1005/C.R.772/Ind-9 dated 9.2.2005 for the area of 108.63 ha. The Mining plan was earlier approved on 06.05.03 under Rule-24 (A) of M.C.R. 1960 for renewal of Mining lease over an area of 108.63 Hecets.. vide letter No.-NGP/Mn/MPLN-257/NGP.

The ML area 25.15 hecets. was earlier sanctioned under ML for 20 years period w.e.f. 14.05.1982 to 13.05.2002. This has been further renewed for 20 years period from 14th May 2002 to 13th May 2022 vide grant order no. MMN-1005/C.R.763/Ind-9 dated 9.2.2005. The Mining plan was earlier approved on 06.05.03 under Rule-24 (A) of M.C.R. 1960 for renewal of Mining lease over an area of 25.15 Hecets.vide letter No.-NGP/Mn/MPLN-257(A)/NGP.

The above mentioned mining leases are contiguous having same Mining Plan period i.e. 2002-03 to 2006-07. The composite 1st Scheme of Mining for both the mining leases has been approved up to 2011-12 vide letter no. NGP/Mn/MPLN-257/NGP dated 14.12.2010.

The details of lease hold area of Munsar Mine in village Munsar, Chargaon, Khairi, Parsoda & Kandri, Tahasil- Ramtek, Dist.- Nagpur is given in the following table-

Name of Mine	Area in Ha.	Period of renewal	Grant Order No.
Munsar Mine	108.63	1 st July 2002 to 30 th June 2022	MMN-1005/C.R.772/Ind-9 Dated 9.2.2005
Munsar Mine	25.15	14 th May 2002 to 13 th May 2022	MMN-1005/C.R.763/Ind-9 Dated 9.2.2005

Copy of the grant order & lease deed is enclosed as Annexure – XII & XIII.

The status of land is given below:

Mine	Area in Ha.	Forest land	Revenue land	Pvt land
Munsar	108.63	12.15 ha	96.78 ha	96.78 ha
Munsar	25.15	3.40 ha	2.08 ha	19.67 ha

It is propose to exploit 316750 Tonnes of ROM from opencast & underground sorces. Mine will be producing 150000 Tonnes of Clean ore during present SOM period (2012- 13 to 2016 – 17. Munsar Mine has been granted environment clearance of 49992 Tonnes. ***Environment clearance for enhance production capacity will be obtained from MoEF, after approval of the present SOM.***

PART-I

1.0 Review of Mining Plan

1.1 Name and Address of the mine: Munsar Mine.
MOIL Limited
(Formerly Manganese Ore (India) Limited)
P.O. Khairi Bijewada , Tah. Ramtek,
Dist. Nagpur, Maharashtra
Tel. 9371622099.

1.2 Particulars of approval of Mining Plan (Under MCR or MCDR, indicate approval letter number and date)

The Mining plan was earlier approved on 06.05.03 under Rule-24 (A) of M.C.R. 1960 for renewal of Mining lease over an area of 108.93 Hects. vide letter No.-NGP/Mn/MPLN-257/NGP and for 25.15 hecets vide letter No.-NGP/Mn/MPLN-257(A)/NGP. Thereafter, the a composite 1st Scheme of Mining for both the mining leases has been approved up to 2011-12 vide letter no. NGP/Mn/MPLN-257/NGP dated 14.12.2010

Mining Plan/SOM	Approval no	Date	Under Rule	period
Mining Plan 108.93 ha	NGP/Mn/MPLN-257/NGP	06/05/2003	24A of MCR 1960	2002 - 2022.
Mining Plan 25.15 ha	NGP/Mn/MPLN-257 (A)/NGP	06/05/2003	24A of MCR 1960	2002 - 2022.
1 st Scheme of Mining – 108.93 ha & 25.15 ha	NGP/Mn/MPLN-257/NGP	14.12.2010	12 of MCDR 1988	Up to 2011-2012
2nd Scheme of Mining – 108.63 ha & 25.15 ha	Submitted for approval		12 of MCDR 1988.	2012-13 to 2016-17

1.3 Date of Commencement of Mining operation.

- Mining operations in this lease were started by MOIL in early sixties. The production of manganese ore from the underground was commenced in the year 1982

prior to that it was worked by opencast mine by MOIL & the then British company, the CPMO.

1.4(a) *Deficiencies, if any that existed with approval mining plan, to be taken note if and rectified by incorporating suitable proposal for implementation in the Scheme.*

- No deficiencies are left with approved Scheme of Mining.

1.4(b) *Review of Compliance position of salient features of the mining plan on chapter wise basis bringing-out marked deviation, if any, and justification/reasons there of. Items to be covered may include exploration. Mine development, exploitation, Afforestation programme, reclamation and rehabilitation, control of dust, noise and ground vibrations and any other significant feature.*

1) Exploration:

As Proposed in 1 st SOM				Actual			
Year	Number of Bore Holes	Number of trial pits	Meter age	No of BH	Depth	Meterage	Number of trial pits
2010-11	2	-	-	2	1 - BH no.65 From surface 1-BH No.66 from Underground	175 Mtrs 110 Mtrs	6
2011-12	2	-	-	NIL	--	--	5

Trail pits have been done in various dumps.

Two Bore Holes are drilled. Since the ore zone is low angle plunge controlled, the Bore Hole drilled from surface (BH No. 65) is placed at 55° angle and one BH from underground is placed vertical. In all 4 Boreholes were proposed with Scheme of Mining. Against the target 4 Boreholes, 2 are drilled, 1 from surface and 1 from underground. Form J of U/G bore hole – No.66 along with plan and core logs are enclosed as plate no. XVII & XVII(A)

Exploitation:**1) Opencast Development:**

No opencast development was suggested in 1st SOM.

Quantum of Underground & Dump Working as suggested in 1st SOM & Actual is appended below:

MUNSAR 108.63 ha Area**Summarized details of the actual Production from Underground & Dump**

Source	Year					Total
	2007-08	2008-09	2009-10	2010-11	2011-12	
Underground						
Projected ROM	16860	20909	36889	30000	30000	134658
Actual	16860	20909	36889	29139	24786	128583
Projected Clean Ore	8503	13952	20778	15000	15000	73233
Clean Ore	8503	13952	20778	17046	17000	77279
Dump Working (Lumpy & Fines)						
Projected ROM	264687	230633	186607	140000	140000	961927
Actual ROM	264687	230633	186607	188200	185000	1055127
Projected Clean Ore (Lumpy)	39703	34595	27991	15750	15750	133789
Actual (Lumpy)	39703	34595	27991	28230	27750	158269
Projected Fines	16489	13368	11995	5250	5250	52352
Actual Fines	16489	13368	11995	12167	8000	62019
Clean Ore from dumps	56192	47963	39986	40397	35750	186141
Total Clean Ore (UG+Dumps)	64695	61915	60764	57443	52750	297567
SUMMARY						
Projected ROM	281547	251542	223496	170000	170000	1096585
Actual ROM	281547	251542	223496	217339	209786	1183710
Projected Clean Ore	64695	61915	60764	36000	36000	259374
Total Clean Ore	64695	61915	60764	57443	52750	297567
Dump Development	152290	178644	161382	60952	60952	614220
OB/Waste - m³	152290	178644	161382	161378	180000	833694

MUNSAR 25.15 ha Area**Summarized details of the actual Production from Dump & Dump Development**

Source	Year					Total
	2007-08	2008-09	2009-10	2010-11	2011-12	
Dump Working						
Dump ROM in cum	230	230	230	170	0	860
Projected Clean Ore in T	480	480	500	0	500	1960
Clean Ore in T	480	480	480	360	0	1800
Dump Development in m ³	4000	4000	4000	3000	0	15000

Dump Mining:

The actual dump development, ROM production from dump & clean ore recovery has been increased during the SOM period as around 6 dumps were characterized by trenching and due to the favorable market conditions for low grade ore. Production has been exceeded the target. Percentage of recovery from the dumps including fines is about 21%.

Underground:

The projected target for 1st scheme up to 2011-2012 was just matched the target, whereas, the clean ore, against the projected production the achievement is 77279 T, which is about 5% in excess of projected underground production as the recovery % has been increased.

Mineral Rejects & Waste during SOM Period

Source	Mineral Rejects in T	Waste in cum
Underground	38575 (30% of ROM)	NIL
Dumps	31653 (20% of Clean Ore)	614220

(4) Afforestation Programme:

No place either wasteland or stabilized dumps were available for plantation therefore no plantation were proposed.

Measures to protect environment were taken by planting 10000 Nos. of trees over an area of 4.5 Ha up to 31st December 2011. Trees planted during the scheme period are appended below showing area in Ha. and no. of plants planted.

Year	2007-08		2008-09		2009-10		2010-11		2011-12		Total	
	Area	Nos	Area	Nos	Area	Nos	Area	Nos	Area	Nos	Area	Nos
Proposed	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Actual	1.00	3300	1.00	1700	0.50	1000	Nil	Nil	2.0	4000	4.5	10000

(5) Reclamation & Rehabilitation :-

Reclamation and rehabilitation of mined out area was not proposed in the mining plan.

- No Reclamation or Rehabilitation was proposed in SOM. The old opencast Durga Pit No.1 has been filled with 50000 m³ waste rock, which was generated by dump development.

(6) Control of Dust, Noise and ground Vibration

DUST:-

At Munsar mine, probable sources of air pollutants would be transportation by trucks and other vehicles on the surface area drilling in underground. Water spraying and monitoring the air quality quarterly was proposed.

As proposed, the mine roads have been sprinkled with water. Wet drilling is carried out in underground. Quarterly monitoring of the air samples and water is being carried on regularly. Air & water analysis report is enclosed as Annexure XI & XII.

NOISE :-

Noise level at some of the working points needed supply of protective earplugs to the operators.

- Whereas the earplugs have been provided to drilling operators, compressor operators & other HEMM operators & Ventilation Fan Operators.

1.4(c) Compliance of conditions -

Whereas all conditions stipulated in the approval of the Mining Plan and 1st Scheme of Mining along with Progressive Mine Closure Plan have been observed meticulously.

1.4(d) Compliance of violations -

- Not applicable

1.4(e) Any other points requiring attention in the interest of proper mine design, development, conservation, environment and ecology of area.

- Being the Government of India's Enterprise, the company always pay attention on all types of required changes for, mine design, development, conservation environment and ecology in the interest of nation and same trend will continue in future also.

PART-II

2.0 Proposal Under 2nd Schemes of Mining:

2.1 Name and address of applicant: MOIL Limited
(Formerly Manganese Ore (India) Limited)
(A Government Enterprise)
1-A, MOIL Bhawan,
Katol Road, Nagpur- 440 013

2.2 Name address and Registration No. of recognised (Key) persons who prepared the SOM
Shri.R.S.Verma
G.M. (Mines)
MOIL LTD,
1-A, MOIL Bhavan,
Nagpur - 440013
Tel-0712-2806241
RQP No.-RQP/NGP/206/98/B
Valid up to 14.7.2020.

2.3 Mineral to be mined out: Manganese ore

2.4 Area and date of expiry of lease:

Mine	Area in Ha.	Forest land	Revenue land	Pvt Land	Date of Expiry
Munsar	108.63	12.15 ha	80.73 ha	15.75 ha	30 th June 2022
Munsar	25.15	3.40 ha	2.08 ha	19.67	13 th May 2022

2.5 Date of expiry of 5 years period of mining lease for which approved on last occasion

Mining Plan/SOM	Approval no	date	Under Rule	period
Mining Plan 108.93 ha	NGP/Mn/MPLN-257/NGP	06/05/2003	24A of MCR 1960	2002 - 2022.
Mining Plan 25.15 ha	NGP/Mn/MPLN-257 (A)/NGP	06/05/2003	24A of MCR 1960	2002 - 2022.
1 st Scheme of Mining – 108.93 ha & 25.15 ha	NGP/Mn/MPLN-257/NGP	14.12.2010	12 of MCDR 1988.	Up to 2011-12
2nd Scheme of Mining – 108.63 ha & 25.15 ha	Submitted for approval		12 of MCDR 1988.	2012-13 to 2016-17

3.0 ORE RESERVES

RESERVES :-

3.1 Category wise (Proved, probable and possible) reserves estimated in the earlier SOM Plan with grade :-

Grade :-

The manganese of the lease area has been classified under four grades based on Mn percentage availability. This is as under - (1) Mn - 46 to 48 %, (2) Mn - 35 to 46%, (3) Mn - 30 to 35% and (4) Mn - 14 to 30%. The average Mn% in dump is 25.35%. The manganese is of ferro grade as well as LGHS grade.

3.2 Depletion of reserve during the period of the approved Mining Plan :-

The mineable reserve as per approved Mining Plan.

Mineable reserve as calculated in the approved Mining Plan.

Proved reserve	=	14,81,681 T.
Probable reserve	=	9,80,100 T.
Possible reserve	=	9,06,140 T.
Conditional	=	81,280 T.
Total	=	34,49,201 T.
Dump reserves	=	3,01,000 T.
Grand Total	=	37,50,201 T.

The depletion of the reserve during the SOM period is given below:

ORE DEPLETION				
Year	Reserves	Depletion	Add Res	Balance
1.4.2002	1481681	13015	0	1468666
1.4.2003	1468666	887	0	1467779
1.4.2004	1467779	493	0	1467286
1.4.2005	1467286	8068	0	1459218
1.4.2006	1459218	8693	0	1450525
1.4.2007	1450715	8503	0	1442212
Reserves Calculated as per UNFC				603350
1.4.2008	603350	13952	0	589398
1.4.2009	589398	24127	171170	736441
1.4.2010	736441	29139	58620	765922
1.4.2011	765922	24786	0	734256
1.4.2012	734256			

In-situ Reserves/Resources as on 1.4.2012 as per UNFC

MUNSAR MINE Lease Area 108.63 Ha

Classification	Quantity in Tonnes	
	Code	Reserves/ Resources
Proved Mineral Reserves	111	1022085
Probable Mineral Reserves	121	633080
Probable Mineral Reserves	122	504000
Reserves		2159165
Pre-feasibility Mineral Resources	211	257390
Pre-feasibility Mineral Resources	221	303190
Pre-feasibility Mineral Resources	222	689780
Inferred Mineral Resources	333	1227720
Resources		2478080
In-situ Ore Reserves/Resources		4637245

Dump Reserves as on 1.4.2012 of lease area of 108.63 ha: 725004 T

In-situ Reserves as on 1.4.2012 of lease area of 25.15 ha NIL

Dump Reserves as on 1.4.2012 of lease area of 25.15 ha: 21830 T

The quantum of balance ore in the present stope between chainage 1650 to 2650 and between 70 ft level and 170 ft level = 17928 T without barrier pillar and 31500 T with barrier pillar.

(d) Additional reserve established:-

There are two type of dumps in the lease area. One is OB dump/White dump and other is mineralised dump/black dump with recovery of low grade manganese ore (Mn 25%). The overall recovery from dump is about 21%. Often it has been observed in the ML area that after removal of schist at top from white dump, ore has been recovered as if schist and mineralised dump has been stacked in layers. This is all based on past experience of mining in ML area. Hence about 7,25,004 T of reserve has been assessed from dumps in 108.63 hec area which is appended as Annexure -VI while 21830 T has been assessed from only dump in 25.15 hec area which is appended as Annexure - VI.

Category wise Updated Mineral Reserve as per UNFC classification:

The mineral reserve has been put under 111 and 121 category while resource has been put under 221, 222 & 333 category as per the UNF classification. No In-situ mineral reserve has been established from 25.15 heccts lease area and only reserve is available from old dumps, which is considered in 111.

1) Economic Axis :-

E-1 - (i) Detailed exploration, (ii) Mining Plan (iii) Specific end use grade of reserve established, (iv) Specific knowledge of forest / non forest and other land use data.

E-3 - Reconnaissance to detailed geological study, rough estimates of grades.

2) Feasible Axis :- Feasibility study carried out

F-1 - 1. Geology: Detailed exploration, closed space drilling, bulk samples for beneficiations, geotechnical study.

2. Mining: Method, safety measures, mining plan, mine recoveries and efficiency, estimates of man powers.

3. Environment: EIA studies/ EMP, detailed land use data.

4. Infrastructure

5. Costing: Capital and operating costs and details of working capital.

6. Marketing: Over view, specific market aspects.

7. Economic Viability: Cash flow fore cast, inflation effects and sensitivity studies.

8. Other factors: Statutory provisions relating to land, labour, mining, taxation etc.

3) Geological Axis:

G-1 - 1. (i) Geological survey: Mapping on a scale of 1:2000,
(ii) Surface geological plan showing surface geological features and extent of deposit, structure, location of bore holes, assay plan and bore hole data.

2. Geochemical survey: Litho chemical analysis.

3. Geophysical survey

4. Technological: Pitting, drilling, sampling.

5. Petrographic study

6. Geo-statistical analysis

- G-2 - 1. (i) Geological survey :** Mapping on a scale of 1:2000.
- 2. Geochemical survey :** Litho chemical analysis.
 - 3. Geophysical survey**
 - 4. Technological :** Pitting, drilling, sampling.
 - 5. Petrographic study**

G-3 - 1. (i) Geological survey : Mapping on a scale of 1:2000, Assessment of detailed stratigraphy, lithology, structure, surface mineralisation, analysis of old history of mining.

- 2. Geochemical survey :** Geo chemical sampling.
- 3. Geophysical survey**
- 4. Technological :** Pitting, drilling.
- 5. Petrographic study :** Study of rocks of deposits and its surroundings.

- G-2 - 1. (i) Geological survey :** Mapping on a scale of 1:2000.
- 2. Geochemical survey :** Litho chemical analysis.
 - 3. Geophysical survey**
 - 4. Technological :** Pitting, drilling, sampling.
 - 5. Petrographic study**

- G-3 - 1. (i) Geological survey :** Mapping on a scale of 1:2000, Assessment of detailed stratigraphy, lithology, structure, surface mineralisation, analysis of old history of mining.
- 2. Geochemical survey :** Geo chemical sampling.
 - 3. Geophysical survey**
 - 4. Technological :** Pitting, drilling.
 - 5. Petrographic study :** Study of rocks of deposits and its surroundings.

United Nations Frame-work Classification (UNFC)

3.3 Category wise resource established as on 1.4.2012

1227720 Tonnes under inferred mineral resources (333)

3.4 Category wise updated reserves with grades as per UNFC on 1.4.2012 is given below:

Quantity in Tonnes

Classification	Code	Quantity	Grade
(1)	(2)	(3)	(4)
Total Mineral Resources (A+B)			25 to 48% Mn
A) Mineral Reserves			
1. Proved Mineral Reserves	111	1022085	25 to 48% Mn
2. Probable Mineral Reserves	121	633080	25 to 48% Mn
3. Probable Mineral Reserves	122	257390	25 to 48% Mn
Total 1+2+3		2159165	
B) Remaining Resources			
Feasibility Mineral resource	211	257390	25 to 48% Mn
1. Prefeasibility Mineral Resource	221	303190	
2. Measured Mineral Resource	222	689780	
3. Indicated Mineral Resource	331	NA	
4. Inferred Mineral Resource	332	NA	
5. Reconnaissance Mineral Resource	333	1227720	
Total (1to5)		2478080	
Grand Total A+B		4637245	

Reserves/ Resources are calculated on vary basis of 10% Mn Threshold value.

“L” section showing UNF classification is enclosed as Plate no. X

Dump Reserves as on 1.4.2012 of lease area of 108.63 Ha: 7,25,004 T

– Grade Mn 20% to 30%

In-situ Reserves as on 1.4.2012 of lease area of 25.15 ha NIL

Dump Reserves as on 1.4.2012 of lease area of 25.15 ha: 21830 T

– Grade Mn 20% to 30%

Plan of mineralized dumps & characterization is enclosed in Plate no. XII-A

3.5: The grade wise reserve as on 1.4.2012 estimate is given below:

UNFC Code	In situ Reserves	Ferro Grade Mn 33-38% Rec-15%	Silico Grade Mn 25 - 31% Rec-35%	Fines Mn 25-31% Rec-10%
Proved Mineral Reserves -111	1022085	153313	357730	102209
Probable Mineral Reserves-121	633080	94962	221578	63308
Probable Mineral Reserves-122	504000	75600	176400	50400
Reserves	2159165	323875	755708	215917
Pre-feasibility Mineral Resources -211	257390	38609	90087	25739
Pre-feasibility Mineral Resources-221	303190	45479	106117	30319
Pre-feasibility Mineral Resources-222	689780	103467	241423	68978
Inferred Mineral Resources-333	1227720	184158	429702	122772
Resources	2478080	371712	867328	247808
Grand Total	4637245	695587	1623036	463725

Reserves/ Resources are calculated on vary basis of 10% Mn Threshold value.

4.0 CONCEPTUAL MINING PLAN:

CONCEPTUAL PLAN

Conceptual plan (Upto Mine life end) :-

Total lease area	=	(i) 108.93 Hects.. (ii) 25.15 hecets.
Mineable area	=	11.0 Hects.
Reclaimable area	=	6.0 Hects.
Proposed production Clean Ore	=	80,000 T./annum
ROM	=	130000 TPA
Institu Reserves as on 1.4.2012	=	2159165 T
Dump Reserves as on 1.4.2012	=	746834 T
Anticipated life of the mine	=	16.60 say 17 Years
Ultimate generation of waste	=	1000000 cum

Upto lease period :-

Area under reclamation	=	1.0 Hect
Area under plantation	=	10.00 Hect.
Production	=	80000 TPA
ROM	=	130000 T
Extent of area to be worked	=	11.0 Hects.

Upto five year ensuing period :-

Area under reclamation	=	Nil
Area under plantation	=	4.50 Hect.
Extent of area to be worked	=	10.56 Hects.

The leasehold area of 108.93 ha was acquired by CPMO, a British company. The mining activities were commenced by way of boulder mining. The opencast activities were commenced with depletion of boulder ore. As market was gaining momentum, the underground sections at different R.L were opened. At present the underground workings are in 70'L, between Ch 200 & Ch 3400. Vertical shaft sinking has been commenced in the year 2010 at the mine for the development of lower levels and exploitation of manganese ore. In addition to this, additional shaft is also proposed in the lease area. Details are given in Chapter 5-Mining.

The sinking of vertical shaft at 108.63 ha area is in progress. The work has been commenced from 20.5.2010 at Ch. 2600. This shaft will be sunk up to –330’L, drives will be driven on either side of the shaft for complete exploitation of the ore. So far the exploration has established the ore up to –230’L. it is proposed to explore the area to its full potential. Phase-wise exploration scheme has been suggested in this SOM.

Year	No of Bore Holes with Chainagages	Total Drilling in Meters
2012-13	10 Bore Holes at Ch. -1200, -200, 800, 1400, 2000, 2500, 3000, 3500, 4000, 5000	3000 Mtrs
2013-14	10 Bore Holes at Ch. -1200, -200, 800, 1400, 2000, 2500, 3000, 3500, 4000, 5000	3000 Mtrs
2014-15	0	0
2015-16	0	0
2016-17	0	0
Total	20 Boreholes	6000 Mtrs

It is proposed to reclaim the Durga Pit & of Parsoda will be reclaimed in course of mining. Since the reserves are established upto –230’L, the conceptual plan is proposed to that level only. On exploitation of ore, the area will be filled by sand, except the water ponds. The left out area will be stabilized by suitable plantation.

The dumps are the potential sources of low-grade ore for Munsar Mine. Since the market is in favour of low quality ore, the old mineral dumps will be retrieve for conservation of mineral. As they are mix dumps, after the recovery of mineral the rejects will be kept in same area. In the process, it is envisaged that the dump heights will be lowered by about 50%. These dumps will be stabilised by planting suitable species. Terracing will be developed at 10mts height, wherever it is required. The ultimate R.L.’s are as under.

Underground R.L	= 210 m
Opencast/Pit bottom R.L of Bunglow Pit .	= 297 m
Dump Top R.L.	= 410m (6m from surface)

Time frame of completion of mineral exploration programme in lease hold area:

The prospecting has been done in the lease area by way of exploration and the evidence of deposit has been proved. Extensive mining has been done in the lease

area. It is proposed to explore - 130' level & 230' level with 20 Bore Holes of the depth of around 300 mtrs during the year 2012-13 & 2013-14 . The actual depth of the hole will be decided on spot based on the lithology encountered.

Whether the site (s) for disposal of waste rock & un-saleable ores has/have examined for adequacy of land suitability of long term use in the event of continuation of mining activity :-

Dumping will be done in out side the pit limit and in Durga Pit, which have mined out and back filling of the Durga pit has already been mentioned in the approved Mining Plan/ SOM of the Munsar Lease 5.74 hac area.

Whether backfilling of pits after recovery of ore/mineral upto techno economically feasible depth envisaged. If so, described the broad features of the proposal:-

Backfilling of old excavated and exhausted workings will be done towards western side in and around Durga Pit in 2.40 hect area. This will prevent water logging/inundation leading to seepage in under ground workings. Besides this, Bunglow Pit and Parsoda pit each having around 2.40 hect area will also be backfilled upto ground level.

Underground:

In this SOM around 140000 T clean ore (233333 T ROM) will be produced from the underground from 70'L, -30'L & -130'L and stope will be backfilled by sand, through hydraulic sand stowing method and manual filling of the stope by the waste generated during development of the drives in the rock. This back filling in the stopes will be stabilized wall rock contacts of the ore body and thus the subsidence of the surface area will be stabilized.

5.0

MINING

5.1 Salient description of present mining method:

Munsar has a long strike length ranging from chainage (-) 1200 to chainage 8400. It is about 2.90 kms in length. Average width of ore bed on out crop is about 7 mtrs. There are number of old opencast pits all along the strike length of ore bed, and they are named as under.

	Extent		Pit Bottom	Size(m x m x m)
	From chainage	to Chainage	level (RL in mtrs.)	(length x width x depth)
Durga Pit	(-)1200	00	335	60 x 40 x 27
Main Pit	0	900	306	200 x 120 x 25
Main hill	900	3800	-	-
Bungalow Pit	3800	4700	307	110 x 45 x 25
K.L. Pit	5400	6800	300	490 x (60-120) x 18
Parsoda Pit	7600	8400	300	230 x 20 x 20

Presently opencast working is of KL pit discontinued. Working at Bungalow Pit area in between Ch. 4000 to 4600 is proposed in this Scheme of Mining in phased manner.

DUMP MINING: Low grade siliceous ore consisting 25%-30% Mn are recovered from the various old mineralized dumps. The ore removed are lumpy and fines (+1.5 mm size)

UNDERGROUND WORKING: The underground working activity is confined from Ch.200 to Ch. 3700 at 170'L. Three levels are developed namely 270'L (357mRL) 170'L (333mRL) and 70'L (303mRL). 270'L & 170'L are opened up by adit while to reach 70' L an incline has been sunk at Ch. 200. The two upper levels (270' and 170' L) are already exhausted and the working closed after proper filling and presently underground mining activities are confined to 3rd level i.e. 70'L. The mining and development activity at this level is carried on between chainages 1850 to 3050. Stopping is carried out between chainages 1850 to 2650. Stopping permission from Ch. 2650 to Ch. 2850 has been submitted to IBM for approval. For the proposed stopping operation, two

winzes has been sunk from 170'L to 70'L at Ch. 2850 & Ch. 3050. Development heading has reached up to Ch. 3400 in rock. Underground plan & section is enclosed as plate VII.

Vertical Shaft Sinking

Vertical Shaft sinking operation has been commenced on 20.5.2010 at Ch. 2600 at 342 MRL.

SINKING OF VERTICAL SHAFT AT MUNSAR MINE

1. VERTICAL SHAFT DETAILS:

- I) LOCATION: Ch. 2600
- II) CO-ORDINATE: N14585-E15460 (GRL-342)
- III) DIAMETER: 4.5 METERS (FINISHED)
- IV) DEPTH: 156 METERS
- V) NO. OF LEVELS: 4 (70'L, -30'L, -130'L & -230'L)
- VI) WINDER: DOUBLE DRUM, BALANCED
DOUBLE CAGE,
APPROX. MOTOR H.P.: 250
D.C. WITH PLC
BASED THYRISTAIERD
CONTROL.
- VII) SPEED OF WINDING: 3 METERS/SECOND.

SINKING OF VERTICAL SHAFT:

Sinking of vertical shaft has been started on 20.5.2010 at Ch. 2600, shaft collar is located at 347 MRL. The finished diameter of the sinking shaft is 4.5 m. It is proposed to hoist 1,60,000 Tonnes ROM per year.

The shaft will be sunk to open -30'L, -130'L & -230' level. The estimated depth of the shaft will be 156 m. The RLs of the shaft at various points will be as under:

RL of shaft collar	--	--	--	--	--	342 mtrs.
RL of + 70' Level	--	--	--	--	--	306 mtrs.
RL of -30' level	--	--	--	--	--	276 mtrs.
RL of -130' level	--	--	--	--	--	246 mtrs.

RL of -230' level	--	--	--	--	--	216 mtrs.
RL of shaft bottom	--	--	--	--	--	186 mtrs.

It is proposed to hoist the ore through cage by tubs only. Since, it is proposed to sink the shaft in foot wall, the main shaft cross cut will be extended to hangwall with approx. length of 130 Mts at each level.

Sinking & Development work carried out up to 1.4.2012 is given below:

a) Vertical Shaft:

Sinking up to: 102 mtrs

Lining up to 92 mtrs

b) Inset Excavation & Inset Lining at 70'L - completed

Inset Excavation & Inset Lining at (-)30'L - completed

c) Horizontal development at 70'L – 138.15 mtrs from shaft inset

Horizontal development at (-)30'L – 35 mtrs from shaft inset

Details are given in underground development.

Additional New Vertical Shaft:

It is also proposed the sink additional new vertical shaft in the property of 108.93 ha area. It will be located in between the Ch. 5100. Pre-feasibility work is undergoing. Feasibility and other rock-mechanical studies will be undertaken during the year 2012-13. Anticipated depth of the shaft will be around 150 mtrs from the surface.

High Speed Winze:

It is also proposed to deepen the additional winze from the surface near vertical shaft, which is nearly 44 mtrs in depth. This will be used for secondary outlet as well as for hoisting the ore/waste from 70'L, before commencing of the vertical shaft. This work will be undertaken during the year 2012-13.

Year-wise development for first 5 years:

The method of U/G working followed at Munsar underground Mine is Horizontal Flat back cut & fill mining. The support system varies from the conventional timber chokes with probs. The Mine is developed by driving haulage roads, cross cuts and then dividing the ore body into blocks by sinking the winzes. The length of stope blocks is 60 mtrs. The haulage road is located in orebody. Sill pillar of 5m height is being kept for stability & sill drive has been advanced at 70'L. The vertical interval between two consecutive levels is 30 mtrs. In lower levels haulage road will be placed in footwall rock.

UNDERGROUND DEVELOPMENT:

The plan and section showing schedule of development for 5 years period from 2012-13 to 2016-17 are enclosed as Plate No. V & VI

Summarized Year Wise Underground Development is appended below:

Projected Year wise Underground Development in RMT - 108.63 ha

Year		2012-13	2013-14	2014-15	2015-16	2016-17	Total
Level	Description						
70'L	Vertical	56	56	0	0	0	112
	Horizontal	55	56	0	0	0	111
(-)30'L	Vertical	0	0	252	0	252	504
	Horizontal	0	0	460	0	580	1040
(-)130'L	Vertical	0	0	0	168	308	476
	Horizontal	0	0	0	350	807	1157
(-)230'L	Vertical	0	0	0	0	196	196
	Horizontal	0	0	0	0	466	466
	Vertical Shaft	39	15	0	0	0	54
	High Speed Winze	44	0	0	0	0	44

CHAINAGE WISE YEAR WISE UNDERGROUND DEVELOPMENT IS AS BELOW:

MUNSAR MINE

PEOJECTED YEAR WISE, CHAINAGE WISE UNDERGROUND DEVELOPMENT

YEAR	LEVEL	DEVELOPMENT (in Mtrs)						
		HORIZONTAL		VERTICAL		TOTAL		G RAND
		CH TO CH	MTRS	CH TO CH	MTRS	HOR	VER	TOTAL
2012-13	70'L	3250 to 3450	56	Wz 3050	28	56	56	112
				Wz 3250	28			
2013-14	70'L	3450 to 3650	55	Wz 3450	28	55	56	111
				Wz 3650	28			
2014-15	(-)30'L	2750 to 1800	280	Wz 1650	28	460	252	712
				Wz 1850	28			
		2750 to 3350	180	Wz 2050	28			
				Wz 2250	28			
				Wz 2450	28			
				Wz 2650	28			
				Wz 2850	28			
				Wz 3050	28			
Wz 3250	28							
2015-16	(-)130'L	2750 to 2000	225	Wz 2050	28	350	168	518
				Wz 2250	28			
		2750 to 3150	125	Wz 2450	28			
				Wz 2650	28			
				Wz 2850	28			
				Wz 3050	28			

MUNSAR MINE

PEOJECTED YEAR WISE, CHAINAGE WISE UNDERGROUND DEVELOPMENT

YEAR	LEVEL	DEVELOPMENT (in Mtrs)						
		HORIZONTAL		VERTICAL		TOTAL		G RAND
		CH TO CH	MTRS	CH TO CH	MTRS	HOR	VER	TOTAL
2016-17	(-)30'L	1800-800	300	Wz 250	28	580	252	832
		3350-4250	280	Wz 450	28			
				Wz 650	28			
				Wz 850	28			
				Wz 1050	28			
				Wz 1250	28			
				Wz 1450	28			
				Wz 3450	28			
				Wz 3650	28			
	(-)130'L	2000 - 450	465	Wz 800	28	807	308	1115
		3150 - 4300	342	Wz 1000	28			
				Wz 1200	28			
				Wz 1400	28			
				Wz 1600	28			
				Wz 1800	28			
				Wz 3250	28			
				Wz 3450	28			
				Wz 3650	28			
				Wz 3850	28			
	Wz 4050	28						
	(-)230'L	2750-1800	286	Wz 2050	28	466	196	662
		2750-3350	180	Wz 2250	28			
				Wz 2450	28			
Wz 2650				28				
Wz 2850				28				
Wz 3050				28				
Wz 3250	28							
TOTAL		1853			1853	756	2609	

MUNSAR MINE

PROJECTED YEAR WISE VERTICAL SHAFT SINKING

Year	Sinking in Mtrs	Lining in Mtrs	Shaft X cut		Shaft Inset	OTC Lining	
			Level	H Dev in Mtrs			
2012-13	39	49	(-)30'L	110	15 Mtrs at	45 Mtrs	(-) 30'L to
			(-)130'L	106			(-) 130'L
2013-14	15	15	(-)130'L	46	(-)130'L	48 Mtrs	(-) 130 to
			(-)230'L	159	(-)230'L		(-) 230'L
TOTAL	54	64		421	30 Mtrs	93 Mtrs	

UNDERGROUND LAYOUT:

At present, the entry to the working level i.e. 70 ft level (303mRL) is through incline and vertical shaft. The brow of incline is located near Ch. 200 at 241mRL and the length of incline is 90.60m. This level has been development upto Ch. 3300 by way of ore drive and X-cutting, carried out at every 15m. interval mainly to ascertain the width of ore body. The winzes are sunk from the 170'L to 70'L at every 60m interval. Since the width of ore body is between 6-7m. haulage road is planned in the ore drive itself. For the stability of ore drive solid pillar of 5m thickness is left from the roof of the ore drive, thus total thickness of sill pillar becomes 7.5 m (5 m + 2.5 m Ht. of ore drive). As on extraction of ore from either side of ore drive is done, it can be treated as solid pillar.

The ore drive, x-cuts - 2.4 m x 2.1m
 Winzes - 2.4 m x 1.8 m

The mode of transport of the ore from u/g to surface is by double drum electric haulage installed at surface 16 cft tubs are used for this purpose by incline. Ore &

waste will be taken out from the high speed winze located near the shaft. Ore & waste be taken out from the vertical shaft in the year 2015-16 through 24 cft u tubs.

UNDERGROUND SUPPORT:

The underground excavated area which are X-cuts, ore drive, winzes stopes etc. are supported by various method.

Support in Winze : The winzes are driven from upper 170 ft L to 70 ft L through ore. The strata encountered in winze is quite competent and self supporting. Only the collar of the winzes is concreted for a depth of about 5 m.

Support in Stopes: The stoping operations are carried out at 70 ft level, approved systematic support rule is incorporated.

UNDERGROUND DEVELOPMENT :

Presently underground mining is confined to only in one level, that is 70 ft level.

1) At this level one ore drive is driven with in the ore body, which serves as haulage road, for transporting of ore, rest of one width is left as sill pillar.

2) At 7.50 m height from floor of this level, one stope drive is driven along the strike direction.

3) At every 15 m interval, cross cuts are driven towards both walls to explore the wall contacts.

4) Winzes at every 60 m interval are sunk from upper level, to drop filling material or to provide access for pipe for hydraulic sand stowing they also serve for ventilating the stopes.

Manways and chutes are taken from haulage road drive to stope drive, at every 60m. and 30m. interval respectively.

On completion of mining of one lift chutes and manways are heightened at every lift. This process is repeated till last lift is mined.

Wall rocks in this mine are not competent enough to self support. Further recovery of saleable ore is very low, hence for economical and geotechnical reasons development of haulage drive in country rock is avoided. Ore drive and haulage drive is

one and the same. Further it is planned not to leave crown pillar below 70 ft level to maximise the conservation aspect. While carrying out stoping operations between 70' level and 30' level, for the stability of the 70' level, Haulage road the crown pillar is required to be left. But after the completion of mining operations between 70' level and 30' level, the ore left as crown pillar will be extracted in retracting manner. This crown pillar can be extracted safely as already 6 m thick sill pillar is left above 70' level.

Stoping:

The stoping operations at present are confined from ch. 1650 to 2650 and between 70 ft level and 170 ft level. The average width of ore body is 6-7 mtrs. And dips towards north with steep angle.

Sequence of Stopping:-

Development of Stopping

- 1) Size of each block stope block is 60m x 30m x full ore width.
- 2) The ore drive at 70 ft level is driven along ore body.
- 3) Cross cuts are provided at 15m interval to ascertain the width of ore body. Sill pillar of about 7.5 m thick is left and above it a stope drive is driven along the strike direction.
- 4) Winzes are sunk from 170 ft level to stope drive level at 60m interval.
- 5) Position of manways, orepass travelling way of 1.5 m x 1.8m is maintained between manways lift. This is provided for ventilation, transportation of ore etc. and also it is utilised as second out let.
- 6) Manways are kept at 60m interval by puncturing the sill pillar and the orepasses are kept at 30m interval along the strike.
- 7) Manways and chute are raised upwards as soon as next lift is advanced and are covered at top or fenced to prevent inadvertant fall of persons in them. Steel ore pass of 1.0m dia and steel manway 1.2m dia is provided for each stope.

Mining in Stope :-

- 1) Manways and ore passes are raised by 1.5m.
- 2) Stope drive is stripped from wall to wall in between two manways.

3) As the stripping advances the timber supports are extended closer to the working faces.

4) The void so created is filled with sand by hydraulic sand stowing system, leaving a traveling passes of 2.1m x 1.8m.

5) Next slice is started by giving blast over manway orepass. Subsequently it is extended upto lift to left height.

6) The slice is then extended to either of the sides of manway/orepass and extraction is continued upto the midway of the orepasses.

7) As the slice advances the timber support are provided as per the systematic support rule.

8) The voids created is filled with sand.

The activities mentioned in 5 to 8 are repeated upto the upper level.

Mucking:

The blasted ore is manually transported to ore pass and located in tubs at 70 ft level haulage road subsequently tubs are tramed by hand pushing/ battery locomotives to incline pit bottom or shaft inset.

Filling:

The gap created by mining is filled by sand by means of sand stowing. Sand stowing plant is located on surface of Ch 1600. The underground is connected with sand stowing plant by means of 3 nos of bore holes up to 270' level and from 270' level the sand stowing pipes are connected through winzes upto stopes.

UNDERGROUND PRODUCTION:

Projected year wise production of Munsar Mine 108.63 ha Area

Source	Quantity in Tonnes				
	2012-13	2013-14	2014-15	2015-16	2016-17
Underground					
ROM	41670	50000	50000	50000	83330
Clean Ore	25000	30000	30000	30000	50000

O/C DEVELOPMENT

Opencast working is suggested at 135'L Pit from Ch 4000 to Ch.4400 and from MRL to MRL 340 to 297. The proposed opencast activities are limited to 297MRL over the strike length of 100mts. These activities will be extended to 297 MRL i e 10mts below present pit bottom. Considering the pinching & swelling nature, the sections are drawn perpendicular to trend of ore zone for the purpose of calculation. since the o/c activities are permitted to limited area, due to constraints of other surface features & structures, the activities of exploitation viz a viz the development will be limited to 2mts per year. Owing to the configuration of ore zone the production trend will be reducing with depth.

MUNSAR MINE - 108.63 ha
Opencast Development - Bunglow Pit - 135'L

Year	MRL	Development in m ³			Manganese Ore		
		HW	FW	Total	Insitu in m ³	ROM in T	Clean Ore in T
2012-13	340-302	30000	60000	90000	2650	8350	5000
2013-14	340-302	32000	65000	97000	2650	8350	5000
2014-15	340-297	35000	67000	102000	2650	8350	5000
2015-16	340-297	35000	70000	105000	2650	8350	5000
2016-17	340-297	37000	75000	112000	2650	8350	5000
Total		169000	337000	506000	13250	41750	25000

The sizes of main entries, haulage roads, ore drives, winzes etc. are given below:-

Sl.No.	Items	Sizes
1.	Main Shaft	4.25 mtrs.(dia)
2.	Haulage Roads	2.4 x 2.1 mtrs
3.	Ore drives	2.1 x 2.1 mtrs.
4.	Crosscuts	2.4 x 2.1 mtrs.
5.	Winzes	2 x 2 mtrs.

DUMP PRODUCTION:-

At Munsar these are 12 dumps out of which nine (9) known mangiferous dumps. Mainly third grade lumpy are (30-33% Mn) and low grade high siliceous ore (30/25% Mn) are mined from it. Some of the dumps are covered with schistose rock. Where cover of schist is more than 1.50m high, they are removed by front end loader, this cover rock is again dumped on the other end or the same dump separately, so that it should not interfere in subsequent mining.

After removing schist, benches of 6 m height and width not less than the height of the bench are found and the mineralised dump will be shifted towards north western side. Sorting and sizing will be done in North West side by miners. Grade wise cleaned ore is stacked separately on the stacking ground. There after it will be sampled and transported by truck to railways siding. Mineral rejects of the dumps, will be stacked by side of mineral reject dumps.

The area for Dump production have been marked on progressive mine closure plan. These mineral dumps will be retrieved for lumpy & fines production. The year wise generation of mineral reject is shown on PMCP & Environment Plan.

Year wise Projected Dump Production - Munsar 108.63 ha area

Sr No	Description	2012-13	2013-14	2014-15	2015-16	2016-17	Total
1	Rock Dump-MD1	1000	1000	1000	1000	1000	5000
2	370'L Dump-MD2	500	500	500	500	500	2500
3	Western Part of Managzine Dump MD3	10000	10000	10000	10000	10000	50000
4	Main Magazine Dump - MD4	2500	2500	2500	2500	2500	12500
5	Central Magazine Dump - MD5	10000	10000	10000	10000	10000	50000
6	Sand Stowing Plant Dump - MD6	2000	2000	2000	2000	2000	10000
7	220'L Dump - MD7	1500	1500	1500	1500	1500	7500
8	135,L Dump MD8	2500	2500	2500	2500	2500	12500
9	Parsoda Dump MD9	0	0	0	0	0	0
Dump Production (Lumpy)		30000	30000	30000	30000	30000	150000
Fines		10000	15000	15000	15000	15000	75000
Total Dump Production in T		40000	45000	45000	45000	45000	220000

At the mine 150000 Tonnes of Manganese mineral is estimated from the dumps, on very basis of 10%Mn, threshold value. (Reserves are estimated with 21% recovery) Considering the market, for the fines mechanical screen has been installed of capacity 50T/hr near the siding.

5.3 Yearly projected production plan proposed for next five years

Year wise total R.O.M. production: (open cast + underground + Dump- cleaned ore) in Tonnes

Projected year wise production of Munsar Mine 108.63 ha Area

Source	Quantity in Tonnes					Total
	2012-13	2013-14	2014-15	2015-16	2016-17	
Underground						
ROM in T	41670	50000	50000	50000	83330	275000
Clean Ore in T	25000	30000	30000	30000	50000	165000
Opencast						
ROM in T	8350	8350	8350	8350	8350	41750
Clean Ore in T	5000	5000	5000	5000	5000	25000
Dump						
Development in cum	200000	200000	200000	200000	200000	1000000
Lumpy and Fines in cum	1900	1900	1900	1900	1900	9500
Dump Production (Lumpy) in T	30000	30000	30000	30000	30000	150000
Fines in T	10000	15000	15000	15000	15000	70000
Dump Production (Lumpy + Fines) in T	40000	45000	45000	45000	45000	220000
Production from Dump, O/c & UG	70000	80000	80000	80000	100000	410000

Projected year wise production of Munsar Mine 25.15 ha Area

Source	Quantity in Tonnes				
	2012-13	2013-14	2014-15	2015-16	2016-17
Dump ROM in cum	200	200	200	200	200
Dump Prod (Lumpy) in T	400	400	400	400	400
Dump Development in Cum	17000	17000	17000	17000	17000

Projected year wise Development & Filling Quantity in m³ - 108.63 & 25.15 ha Area

Source	2012-13	2013-14	2014-15	2015-16	2016-17
OB - Opencast m ³	75000	75000	80000	100000	100000
Dump Development m ³	217000	217000	217000	217000	217000
Sand Filling in Stopes m ³	15000	19000	19000	19000	30000

Recovery of clean ore from dump working will be 21% while in under ground working will be 60% and in opencast it will be about 60% only.

5.3.1 Proposed rate of Production when mine is fully developed:

The production schedule for scheme period is mentioned above. The production has been proposed in proportion with development. The mine has potential of 4.6 Million Tonnes (Reserves + Resources). For exploitation, vertical shaft sinking is started in the year 2010 at Ch 2600 at Munsar mine which will be connecting the productive levels at (-)30'L, (-)130'L & (-)230'L

12-13	13-14	14-15	15-16	16-17
70000	80000	80000	80000	100000
17-18	18-19	19-20	20-21	21-22
100000	100000	120000	120000	125000

The increase in production is anticipated with vertical shaft.

5.4 Any change in the proposed method of Mining, Drilling, Blasting & development of machinery if so, given details:-

(a) Method of mining:

No change is proposed in method of underground stoping at 70'L. However, haulage road will be developed in rock at -30'L, -130'L & -230'L. Sill drive & sill pillar is not suggested at lower level for conservation of minerals. mining. As proposed, dump mining will continue to recover low grade manganese from mineralized dumps as per the prevailing conditions of the market

(b) Drilling: The drilling of development headings and stope will be carried out by jack hammer mounted on air leg. The holes will be of 32 mm dia and length of hole will vary between 0.6 to 1.5 m. The machines will be operated by compressed air which is supplied by compressor installed on surface. The drilling patterns for ore drive, X-cuts haulage road and winzes and stope are shown in Annexure - 5.

(c) Blasting:-

Underground :- As stated earlier the drilling blasting pattern for cross cuts, ore drive haulage road and winzes and stopes faces is enclosed as drawing & from fig 8 to 10 indicating no. of holes. In under ground development wedge pattern of

cut holes will be practiced. The holes drilled in this fashion are to appropriate depth and charged and fired with delay detonators in sequence to minimize the vibration and to give optimised breakage. Blasting pattern adopted in underground stopes for mining is enclosed in Annexure - 6.

(ii) Type of explosive to be used :-

- i) Nitro Compound
- ii) Safety Fuse
- iii) Detonators
- iv) Cordtex

(iii) Storage of explosive (Like capacity and type of explosive magazine) :-

The explosives are stored properly as per guidelines issued by controller of explosives with round the clock security. The details of explosive magazine is given below :

A) Mag. Licence No. - E-25(7)/215/III/MR/NGA/16-E

B) Capacity :

- i) Nitro Compound - 7500Kg.
- ii) Safety Fuse - 14500 mtrs.
- iii) Detonators - 30,000 Nos.
- iv) Cordtex - 3000 mtrs.

C) The proposed quantum of explosive to be used every year = 5.0 T. of small dia (25mm) in U/G working, considering the powder factor of 11 T/kg in Manganese Ore & 7-8 Cum/kg in rock. About 2 T of large dia explosives (83 m) will be utilized in opencast workings.

(iv) Precaution to be observed during drilling & blasting :-

Following precautions will be taken during blasting period.

- (1) Sufficient warning by signal is given over the entire area falling within the danger zone & ensure that all persons within such area have taken proper shelter.
- (2) Wet drilling is to be done.
- (3) Suitable air respirator will be provided to drillers.

- (4) Controlled blasting will be done.
- (5) Proper stemming of holes will be carried out.
- (6) Overcharging of holes will be carried out.
- (7) Blasting will be carried out by qualified blaster.
- (8) Blasting will be done as per DGMS norms.

For the same blasting studies has been done from the Department of Mining Engineering, VNIT, Nagpur. Copy of the recommendations is enclosed as Annexure - XX

(d) Extent of Mechanization:

The Munsar mine is having the three types of working i.e. under ground, opencast and dump mining. The machinery used for this operation and their impact is enumerated below.

Underground:

The drilling of development headings and stope will be carried out by jack hammer mounted on air leg. The holes will be of 35 mm dia and length of hole will vary between 0.6 to 1.5 m. The machines will be operated by compressed air which is supplied by compressor installed on surface. The drilling patterns for ore drive, X-cuts haulage road and winzes and stope are shown in Annexure - 6.

Type	No.	Dia of hole	Size Capacity	Make	Moving	H.P.
Jack Hammer Drill	For Development Headings - 5	35 mm.	7.5 m/hr.	Silver-30	Pneumatic	80PSI
Jack Hammer Drill	For Stopping - 5	35 mm.	7.5 m/hr.	Silver-30	Pneumatic	80PSI
Jack Hammer Drill	For Winzes - 3	35 mm.	7.5 m/hr.	Silver-30	Pneumatic	80PSI

Loading Equipment:

In underground ROM and waste comes from stope mining and development headings. The ROM/ waste is loaded manually in 16 cft/ 24 cft tubs. These tubs are pushed manually/ battery operated locomotives from face the shaft bottom/ incline bottom.

One loader and three tippers are provided for waste rock handling at dump.

Haulage & Transport equipment within the M.L.

The tubs loaded and brought to incline bottoms manually are hauled upto surface with help of double drum haulage. On surface the tubs containing ore are pushed manually to the ore cleaning floor while the tubs containing waste material are hauled manually to live waste dump. By the year 2014-15, shaft will be commissioned and the tubs will be transported to the surface through the cages of the shaft..

Transport from Mine Head to Destination

From OCF the ore is brought to siding by tubs pushed manually. From siding the ore is transported to its final destination by railway wagons as well as by trucks depending upon the convenience and choice of buyers.

Extent of mechanization for the proposed opencast & in dump area:

Hydraulic excavator of 1.4 m³ bucket capacity will be deployed for excavation of overburden rock in dump area & in opencast workings.

Tippers of 12-15 T capacity will be deployed for transportation of ore / waste in opencast & dump area.

One 100 mm down the hole drilling machine along with portable compressor of 400 cfm will be deployed for drilling the blast holes in opencast only. In dump area there will be not any blasting as the dumps are in loose conditions.

Spacing & Burden in the opencast will be kept as per the VNIT report mainly in 2 (Spacing) mtrs x 2.5 (Burden) mtrs.

Water sprinklers will be used for spraying water on haul road for dust suppression in dumps & in opencast area.

CHAPTER – VI

6.0 HANDLING OF WASTE/SUB-GRADE MATERIAL :-

6.1 Nature of waste, its rate of yearly generation and proposals for disposal of waste for next five years:

The nature and quality of top soil over burden/waste and mineral rejects likely to be generated during the next five year:

The mine waste is in the form of following :-

(1) **Top soil :-** No top soil is proposed to be generated.

(2) **Mine waste :-** The mine waste is in the form of Mica schist

with interspersed quartzite. The bed rejects arising out from the sorting and sizing of R.O.M. comprises of Gondite, Magniferous quartzite & reject below threshold value of 10% etc. The quantity generated during next 5 year below the threshold value is given below

Dump Mining

<i>Year</i>	<i>Top Soil (m³)</i>	<i>O.B./waste (m³)</i>
2012-13	Nil	200000
2013-14	Nil	200000
2014 -15	Nil	200000
2015-16	Nil	200000
2016-17	Nil	200000

Opencast Working:

Year	Waste in cum
2012-13	90000
2013-14	97000
2014-15	102000
2015-16	105000
2016-17	112000
	506000

The underground development is suggested with present scheme of mining. The activities in underground will be vertical shaft sinking, haulage road, cross cuts and stoping area earmarked for the same. However, the generated waste due to developments in rock will be utilized in stoping operation as a fill material. The

generation of waste shown above is a result of dump working. To exploit the dump ore, it may need to cut the bench of 1.5m to 6m, there by generating the anticipated above quantity.

Selection of dumping site:

Simultaneous backfilling of the OB/ schist will be done during the ensuing Scheme of Mining period. It will be done towards western side in Durga Pit. The site has been chosen such that will not interfere with mine workings in future. The opencast working is suggested in Bunglow pit. The area earmarked for dumping is shown on the EMP & PMCP plan.

6.1.1 Buildup of dumps, method and manner of disposal of waste rock, designed capacity and precautions envisaged for confinement of dumps :-

As mentioned above, simultaneous backfilling will be done. The durga pit will be backfilled up to ground level. The area to be backfilled will be about 1.2 hecets and the height of backfilling will be up to 10m.

The manner of loading and unloading of OB / waste will be by mechanical means. Leveling of backfilled area will be done by scraper and leveler. Afforestation will be done on it in future.

Precautions for confinement of dumps to prevent pollution of surface water bodies / courses:

The lease area is undulating with general slope towards north. Garland drain and bund has been prepared towards the sloping side to prevent siltation of low lying areas. Grasses will be planted to prevent wash off due to wind during summer.

At the toe of the existing dump, retaining wall will be prepared to prevent siltation in north. The length of the retaining wall will be about 1000m and width 0.5m. The height of the wall will be about 1.0m. It is proposed to prepare about 200m length of retaining wall per year during next five years.

6.2 Rate of yearly generation of mineral rejects :-

As such no sub grade mineral is generated at the mines of MOIL. The quantity below cut off grade (20% as per present market) having generally

analysis as 13-15%, is stored separately to call as “Mineral Reject Dump”. These rejects are about 20 % of the total ROM production.

Yearly Generation of Mineral Rejects is appended below:

year	Mineral Reject (T)	Quality Mn%
12-13	12000	Below 20% Mn & above threshold
13-14	12000	-“-
14-15	12000	-“-
15-16	12000	-“-
16-17	12000	-“-
TOTAL	60000	-“-

6.3

Quantity and grade of sub-grade material available at mine:

Not applicable.

7.0 USE OF MINERALS :-

The Manganese produced from this mine is used for blending purpose with different ores of Manganese ore based Ferro Alloys. A list of few buyers is appended below-

S.N.	Name of buyer	Destination
1	Maharashtra Electros melt Ltd.	Chandrapur
2	Bhilai Steel Plant	Bhilai
3	Shrinivasa Ferro Alloys	Durgapur, Raipur.
4	Shyam Ferro Alloys Ltd.	Burdwan
5	Nav Bharat Ferro Allys Ltd.	Bhadrachalam
6	Haldia Steel Ltd.	Durgapur

MINERAL BENEFICIATION: -

8.1 Results of any beneficiation investigation conducted and changes made in existing mineral beneficiation plan and tailing disposals, if any, with benefits expected (necessary flow-sheet and tailing dam designs etc. to be submitted as applicable)

- Mineral drawn on surface is sent to OCF for appropriate sizing and grading. This is a manual process. The -25mm fraction is screen for +10mm fraction. With change in demand for lower fractions, a screen has been installed for recovery of fines +3mm. The mineral dumps will be re- cleaned for +3mm, +10mm & +25mm fractions through double deck screen.

Beneficiation tests done, if any, on sub-grade mineral including fines and proposals for installation of new or additional beneficiation facility, if any (furnish process details in brief along with expected tailing loss).-

As such the ore is saleable in market. The rejects generated in process are stacked in year marked area. These reject dumps retrieve with demand of lower grade. Since the production is saleable in market, no beneficiation is required at this stage.

Material balance is enclosed as Annexure - X

9 - REVIEW OF ENVIRONMENT MANAGEMENT PLAN

Sr. No	Item	Proposed as per the approved scheme of mining	Position at the end of scheme period	Proposals for the ensuring 5 years Mining Scheme
1	2	3	4	5
1	Top soil preservation and utilisation	No top soil will be disturbed.	During last 5 years no top soil is removed.	No top soil will be removed.
2	Land reclamation and rehabilitation	About 50000M ³ will be reclaimed at Durga Pit pit.	The Durga Pit pit is filled with 50000M ³ .	Proposal for filling the durga pit
3	Waste dump management	Waste dumps will be stabilized with suitable plantation.	The plantation over waste dump is shown on plate	No proposal on waste dump
4	Afforestation programme	No area is available for plantation.	-	The plantation will be carried with 1000 samplings per year
5	Quality of air	Will be monitored quarterly.	Monitored quarterly. %age of SPM, NOx & SO ₂ are under norms.	Will be monitored Quarterly.
6	Quality of mine water	Quarterly monitoring was proposed	Monitored quarterly. %age of BOD, COD & SS are under norms.	Will be monitored Quarterly.
7	Noise level	Ear plugs to be provided to:- 1. Drilling M/c operators 2. Compressor operators 3. Ventilation fan operators	Earplugs have been provided to the all operators as mentioned in Col. 3.	Earplugs will be provided to the related persons.
8	Vibration	Mining will be carried out more than 100 m below the surface. Small dia. Blasting with electric detonator is proposed	Small dia. Blasting with electric delay detonator is carried out in U/G. No vibration effects observed. Vibration study has been carried out.	Use of Delays, relays & Nonel is proposed. Vibration Study will be done.
9	Treatment of mine water and effluents/ toxic substances before discharge	Underground water will be used mostly for mine and exploratory drilling, sand stowing and cooling purpose. (12650 lpm-300 m ³ /day)	No toxic elements are found in mine discharge water. Mine water has been utilized for sand stowing, drilling, dust suppression etc.	Not applicable
10	Re-circulation of treated water	Not applicable	Drinking water has been provided through bore well. Quality is good as per norms.	Not applicable

As such no area is available for mass plantation. For scheme period it is proposed to plant 1000 per year.

10.0 Any Other Information :

NIL

PROGRESSIVE MINE CLOSURE PLAN

of

MUNSAR MINE

OVER AN AREA OF 108.63 & 25.15 Ha.

MOIL LIMITED
(formerly Manganese Ore (India) Limited)

PROGRESSIVE MINE CLOSURE PLAN

of

MUNSAR MINE

OVER AN AREA OF 108.63 & 25.15 Ha.

UNDER RULE 23 B

OF

MINERAL CONSERVATION AND DEVELOPMENT

RULE - 1988

2011 – 12 to 2016 - 17

Prepared by-

Manganese ore (India) Limited

RQP No.-RQP/NGP/206/98/B

Valid up to 14.7.2020.

11.0 PROGRESSIVE MINE CLOSURE PLAN

11.1.0 INTRODUCTION:

i) Name of the lessee: MOIL Limited
(Formerly Manganese Ore (India) Limited)
1-A, MOIL Bhawan, Katol Road
Nagpur- 440 013 (M.S.)
Tel: (0712) 2806100
Fax: (0712) 2590774

ii) Name & Address of the mine: Munsar Manganese Mine
MOIL Limited
(Formerly Manganese Ore (India) Limited)
P.O. Khairi Bijewada, Tal. Ramtek
Dist. Nagpur.
Maharashtra
Tel. 9371622099

iii) Location: Longitude: 79° 16' 51'' E
Latitude: 21° 23' 59'' N

iv) Type of lease area:

Area	Forest land	Revenue land	Pvt. land
108.63 ha	12.15 ha	80.73 ha	15.75 ha
25.15 ha	3.40 ha	2.08 ha	19.67 ha

(c) **Type of lease area & the present land use pattern:**

Type of lease area: Waste Land

Existing land use pattern: Barren Land

S. No.	Item	Type of land (In Hects.)				
		Forest Land	Agriculture land	Grazing Land	Barren Land	Any other type
1	A Lease area	12.15	-	-	96.78	-
2	B. Mining & allied activities					
	(i) Mining area	-	-	-	8.00	-
	(ii) Dumps	-	-	-	32.50	-
	(iii)Roads/Infrastructure/ Site services	-	-	-	20.30	-
	(iv) Plantation	-	-	-	16.50	-
	Total	-	-	-	77.30	-

S. No.	Item	Type of land (In Hects.)				
		Forest Land	Agriculture land	Grazing Land	Barren Land	Any other type
1	A Lease area	3.40	-	-	21.75	-
2	B. Mining & allied activities					
	(i) Mining area	-	-	-	2.65	-
	(ii) Dumps	-	-	-	2.75	-
	(iii)Roads/Infrastructure/ Site services	-	-	-	-	-
	(iv) Plantation	-	-	-	-	-
	Total	-	-	-	5.40	-

(d) Method of mining and mineral processing operations :-

For method of Mining refer Chapter 5 of SOM.. No processing of mineral is required.

11.1.1 REASONS FOR CLOSURE :-

The lease area is not proposed to be closed during the PMCP period.

11.1.2 STATUTORY OBLIGATION :-

The environment clearance has been given by the MOEF vide letter no J-11015/413/2007-IA.II(M) dt 26.12.2007, appended as annexure incorporating, the general & specific conditions. The forest clearance is under process. In principle, 1st stage clearance has been given, 2nd stage clearance is awaited. This PMCP is being prepared in order to comply Rule-23 (B) of MCDR 1988. The lessee will also submit Financial Assurance as per Rule 23F of M.C.D.R. 1988.

11.1.3 CLOSURE PLAN PREPARATION

i) NAME OF THE APPLICANT :

MOIL LIMITED
(Formerly Manganese Ore (India) Limited)
1-A, MOIL Bhawan, Katol Road
NAGPUR - 440001(MS)
PHONE NO. (0712) 2806100
FAX : (0712) 2590774
Website: www.moil.nic.in

ii) NOMINATED OWNER:

SHRI G.P.KUNDARGI,
Chairman cum Managing Director
MOIL LTD
{Formerly Manganese Ore India Limited)
1-A, MOIL Bhawan,
Katol Road,
NAGPUR – 440 013

iii) LIST OF DIRECTORS :

Shri. G. P. Kundargi
Chairman-cum-Managing Director
MOIL LIMITED, MOIL BHAWAN, 1-A, KATOL ROAD NAGPUR 440013 - Email: gpk@moil.nic.in

Shri. A. K. Mehra
Director (Commercial)
MOIL LIMITED, MOIL BHAWAN, 1-A, KATOL ROAD NAGPUR 440013 - Email: akmehra@moil.nic.in

Shri. M.P.Chaudhari
Director (Fin.)
MOIL LIMITED, MOIL BHAWAN, 1-A, KATOL ROAD NAGPUR 440013 - Email: chaudhari@moil.nic.in

Shri. Dalip Singh
Joint Secretary, Govt. of India, Ministry of Steel,
Udyog Bhawan NEW DELHI – 110011

Shri. K.Shivaji, Prinicipal Secretary (Industries) Govt. of Maharashtra,
Industries, Energy & Labour Department
Mantralaya Mumbai 400 032

Dr. Subir Kr. Bhattacharyya
Retired CMD of IISCO
34/2 Mahim Halder Street, Kolkata - 700 026

Shri Vijay V Kale
Chartered Accountant
16A/20, WEA Main Ajmal Khan Road, Karol Bagh
New Delhi - 110 005

Smt. Madhu Vij, Professor
18/8, Kalkaji New Delhi - 110 019

Shri Sanjeeva Narayan
Practicing Chartered Accountant
A-33, Pandara Road, New Delhi- 110003

Shri Hem Chander Disodia
Retired IAS Officer
HNO 1681, Sector-21 Ward-29,
Panchkula, Haryana- 134112

Shri Bal Kishan Gupta
Retired IRS Officer, 139, Munirka Vihar
New Delhi- 110 067

Dr.D.D. Kaushik
Ex Director of ICSI
D-6/6123/5 , Vasant Kunj
New Delhi 110 070

11.1.4 Status of the Applicant : This is Government of India's Public Undertaking engaged in Mining and beneficiation of Manganese Ore.

11.1.5 Mineral or Minerals which the applicant intends to mine. : Manganese.

11.1.6 Name, address and Registration No. of Recognised (Key) persons Who prepared the Mining Plan : R.S.Verma, G.M.(Mines)
MOIL Limited
1A, MOIL Bhawan, Katol Road
Chaoni – Nagpur- 440 013
Tel: 0712-2806241
Reg. No. IBM/RQP/206/98/NGP
Validity 14.7.2020

11.1.7 Name & address of prospecting Agency: MOIL Limited
1A, MOIL Bhawan, Katol Road
Chaoni – Nagpur
Pin: 440013.

11.2.0 MINE DESCRIPTION:

11.2.1 GEOLOGY:

(a)Topography:

The lease area is undulating with highest level 90m high from general ground level of 315m A.M.S.L towards south and east. The highest level is towards north west. The hillock is having almost NW- SE trend

(b)General Geology:

Manganese ores are found in 3 types of provenances in India.

- (i) Metamorphosed Manganiferous sediments (Gondite and associated ore).
- (ii) Manganiferous sediments altered and intruded by igneous rocks (Kodurite and associated ore).
- (iii) Lateritic concentration derived from older rocks.(Lateritic ore).

The manganese ore belts of Maharashtra are associated with the metamorphosed manganiferous sediments of Sausar series. The ore zones are found mainly in the Gondite horizon at top and bottom of Munsar stage and in Munsar stage itself. The ore bodies in Munsar mine area are located mainly in Mansar stage of Sausar series.

The different stages of Sausar series and their lithological characteristics as also the location of Gondite and Managanese ore horizon in the stratigraphic sequence have been furnished in the following table.

S a u s a r	- Bichua stage - Predominantly metamorphosed calcareous sediments.
	- Junewani stage -Predominantly metamorphosed arenaceous sediments
	Gondite horizon (with thin and inpersistant bands of manganese ore)
	- Munsar stage - Metamorphosed argillaceous and manganiferous sediments with few manganese ore bodies in the schists.
S e a r i e s	- Lohangi stage - Predominantly metamorphosed calcareous arillaceous sediments
	- Sitasongi stage - Predominantly metamorphosed arenaceous - argillacaous sediments

The manganiferous horizons are observed to be preferentially associated with arenaceous-argillaceous materials rather than with calcareous masses of the Sausar series.

The structure of the Sausar series is very complex. The general strike of formation is NE-SW to E-W with zones of isoclinal folding with steep (50⁰-80⁰) dips. The main folds have been cross folded at a later stage, the cores of the cross fold, being some time occupied by granite of post folding age. There are numerous steeply dipping strike faults which have affected the rocks. The folds as well as the faults tend to be arranged in “En echelon” manner.

LOCAL GEOLOGY

The manganese ore of this area is associated with the rocks of Sausar series of Indian Stratigraphy. The ore bed in this area occurs in the Munsar formation of the Sausar rock belongs to the Dharwar metasediments and comprises of “various types of schists and gneisses, dolomitic marble” calcgranulites and Biotite gneiss is found at the base of the lower most sausar formation and it is involved in the movement with rocks of the same group. During this movement it might have developed some features which makes it difficult to identify. Moreover these rocks have undergone a high degree of metamorphism and the rocks are characteristically metamorphosed.

Till seventies occurrence of only one limb was reported but subsequent exploration by drilling revealed the existence of another limb occurring at a sub surface zone especially in Munsar extension K.L. pit section and Parsoda area due to folding and faulting of the strata.

The other limbs described above are not existing along with the surface exposed limbs. But in Main pit K.L. pit these limbs start parallelly where the surface limbs pinch. This phenomenon is due to small scale faulting during the semi plastic conditions of the ore body which stretched the ore zone into these parallel limbs separated by faults.

These faults are strike slip faults of low magnitude and are contemporary to the mineralisation process. These faults are marked on surface Geological plan.

LITHOLOGY

The hanging wall formation occurring to the north of the ore body consists of quartz - mica schist which changes to schistose gneiss due to textural composition and different mineralogical assemblages caused due to metamorphism. In some places the rock contains large bands of quartzite and thus it often looks like quartzitic schistose gneiss/ quartzose gneiss particularly between Ch. 2700 to 3650. The feldspar in the pink schistose gneiss is highly weathered which makes the entire formation soft and brittle. In underground section at a few places the rock has been deformed to such an extent that it looks like pegmatite.

Another formation i.e. pure and impure dolomitic limestone has been found to occur in patches along the western flank of main Munsar hill (north of 170' L adit from Ch.600 to Ch. 1200.)

The footwall rock to the south of the ore zone is muscovite hard; well foliated and comprises of less quartz & is muscovite sillimanite schist. The rock is marker horizon for ore zone all along the strike of the Munsar deposit. At places the rock looks like a sericitic schist (Ch. 2700 to Ch. 3600) in main hill underground section and this may be due to metamorphism.

Ore Horizon

The Manganese ore horizon in the area is of composite nature characterised by interbanding of manganiferous quartzite, gondite and Manganese ore. The ore horizon occur at stratigraphic contact with quartz-mica schists on the hanging wall side and muscovite - sillimanite schist on the footwall side. The Munsar ore body is isoclinally folded and plunging formation with high Northerly dip. The ore body is developed along entire strike length with detached lenticular pattern imparted by plunging crossfolds and faults. The lenticular ore body also exhibits pinching and swelling tendencies, both along strike and dip. As a result the thickness of the ore horizon varies widely from 3m to 35m with highest in Munsar pit between chainage 400 chainage to 800 and lowest in the eastern flank of the hill at chainage 2,700. Tight isoclinal folding also causes local variation of thickness of the body. Local repetition of the ore body due to folding is not uncommon particularly in K.L. pit area. The average thickness of ore horizon is 6m to 10m over major part of Munsar mine area.

The Mn-ore in Munsar mine area is finely crystalline to massive in nature. The ore forming minerals are Braunitite with Psilomelane and little Pyrolusite. Both hard and soft varieties of ore are present in the area. In the hard ore Braunitite granules are closely cemented by Psilomelane imparting a tough metallic characteristics. In the soft ore the amorphous and soft variety of impure Psilomelane with some Pyrolusite imparts an earthy look to the ore. The gangue is chiefly composed of Quartzose materials with some Mica, Clay, Apatite, Baryte etc. Mangano - phyllites are also present as gangue in ore from few areas.

Structure

The Munsar mine area is characterized by a complex structural set-up created by different phases of folding, faulting and Metamorphism. The ore body with associated metasediments were isoclinally tight folded and suffered metamorphic alteration. Subsequent deformation by superimposed folding produced Plunging cross folds. The tight folding also resulted in number of strike faults and fracture zones along the axial plane of folds. The Plunging cross folding and associated faulting were responsible for dislocation and separation of the ore body at intervals of about 180m to 260m along strike.

The strike and dip of the ore body show marked changes from place to place. In the western part, in Durga pit areas, the strike of the ore body is generally E-W with dip of 50° to 70° North. In the Munsar mine the strike is generally N 60°W to S 60° E with 70° to 85° dip towards NE. Local change of dip direction to SW due to twisting of ore horizon is not uncommon in this part. The strike changes further east in K.L. Pit area, to NW- SE and then the NNW -SSE with northerly dip of 50° to 65° dip towards east. The strike alignment of the ore zone over the Munsar area thus exhibits as accurate disposition with concavity towards south.

Few transverse to oblique faults with limited throw affected the ore body, particularly in western and central part.

(c) **Chemical constituents :-**

The ore body of the lease area has following chemical constituents.

		<i>Ferro Grade Ore</i>	<i>L.G.H.S.</i>
Mn	:	43 - 45 %	30 - 35 %
Silica	:	15 - 16 %	25 - 30 %
Phos	:	0.26 %	0.30 %
Fe	:	7.5 - 8.0 %	8.0 %

11.2.2 RESERVES :-
the Scheme of Mining.

For details refer chapter 3: reserves and para-3.3 & 3.4 of

11.2.3 MINING METHOD :-

Existing and proposed method of mining :- Refer chapter 5: Mining & para 5.1 and 5.2 of Scheme of Mining.

11.2.4 MINERAL BENEFICIATION :-

No beneficiation is done at mine site except manual sorting and sizing. A trammel of 50T/hr for mechanical screening of -10mm has been installed near the siding.

11.3.0 REVIEW OF IMPLEMENTATION OF SCHEME OF MINING INCLUDING FIVE YEARS PROGRESSIVE MINE CLOSURE PLAN UPTO THE FINAL CLOSURE OF MINE:

The Mining plan was earlier approved on 06.05.03 under Rule-24 (A) of M.C.R. 1960 for renewal of Mining lease over an area of 108.93 Hects. vide letter No.-NGP/Mn/MPLN-257/NGP and for 25.15 hecets vide letter No.-NGP/Mn/MPLN-257(A)/NGP. Thereafter, the a composite 1st Scheme of Mining for both the mining leases along with PMCP has been approved up to 2011-12 vide letter no. NGP/Mn/MPLN-257/NGP dated 14.12.2010

11.4.0 CLOSURE PLAN:

11.4.1 Mined out land :-

(a) Proposal and manner of reclamation and rehabilitation of mined out land :-

Mining effect environment in various ways including depletion of land cover, vegetation, removal of soil, change of land scape,deposition of the solid waste product thus causing imbalance in the land scape and increasing air, water & soil pollution. There is no proposal of reclamation or rehabilitation of the mined out land during the progressive mine closure period within the ML area. How ever Durga Pit towards south west in adjoining ML area is proposed to be backfilled by 50000 cum of OB and waste. About 10,000 sqm excavated area will be backfilled upto ground level. The K.L. Pit spread in 5 hecets. area will be utilised for storing water during the PMCP period within the ML area.

11.4.2 Water quality management:

(a) Surface and ground water body :-

No perennial surface water source such as river or nalla exists within the core or nearby buffer zone and hence no diversion will be required. Seasonal water courses exist towards south of the applied area.

Ground water is the principal source of water for consumption in this region. Dug well and tube well constitute a regular source of potable water for the local people. There are total 13 no of open wells and 10 tube wells in the lease area. There is a water supply system to the mine residential quarter through a storage tank near mine office.

(b) Hydrological study :-

The behaviour of ground water table has been noticed to be uniform. The accumulated water from the opencast Durga pit and Main pit are pumped out so as to avoid seepage in underground. Sumps of adequate capacity have been made to drain out water. The mining activity being underground, the water table is already intersected. Hydro-geological survey of the area has been carried out. Ground water fluctuation area is 1 m to 3.5 meter between the pre and post Monsoon season. The Ground water development in the area is 22%. The mine water will be utilized for sand stowing operations & sprinkling on roads etc. (refer point 2, page1 of Environmental clearance). No erosion, sedimentation & siltation due to mine working is expected. No water treatment will be required. There is no toxic contamination in the ore and overburden. Hence contamination of any nature is not expected for surface or any ground water source. It is proposed to construction of Parapet Walls/Retaining at toe of dumps to avoid siltation towards sloping side of the ML area. Water balance chart is appended is annexure -12.

The Munsar Mine has opencast as well as U/G workings. There is separate arrangement for drainage of both workings. The rain water is carried away from mine by drains.

Drainage in old opencast workings: The accumulated water from Durga pit and main pit will be pumped out so as to avoid seepage in U/G. Two 50 HP pumps one each in either pits will be provided for pumping.

Drainage of under ground water : In under ground 70' level, two water pumps having capacity 50 HP each with yielding capacity 1350 ltrs/minutes each are installed to cope up in rush and seepage water. There is one sump having capacity of 15,55,000 ltrs which is situated between Chainage 650 and 850. Above mentioned pumps will drain out water which accumulated in the sump.

In normal days accumulation of seepage water is 30,000 ltrs. per day where as in monsoon is goes to about 3 lac ltrs per day.

In addition to this there is also a small sump at chainage 200 near incline pit bottom. This has capacity of 35000 ltrs. Two 15 HP each pumps are connected to this sump.

With above all sumps and sump capacities arrangement, it is ensured that even in case of power failure and break down of all the pumps at a time , there is sump capacity for holding water accumulation for 2 to 3 days.

Make	No.	Head (in m)	Yield LPM.	Movie Power	H.P.	Location
Kirloskar	1	45	500	Electricity	15	70' level
U/GKirloskar	1	45	900	Electricity	20	70' level
U/GMax Flow	1	100	1350	Electricity	50	70' level
U/GMax Flow	1	100	1350	Electricity	50	70' level U/G

The ground water table R.L. varies from 308m R.L. in Parsoda pit to 324.35m R.L. in main hill section.

(c) Acid mine drainage :-

Acid mine drainage is produced wherever a mine of any type, impermeable formations interacts with the water table , aquifer, perched water body or where surface water finds its way into a mine in terrains where sulphides (Particularly pyrites) are present in the ore or country rock. Among objectionable features of the acid mine drainage are low pit and high levels of sulphides, iron and total dissolved solid. These deplete the oxygen levels in water, increase the toxicity by rendering heavy metals soluble, and create corrosion problems. There is no sulphide in the country rock, hence problems of acid mine drainage is irrelevant in this mine.

11.4.3 Air quality management :-

The air quality in the lease area as well as in the near by buffer zone is well below the permissible limits.

	Promulgated limit	Present in the applied area
SPM	500 $\mu\text{g} / \text{m}^3$	66-233 $\mu\text{g} / \text{m}^3$
SO ₂	120 $\mu\text{g} / \text{m}^3$	10-30 $\mu\text{g} / \text{m}^3$
NOx	120 $\mu\text{g} / \text{m}^3$	3-27 $\mu\text{g} / \text{m}^3$

The air is polluted due to generation of dust by plying of vehicles, drilling, blasting, loading of OB and ore. The dust generated due to plying of vehicles will be nullified by sprinkling of water on approach road.

11.4.4 Waste management:

(a) **Type quality and quantity of OB and mineral rejects:**

Given in Scheme of Mining.

(b) **Disposal & utilisation of O.B. and mine waste :-**

Simultaneous backfilling of OB/waste will be done in the Durga pit situated in adjoining ML area towards south west. This will be backfilled upto ground level. The height will be upto 10m. The manner of loading and unloading will be by mechanical means. Leveling of backfilled area will be done by scraper and leveler. Afforestation will be done on it in future.

(c) **Protective measures :-**

Construction of Parapet Walls/bund is proposed at toe of dumps to avoid siltation towards sloping side of the ML area due to dumps. No toxic and hazardous element is present in the OB as well as in the ore body. Hence no toxic contamination is expected and protective measure is required. The non-active sides of the dump will be vegetated and stabilised by fast growing grasses.

11.4.5 TOP SOIL MANAGEMENT :- No top soil generation is proposed.

11.4.6 TAILING DAM MANAGEMENT :-

No wet or chemical mineral beneficiation is carried out in the lease area. Hence no tailing will be created.

11.4.7 INFRASTRUCTURE :-

(a) Existence and utilisation:

The lease area falls in Ramtek Tehsil of Nagpur Distt. of Maharashtra State. The lease area is about 45 kms from Nagpur. It is 40 Kms on N.H. 7 towards Jabalpur upto Munsar village and then 5 kms upto the mine site on Ramtek State Highway.

There are infrastructural facilities such as workshop, mine office, store, training center & canteen etc. Amenities such as toilets, rest shelters, creche and urinals etc. as per Mines Act are also present. Railway siding for loading of ore, Building & structures, water treatment plant, transport and water supply is present in the lease area. No aerial rope way & conveyor belt is present.

(b) Measures of precaution and maintenance :-

The above mentioned infrastructural facilities available in the lease area for mining operations and in compliance of various Rules and Acts will be maintained. All precautions will be taken to safe guard it. The above facilities are beyond mining limit.

11.4.8 DISPOSAL OF MINING MACHINERY :-

No disposal of mining machinery is envisaged in the PMCP period.

11.4.9 SAFETY AND SECURITY :-

The non-active sides of the working quarry will be suitably fenced and access to surface opening will be prohibited. The mine will be suitably guarded and any approach to mine will be restricted and prohibited. It is also proposed to installed CCTV cameras in the sensitive area.

11.4.10 DISASTER MANAGEMENT AND RISK ASSESSMENT :-

The lease area does not come under active seismic zone. Land slide, subsidence is not expected. No river is near the lease area and hence flood is not expected. In case of eventuality, first aid will be given by the competent authority initially to the injured person. The competent person / Mines manager or Mining engg. will give notice of accident as per Rule-23 of Mines Act-1952. The persons / competent authorities named above will be responsible for co-ordinations between management and Distt. authorities / DGMS etc. Regarding general safety as per Rule-181 of MMR 1961,

“No person shall negligently or will fully do anything likely to endanger life or limb in the mine, or negligently or will fully omit to do anything necessary for the safety of the mine or of the persons employed there in”. The workers will be provided with protective foot wear and safety helmets.

11.4.11 CARE & MAINTENANCE DURING TEMPORARY DISCONTINUANCE:-

The quarry faces at top will be suitably fenced or parapet wall will be made in order to avoid any cattle fall or accident in the mines during the course of temporary discontinuance. The mine has been properly guarded by deploying security guards.

11.5.0 ECONOMIC REPERCUSSIONS OF CLOSURE OF MINE AND MANPOWER RETRENCHMENTS :-

(i) Mine closure is an important activity in the community development for surrounding area in general and for mining site in particular. Mining ceases as a result of exhaustion of mineral reserves, uneconomical mining or any technical or legal reasons.

These aspects are generally relevant at the time of final closure of mine or in case of mine where it is proposed to reduce the manpower in a phased manner.

This will be a working mine and no closure of mine is expected in PMCP period and as such is not applicable

(ii) No man power retrenchment will be done during the ensuing Progressive mine closure plan period. No socio-economic repercussions are envisaged as such. On the other hand due to employment given to local residents, socio-economic awareness & upliftment has taken place. Also the poverty has reduced. As stated earlier the mine will not be closed during the ensuing period.

11.6.0 Time scheduling for Reclamation and Rehabilitation :-

No reclamation & rehabilitation has been proposed during PMCP period. As mentioned earlier, the Durga Pit in adjoining ML area will be backfilled up to ground level during the PMCP period. The area to be backfilled will be about 1.7 hact. and quantity to be used will be around 50000 cum of OB and waste. From

year 2012-13, the reclamation of Durga pit will be begin which lies with in the ML area of adjacent lease of 5.74 ha. The K.L. pit existing in both 108.63 as well as 25.15 hec area and Main pit will be rehabilitated by way of conversion into water reservoir. The existing mineralised dumps will be re-handled to recover the ore while waste to be backfilled as stated above. Parapet wall/ bund will be prepared at toe of dump. The dead dumps will be stabilised by vegetating with fast growing grasses and sloping at angle of repose. Plantation in 1.00 hec area per year with tree density of 2500 trees per hec will be carried out in north-west boundary. Fencing of old pits will be done. All the above measure will be implemented in 108.63 hec area. No measures are proposed in 25 hec ML area during the PMCP period.

11.7.0 Reclamation & Rehabilitation Cost :-

The cost envisaged based on the activities required for implementing the protective and rehabilitation measures including their maintenance and environment monitoring is given in table.

ENVIRONMENTAL MONITORING-

Monitoring schedule of environmental components like Air, Water and Ground Vibration (due to blasting) will be carried out as per norms laid down by EAC in Environment Clearance by MOEF. Following stations have been selected for monitoring the environmental components:

Air Pollution- Near Mine Office, quarry edge, drilling site, close to loading point, haulage road and near public places.

Ground Vibration - Within 250 to 300 meters of blasting site, At the nearest human settlement.

Noise Pollution - Near the operating machineries, Noise produced by mine blast at near by village/ town ship or public place or road. Water Pollution-At discharge point into water course or inland water body of following - Quarry Sump, Workshop effluent, Town ship/sewage/ Office/Surface runoff from dumps.

Soil quality Survey - One sample from different land use areas avoiding rainy season

Air Pollution Monitoring-

Ambient air quality monitoring will be carried out as per Central Pollution Control Board's guidelines by the following methods:

1. Particulate Matter (PM_{10} & $PM_{2.5}$) : Gravimetric
2. Sulphur Dioxide (SO_2) : Improved West & Gaeke method
3. Nitrogen Oxides (NO_x) : Modified Jacob & Hochheiser
(Na- Arsenite)

Noise Level Monitoring

Monitoring of noise level at mine site and at work environment will be carried out as suggested by concerned Regional Officer of Maharashtra State Pollution Control Board.

Air & Water analysis report is enclosed as Annexure.

11.8.0 Financial Assurance of 108.93 ha. ML area: - The FA has been submitted in form of Bank Guarantee as per Rule 23 F of MCDR 1988 of Rs. 16,27,000 /- for period upto 31.03.2012 as per details below @ Rs. 25000 /- per hect. for area put to use for mining for allied activities.(67.60 hect. x 25000 /- per hect. = Rs. 16,90,000) additional Rs 63000 along with present FA will be extended up to 31.3.2017 after the approval.

S.No.	Head	Area put to use at start of mining plan / Mining Scheme	Additional area requirement during plan / scheme period	Total	Area reclaimed & rehabilitated	Net area for financial assurance
(a)	(b)	(c)	(d)	(c+d)=e	(f)	(e - f =g)
1	Area excavated	8.0	–	8.0	–	8.0
2	Storage for top soil	–	–	–	–	–
3	Overburden dumps	26.25	2.055	28.305	–	28.305
4	Mineral storage	4	–	4	–	4
5	Infrastructure I Workshop II ANFO Mixing shed III Crusher etc.	15	–	15	–	15
6	Roads	2.0	–	2.0	–	2.0
7	Railways	–	–	–	–	–
8	Green belts	2.0	4.50	6.50	–	6.50
9	Tailing ponds	–	–	–	–	–
10	Effluent Treatment Plant	–	–	–	–	–
11	Mineral separation plant	–	–	–	–	–
12	Township area	–	–	–	–	–
13	Others (specify) I. Site services	3.30	–	3.30	–	3.30
	Total	60.55	4.50	67.60	–	67.60

11.8.0 Financial Assurance of 25.15 ha. ML area: - The amount as per details below @ Rs. 25000 /- per hect. for area put to use for mining for allied activities. (5.40 hect. x 25000 /- per hect. = Rs. 1, 35,000/-) is less than minimum amount. Hence, the FA has been submitted in form of Bank Guarantee as per Rule 23 F of MCDR 1988 of Rs. 2,00,000 /- (minimum amount) for period upto 31.03.2012. The same will be extended up to 31.3. 2017 after the approval.

S.No.	Head	Area put to use at start of mining plan / Mining Scheme	Additional area requirement during plan / scheme period	Total	Area reclaimed & rehabilitated	Net area for financial assurance
(a)	(b)	(c)	(d)	(c+d)=e	(f)	(e - f =g)
1	Area excavated	2.65	—	2.65	—	2.65
2	Storage for top soil	—	—	—	—	—
3	Overburden dumps	2.75	—	2.75	—	2.75
4	Mineral storage	—	—	—	—	—
5	Infrastructure I Workshop II ANFO Mixing shed III Crusher etc.	—	—	—	—	—
6	Roads	—	—	—	—	—
7	Railways	—	—	—	—	—
8	Green belts	—	—	—	—	—
9	Tailing ponds	—	—	—	—	—
10	Effluent Treatment Plant	—	—	—	—	—
11	Mineral separation plant	—	—	—	—	—
12	Township area	—	—	—	—	—
13	Others (specify) I. Site services	—	—	—	—	—
	Total	5.40	—	5.40	—	5.40

	(vii) Afforestation on dumps	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	(viii) Other (Please specify)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
(C) REHABILITATION OF BARREN AREA WITHIN LEASE	(i) Afforestation (Green belt building)	--	--	--	2.25	2.25	--	--	--	5625	2625	--	--	--	5.0	5.0	Boundary
	(ii) Other (Please specify)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
(D) ENVIRO NMENTA L MONITO RING (Core zone & Buffer Zone separately)	(i) Ambient Air Quality	--	--	--	--	--	--	--	--	--	--	--	--	--	1.0	1.0	Core Zone
	(ii) Water Quality	--	--	--	--	--	--	--	--	--	--	--	--	--	1.0	1.0	Core Zone
	(iii) Noise Level Survey	--	--	--	--	--	--	--	--	--	--	--	--	--	0.05	0.05	Core Zone
	(iv) Ground Vibration	--	--	--	--	--	--	--	--	--	--	--	--	--	0.50	0.50	Core Zone
	(v) Other (Occupational Health)	--	--	--	--	--	--	--	--	--	--	--	--	--	1.0	1.0	--
	Total	--	--	--	2.25	2.25	--	--	--	--	--	--	--	--	20.05	20.05	--