SCHEME OF MINING

(UNDER RULE 12 OF MCDR, 1988)

WITH

PROGRESSIVE MINE CLOSURE PLAN

(UNDER RULE 23-B OF MCDR, 1988)

OF

GURUBEDA IRON ORE MINE

ML - AREA OVER 49.776 HECTOR 122.996 ACRES FOR IRON ORE IN VILLAGE GURUBEDA UNDER JODA P.S. OF KEONJHAR DISTRICT, ODISHA.

FOR PERIOD OF 2013 – 2014 TO 2017 - 2018

STATUS OF THE LEASE AREA

Category		Non-Forest Land	Date of lease execution	Date of lease Expiry	Renewal Applied
A-OTFM	40Ha.	0.736 Ha.	22.09.1972	21.09.2002	03.07.2001

Lesee

S S. C. Padhee

Prepared by

CHANDRABHANU DAS

RQP/BBS/052/2004/A

GEO CONSULTANTS Pvt. Ltd.

Bhubaneswar

SCHEME OF MINING

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ML AREA OVER 49.776 HECT OR 122.996 ACRES FOR IRON ORE IN VILLAGE GURUBEDA UNDER JODA P.S. OF KEONJHAR DISTRICT, ODISHA.

FOR THE PERIOD OF 2013 – 2014 TO 2017 - 2018

STATUS OF THE LEASE AREA

Category	Forest land	Non-Forest Land	Date of lease execution	Date of lease Expiry	Renewal Applied
A-OTFM	49.040Ha.	0.736 Ha.	22.09.1972	21.09.2002	03.07.2001

Lesee

Sri S. C. Padhee

Prepared by

CHANDRABHANU DAS

RQP/BBS/052/2004/A

GEO CONSULTANTS Pvt. Ltd.

Bhubaneswar

S. C. PADHEE
MINES OWNER

Head Office:
BALIBANDHA- 768001
SAMBALPUR
Tel: 0663-2401041

P.O.: JODA-758034
DIST: KEONJHAR (ORISSA)
Tel: 06767-272275(Residence)
- 272394(

UNDERTAKING - I

I, hereby undertake that, all the measures proposed in the progressive mine closure plan chapter of the Scheme of Mining of Gurubeda iron ore Mines of Sri S C Padhee over an area of 49.776 hect or 122.996 acres in village Gurubeda of Keonjhar district, Odisha, will be implemented by me in a time bound manner as proposed.

Signature of the Lessee

For Sri S C Padhee

Sushil Kumar Padhi

Sushil Kumar Padhi

(Legal Heir & Power of Attorney Holder)

Date: 16-06-13

Place: Joda

S. C. PÁDHEE
MINES OWNER

Head Office:
GAJBANDHA- 768001
SAMBALPUR
Tel: 0663-2408041

P.O.: JODA-758034
DIST: KEONJHAR (ORISSA)
Tel: 06767-272275(Residence)
- 272394(

CERTIFICATE

This is to certify that "The Provisions of Mines Act, Rules and Regulations made there under have been observed in the Scheme of Mining of Gurubeda iron ore Mines of Sri S C Padhee over an area of 49.776 hect or 122.996 acres in village Gurubeda of Keonjhar district, Odisha and where specific permissions are required, the applicant will approach the D.G.M.S. Further, standards prescribed by DGMS in respect of Miners Health will be strictly implemented".

Signature of the Lessee

For Sri S C Padhee

Sunil Kumar Padhi

Date: 16.06.13

Place: Joda

Susil Kumar Padhi

(Legal Heir& Power of Attorney Holder)

CERTIFICATE - I

This is to certify that the provisions of MCDR, 1988 and MCR 1960 in respect of the Scheme of Mining of Gurubeda Iron ore Mines of Sri S C Padhee over an area of 49.776 hect or 122.996 acres in village Gurubeda of Keonjhar district, Odisha, are strictly observed in the scheme of mining and wherever specific permissions are required, the applicant will approach the concerned authorities of the Indian Bureau Of Mines for granting the permission.

Place : Bhubaneswar
Date : 15/06/15

Chandrabhanu Das

RQP/BBS/052/2004/A

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INTRODUCTION

The ML area of Guubeda Iron Ore Mines is featured in Survey of India Toposheet No. 73G/5 and extends over an area of 49.776 Ha in village Gurubeda under Barabil Tahasil of Champua sub-division of Keonjhar dist. Odisha. The lease was executed on 22.09.72 for 20 years and subsequently renewed for 10 years and expired on 21.09.2002. Renewal application was filled by the Lessee, S.C. Padhee, on 03.07.2001 for a period of 20 years. The State Govt. has not communicated the renewal till date and as such the renewal is pending and is deemed to be extended as per provision of Rule 24 A (6) of MCR 1960.

Mining plan in respect of the applied renewal area was approved by IBM. Modification to the above mining plan was also approved by Controller of Mines (CZ) Nagpur vide letter no. MPM/OTF-MECH /05 /ORI /BHU/ 2007-08/940 dated 05.09.2007. Subsequently the scheme of mining for the period from 2008-09 to 2012-13 has been approved by Regional Controller of Mines, IBM, BBSR vide letter no.MS/OTF-MECH/50-ORI/ BHU/ 2008-09 dated 20.5.2009.

Presently scheme of mining is being prepared for the coming five years i.e 2013-14 to 2017-18.

Primarily there was no forest land within the lease area as per the old settlement record. Subsequently 49.040 ha out of the total lease area was considered as forest land as per DLC report of Keonjhar dist. Forest Diversion Proposal for 49.040 ha has already been submitted to forest authorities which is under process. Balance 0.736 ha (49.776ha - 49.040 ha) is non-forest, govt. and private land.

The lessee has following two other mining leases within the state of Odisha.

i) Bansapani iron ore mine over 37.868 hectares in Keonjhar district and

ii) Jalangabira limestone and dolomite mines over 68.708 ha in Sundargarh district.

अनुमोदित
APPROVED

क्षेत्रीय खान नियंत्रक
REGIONAL CONTROLLER OF MINES
भारतीय खान ब्यूरो
INDIAN BUREAU OF MINES
भुवनेश्वर/BHUBANESWAR

The Longitude & Latitude of the boundary Pillars are given below :

PL NO.	LONGITUDE	LATITUDE
1	85°26'37.98"	21°58'14.52"
2	85°26'37.92"	21°58'12.97"
4	85°26'37.77"	21°58'8.26"
5	85°26'37.71"	21°58'5.83"
6	85°26'37.57"	21°58'2.24"
7	85°26'37.48"	21°57'59.42"
8	85°26'39.27"	21°57'59.36"
9	85°26'42.04"	21°57'59.26"
10	85°26'43.55"	21°57'59.23"
11	85°26'45.29"	21°57'59.12"
12	85°26'50.18"	21°57'58.89"
13	85°26'58.38"	21°57'58.82"
14	85°27'9.18"	21°57'58.29"
15	85°27'12.84"	21°58'1.97"
16	85°27'15.41"	21°58'4.46"
17	85°27'17.86"	21°58'6.80"
18	85°27'20.82"	21°58'9.66"
19	85°27'22.75"	21°58'11.57"
20	85°27'20.94"	21°58'11.69"
21	85°27'14.94"	21°58'12.08"
22	85°27'8.48"	21°58'12.53"
23	85°27'1.86"	21°58'12.96"
24	85°26'56.70"	21°58'13.31"
25	85°26'53.89"	21°58'13.54"
26	85°26'52.06"	21°58'13.66"
27	85°26'50.95"	21°58'13.82"
28	85°26'46.49"	21°58'13.92"
29	85°26'41.00"	21°58'14.31"
30	85°26'38.85"	21°58'14.45"

CHAPTER-I

1.0 REVIEW OF THE SCHEME OF MINING

1.1 NAME OF THE MINE

Gurubeda Iron ore Mines covers an area 49.776 Hect. in the village Gurubeda under Barbil Tahasil of Champua Sub-division of Keonjhar District, Odisha.

1.2 PARTICULARS OF THE APPROVED SCHEME OF MINING

The scheme of mining was prepared by Chandrabhanu Das Regn. No. RQP/BBS/052/2004/A of Geo consultants Pvt. Ltd. The said scheme of mining was submitted in compliance to Rule 12 of MCDR, 1988 and was approved by the Controller of Mines (CZ), India Bureau of Mines, vide letter no. MS/OIF.MECH/50-ORI/BHU/2008-09 dated the 20.05.2009(Ref to Annexure-I). The approved scheme of mining covered the period of FIVE years from 2008-09 to 2012-13.

1.3 DATE OF COMMENCEMENT OF MINING OPERATION

Mining operations within the area commenced on 22.09.1972 and continued till September 2009 from which it has been temporarily closed due to want of Forest & Environment clearances. The lease deed for the first term was executed on 22.09.1972 for a period of twenty years and renewed for a further period of ten years. The first lease term expired on 21.09.2002 and the application for the second renewal was filed on 03.07.2001 for a period of twenty years. As the state Govt. has not communicated anything till date regarding the renewal, the lease is deemed to be extended as per the provision of Rule 24A (6) of MCR 1960.

1.4 (A) DEFICIENCIES, IF ANY, THAT EXISTED IN THE APPROVED MINING SCHEME OF MINING TO BE TAKEN NOTE OF AND RECTIFIED BY INCORPORATING SUITABLE PROPOSALS FOR IMPLIMANTATION IN THE SCHEME OF MINING– No

(B) REVIEW OF COMPLIANCE POSITION OF SALIENT FEATURES OF THE MINING PLAN AND CONDITIONS IMPOSED, IF ANY.

The scheme of mining was approved for the period of five years from 2008-09 to 2012-13. The following commitments were made in the mining plan and the actual achievements during the period is as follows.

(i) EXPLORATION:

Year	Target	Achievement	Shortfall/excess & reasons for deviation
2008-2009	5 nos. of boreholes were proposed.	Nil	The mine is temporarily closed since Sept. 2009
2009-2010	5 nos. of boreholes were proposed.	Nil	-do-
2010-2011	5 nos. of boreholes were proposed.	Nil	-do-
2011-2012	6 nos. of boreholes were proposed.	Nil	-do-
2012-2013	7 nos. of boreholes were proposed.	Nil	-do-

(ii) MINE DEVELOPMENT.

The mining of Gurubeda Iron Mines is done by opencast mining method. The focus was given in the scheme of mining to develop the Main Quarry. As the mine was active, the required infrastructures like office, road, first-aid station, rest shelter are present within the lease area. The mine has been operated by semi-mechanised method with single shift basis. The following table depicts the year-wise achievement of production of iron ore.

YEAR	Production Target (MT)	Production Achievement (MT)	Shortfall/ Excess & reasons for deviation
2008-2009	401016	79906	Due to labour problem.
2009-2010	400428	24700	Due to labour problem.
2010-2011	400869	Nil	Mining stopped due to want of forest & Env clearances
2011-2012	400234.8	Nil	
2012-2013	400554	Nil	

(iii) WASTE MANAGEMENT

Year	Target (m^3)	Achievement (m^3)	Shortfall/excess & reasons for deviation
2008-2009	122214	34660	Due to less production
2009-2010	185785	2800	
2010-2011	133570	Nil	No production of ore
2011-2012	121976	Nil	
2012-2013	122074	Nil	

iv) Afforestation:

Year	Target (Nos)	Achievement	Shortfall/excess & reasons for deviation
2008-2009	640	Nil	The mine is temporarily closed from Sept 2009
2009-2010	640	-do-	
2010-2011	640	-do-	
2011-2012	640	-do-	
2012-2013	640	-do-	

(v) MANAGEMENT OF ENVIRONMENT

a) Dust: The mine was proposed to be worked by semi mechanised. The generation of dust is due to blasting and deploying of machineries like trucks, hydraulic excavator and jack hammer etc. Regular sprinkling of water has been proposed in the mines road. During the scheme period regular sprinkling of water has been done to suppress the dust. Hence, the effect on air pollution was negligible.

b) Vibration and noise: Special precautions like control blasting, use of delay detonators, use of ear plugs by drivers have been proposed and have been regulated during the operational period.

c) Effect on Air and Water: No noticeable adverse impact has been observed in case of air and water - both underground and surface. In fact atmospheric fresh air is available within the area today.

d) Proposal for reclamation of land affected by mining :

Since all the quarries were in mineralised zone and resource was not exhausted completely in the scheme period, no proposal was envisaged.

1.4 c) REVIEW OF COMPLIANCE POSITION OF CONDITIONS & STIPULATIONS IMPOSED, IF ANY WHILE APPROVING MINING PLAN.

No such

1.4 d) REVIEW OF COMPLIANCE OF VIOLATIONS POINTED OUT AFTER INSPECTION MADE UNDER 1988 DURING LAST 5 YEARS.

Ref: Violations were pointed out by IBM through their letters No. ORI/IRON/KJR/MCDR17/BBS dt 03.09.10 and Letter No. H/11021/1/BBS 2011/2468 dated 16/19.12.11. These have been duly complied by the lessee. (Copies enclosed as Annexure - VIII).

1.4 e) ANY OTHER POINTS REQUIRING ATTENTION IN THE INTEREST OF PROPER MINE DESIGN, DEVELOPMENT & CONSERVATION & ECOLOGY OF THE AREA.

No such.

CHAPTER- II

2.0 PROPOSAL UNDER SCHEME OF MINING FOR THE NEXT FIVE YEARS (2013-14 to 2017 -18)

2.1 NAME AND ADDRESS OF THE APPLICANT

SRI S. C. PADHEE
At / PO - Joda
Dist - Keonjhar
Pin - 758034
Phone - (06767) 272394 (O)
(06767) 272275 (R)

Original owner of the leasehold was Sri S C Padhee. After demise of S C padhee in May 2007, Mr Sushil Kumar Padhee, Mr Prasant Kumar Padhee (both sons of Late S C Padhee), Ms Sujata Panda & Ms Mamata Nanda (both daughters of Late S C Padhee) were declared by the Tahasildar, Sambalpur Sadar, as legal heirs of Late S C Padhee. Then through the General Power of Attorney executed on 29.05.2007, Sri Sushil Kumar Padhee has been declared as the Power of Attorney Holder (Copy enclosed as **Annexure VI**).

2.2 NAME AND ADDRESS, REGISTRATION NO. OF THE RECOGNISED PERSON WHO PREPARED THE SCHEME

Name: CHANDRABHANU DAS, RQP

Address: Geo Consultants Pvt. Ltd.
290 A, Bomikhal, In front of Ekamra Talkies
Cuttack Road, Bhubaneswar -751010
Phone/Fax – 0674 2575702
9437019019(m)
Regn. No. – RQP/ BBS/052/2004/A
Valid up to - 30.08.2014

2.3 MINERALS TO BE MINED

The lessee is mining iron ore within the lease area.

2.4 AREA AND DATE OF EXPIRY OF LEASE

Gurubeda Iron ore mines covers an area 49.776 ha.cl. in the [illegible] Gurubeda under Barbil Tahasil of Champua Sub-division of Keonjhar District, Odisha.

The lease deed for the first term was executed on 22.09.1972 for a period of twenty years and further renewed for the ten years. The lease term expired on 21.09.2002 and the application for third renewal was filed on 03.07.2001 for a period of twenty years. As the state Govt. has not communicated anything till date regarding the renewal, the lease is deemed to be extended as per the provision of rule 24A (6) of MCR 1960.

2.5 DATE OF EXPIRY OF FIVE YEARS PERIOD FOR WHICH APPROVED ON LAST OCCASION

The scheme of mining was prepared by Sri Chandrabhanu Das, Consulting Geologist with Regn. No.RQP/BBS/052/2004/A, the scheme of mining was submitted in compliance to Rule 12 of MCDR, 1988 was approved by India Bureau of Mines, vide letter no. MS/OTF.MECH/50-ORI/BHU/2008-09 dated the 20.05.2009.The approved scheme of mining is valid for the period from 2008-09 to 2012-13.

The present scheme of mining is valid for the period from 2013-14 to 2017-18.

CHAPTER-III

3.0 RESERVES

3.1 RESERVES ESTABLISHED CATEGORY-WISE (PROVED, PROBABLE AND POSSIBLE) RESERVE ESTIMATED IN THE EARLIER APPROVED MINING SCHEME WITH GRADE

As per the last approved scheme of mining the resource of iron ore of the total lease hold are as follows.

Reserve Category	Geological Reserve(MT)	Mineable Reserve(MT)
Proved	5158473.6	4804296
Probable	592200	570528
Possible	2026046.4	1472083
Total	**7776720**	**6846907**

3.2 DEPLETION OF RESERVE

2008-2009 – 92,000 MT
2009-2010 (Up to Sep) –15,850 MT

3.3 ADDITIONAL RESERVES ESTABLISHED CATEGORYWISE (WITH BASIS AND PARAMETERS CONSIDERED)

In the year 2008-09 the lease area has been explored by 26 nos of boreholes. The notice to IBM regarding boreholes in form-J under Rule -47 of MCDR 1988 has been submitted by lessee (Annexure - II). Descriptive litho log in form –K has also been submitted to IBM (Annexure - III). During drilling, samples in form of drill cuts coming out of the holes due to air pressure were collected from every 3 meters. The samples comprised of the mineralised portion excluding associated intermediate wastes which have been analysed.

In the last approved scheme of mining reserve had been estimated according to the borehole log. So in the ensuing scheme of mining, an attempt has been made for more authentication of reserve by assessing the reserve grade-wise.

For the purpose, grade of iron ore has been categorized into five types such as 45-50%, 50-55%,55-58%,58-60%,60-62% and 62-65%.

3.3.1 PARAMETERS OF RESERVE ESTIMATION

i) Cut-off grade
ii) Influence
iii) Bulk density
iv) Recovery factor

Cut-off grade

The cut off grade of any ore deposit is directly related to the marketability of the ore. The cut-off grade for the iron has been taken as 58% for calculation of reserve. Iron ore containing 45% to 58% Fe has been categorized as sub-grade.

Influence

The influence of the various sections has been considered as the half distance between two adjacent sections & varies for different sections.

Bulk density

The average bulk density has been calculated to be 3.5 MT/m^3

Recovery factor

As the mine is temporarily closed since September 2009, the recovery factor of iron ore has been calculated based on the figures submitted in the annual returns. There is no mention about ROM in the annual returns of 2001-02 to 2004-05. Also there is a mistake in the ROM figure mentioned in the annual return of 2009-10. Therefore, ROM figures of these years have been supplied by the lessee for the calculation of recovery factor. The figures taken for calculation are as below:

Year	Production of ROM	Production of grade-wise reserve
2001-02	43100	17910
02-03	15454	5440
03-04	53520	19200
04-05	68281	30172.78
05-06	116000	50400
06-07	168000	80550
07-08	112500	106867.3
08-09	90800	79906.4
09-10	27221	24700
Total	694876	415146.48

Therefore,

ROM production= 694876MT

Grade-wise production of saleable ore= 415146.48MT

Recovery Factor of saleable ore= 415146.48/694876= 59.74%

Therefore, the Recovery Factor of saleable ore i.e. >58% Fe has been considered as 60%.

During the above mentioned period considered for calculation, the threshold value of iron ore was much higher than the present threshold value i.e. >45% Fe. As there is no account of sub-grade ore in the previous annual returns, and as evident from the exploratory boreholes 33m of sub-grade ore has been encountered out of a total of 168m of iron ore, therefore %of sub-grade ore comes to be 33 x 100/168 = 19.64 or 20% . Therefore, total ore of +45%Fe occurs in the ratio of 4:1 i.e saleable ore : sub-grade ore. As saleable ore is 60% of RoM as calculated from the annual returns, therefore percentage of sub-grade shall be 15% of RoM. Therefore the recovery factor considered for calculation of reserve is 75% of ROM. Break-up of the ROM is as below:

Iron ore -75% (Out of which 80% is saleable and rest 20% is sub-grade ore)

IB- 25%

3.3.2 METHOD OF RESERVE ESTIMATION

Ore zone of this leasehold is heavily brecciated. The float ore mining of the [illegible] portion has almost been completed by the lessee. Based upon quarry exposures and borehole data the reserve has been estimated by cross sectional area method. It consists of preparing cross sections at regular intervals oriented approximately at right angle to the regional trend of geological formations. At the same time, quarry excavation and other surface features are taken in to consideration to prepare the sections across them to represent the benches of quarries. The ore zone is computed for each section by means of graphical method. The area is converted in to volume by multiplying the same with the length of influence of the particular section (which is the half distance between two adjacent sections on either side). The tonnage of each strip around the section is obtained as a product of volume and bulk density.

Geological sections have been prepared where sub-surface data is available. Iron ore zone has been plotted clearly in these sections.

Categorisation of reserve has been made as below:

Proved (G1): Ore body as revealed in boreholes and working quarries has been put under proved category. Longitudinally a maximum distance of 50m on either side of the proved ore body has been categorized as G1 reserve.

Probable (G2): A longitudinal zone of 50 m on either side of the G1 zone has been considered as G2 zone.

Possible (G3): The ore zone has been longitudinally extended 25m on either side beyond the G2 zone which has been categorized as G3 zone.

A simple formula is utilized to calculate the ore reserve which is as follows:

G = C.D.I

Where,

G = Geological reserve in metric tons (MT)

C = Cross sectional area in square meters (m^2)

D = Bulk density in metric tonnes per cubic meter (MT/m^3)

I = Recovery factor

3.3.3 Geological reserve:

Total reserve of all the three categories has been summed up to calculate grade – wise geological reserve. The geological reserve comes to be of 6673933 MT say 6.67 million tonne. The detail calculation has been given in table 3.3.3.1

3.3.4 Mineable reserve: The grade – wise mineable reserve has been arrived at considering the loss due to slope factor and safety zone. The recoverable part of the geological reserve, alienating the reserve due to slope and safety zone, is the mineable reserve. The mineable reserve comes to be of 6175208 MT say 6.18 million tonne. The detail calculation has been given in table 3.3.3.2

3.5 CATEGORYWISE UPDATED RESERVE WITH GRADE (INDICATING END-USE GRADE WITH ANALYSIS) AS WELL AS MARGINAL GRADE:

Summary of the **geological reserve** has been given in the following table.

	Reserve (MT)	Saleable (MT)	Sub-grade (MT)
Proved	4695023	3797721	897302
Probable	1429628	1208340	221288
Possible	549282	466595	82687
Total	**6673933**	**5472656**	**1201277**

GRADE WISE UPDATED GEOLOGICAL RESERVE

Iron ore reserve	
Grade in %	Tonnage in MT
45-50	330354
50-55	159338
55-58	711585
58-60	1294257
60-62	2406915
62-65	1771484
TOTAL	**6673933**

Mineable Reserve

Summary of the mineable reserve has been given in the following table.

	Reserve, MT	Saleable, MT	Sub-grade, MT
Proved	4624937	3758818	866119
Probable	1400647	1179360	221287
Possible	149624	66937	82687
Total	6175208	5005115	1170093

GRADE WISE UPDATED MINEABLE RESERVE

Iron ore reserve	
Grade in %	Tonnage in MT
45-50	314604
50-55	159338
55-58	696151
58-60	1180462
60-62	2265637
62-65	1559016
TOTAL	6175208

Demonstrated Reserve is 6025584 MT

A typical chemical analysis of ore of the leasehold is given below:

Fe%	SiO_2%	Al_2O_3%	P%
63.10	1.16	2.56	0.043

Authenticated analysis report has been attached vide Annexure no IV.

Sub-grade ore:

Ore having Fe% >45% and < 58% has been considered as sub-grade ore. As seen from the calculated reserve quantity of sub-grade ore comes to be around 20% of the total ore. Hence in all calculations 20% of the ore i.e. 15% of ROM has been considered as sub-grade ore.

Table 3.3.3.1

Geological Reserve

Section	Grade	X-Sectional area in (m^2)	L.O.I in (m)	Vol. of excavation in (m^3)	Vol. of ore in (m^3)	Tonnage in MT	Vol. of IB in (m^3)	X-section of OB in (m^2)	Vol. of OB in (m^3)	Vol. of Total Waste in (m^3)	Vol. of Swell waste in (m^3)	Stripping ratio	Category
a	b	c	d	e=c*d	f=e*75%	g=f*3.5	h=e*25%	i	j=i*d	k=j+h	l=k*1.4	m	n
1-1'	62-65	1080	140	151200	113400	396900	37800	1670	233800	481495	674093	1:0.2	Proved
		750	140	105000	78750	275625	26250						Probable
		375	140	52500	39375	137813	13125						Possible
	60-62	2410	140	337400	253050	885675	84350						Proved
		150	140	21000	15750	55125	5250						Probable
		75	140	10500	7875	27562	2625						Possible
	58-60	420	140	58800	44100	154350	14700						Proved
	55-58	987	140	138180	103635	362723	34545						Proved
		450	140	63000	47250	165375	15750						Probable
		225	140	31500	23625	82687	7875						Possible
	50-55	155	140	21700	16275	56963	5425						Proved
Sub - Total				990780	743085	2600798	247695	1670	233800	481495	674093	1:0.2	
2-2'	62-65	810	90	72900	54675	191363	18225	730	65700	146700	205380	1:0.2	Proved
		600	90	54000	40500	141750	13500						Probable
		300	90	27000	20250	70875	6750						Possible
	60-62	690	90	62100	46575	163012	15525						Proved
	58-60	540	90	48600	36450	127575	12150						Proved
		300	90	27000	20250	70875	6750						Probable
		150	90	13500	10125	35437	3375						Possible
	55-58	210	90	18900	14175	49613	4725						Proved
Sub - Total				324000	243000	850500	81000	730	65700	146700	205380	1:0.2	

3-3'	62-65	540	100	54000	40500	141750	13500	740	74000	168075	235305	1:0.2	Proved
		360	100	36000	27000	94500	9000						Probable
		150	100	15000	11250	39375	3750						Possible
	60-62	925	100	92500	69375	242813	23125						Proved
		360	100	36000	27000	94500	9000						Probable
		150	100	15000	11250	39375	3750						Possible
	58-60	330	100	33000	24750	86625	8250						Proved
		300	100	30000	22500	78750	7500						Probable
		150	100	15000	11250	39375	3750						Possible
	55-58	195	100	19500	14625	51187	4875						Proved
	45-50	285	100	28500	21375	74812	7125						Proved
		18	100	1800	1350	4725	450						Probable
Sub - Total				376400	282225	987787	94075	740	74000	168075	235305	1:0.2	
4-4'	62-65	815	130	107250	80438	281533	26812	1400	182000	394842	552779	1:0.2	Proved
	60-62	1800	130	234000	175500	614250	58500						Proved
		684	130	88920	66690	233415	22230						Probable
		150	130	19500	14625	51188	4875						Possible
	58-60	1500	130	195000	146250	511875	48750						Proved
		480	130	62400	46800	163800	15600						Probable
		75	130	9750	7313	25595	2437						Possible
	50-55	300	130	39000	29250	102375	9750						Proved
	45-50	585	130	76050	57037	199629	19013						Proved
		150	130	19500	14625	51188	4875						Probable
Sub - Total				851370	638528	2234848	212842	1400	182000	394842	552779	1:0.2	---
Grand - Total				2543450	1906838	6673933	635662	4540	555500	1191112	1667557	1:0.2	---

Table 3.3.3.2

Mineable Reserve

Section	Grade	X-Sectional area in (m^2)	L.O.I in (m)	Vol. of excavation in (m^3)	Vol. of ore in (m^3)	Tonnage in MT	Vol. of IB in (m^3)	X-section of OB in (m^2)	Vol. of OB in (m^3)	Vol. of Total Waste in (m^3)	Vol. of Swell waste in (m^3)	Stripping ratio	Category
a	b	c	d	e=cxd	f=ex75%	g=fx3.5	h=ex25%	i	j=ixd	k=j+h	l=kx1.4	m	n
3-3'	62-65	1080	140	151200	113400	396900	37800	1670	233800	464485	650279	1:0.2	Proved
		750	140	105000	78750	275625	26250						Probable
		54	140	7560	5670	19845	1890						Possible
	Sub - Total			263760	197820	692370	65940						---
	60-62	2362	140	330680	248010	868035	82670						Proved
		150	140	21000	15750	55125	5250						Probable
	Sub - Total			351680	263760	923160	87920						---
	58-60	420	140	58800	44100	154350	14700						Proved
	Sub - Total			58800	44100	154350	14700						---
	55-58	945	140	132300	99225	347288	33075						Proved
		450	140	63000	47250	165375	15750						Probable
		225	140	31500	23625	82687	7875						Possible
	Sub - Total			226800	170100	595350	56700						---
	50-55	155	140	21700	16275	56963	5425						Proved
	Sub - Total			21700	16275	56963	5425						---
TOTAL				922740	692055	2422193	230685	1670	233800	464485	650279	1:0.2	---
3-2'	67-65	810	90	72900	54675	191363	18225	730	65700	138900	103260	1:0.2	Proved
		600	90	54000	40500	141750	13500						Probable
		60	90	5400	4050	14175	1350						Possible
				132300	99225	347288	33075						---

	Sub - Total												
	60-62	642	90	57780	43335	151672	14445						Proved
	Sub - Total			57780	43335	151672	14445						---
	55-60	498	90	44820	33615	117652	11205						Proved
		300	90	27000	20250	70875	6750						Probable
	Sub - Total			71820	53865	188527	17955						---
	55-58	210	90	18900	14175	49613	4725						Proved
	Sub - Total			18900	14175	49613	4725						---
TOTAL				280800	210600	737100	70200	750	85700	135900	190260	1:0.3	---
	62-65	540	100	54000	40500	141750	13500						Proved
		336	100	33600	25200	88200	8400						Probable
		30	100	3000	2250	7875	750						Possible
	Sub - Total			90600	67950	237825	22650						---
	60-62	925	100	92500	69375	242813	23125						Proved
		336	100	33600	25200	88200	8400						Probable
		54	100	5400	4050	14175	1350						Possible
	Sub - Total			131500	98625	345188	32875						---
3-3'	58-60	330	100	33000	24750	86625	8250	740	74000	156675	219345	1:0.2	Proved
		300	100	30000	22500	78750	7500						Probable
		18	100	1800	1350	4725	450						Possible
	Sub - Total			64800	48600	170100	16200						---
	55-58	195	100	19500	14625	51188	4875						Proved
	Sub - Total			19500	14625	51188	4875						---
	45-50	225	100	22500	16875	59062	5625						Proved
		18	100	1800	1350	4725	450						Probable
	Sub - Total			24300	18225	63787	6075						---
TOTAL				330700	248025	868088	82675	740	74000	156675	219345	1:0.2	

4-4'	62-65	825	130	107250	80438	281531	26812	1400	182000	386555	541177	1:0.2	Proved
	Sub - Total			107250	80438	281533	26812						---
	60-62	1800	130	234000	175500	614250	58500						Proved
		660	130	85800	64350	225225	21450						Probable
		18	130	2340	1755	6142	585						Possible
	Sub - Total			322140	241605	845617	80535						---
	58-60	1500	130	195000	146250	511875	48750						Proved
		456	130	59280	44460	155610	14820						Probable
	Sub - Total			254280	190710	667485	63570						---
	50-55	300	130	39000	29250	102375	9750						Proved
	Sub - Total			39000	29250	102375	9750						---
	45-50	585	130	76050	57037	199630	19013						Proved
		150	130	19500	14625	51187	4875						Probable
	Sub - Total			95550	71662	250817	23888						---
TOTAL				818220	613665	2147827	204555	1400	182000	386555	541177	1:0.2	---
GRAND-TOTAL				2352460	1764345	6175208	588135	4500	555500	1243615	1601061	1:0.2	---

3.6 Justification of UNFC:

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On economic front, mining plan for the area has been approved and the materials already being dispatched to the consuming industry for further use. The ore is suitable having good market value and end use. Land use pattern, working plan is already known or designed for future use. Thus the reserves can be brought under E1.

On feasibility axis, grade of ore of this patch is certain and has been scientifically extrapolated. Leasehold area is valid as per MCR 1960. There will be no displacement. However, env. clearance and forest clearance are yet to be obtained. Thus, the resources can be brought under F2.

Detailed geological survey has been carried out, surface exposures have been plotted in the geological map on scale 1:2000. Detailed exploration by putting boreholes was carried out, number of pits were opened which later on converted into quarries. Exploratory mining and systematic sampling have been undertaken within the lease. The proved reserve has been estimated based on the actual thickness of the ore body as exposed in quary faces and boreholes. Thus geological axis can be brought under G1.

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On economic front, mining plan for the area has been approved and the materials already being dispatched to the consuming industry for further use. The ore is suitable having good market value and end use. Land use pattern, working plan is already known or designed for future use. Thus the reserves can be brought under E1.

On feasibility axis, grade of ore of this patch is certain and has been scientifically extrapolated. Leasehold area is valid as per MCR 1960. There will be no displacement. However, env clearance and forest clearance are yet to be obtained. Thus, the resources can be brought under F2.

Based on the exploration carried out in the area and also from nearby quaries, the ore zone has been extended up to 50m lateral beyond proved zone. This lateral extension of the ore body is kept under probable category assuming that the ore body may continue further. Thus, the geological axis can be brought under G2.

221 & 222

Reserve blocked due to pit slope factor and safety zone in the proved category has been termed as 221 and that of probable zone has been termed as 222. Similarly geologically proved and probable sub-grade ores have been categorized under 221 & 222 categories as those are not marketable at the present market.

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Economic and Feasibility studies are yet to be made. Therefore, Economic axis has been taken as E3 and Feasibility as F3.

Geological prospecting including mapping, assessment of lithology and analysis of the nearby quaries has been taken up. Further lateral extension of 50m has been assumed beyond the probable zone. Future exploration has been planned to prove the possible extension of the ore body. As such this can be categorised as G3.

As per the above parameters the resources as per UNFC codification are as follows:

	Iron ore in MT			
	Code	Saleable	Sub-Grade	Total
Reserve	121	3758818	-	3758818
	122	1179360	-	1179360
Remaining Resources	221	38903	897302	936205
	222	28980	221288	250268
	333			549282
Total		**5006061**	**894873**	**6673933**

3.5 YEAR WISE FUTURE PROGRAMME OF EXPLORATION:

In the southern and eastern side of the existing quarry bore holes were drilled in the previous plan period. So to know the potentiality of the rest area total twenty no. of coring boreholes have been proposed within the area as shown in the table below. The bore holes will be drilled in 100x 100m grid pattern and it will continue up to the end of mineralised zone. The bore holes will be given over the existing dump area to prove its boreness during the first year of the scheme period. The location of proposed bore holes have been shown on the **Geological Plan (Plate No. IV)**

TABLE - 3.1

Year	Boreholes nos.	location	Depth of BH (m)
2013-2014	PBh-1 to PBh-8	100s-1200E,100S-1100E,100S-1000E,100S-900E,200S-900E,200S-1000E,200S-1100E,300S-1000E	End of the Mineralization zone
2014-2015	PBh-9 to PBh-14	300S-900E,300S-800E,400S-900E,400S-800E,400S-700E,300S-700E	End of the Mineralization zone
2015-2016	PBh-15 to PBh-20	200S-800E,100S-800E,100S-600E,100S-500E,200S-500E,300S-500E	End of the Mineralization zone

CHAPTER-IV

4.0 CONCEPTUAL MINING PLAN

4.1 Anticipated life of the mine

The demonstrated mineable reserve under proved and probable (G1+ G2) category comes to be 6025584 MT. Considering average annual production of 400000 MT of saleable ore, anticipated life of the mine comes to be 15.06 or say 15 years.

4.2 The ultimate extent and size of the pit

During the conceptual period all mineralized area will be exploited. The excavated area comes to be 400150 m². Ultimate pit bottom RL will be 458 m. as per the existing status of exploration which will certainly be changed after exploration is complete in the area.

4.3 Ultimate slope angle

During proposed planning period, the individual benches will be kept nearly vertical. Ultimate pit slope will be kept at 45° with the horizontal by maintaining height and width of benches at 6m.

4.4 Ultimate pit limit boundaries

Ultimate pit limit boundaries have been earmarked in conceptual plan **(Ref. plate no – VIII)**

4.5 Ultimate capacity of the dump

4.4.1 Present status of Dump:

There are three existing waste dumps and one sub-grade dump present in the lease area occupying 32999m² area. One dump namely Dump-1 exists outside the mineralized area. Other three dumps namely Dump-2, Dump-3 & Sub-grade stock-1 are present within the mineralized area. Terraces are yet to be made in the dumps. No management has been done over the existing dumps.

The waste generated during mining will be utilized for backfilling of the mined out land which will commence from the second year of the ensuing scheme period i.e. 2014-15. Hence, conceptually there will be no dump in the leasehold. However, an area of 3.498 Ha has been earmarked on barren patch to dump the waste temporarily. The ultimate capacity of proposed dump will be **560160m³** with a max. height of 24 meter.

4.6 Land degradation and/reclamation/afforestation

Laterite, shale and Lateratic soil constitute the bulk of the waste generated in the mine. During the conceptual period a total of 1581111 m³ of waste (swell vol.) will be generated. It is planned to reclaim the mine out land by backfilling simultaneously with mining from 14-15. The stored wastes of the dump will be used fully for the purpose.

Swelled volume of waste = 1581111 m³
Surface area of excavation = 400150 m²
Average depth of the mined out land 12 m
Can be utilized for backfilling of =1581111 m³/12/1.2 = 109799 m²
[1.2 considered as the compaction factor]
The rest area i.e.290351 m² will be subject for bench plantation by using 46456 nos. of saplings
Hence, at the conceptual period the total dump will be utilized for backfilling the mined out area. The backfilled area will be brought under plantation for rehabilitation.

Post Mining Land use pattern, Table No 4.1

Type of land use	At present (Ha)	During scheme period (Ha)	Total in Ha	Total Area in the Conceptual period	Total Area in the Conceptual period after Final Mine closure
Area of excavation	32.861	- 7.613	25.248*	28.679	Nil
Overburden dump	1.264	2.234	3.498**	3.49	Nil
Mineral storage	0	0.476	0.476	Nil	Nil
Sub-grade stock	2.035	- 0.517	1.458***	Nil	Nil
Infrastructure	1.518	0.643	2.161	0.9	0.9
Township	Nil	Nil	Nil	Nil	Nil
Roads	2.460	Nil	2.460	2.460	2.46
Green belt	Nil	1.60	1.60	2.81	2.81
Magazine	0.089	Nil	0.089	Nil	Nil
Area for future exploration & Min	Nil	Nil	Nil	6.638	Nil
Backfilled /rehabilitated area	Nil	4.698	4.698	4.698	43.505
Total	40.227	9.651 - 8.19=1.461	41.688	49.675	49.675

*This is equal to 32.861- (4.698 [proposed for backfilling] - 0.656 [proposed for backfilling from existing dumps D2 & D3] - 0.36 [proposed for backfilling from existing SG stack=3.682]) – (2.89 [proposed for dumping] – 0.46[proposed for dumping from existing SG stack=2.43]) – 0.643 [proposed for infrastructure] – 1.458 [proposed for SG stock] – [0.476[proposed for M5] – 0.101[existing outside the excavated area=0.375]] – 0.24 [plantation area within the excavated area] + [1.215 [area included in the area to be excavated which was earlier in the SG stock]= 23.96 Ha

**This is equal to 1.264+ 2.89 – 0.656 [area of Dump 2 & 3 proposed to be utilized for excavation and backfilling] = 3.498 Ha

***this is equal to 2.035 + 1.458 – [[0.36[proposed for excavation]] + [0.46 [proposed for dumping]] + [1.215 [proposed for future excavation]]] = 1.458 Ha

Ore & Over burden ratio

The ore & overburden ratio of the proposed conceptual quarry will be 1: 0.2.

Future Exploration programms:

Presently, almost all part of the lease area has been explored excepting the eastern part. Remaining area of 6.638 Ha has been proposed to be explored through twenty no of boreholes.

CHAPTER-V

5.0 MINING

5.1 SALIENT DESCRIPTION OF PRESENT MINING METHODS

As the mine belongs to category A (OTFM) the ore deposit has been exploited by following traditional method of opencast mining by benching with single shift basis. Present position of the quarry has been shown in Plate No V. Height of the benches have been maintained at around 6 m. Width of exising benches varies from a minimum of 6 m. The sorting of ore is done by fully manual means by using simple mining implements like pick axe, spade, chisel, hammer etc. The over burden gets loaded in to 10 tonne capacity tippers by using 0.9 m^3 bucket capacity excavators. Drilling and blasting has been carried out to loosen the hard strata. It is planned by the lessee to install a 150TPH mobile crushing plant and the corresponding mobile screening plant for necessary crushing and screening to make the ore saleable. Then it is planned to sale directly iron ore to various user industries.

5.2 YEARWISE DEVELOPMENT FOR THE ENSUING FIVE YEARS PERIOD

During the scheme period of five years (which is currently in force) mining activities will be confined to the main quarry. In the ensuing scheme period of five years it is planned to go deeper as well as laterally to extract and exhaust iron ore. In the main quarry the mining will be carried out from NW end. As at the end of the each year the quarry R.L. will touch ultimate depth due to mineral exhaustion, simultaneously backfilling proposals have been given from the 2014-15 onwards till the end of the scheme period.

Position of the quarry and the benches have been shown in Plate No V. Height of the benches will be maintained at around 6 m. and width of benches will be maintained at a minimum of 6m. The year-wise volume of excavation, ore recovery and generation of waste & overburden, RL of benches and stripping ratio for each year has been mentioned in the enclosed table **(Table No. 5.2.1)** Crushing and screening of lump ore will be achieved by the mobile crushing and screening plant of the lessee installed a 150 TPH. Average vol. of excavation, ore

recovery and swelled vol. of waste and overburden generation during the ensuing period has been summarised in the following table.

TABLE - 5.2.2

YEAR	Total ROM in m^3	Ore From quarrying (in MT)	Ore From Rehandling of sub-grade stock	Total ore (in MT)	Saleable ore (in MT)	Non-saleable (Sub-grade) (in MT)
2013-14	66920	175665	336489(269191-Saleable and 67298- Non-saleable ore)	512154	409723	102431
2014-15	151900	398738	0	398738	318990	79748
2015-16	152330	399840	0	399840	319872	79968
2016-17	152040	399105	0	399105	319284	79821
2017-18	152180	399473	0	399473	319578	79895
TOTAL	675360	1772821	0	2109310	1687447	421863
AVERAGE	135072	354564		421862	337489	84373

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Layout of the proposed mine working has been shown in Plate No. V.

5.3 YEARWISE PRODUCTION FOR THE ENSUING 5 YEARS PERIOD

The proposed planning for the next five years has been programmed to explore the ore zone with lateral and depth ward extension. It is also aimed to develop the benches with proper height and width adopting mechanized method of working.

In the first year of the ensuing scheme period it has been proposed to rehandle the existing sub-grade stock. The ore generated from the rehandling will be transported to the adjoining lease of same lessee for blending. Presently there are three existing dumps with a sub-grade stock acquiring over an area of 32990m^2 in the lease area. All these dumps & sub-grade stock are present in the mineralized area. As those are present in the mineralized area, therefore there is planning of rehandling dumps 2, 3 & sub-grade stock (1) in year 2013-14 having a total vol. of 480699 m^3 of waste. After recovery of the 20% ore from dump -1,3 & 4 which amounts to 336489 MT of ore (269191MT- Saleable and 67298MT - Sub-grade ore), the remaining 80% waste i.e 384559 m^3 will be accommodated in the proposed dump. Simultaneously backfilling proposal has been proposed from the 14-15 onwards, as ore gets exhausted vertically from a particular area in every development year. In the development calculation, the recovery percentage of

ore has been assumed as 75%. Out of these 80% has been considered as saleable ore and rest 20% are considered as sub-grade. The development has been planned from the NW part in 13-14 and will move easterly in the subsequent years till 480E grid in 2017-18. The exhausted area of 13-14 has been planned to be backfilled in 14-15 and this backfilled area will be brought under plantation in 15-16. In this manner reclamation and rehabilitation would continue in the subsequent years.

Year wise development of the pit has been shown in the Plate No. - V in plan and sections.

Development during 2013-14 (Ref. Plate – V)

The proposed development during this year is to be carried out from the ultimate pit boundary.

Description

Cross section considered	5-5'
R.L. of the quarry floor at the end of year (m)	572
Length of influence	140
Height (m)	6
width of the bench (m)	Variable
Over all slope of the quarry	45°
No. of benches	2

Summary:

Production of saleable ore in MT	140532
Generation of waste in m^3	20510
Generation of Sub-grade in MT	35133
Stripping Ratio in m^3/ MT	1:0.11

Development during 2014-15 (Ref. Plate – V)

Description	
Cross section considered	546
R.L. of the quarry floor at the end of year (m)	140
Length of influence	6
Height (m)	Variable
width of the bench (m)	45°
Over all slope of the quarry	5
No. of benches	

Summary:

Production of saleable ore in MT	318990
Generation of waste in m^3	56595
Generation of Sub-grade	79748
Stripping Ratio in m^3/ MT	1:0.14

Development during 2015-16 (Ref. Plate – V)

Description	
Cross section considered	5-5'
R.L. of the quarry floor at the end of year (m)	546
Length of influence	140
Height (m)	6
width of the bench (m)	Variable
Over all slope of the quarry	45°
No. of benches	2

Summary:

Production of saleable ore in MT	319872
Generation of waste in m^3	76384
Generation of Sub-grade	38080
Stripping Ratio in m^3/ MT	1:0.09

Development during 2016-17 (Ref. Plate – V)

Description

Cross section considered	S-S'
R.L. of the quarry floor at the end of year (m)	546
Length of influence	140
Height (m)	6
width of the bench (m)	Variable
Over all slope of the quarry	45°
No. of benches	1

Summary:

Production of saleable ore in MT	319284
Generation of waste in m³	115416
Generation of Sub-grade	38010
Stripping Ratio in m³/ MT	1:0.09

Development during 2017-18 (Ref. Plate – V)

Description

Cross section considered	S-S'
R.L. of the quarry floor at the end of year (m)	516
Length of influence	140
Height (m)	6
width of the bench (m)	Variable
Over all slope of the quarry	45°
No. of benches	5

Summary:

Production of saleable ore in MT	319578
Generation of waste in m³	84945
Generation of Sub-grade	76200
Stripping Ratio in m³/ MT	1:0.21

YEAR WISE DEVELOPMENT

Year	X-Sectional area in (m^2)	L.O.I in (m)	Vol. of excavation in (m^3)	Vol. of ore in (m^3)	Tonnage in MT	Saleable Ore	Non Saleable Ore	Vol. of IB in (m^3)	X-section of OB in (m^2)	Vol. of OB in (m^3)	Vol. of Total Waste in (m^3)	Vol. of Swell waste in (m^3)	Stripping ratio
	e	d	e*e+e*d	f=ex75%	g=fx3.5	h=gx80%	i=gx20%	j=ex25%	k	l=kxd	m=j+l	n=mx1.4	o=m/g
2013-14	408	140	66920	50190	175665	140532	35133	16730	27	3780	20510	28714	1:0.11
2014-15	1085	140	351980	113925	398738	318990	79748	37975	133	18620	56595	79233	1:0.14
2015-16	1088	140	152320	114240	399840	319872	79968	38080	0	0	38080	53312	1:0.09
2016-17	1086	140	152040	114030	399105	319284	79821	38010	0	0	38010	53214	1:0.09
2017-18	1087	140	152180	114135	399473	319578	79895	38045	335	46900	84945	118923	1:0.21
Grand Total			675360	506520	1772821	1418256	354565	168840	495	69300	238140	333396	1:0.66

5.4 ANY CHANGE IN THE PROPOSED METHOD OF MINING, DRILLING AND BLASTING AND DEPLOYMENT OF MACHINERY. IF SO, GIVE DETAILS

There will be no change in the method of mining as was proposed in the earlier approved scheme of mining. Rear dump trucks of 10 MT pay load capacity will be used for transport of ore and overburden. The trucks will be loaded manually.

5.4.1 LIST OF MACHINERIES

Drilling of the blast holes will be performed by wagon drills. The proposed benches of 6m height will be drilled in one stroke by maintaining 6.6 m deep hole.

5.4.1.1 REQUIREMENT OF WAGON DRILL

Drilling parameters

Diameter of the blast hole	100mm
Height of the bench	6m
Sub-grade drilling	0.6m
Length of the hole	6.6m
Burden	3.0m
Spacing	3.5m
Volume of earth to be broken/loosen per hole.	3.0m X 3.5m X 6m = 63 m^3

Meterage of drilling per year

Max. Volume of excavation in a year	152320m^3
Volume required to be blasted (60% of total excavation)	91392m^3
Number of holes to be drilled	91392m^3 / 63 = 1450 nos
Meterage of drilling to be required	1450x 6.6=9570m

Meterage of drilling per drill

Speed of the drill	10m/Hr
No of working days in a year	300
Efficiency	65%
Number of shifts/day	1
Meterage of drilling to be effected/year	300 x 10 x 8 x 1 x 65% = 15600 m

Required drills

Total meterage to be drilled/year

Number of drills required =	Total meterage to be drilled/year ——————————— Total meterage to be drilled/ year/drill
	9570m/15600m = 0.61soy 1 no

TRUCK/TIPPER:

Max annual excavation of ore	399840MT
Avg no of working days	300
Avg daily material to be transported	1333MT
Capacity of truck/tipper	10 MT
Required trips	134
No of trips a truck /tripper can do per day	8
No of trucks/ tripper required	17
Standby to meet repair and maintenance time	2
Water tank mounted truck	1
Total	**17+2+1= 20**

MOBILE AIR COMPRESSOR:

One tractor compressors has been proposed which would be sufficient to run jack hammers separately which will used for secondary blasting.

5.4.1.2 EXCAVATION

Specification	
Bucket capacity	0.9 Cu. M
Production efficiency [machine operating efficiency + job management efficiency]	90%
Time cycle/pass at 90° swing	25 sec
Excavating Parameters	
Nominal bucket capacity	0.9 Cu. M
Average nominal bucket capacity [C]	1 Cu. M
Bucket fill factor [f]	0.9
Time cycle/pass at 90° swing [T]	25 sec
Swell factor [s]	0.8
Production efficiency factor [e]	0.9
Seconds per hour [I]	3600
Depth of cut factor [d]	0.95
Rate of production	
Output/shovel/hour	C x f x s x d x e x I ÷ T = 1 x 0.9 x 0.8 x 0.95 x 0.9 x 3600 ÷ 25 = 88.65 Cu. M
Output/shovel/shift with 5 hours effective working time.	88.65 x 5 = 443.25 Cu. M
Number of excavator(s) required	Total waste handling in a day ÷Handling capacity of one excavator per day
Waste handling per day (Considering the maximum waste handing of the 5th year and 300 working days in a year)	84945 m^3 ÷ 300 = 283.15 or say284m^3
Excavator required to be engaged	284 ÷ 443.25 = 0.64 or say 1 No + 1 stand by= 2 nos.

Machineries proposed to be used in the mine for the purpose of development are as follows:

List of Machineries

Machines	Capacity	No
Wagon Drill	100 mm	1
Jack hammer	32Kg	1
Tractor compressor	3.39m^3/min	1
Truck/tripper	10 MT	20
Proclain	8 C-0.9 m^3	2
Rock Breaker	100TPH	1
Backhoe loader	8 C-0.3 m^3 (HP-75)	1

5.5 BLASTING

Iron ore is usually hard and required drilling & blasting for loosening of the rock mass for ease of the excavation. Blasting is not required for float ore and shall be required for in-situ ore. Rock breaker shall be utilized in-stead of secondary blasting.

5.5.1 BROAD BLASTING PARAMETERS

Drill holes are drilled in single rows as well as in multi ROW ON staggered pattern by DTH drills. To avoid secondary blasting rock breakers wil be used. However, drilling, blasting parameters are chosen as follows:

Sl. No.	Parameters		Magnitude
1	Dia of the hole		110mm
2	Drilling pattern		3.0m
			3.5m
3	Depth		6m
			0.6m
			6.6m
4	Nature of the hole		Vertical
5	Type of main explosive	Name	ANFO
		Dia of catridge	83mm
6	Powder factor		8 t/kg
7	Requirement of explosive	Quantity/hole	10 kg
		Quantity/single blast	50 kg
8	Initiative explosive	Detonator	ED
		Fuse	Cordex
9	Type of blasting	Frequency of blasting	Primary & secondary
10	Yield/hole		25 m³

5.5.2 TYPE OF EXPLOSIVE TO BE USED

Ammonium nitrate mixed with diesel oil (ANFO) in the proportion of 94:6 gives a very good explosive which is cheap and viable for blasting. It is easy to prepare by direct mixing at site immediately before charging of shot holes.

The ANFO will be used as column charge and power gel explosive will be used as primer. ANFO and power gel requirement shall be in the proportion of 70:30 to 60:40 electric detonators and detonating fuse combination will be used for ignition.

5.5.3 STORAGE AND TRANSPORATION OF EXPLOSIVES

An approved & licensed magazine exists within the leasehold. The license shall be made to store under-mentioned kinds and quantities of explosives:

Sl.No	Explosives	Class/ division	Capacity
1	Nitroglycerine Based explosives	III	3t
2	Detonating fuse	VI/2	15000 m
3	Detonator	VI/3	800 nos.

In addition to these permission will required to use ammonium nitrate (and required fuel oil) along with the above mentioned high explosives.

5.5.4 Labour requirement

Mines Manager - 1 no. (Degree in mining engg. With 1st class Managers certificate of competency)

Geologist-1no (M Sc in Geology with more than 10 yrs experience)

Mining Engineer-1 No(Degree in mining engineering with more than 10 yrs experience.)

Mining Foreman- 1no. (Diploma in mining engg. With foreman certificate of competency)

Mining Mate - 1 no. (Mate's Certificate)

Office Asst. - 2 no.

As the mine has been proposed to be operated through semi-mechanised method, the requirement of manual labour as per the OMS calculation will be as follows.

Max tonnage of production per year= 399840MT

40% of the max. production per year will be done manually.

Manually ore production per year will be= 159936MT

Max. working days per year= 300 days

OMS considered = 5 MT

Nos. of labour required = 107nos.

Total Manpower requirement is 114 Nos.

CHAPTER-VI

6.0 HANDLING OF WASTE / SUB-GRADE MATERIAL

6.1 Rate of yearly generation of waste

Iron ore in Gurubeda M.L area is associated with Laterilic intercalated waste in the mineralized zone. The amount of waste likely to be generated during the ensuing five years of scheme period is tabulated below. Waste generated from the quarry is proposed to be dumped over the existing dump situated to the south of main quarry (Ref-plate-VII) in the mid-portion of the leasehold. In addition to this, two existing dumps situated in the western and eastern side of the existing quarry will be rehandled after screening.

Year wise generation of waste from quarry & rehandling waste

Year	Intercalated waste in m^3	Quantity of waste as OS in m^3	Total waste (m3)	Swell. Vol. of Total waste (m3)	Waste to be generated after rehandling of existing dump(m^3)	Total waste (m^3)
2013-14	16730	3780	20510	28714	384559	413273
2014-15	37975	18620	56595	79233	0	79233
2015-16	38080	0	38080	53312	0	53312
2016-17	38010	0	38010	53214	0	53214
2017-18	38045	46900	84945	118923	0	118923
Total	**168840**	**69300**	**238140**	**333396**	**384559**	**717995**

6.2 Selection of dumping sites:

Presently in the lease area there are three existing dumps with a sub-grade stock acquiring over an area of 32990m^2. All these dumps & sub-grade stock are present in the mineralized area. As these are present in the mineralized area therefore there is planning of rehandling dumps 2, 3 & sub-grade stock (1) in year 2013-14 having a total vol. of 480699 m^3 of waste. After recovery of the 20% ore from dump-2,3 & SG 1, the remaining 80% waste i.e 384559 m^3 will be accommodated in the proposed dump. The proposed dumping site has already been proved to be barren through boreholes. The existing sub-grade stock 1 is located in that site. So after rehandling of this sub-grade stock the generated

waste along with the waste of the development of this scheme period are proposed to be accommodated on the same earmarked area.

6.3 Maximum height and spread of waste dumps

In the ensuing scheme period development has been proposed till the end of the mineralization from the NW part of the quarry. So simultaneous backfilling proposal has been planned with mining from 14 -15 onwards. The waste generated in 2013-14, i.e 28714 m³ (swell waste) will be accommodated in the proposed dump along with the rehandled waste of sub-grade stock which is 384559m³. The maximum area of the proposed dump will be 28900 m². Adding the existing dump No2 total area under dumping shall be 34900 m². From 14-15 onwards the waste generated from the quarry will be utilized for backfilling of area degraded in the previous year. All the waste to be generated in the 14-15 year will be utilized for backfilling of exhausted area of 13-14. If there is a shortfall of required waste for backfilling, dumped waste will be utilised for the purpose. The backfilled area of 14-15 shall be rehabilitated through plantation in 15-16. The process would continue in subsequent years of the scheme period. The details has depicted in the below tables:

Year	Total waste	Vol. reqd to be backfilled (m³)	Waste reqd for backfilling (m³)	Location of backfilling proposal	Source of waste for backfilg	Remaining waste in the proposed dump(m³)	Area to be backfilled (m²)	Area to be rehabilitated (m²)
13-14	413273		-	-	-	413273	-	-
14-15	79233	66290	80304	Exhausted area of 13-14	Dev of 14-15	-1071	8073	-
15-16	53312	151900	182280	Exhausted area of 14-15	Dev of 15-16 & from dump	-128968	8302	8373
16-17	53214	152320	182784	Exhausted area of 15-16	Dev of 16-17 & from dump	-128570	15607	8302
17-18	118923	152040	182448	Exhausted area of 16-17	Dev of 17-18 & from dump	-63525	14611	15697
Total						90139	46983	32372

Year	Waste to be dumped (m^3) Cumulative	Area of dumping (m^2)	Ht of dump (m)	No of benches
13-14	413273	26900	24	3
14-15	412202	28900	24	3
15-16	283234	28900	16	2
16-17	153664	14297	16	2
17-18	90139	9015	8	1

The retreating method of dumping will be adopted. The highest R.L of the proposed dump will be 527m. Ultimate slope of the dump will be around 20° (Ref-plate-V A). The dump has been designed in retreating method.

The Protective measures and precautions to be under taken for the waste dump the management shall be as follows:

i) The ultimate dump slope will be maintained at 20°-22° with individual terraces slopes not exceeding 37°

ii) The individual terrace heights will be maintained at 8m.

iii) Each terrace will have inward slope with catch crains at the inward side of the terrace.

iv) The catch drains of the individual terrace will be connected to the garland drain outside the periphery of the dump.

v) These catch drains will have half concrete open pipes followed by settling tanks to avoid wash offs.

vi) Each terrace will also have a provision of berms at the outer end to reduce gully formation due to rain water wash offs.

vii) The retaining wall has to be made to arrest the waste dump materials for consolidation during the year 2013-14.

viii) Garland drains are to be paved around the dump to arrest possible wash off in rainy seasons during the year 2013-14.

ix) Suitable grass/plant species will be paved in the dump slope, which will hold the materials in its fibrous and spread over roots to protect wash off in the rainy seasons.

x) Plantations of grass and saplings will be done from the year 2013-14 onwards.

6.5 Nature of sub- grade ore

Iron ore containing 45% to 58% Fe is considered as sub grade ore. The incidence of sub-grade iron ore is calculated to be 20% of the volume of the [illegible] zone.

6.6 Quantity of sub-grade ore. Sub-grade iron ore generation from the proposed quarries is computed to be 421862MT. Depending on market condition, these sub-grade ore will be marketed after blending with suitable grade.

6.7 Selection of sub- grade ore stacking site.

Sub-grade ore is proposed to be stacked at the earmarked site. The said area is comperatively flat and away from the water source (Ref-plate-VII). Provision has been made to store sub-grades to be generated in the next five years. However, steps would be taken to sell sub-grade ore through blending with high grade ore.

6.8 Maximum height and spread of sub-grade ore

The generated ROM ore will be transported to the Barsposi Iron & Mn ore lease of the same lessee for crushing and screening. However, a sub-grade stacking site has been earmarked to stock the sub grades which can be separated through eye estimation.

Avg. sub-grade ore to be generated per annum =84373 MT

Surface area of sub-grade stock yard =14580m^2

Average height of the sub-grade stack = 4m

CHAPTER-VII

7.0 USE OF MINERAL

7.1. CHANGES PROPOSED IN THE USE OF MINERAL, IF ANY WITH REASONS

The saleable iron ore produced from the mines varies in grade from 58% to 65% fe content. The total ore is sold to the steel making industries. Fines generated from the crushing are exported.

7.2 CHANGES IN THE SPECIFICATION, IF ANY, IMPOSED BY THE USER INDUSTRIES AND / OR SPECIFICATIONS REQUIRED IN THE CASE OF NEW USER INDUSTRIES, IF ANY , TO BE GIVEN

No such.

7.3 EFFORTS MADE FOR UTILISATION OF THE SUB-GRADE MINERAL INCLUDING FINES.

The sub-grade ore is stacked at specified sites and is blended with high grade ore to meet the specification of consuming industries.

As the existing dumps were observed to have potential to recover some ore, proposal has been given to recover the ore from the waste dumps through screening of the dumped material in the mobile screening plant already possessed by the lessee. From the observation, it has been revealed that 20% ore will be recovered from the rehandled waste which contains 45% to 58% Fe. Out of these recovered ore 80% is saleable and the rest 20% is sub-grade ore. In the year 2013-14 rehandling proposal has been given for the sub-grade Dump 1,3 & 4. The recovered sub-grade ore through screening will be blended with high grade ore of the mine to make them marketable.

CHAPTER-VIII

8.0 MINERAL BENEFICIATION

8.1 RESULTS OF ANY BENEFICIATION INVESTIGATION CONDUCTED AND CHANGES MADE IN EXISTING MINERAL BENEFICIATION PLANT AND TAILING DISPOSALS, IF ANY, WITH BENEFITS EXPECTED (NECESSARY FLOW SHEET AND TAILING DAM DESIGN ETC. TO BE SUBMITTED AS APPLICABLE)

It is planned by the lessee to install a 150TPH mobile crushing plant and the corresponding mobile screening plant for necessary crushing and screening to make the ore saleable. Then it is planned to sale directly iron ore to various user industries.

Material Balance:

Proposed Average annual ROM production- 135072 m³

Production of ore- 135072 x 75% x 3.5 = 354564 MT (IB (Fe% <45%)to the tune of 25% of ROM shall be separated through hand picking)

Saleable ore (58-65% Fe) separated through eye estimation after separation of sub-grade (45 to <58% Fe) = 354564 x 80% = 283651 MT

Amount of sub-grade ore(45 to <58% Fe) = 354564 x 20%= 70913 MT

Ore which will be subjected to crushing = 283651 MT

After screening- 60% shall be sized ore (5-18mm) = 283651 x 60%= 170191 MT &

Fines (0-5mm)= 283651 x 40%= 113460 MT

Annual Final Output:

IB: 33768 m³ (Fe% <45%)

Sub-grade- 70913 MT (Fe% - >45 to <58%)

Sized ore- 170191 MT (Fe% - 58 to 65%)

Fines - 113460 MT (Fe% - 58 to 65%)

8.2 BENEFICIATION TEST DONE, IF ANY, ON SUB-GRADE MINERAL INCLUDING FINES AND PROPOSALS FOR INSTALLATION OF NEW OR ADDITIONAL BENEFICIATION FACILITY, IF ANY, (FURNISHED PROCESS DETAILS BRIEF ALONG WITH EXPECTED TAILINGS LOSS).

No such test has been done.

CHAPTER-IX

9.0 ENVIRONMENT MANAGEMENT PLAN

ENVIRONMENTAL IMPACT ASSESSMENT

Overview of environmental impacts due to different phases of mining

Mining Phase	Activity	Potential Environmental Impact
Exploration and surveying	Geochemical Geophysical and airborne surveys. Drilling and trenching. Blasting for exploration. Exploration camp housing Vehicle and machinery parks. Fuel point and services. Access road construction Waste disposal and camp sanitation system	Vegetation removal, damage and destruction Habitat disturbance due to noise and vibrations Disturbance to residents and wild life Soil erosion along trenches and transects Dumping of drill cores and wastes
Mine Development Sourcing and Stockpiling	Mine construction Striping / sorting of soil overburden Installation of power lines Surveying and leveling sites for building and plants. Construction of mine and surface water treatment plants. Construction of mine facilities, offices and roads. Construction of processing plants, smelters and refinery	Habitat loss and disturbance of habitation of flora and fauna Reduction in biodiversity of the locality Altered and forms due to construction Altered drainage and runoff flows Increased erosion of site area Increased situation of surface water
Removal and storage of ores and waste materials	Stripping /sorting of soil Overburden Waste rock stock piling. Low grade ore stock piling. High grade ore stock piling	Land alienation from waste rock stack piles Disturbance form vehicle and machinery noise and site illumination Acceleration of acid rock drainage through exposure of ores to air and water
Blasting. Mining and Grinding	Blasting of rock for extraction Transport of ore to crusher, smelters Extraction and preliminary crushing of ore Floatation, chemical concentration and leaching of ores and final product	Ground surface disturbance Disturbance due to noise and Vibrations Dust and fumes from explosion, mine vehicles and transport systems Contamination from explosive residues.

Transport of final product to markets	Packaging /loading of final product into transportation. transportation of final product via rail link	Disturbance due to [illegible] vibrations and site illumination Dust and fu[illegible] from exposed product stockpiles
Mine closure and post operational waste	Decommissioning of roads Dismantling of buildings Planting of disturbed areas Recounting waste dumps Water Quality treatment Fencing dangerous areas Monitoring of seepage.	Noise & dust during dismantling Subsidence, slumping and flooding of previously mined areas Acid rock drainage exposed ores Continuous discharge of contaminants to ground and surface water via seepage.

Impact of mining on Land environment:

Impact on Topography

Open scrubs mark the general topography of the area. The impacts on the topography of the core zone is in the form of changed landscape due to the mining activities in the form of digging, leveling of lands & dumping of waste etc.

Impact on Land use Pattern

The proposed mining activity and other developmental activities will have an impact on the present land use. The applied ML area of 49.776 Ha was previously devoid of forest land and represented by agricultural field, village site, road and waste land as per the old settlement. The land is coming under Patbot – II kisam. As the area is under mining lease since so many years there is no village settlement with in the mining lease and the cultivation has been stopped since long with in the area. As the proposed area does not involve any forestlands impact on forestry is not envisaged. As the area is also devoid of any agricultural activity their possible impacts are also not predicted.

As far as impact on the land use pattern is concerned, the buffer zone will not be affected as the mining operations are confined only to the core zone. They are of greater concern as the mining operations & the eventual pollution affects & solid waste disposal could drastically influence the landscape and aesthetic beauty of the area. The OB & the soil generated, as a consequence of mining activity will not be mixed with non-saleable or sub grade. They will be utilized for bund formation and green belt development in & around the mine site.

Miligation Measures:

a. Reclamation of mined out areas

Laterite and Lateratic soil constitute the bulk of the waste generation in the mine. During the conceptual period a total of 1765018 m3 of waste (swell vol.) will generated. It is planned to reclaim the mine out land by backfilling simultaneously with mining from the first year of the next scheme period based on the result of exploration. The stored wastes of the dump will be used fully for the purpose. Some parts of the mined out pits will be converted into artificial lake or a water body as a part of Hydro reclamation. The remaining area in the lease area will be handed over to the local people for social forestry after taking the necessary steps towards the betterment of the land quality.

Soil Erosion

Hill slopes are vulnerable to soil erosion. Construction of check dams and gully plugs will be an effective insulation to arrest soil erosion. Terracing of dumps will also form an effective control measure in reducing soil erosion. Plantation on the dump slopes will also help in stabilizing the dumps, which shall also contribute in improving the situation.

Top Soil conservation

There is no top soil in the mineralized part of the lease area.

Impact on Air Quality:

The impact on air quality due to the proposed iron mines at Gurubeda depends upon the intensity of ore extraction, operation, mode of transportation and screening of ore.

Further, the intensity of operation is directly related to the rate of production. Open cast mining leads to air pollution which is mainly caused due to generation of dust arising from mining activities. In manual opencast mine mining operations such as mining extraction, loading and unloading, movement of dumpers on haul roads, external dumping and sizing of ore etc are expected to generate airborne fugitive dusts.

Miligation Measures:

Some suggested air pollution control measures to control air pollution are construction of well compacted roads, regular water spraying on roads, provision of

dust collectors for the drilling machines, controlled blasting, plantation of wo[illegible] trees, sleepers, tall grasses around quarry sites, roads, colony and other surrou[illegible] barren zones etc.

Prediction of fugitive dusts has been made with the help of computerized fugitive dispersion model. The model is generally based on Gaussian Plume formulation for computing concentrations. The model has been applied under given geo-mining conditions, considering the worst possible scenario, as per the futuristic mine plan of Gurubeda mine using monitored / collected basic meteorological input parameters for the site.

Impact on Noise Quality:

The existing noise level in the core zone as measured at Gurubeda is 41 to 50 dB during day time and 30 to 40 dB during the night time. The proposed mining will be an open cast mostly manual working type. In this open cast manual mining the various sources of noise in the area are attributed mainly to the following sources

- Drilling and blasting operations
- Equipments such as compressors, dozers, shovels diesel pump etc.
- Vehicular traffic

The various sources of noise mentioned above shall only be periodical and are limited to a fixed period of operation only. In addition to this, the transportation of ores might cause a little effect on the noise level. The noise generated by different machinery used in mining operation is given

in table-4.3.

Table-4.3: Noise generated by machinery used in mining

Machinery	Noise generated in dB (A)
Shovel	90-100
Dozer	90-106
Dumper	80-100
Drill	105
Sprinkler	80
Backhoe	85
Crusher	80-95

the noise level result due to such operations in the active working zones in the [illegible] do not indicate any serious concern as it is well below the prescribed standard [illegible]

4.2.5 Impact on Water Quality :

The mining activities can cause adverse impacts due to mine drainage, siltation due to storm water & contaminated water from domestic sewage. Water shall be used only for Afforestation and domestic purposes which will be met by several ground water sources and hence exploitation of surface water and aquatic biodiversity is not anticipated. As the proposed activity involves dry excavation process with no beneficiation process involved, wastewater is not generated and hence there will be no impact due to effluent generation on the surface or ground water.

a. Impact due to Mine drainage Water

The only water that is expected to be encountered during the course of Ground water intrusion into the mine pit is during rainy season; which is being pumped into a pit, treated and utilized for landscape development. This also can be prevented by providing garland drains around the mine pits. The water will be discharged to open fallow land with in the mining lease area. The impact being marginal will be contained within the lease area. Mining operations are restricted during the rainy days thus the workings accounts to a maximum of about 300 days/year. Hence the possibility of freshly excavated material being carried away by the storm water into nallahs is avoided. The season al nallahs present in the lease area will channelize the storm water. The storm water carries the silt generated from the ore, overburden and soil of the mine area.

Check dams will be constructed at the lowest level of each nallah to contain the storm water. The clear overflow from the check dam is passed on the downside of the nallah to maintain the natural course of water in the region. Retention walls to the dumps are proposed to check the suspended particles rolling down and choking the natural drainage system of the area.

b. Impact due to Water use in Mines:

Mining is the physical process where the water is mainly used for dust suppression and washing of heavy earth moving machineries. Since no chemical transformation takes place and the ore is naturally occuring there is no possibility of any chemical

contamination in the waste water. The domestic effluents being generated will be discharged to soak pits through septic tank.

c. Impact due to Surface Runoff from the Dumps:

The garland drains around the temporary dumpsites helps to check the flow of fines during the surface runoff and helps in minimizing the impact on the surrounding environment. After a period of five years there will be concurrent backfilling for reclamation of the mined out areas. Garland drains and bunds shall be made to prevent the surface runoff.

d. Impact on Ground Water:

Ground water table is expected to be of 470m RL in rainy season. There are possible of intrusion of ground water into working pits. This will be pumped out, treated for making free from suspended particles and used for plantation purpose.Since the ground water table in this region will be much below the proposed quarry floor there will be no problem of seepage/ ground water accumulation in the mine requiring pumping & drainage in dry season.

Impact on Vegetation:

As per the revenue record, it is evident that there was no forestland within the M.L. area. Out of the total mining lease area over 49.776 hectares, 0.562 hectares, are non-forestland and the balance 49.214 hectares are under patch-II kisam and has been considered as forestland as per DLC report. Clearing of the forest shall positively leave impact on flora and fauna. However, the afforestation planned for the project is expected to compensate for the loss of forests.

Impact on Socioeconomic Conditions:

The proposed project shall have beneficial impacts on the employment, education, communication & transportation Health & Sanitation, Economic Condition etc.

Impact on Traffic Density

This is an existing project and only 14 more trucks will be included for mining and allied work. There will be little increase in motorized vehicle and cycle because of the movement of employees to the mining site. The traffic is manageable within the present capacity of the highway and the connective link from the highway to project site. The road is wide & black top to sustain the negligible increase.

Irreversible / Irretrievable Commitments of Environmental Components

Except short term aesthetic change, no irreversible variation in the pleasing environment will be there. The change in landscape is temporary in nature, which will soon be restored by backfilling of stored overburden and afforestation in that area.

Significance of Impacts

This activity has two distinct inter-related operations. Firstly it refers to the need to determine the importance of an impact. Secondly the relative importance of impacts in comparison with other impacts of a different nature some times are considered as part of the impact interpretation. This is termed as evaluation. The environmental impact evaluation follows the identification and quantification of the impacts. The significant impacts, which have been identified and quantified in the previous chapter, are based on the baseline data generated in the field during to December 2007 to February 2008. The data obtained from other sources like Indian Meteorological Department, Census of Orissa, Directorate of Economics and Statistics & other Government Organisations on different aspects have also been utilized. These are expressed in appropriate units in this chapter so as to get the aggregate score of the "Environmental Impact" of the mining lease area and its surroundings. This exercise results in a whole number that could be used in decision making without any ambiguity.

ENVIRONMENT MANAGEMENT PLAN

SALIENT ITEM	PROPOSAL AS PER APPROVED MINING SCHEME	POSITION AT THE END OF 5 YEARS OF MINING SCHEME PERIOD	PROPOSAL FOR THE NEXT FIVE YEAR SCHEME PERIOD
(1)	(2)	(3)	(4)
Top soil storage, preservation and utilisation	Since the area does not contain top soil there was no proposal.	No soil has been recovered.	No separate storage space has been kept for the purpose for the reason that there is no top soil as such in the area.
Land reclamation and rehabilitation	Since all the pits are in the mineralised zone no reclamation proposal was given	No reclamation has been done	Since in all development years, the quarry floor reaches ultimate depth, simultaneous backfilling proposal has been proposed with mining from 14-15 onwards. This backfilled area will be brought under plantation in 15-16. Same process would continue in subsequent years. Details have been shown in the below Table:
Waste dump management	one dump had been proposed	Dumping was done in Main Dump i.e. Dump 1.	For the next five years a single dump has been proposed at the site to the south of Main Quarry. Retreating method of dumping will be adopted. Proposal for erection of check dam and water garland drains with series of settling tanks around the quarry and dump have been made to prevent wash off from the dump
Afforestation programme with precautions for survival &	A total of 3300 saplings were proposed to be planted over	No plantation has been made.	Total 16000 sq. m. area along the boundary Safety zone will be covered with tree plantation. After backfilling of quarries

protection of plantation	2.0 Ha		plantation has been proposed over the backfilled area. An area of 32372 m² will be subjected to plantation from 2015-16 onwards.
Quality & make of water including surface and ground water	The area remains dry throughout the year except monsoon months. No chance of depletion of ground water. Mining activities have no effect on water quality.	No impact on water quality. No effect on ground water.	To prevent wash off of fines from dumps, check dams with water garland will be provided to avoid pollution of perennial source of water. Regular monitoring of air, water and noise has been proposed.
Noise level	Noise due to blasting and plying of tippers.	Precautions like timely maintainance of vehicles and machinerie undertaken	Same precautions will continue. Regular monitoring has been proposed.
Vibration	Due to blasting and excavators.	Precautions undertaken	Same precaulions will continue.
Treatment of mine water and effluent / toxic substances before discharge	No proposal was felt necessary	No treatment is done as there is no toxic substance.	No proposal. Regular monitoring has been proposed.
Recirculation of treated water	Recirculation not required.	Not required	Not required

The year wise program of tree plantation along safety zone is being given in below table:

Year	Area (m^2)	Type of saplings	No. of saplings	Location	Spacing m x m
2013-14	2700	Anacardium occidentale	432	Safety zone along the boundary line	2.5x2.5
2014-15	1800	Ziziphus Mjuba	288	Safety zone along the boundary line	2.5x2.5
2015-16	5600	Punica granatun	896	Safety zone along the boundary line	2.5x2.5
2016-17	3500	Psidium guajava	560	Safety zone along the boundary line	2.5x2.5
2017-18	2100	Mangifera indica	384	Safety zone along the boundary line	2.5x2.5
Total	16000		2560		

The year wise program of tree plantation on backfilled area is being given in below table:

Year	Area (m^2)	Type of sapings	No. of saplings	Location	Distance between saplings (m x m)
2015-16	8373	Punica granatun	1332	Backfilled area	2.5x2.5
2016-17	8302	Psidium guajava	1330	Backfilled area	2.5x2.5
2017-18	15697	Mangifera indica	2550	Backfilled area	2.5x2.5
Total	32372		5212		

Year	Total waste	Vol reqd to be backfilled (m^3)	Waste reqd for backfilling (m^3)	Location of backfilling proposal	Source of waste for backfilling	Remaining waste in the proposed dump(m^3)	Area to be backfilled (m^2)	Area to be rehabilitated (m^2)
				-	-	413273	-	-
13-14	413273	66290	60304	Exhausted area of 13-14	Dev of 14-15	-1071	8373	-
14-15	79230	151900	182280	Exhausted area of 14-15	Dev of 15-16 & ham dump	-128968	8302	8373
15-16	53312	152320	182784	Exhausted area of 15-16	Dev of 16-17 & ham dump	-129570	15697	8302
16-17	53814	152040	182448	Exhausted area of 16-17	Dev of 17-18 & ham dump	-63525	14611	15697
17-18	118923					90139	46983	32372
Total								

CHAPTER-X

10.0 ANY OTHER INFORMATION

a) Conservation of Minerals

For conservation of minerals, scientific mining has been planned which will be adhered to in future. Separate waste dump yard has been marked. The dump has been created in place where there is no or negligible sign of ore. This has been proved by putting bore holes. As the quality of fe ore is of high grade variety, the sub-grade does not pose a problem. Bulk of the sub-grade material will be blended to make the average marketable grade. The generation of non-marketable fines is also minimum. As there is clear cut difference between top overburden from ore, chances of mixing of overburden with ore is also less.

b) Protection of Environment

The mining has been planned in such a way that lateral extension of the faces is more, instead to depth.

CHAPTER-XI

11.0 PROGRESSIVE MINE CLOSURE PLAN

11.1 INTRODUCTION

Name of the lessee	Sri S C Padhee Address: At / Po – Joda Dist – Keonjhar Odisha. - 758034 Ph- 06767- 272394(o), 06767-27 2275(R)

Location & extent of lease area	District and State	:	Keonjhar, Odisha.
	Taluka	:	Barbil
	Village	:	Gurubeda
	Lease area (hectares)	:	49.776
	Toposheet No. 73 G/5	:	1: 50,000
	North latitude 21° 57' 54" to 21° 58' 14" and East longitude 85° 26' 39" to 85° 27' 23".		

Type of lease area (forest non – forest etc.)	A total of 49.214 Ha has been classified as DLC forest. As per the joint verification plan of state mining and forest department, an area of 40.227 hectares have already degraded prior to 25.10.80 due to mining and exploration.
Present land – use pattern	The lease area was previously devoid of forest land & represented by agricultural field, village site, road & waste land as per old settlement. However the land coming under Parbat-II Kissam has been converted to forest land as per D.L.C.

Class	Area In Hectares
Excavated land	32.361
Road	2.460
Dump	1.264
Mineral storage	Nil
Sub-grade	2.035
Magazine	0.089
Rest shelter, Building, Offices	1.518
Green belt	Nil
Untouched land	9.549
Total	**49.776**

Method of mining	Opencast mining by OTFM method
Mineral processing operations	Grade-wise hand sorting by manual means after crushing and screening.

11.1.1 Reasons for closure:

Predictable	The demonstrated mineable reserve is 6025584 MT which will last for another 15 years @ 400000 MT per annum of production of ore. Hence, closure of the mine in the near future due to exhaustion of ore is ruled out.
Unpredictable	Mining may close due to some natural calamities, accident, local issues or drastic fall in market demand or price.

Hence, closing of the mine as a whole does not arise at present

11.1.2 Statutory obligation:

This Progressive Mine Closure plan is submitted as is required under rule 23 B (2) of MCDR, 1988 for existing lease vide notification GSR 330(E) dated 10.04.2003.

IBM: Scheme of Mining being prepared for the leasehold in its approved **(Annexure – I)**

SPCB: Terms of Reference (TOR) has been approved by [illegible] (Annexure – X) and EIA/EMP is under preparation as per the approved TOR.

Forest: 49.040 Ha out of the total area of the leasehold comes under DLC. The Honorable High court has given a decision to continue mining in the broken up land which is 40.227 Ha and has been degraded prior to 25.10.1980. The FDP has been submitted & is under Process Copy enclosed vide Annexure – IX.

11.1.3 Closure plan preparation:

Name of the applicant	Sri S C Padhee
Names & address of the recognized Qualified person who prepared the Mining Closure Plan	Sri Chandrabhanu Das Geo Consultants Pvt. Ltd. 290 A, Bomikhal, In front of Ekamra Talkies Cuttack Road, Bhubaneswar -751010 (0674) 2575702, 9437111913(m) Regn. No.: RQP/BBS/52/2004/A
Name of the executing agency	Closure plan will be implemented by the Lessee himself

11.2 MINE DESCRIPTION

11.2.1Geology:

TOPOGRAPHY

The lease hold area is in general of hilly nature. The general topography is undulating in nature having one prominent hillock at the north western part. The topographic elevation vary from 458.5 to 585.5 having the general gradient towards north east in the central part of the lease hold.

GENERAL GEOLOGY

The Gurubeda lease hold area is a part of the 'Horse shoe shaped iron Ore Geosyncline' otherwise known as Keonjhar iron ore belt. Geologically the terrain forms a part of the oldest meta-sedimentary formations, which are correlated with the Dharwars / Pre-Cambrians in the geological column. The rock belong to the iron ore formations comprise of Schists, Tuffs, Phyllite, basic rocks, BHJ, BHQ, Shale etc and banded iron formations represented by Banded Hematite Jasper with iron ore and shale. Economic mineral deposits of iron ore confined to BIF. The host rocks, which form a part of the eastern limb of the famous horse-shoe-shaped Bonai synclinorium, are in consonance with the disposition of the synclinorium.

11.2.2 Reserve:

Summary of the **geological reserve** has been given in the following table.

	Reserve (MT)	Saleable (MT)	Sub-grade (MT)
Proved	4695023	3797721	897302
Probable	1429628	1208340	221288
Possible	549282	466595	82687
Total	6673933	5472656	1201277

GRADE WISE UPDATED GEOLOGICAL RESERVE

Iron ore reserve	
Grade in %	Tonnage in MT
45-50	330354
50-55	159338
55-58	711585
58-60	1294257
60-62	2406915
62-65	1771484
TOTAL	6673933

Mineable Reserve

Summary of the **mineable reserve** has been given in the following table.

	Reserve, MT	Saleable, MT	Sub-grade, MT
Proved	4624937	3758818	866119
Probable	1400647	1179360	221287
Possible	149624	66937	82687
Total	**6175208**	**5005115**	**1170093**

GRADE WISE UPDATED MINEABLE RESERVE

Iron ore reserve	
Grade in %	Tonnage in MT
45-50	314604
50-55	159338
55-58	696151
58-60	1180462
60-62	2265637
62-65	1559016
TOTAL	**6175208**

Demonstrated Reserve is 6025584 MT

UNFC:

		Iron ore in MT		
	Code	Saleable	Sub-Grade	Total
Reserve	121	3758818	-	3758818
	122	1179360	-	1179360
Remaining Resources	221	38903	897302	936205(gpr-mps)
	222	28980	221288	250268(gpr-mprs)
	333			549282(gpor)
Total		**5006061**	**894873**	**6673933**

11.2.3 Mining Method:

The proposed quarry is being operated in conventional bench method by semi-mechanised cum manual means. Machines under deployment are jack hammer drill, air compressor, tippers, pay loaders, dumpers, excavator etc. Eight meters wide haul road will be developed between quarry, dump and stack with 1:16 to 1:20 gradient.

Bench Geometry

Height of bench	6 m
Width of bench	6 m
Pit slope	45^0

Machines under deployment

Machines	Capacity	No
Wagon Drill	100 mm	1
Jack hammer	32Kg	1
Tractor compressor	3.39m³/min	1
Truck/tipper	10 MT	20
Proclain	8 C-0.9 m³	2
Rock Breaker	100TPH	1
Backhoe loader	8 C-0.3 m³ (HP-75)	1

Production

YEAR	Total ROM in m³	Ore From quarrying (in MT)	Ore From Rehandling of sub-grade stack	Total ore (in MT)	Saleable ore (in MT)	Non-saleable (Sub-grade) (in MT)
2013-14	66920	175665	336488(269191-Saleable and 67298- Non-saleable ore)	512154	409723	102431
2014-15	151980	398738	0	398738	318990	79748
2015-16	152320	399840	0	399840	319872	79968
2016-17	152040	399105	0	399105	319284	79821
2017-18	152180	399473	0	399473	319578	79895
TOTAL	675360	1772821	0	2109310	1687447	421863
AVERAGE	135072	354564		421862	337489	84373

11.2.4 Mineral Beneficiation:

It is planned by the lessee to install a 150TPH mobile crushing and the corresponding mobile screening plant for necessary crushing and screening to make the ore saleable. Then it is planned to sale directly iron ore to various user industries.

11.3 REVIEW OF IMPLEMENTATION OF MINING PLAN/SCHEME OF MINING INCLUDING FIVE YEARS PROGRESSIVE CLOSURE PLAN UPTO THE FINAL CLOSURE OF MINE.

The scheme of mining was approved for the period of five years from 2008-09 to 2012-13. The following commitments were made in the PMCP and the actual achievements during the period are as follows:

(I) Construction of garland drain:

Year	Location	particulars	Particulars and size (L x B x H) in m	Achievement	Reason of shortfall
2008-09	2005-25W	Quarry	110x3x2	Nil	Due to discontinuous mining operation

Year	Location	particulars	Particulars and size (L x B x H) in m	Achievement	Reason of shortfall
2008-09	3005-200W	Dump	185x3x2	Nil	Due to discontinuous mining operation

(ii) Construction of retaining wall around the Dump:

Year	Location	particulars	Size (L x B x H) in m	Achievement	Reason of shortfall
2008-09	3005-200W	Dump	190 x 2 x 3	Nil	Due to discontinuous mining operation

iii) Afforestation:

As no quarry was to exhausted in the last pmcp period, plantation has been proposed in the safety zone area. However no plantation has been taken up in the lease area as the mine was closed since 2009.

Year	Target (Nos)	Achievement	Shortfall/excess & reasons for deviation
2008-2009	640	Nil	The mine is temporarily closed from Sept 2009
2009-2010	640	-do-	
2010-2011	640	-do-	
2011-2012	640	-do-	
2012-2013	640	-do-	

(iii) Environmental aspects:

It was proposed for regular monitoring of air, water and noise within the lease area and the buffer zone. However, monitoring has not been done after 2008 as the mine is temporarily closed since Sept 2009 due to want of statutory clearances.

11.4 CLOSURE PLAN

11.4.1 Mined out land:

A total of 25.248 hectares of land will be excavated till the end of the scheme period.

Similarly, a total of 40.015 ha. of land will be excavated during conceptual period after completion of exploration proposed in the ensuing scheme period.

Type of land use	At present (Ha)	During scheme period (Ha)	Total in Ha	Total Area in the Conceptual period	Total Area in the Conceptual period after final Mine closure
Area of excavation	32.861	- 7.613	25.248*	28.679	Nil
Overburden dump	1.264	2.234	3.498**	3.49	Nil
Mineral storage	0	0.476	0.476	Nil	Nil
Sub-grade stock	2.035	- 0.577	1.458***	Nil	Nil
Infrastructure	1.518	0.643	2.161	0.9	0.9
Township	Nil	Nil	Nil	Nil	Nil
Roads	2.460	Nil	2.460	2.460	2.46
Green belt	Nil	1.60	1.60	2.81	2.81
Magazine	0.089	Nil	0.089	Nil	Nil
Area for future exploration & Min	Nil	Nil	Nil	6.638	Nil
Backfilled /Rehabilitated area	Nil	4.698	4.698	4.698	43.505
Total	40.227	9.651-8.19=1.461	41.698	49.675	49.675

- **For details of calculation please refer the table No 4.1**

The lessee has a plan to drill some more coring boreholes in the area to prove the ore. After delineation of the ore body the limit of excavation will be certainly changed which will be reflected in the next scheme.

It is planned to reclaim the mine out land by backfilling. The stored wastes of the dumps will be used for the purpose simultaneously with mining.

Simultaneous backfilling will commence from the first year of the next scheme period when there will be sufficient excavated area, which can be backfilled.

However in the ensuing scheme period the lessee has proposed to backfill the exhausted quarries simultaneously with mining. The year wise proposal of backfilling is as follows,

Year	Area to be backfilled in m²	Waste required to backfill in m³	Backfilled area for plantation (m²)	No of Saplings
2014-15	8373	80304	-	-
2015-16	8302	182280	8373	1332
2016-17	15697	182784	8302	1330
2017-18	14611	182448	15697	2550
Total	**46983**	**627816**	**32372**	**5212**

11.4.2 Water Quality Management:

11.4.2.1 Existing Surface Water Bodies

Baitarani river flows adjacent to the eastern boundary of the ML area and is the main drainage artery of the locality.

11.4.2.2 Existing Ground Water Bodies

Existing ground water body will not be affected by the mining as the level of operation is much above the water table.

11.4.2.3 Water Quality Management

Water is found to be fit for general use and there is no industrial water involved. The total processes are such that no water treatment has been felt necessary and as a result, the chances of water getting polluted, is negligible. Regular monitoring has been proposed for both surface and UG water bodies.

Working benches will be kept free from loose overburden/ waste materials. Check dam will be constructed around the dump to prevent wash off of loose sediments. All drainage systems for surface water flow will be cleared for free natural flow of rain water.

Garland drains have been proposed around the quarry and the proposed dump in the first year of the scheme period to guide surface run-off from the dump and quarry to the nearby natural nala course. Water thus collected will be directed to a series of settling ponds from where it will be directed to the natural nala. The waste thus collected in the settling tank will be analyzed to contain no chemically hazardous mineral, which may get leached out & contaminate the water bodies.

Construction of garland drain around the Dump.

Year	Location	particulars	Particulars and size (L x B x H) of garland drain to be constructed in mtr
2013-14	450E-300S	Dump	350x3x2

11.4.3 Air Quality Management:

11.4.3.1 Existing Air Quality Status

There exists no industrial activities within 5 km radius of the ML area. Therefore, air pollution will be below the permissible limit.

11.4.3.2 Corrective Measures

11.4.3.3 Monitoring

Regular monitoring of air and noise level will be carried out at potential points.

11.4.3.4 Management

An area of 1.36 Hect is proposed to be planted along safety zone (in the 3.237 Ha on the backfilled area with 5212 saplings (Ref Chapter- 9.0 of the scheme). Water sprinkling will be done over the dust prone areas such as haul road, working faces, loading and unloading points etc. In the conceptual period, the total area would be brought under plantation.

11.4.4 Waste Management:

Presently in the lease area there are three existing dumps with a sub-grade stock acquiring over an area of 32990m². All these dumps & sub-grade stock are present in the mineralized area. As those are present in the mineralized area therefore there is planning of rehandling dumps 2, 3 & sub-grade stock (1) in year 2013-14 having a total vol. of 480699 m³ of waste. After recovery of the 20% ore from dump-2,3 & SG 1, the remaining 80% waste i.e 384559 m³ will be accommodated in the proposed dump. The proposed dumping site has already been proved to be barren through boreholes. The existing sub-grade stock 1 is located in that site. So after rehandling of this sub-grade stock the generated waste along with the waste of the development of this scheme period are proposed to be accommodated on the same earmarked area.

In the ensuing scheme period development has been proposed till the end of the mineralization from the NW part of the quarry. So simultaneous backfilling proposal has been planned with mining from 14-15 onwards. The waste generated in 2013-14 i.e 28714 m³ (swell waste) will be accommodated in the proposed dump along with the rehandled waste of sub-grade stock which is 384559m³. The maximum area of the proposed dump will be 28900 m². Adding the existing dump No2 total area under dumping shall be 34900 m². From 14-15 onwards the waste generated from the quarry will be utilized for backfilling of area degraded in the previous year. All the waste to be generated in the 14-15 year will be utilized for backfilling of exhausted area of 13-14. If there is a shortfall of required waste for backfilling, dumped waste will be utilised for the purpose. The backfilled area of 14-15 shall be rehabilitated through plantation in 15-16. The process would continue in subsequent years of the scheme period. The details has depicted in the below tables:

Year	Total waste	Vol reqd to be backfilled (m^3)	Waste reqd for backfilling (m^3)	Location of backfilling proposal	Source of waste for backfilling	Remaining waste in the proposed dump(m^3)	Area to be backfilled (m^2)	
13-14	413273		-			413273		
14-15	79233	66290	80304	Exhausted area of 13-14	Dev of 14-15	-10771	8373	
15-16	53312	151900	182280	Exhausted area of 14-15	Dev of 15-16 & from dump	-128968	8302	8373
16-17	53214	152320	182784	Exhausted area of 15-16	Dev of 16-17 & from dump	-129570	15697	8302
17-18	118923	152040	182448	Exhausted area of 16-17	Dev of 17-18 & from dump	-63525	14611	15697
Total						90139	46183	32372

Year	Waste to be dumped (m^3) Cumulative	Area of dumping (m^2)	Ht of dump (m)	No of terraces
13-14	413273	28900	24	3
14-15	412202	28900	24	3
15-16	283234	28900	16	2
16-17	153664	14297	16	2
17-18	90139	9015	8	1

The retreating method of dumping will be adopted. The highest R.L of the proposed dump will be 527m. Ultimate slope of the dump will be around 20° (Ref-plate-VA). The dump has been designed in retreating method.

The Protective measures and precautions to be under taken for the waste dump the management shall be as follows:

- The ultimate dump slope will be maintained at 20°-22° with individual terraces slopes not exceeding 37°
- The individual terrace heights will be maintained at 8m.
- Each terrace will have inward slope with catch drains at the inward side of the terrace.
- The catch drains of the individual terrace will be connected to the garland drain outside the periphery of the dump.
- These catch drains will have half concrete open pipes followed by settling tanks to avoid wash offs.
- Each terrace will also have a provision of berms at the outer end to reduce gully formation due to rain water wash offs.

- The retaining wall has to be made to arrest the waste dump material for consolidation during the year 2013-14.
- Garland drains are to be paved around the dump to arrest possible wash off in rainy seasons during the year 2013-14.
- Suitable grass/plant species will be paved in the dump slope, which will hold the materials in its fibrous and spread over roots to protect wash off in the rainy seasons
- Plantations of grass and saplings will be done from the year 2013-14 onwards.

Conceptually:

Laterite, shale and Lateratic soil constitute the bulk of the waste generated in the mine. During the conceptual period a total of 1581111 m^3 of waste (swell vol.) will be generated. It is planned to reclaim the mine out land by backfilling simultaneously with mining from 14-15. The stored wastes of the dump will be used fully for the purpose.

Swelled volume of waste = 1581111 m^3
Surface area of excavation = 400150 m^2
Average depth of the mined out land 12 m
Can be utilized for backfilling of =1581111 m^3 /12 /1.2 = 109799 m^2
(1.2 considered as the compaction factor)
The rest area i.e.290351 m^2 will be subject for bench plantation by using 46456 nos. of saplings
Hence, at the conceptual period the total dump will be utilized for backfilling the mined out area. The backfilled area will be brought under plantation for rehabilitation.

Year	Dump no	Nature of dump i.e I.B.+O.B.	Area at the beginning of the year (m^2)	Additional area during the year (m^2)	Total Area in (m^2)	Area rehabilitated during the year (m^2)	Area at the end of the year (m^2)
2013-14	1	Laterite	12640	22340	34980	Nil	34980
2014-15			34980	Nil	34980	nil	34980
2015-16			34980	Nil	34980	nil	34980
2016-17			34980	Nil	34980	nil	34980
2017-18			34980	Nil	34980	nil	34980

In the scheme period, to control erosion of the dumps, regular compaction, development of terraces and plantation have been proposed. Also, retaining wall and garland drain are proposed to arrest wash offs from the dump.

Construction of retaining wall around the Dump

Year	Location	particulars	Particulars and size (L x B x H) of retaining wall to be constructed in meter
20013-014	450E-300S	Dump, sub-grade & mineral stock	680 x 2 x 3

11.4.5 Top-soil Management:

As such there is no soil cover in the proven portion of the lease area, hence the storing of top-soil does not arise during this scheme period. Through future exploration if presence of top-soil is found, space will be earmarked in the lease to store the top soil, which will be discussed in the second scheme period.

11.4.6 Tailing Dam Management:

As there is production of tailing, management of tailing dam does not arise.

11.4.7 Infrastructure:

Existing

Express Highway No-2 connecting Banspani and Bamebari passes through the area. Banspani is the railway siding, which 3 kms away from the area.

Proposed

No more infrastructures are proposed for future.

Disposal of Mining Machinery:

There is no possibility of decommissioning of the mining machineries during the scheme period.

11.4.9 Safety and Security:

During Mining

- Mining area will be fenced off to prevent falling down of man and animals.
- A guard will be employed to prevent pilferage or theft.

11.4.10 Disaster Management and Risk Assessment:

- Geological and climatic hazards such as landslide, subsidence and inundation is not expected as because the working is by opencast mining
- Although earthquake was felt several times in Odisha, this part of the state has remained unaffected.
- Flood due to river action is not expected due to higher surface relief of the area
- Small scale fire is possible, which can be tackled by fire extinguishers.

11.4.11 Care & Maintenance during temporary discontinuance:

Temporary discontinuance of mining may happen due to below causes:

- Court order

- Natural calamities
- Mine related accident
- Slope failure
- Failure in fulfilment of statutory requirement
- Local issues, or
- Any other unforeseen circumstances

During temporary discontinuance, the following measures can be undertaken partly/fully depending upon the cause:

- Intimation to local mine & legal administrative authorities regarding the discontinuance
- Listing of machines and materials
- Care and maintenance of machineries
- Tightening of security to keep the machine and materials safe and secured
- Preparation of plans and sections at the time of discontinuance
- Repair and maintenance of haul roads
- Regular monitoring of air, water, noise etc in the permitted zones

11.5 ECONOMIC REPERCUSSION OF CLOSURE OF MINE & MANPOWER RETRENCHMENT:

11.5.1 Number of local residents employed in the mine, status of continuation of family member:

Not applicable as there is no chance of closure of the mine.

11.5.2 Compensation given or to be given to the employees in connection with sustenance of himself and their family member:

Not applicable

11.5.3 Satellite occupations connected to the mining industry, number of persons engaged there in, continuance of such business after closure:

Not applicable

11.5.4 Continued engagement of employees in the rehabilitated status of mining lease area and any other remnant activities:

Not applicable

11.5.5 Envisaged repercussions on the expectation of the society around due to closure of mine:

Not applicable as there is no chance of closure of the mine.

11.6 TIME SCHEDULING FOR ABANDONMENT:

11.6.1 Reclamation & rehabilitation of mine-out land

Total volumes of 1581111 m^3 of waste are to be backfilled. Taking an average of 1000 m^3 of backfilling per day time required will be = 1581111 /1000= 1581 days. Taking 20% excess total no of days required will be =2055 days.

Hence, it is planned to do the backfilling simultaneously with the mining from 14-15.

11.6.2 Measure to be taken for protection of water bodies available in the lease area including control of erosion, sedimentation and siltation, water treatment, diversion of water courses, protection of contamination of ground water from leaching, treatment of acid mine drainage etc –

Not applicable.

11.6.3 Corrective measures taken for prevention of pollution of air quality:

To control air pollution, preventions and measures has been taken near the inhabited site and workers hutting.

11.6.4 Disposal of waste material and protective measures to be taken from generation of air, water and land pollutants while handling waste material:

Protective measures to be undertaken after cessation of mining activities are:

- Vegetation will be taken up around the excavated land, which will take at-least eighteen months for completion.

11.6.5 Management of top-soil and protective measures to be taken:

Not applicable in the scheme period.

11.6.6 Protection and stabilization of tailing dam frequency of desilting of tailing material protective measures to be taken for prevention of water bodies:

Not applicable.

11.6.7 Decommissioning, dismantling and disposal of various infrastructure facilities: Not applicable.

11.6.8 Decommissioning of mining machineries: As the lessee possesses other mines the operating machineries will be shifted to other mining sites.

11.6.9 Safety measures to be implemented to prevent access to surface opening, excavations:

The main quarry will be fenced.

11.6.10 Measures of care, maintenance and monitoring of status of unplanned discontinued mining operations:

Not applicable.

11.7 ABANDONMENT COST:

11.7.1 Decommissioning / Demolition:Rs 5.0 lakh

11.7.2 Removal of infrastructure: Rs 2.0 lakh

11.7.3 Removal of equipments and heavy machineries: Rs 2.0 lakh

11.7.4 Site safety: Fencing- Rs 20.0 lakh

11.7.5 Remediation / Mitigation measures:

11.7.5.1 Construction of check dam Rs 3.0 lakh

11.7.5.2 Providing garland drain: Rs 2.0 lakh

11.7.5.3 Total amount required under 11.7.5.1 & 11.7.5.2 - Rs 5.0 lakh

11.7.5.4 Standard cost norm for enrichment of plantation per hectare is as under:

11.7.5.4.1 Pre-planting and nursery:

Sl No	1600 plants per Ha	Wage rate Rs 250/	
	Item of work	Mandays reqd.	Amount (Rs)
1	Site preparation	5	1250
2	Alignment & stacking	4	1000
3	Cost of stacking materials	Lump-sum	1200
4	Nursery cost of 400 seedings @Rs 3.00	-	2000
5	Pitting	10	2500
Sub-total			7950

11.7.10.2.1 Creation and maintenance

1	Carriage and planting	10	2500
2	Weeding, soil working and manuring (thrice)	18	4500
3	Application of insecticides (thrice)	3	750
4	Fireline tracing inspection path	4	1000
5	Cost of fertilizer and insecticides	lumpsum	1500
6	Watch and ward	30	7500
Sub-total			17750
Grand total			25700

Reclamation and rehabilitation of workings

11.7.6.1	Total waste required to be rehandled	1581111 m^3
11.7.6.2	Cost required for rehandling /backfilling @ Rs 55/- per m^3	1581111 x 55= Rs 9[illegible] cores
11.7.6.3	Cost required for leveling and compaction of 40 Hect of mined out area @ Rs 150000/- per Hect	40 x 15000 = Rs 60.0 lakh
11.7.6.4	Cost required for rehabilitation by way of vegetation in backfilled area over 11 Hect @ Rs 25,700/- per Hect (Ref 7.5.4.2)	25700 x 33 =Rs 3.0 lakh
11.7.6.5	Total amount required for reclamation and rehabilitation	9.63 cores

11.7.7 Maintenance / Monitoring during and after closure operation: Rs 5.0 lakh.

11.7.10 Retrenchment and relocation cost: Not applicable.

11.7.11 Research and development: Not applicable.

11.7.12 Administrative / management:

11.7.10.1 Fees for preparation of Final mine closure plan along with collection of data: Rs 10.0 lakh

11.7.10.2 Salary and wages of supervisory personnel for monitoring closure activities for two years- Rs 5.0 lakh@ Rs 20000/- per month.

11.7.10.3 Total- Rs 20,00,000/-

Grand total cost for abandonment is (Ref. 11.7.2, 11.7.3, 11.7.5.3, & 11. 7.6.5.) = 1268 lakh = Rs10.17 crore

*Calculation is based upon the present status of exploration, which is subject to change by detail proving of the ore body.

PROPOSAL FOR ITEM NO. 6 & 7 OF PMCP FOR THE YEAR 2013-14

ITEMS	DETAILS	AREA (HECT.) PROPOSED	QUANTITY IN m3 PROPOSED	EXPENDITURE (Rs.) PROPOSED	
(A) RECLAMATION & REHABILATION OF MINED OUT LAND AREA	(i) Backfilling				
	(ii) Afforestation on the backfilled area	Nil	Nil	Nil	
	(iii) Others (please specify) e.g. Afforestation on exhausted benches				
	(iv) pisciculture	Nil	Nil	Nil	
	(v) Covering into water reservoir	Nil	Nil	Nil	
	(vi) Picnic Spot	Nil	Nil	Nil	
(B) STABILISATION & REHABILATION OF DUMPS (with lease)	(i) Terracing				
	(ii) Pitching		3 Nos	200000	
	(iii) Construction of Parapet walls/Retaining wall at toe of dumps	1 No	680m x 2m x 2m	300000	
	(iv) Construction of Check Dams along slope of valleys etc.			Nil	
	(v) Construction of Settling Ponds (Geotond drains etc)	1 No	350m x 3m x 2m	120000	
	(vi) Desilting of settling ponds, Channels	Nil	Nil	Nil	
	(vii) Afforestation of dumps	Nil	Nil	Nil	
	(viii) Others (Please specify)		452 nos	Rs 200000/-	Safety Zone
(C) REHABILATION OF BARREN AREA WITHIN LEASE	(i) Afforestation (green belt buiding)				
	(ii) Others (Please specify)				
(D) ENVIRONMENTAL MONITORING (core zone	(i) Ambient air quality		3	20000	
	(ii) Water Quality		2	10000	
	(iii) Noise Level Survey		4	30000	
	(iv) Ground Vibration		-	-	
	(v) Others (Soil & Dust)		-	-	
			1	10000	
(D) ENVIRONMENTAL MONITORING (buffer zone	(i) Ambient air quality		2	20000	
	(ii) Water Quality		1	10000	
	(iii) Noise Level Survey				
	(iv) Ground Vibration		2	20000	
	(v) Others, Soil Dust		1	10000	
	TOTAL			930000	

PROPOSAL FOR ITEM NO. 6 & 7 OF PMCP FOR THE YEAR 2014-1

ITEMS	DETAILS	AREA (HECT.)	QUANTITY in m3	EXPENDITURE (Rs.)	
		PROPOSED	PROPOSED	PROPOSED	
(A) RECLAMATION & REHABILATION OF MINED OUT LAND AREA	(i) Backfilling	0.8771	83580	46,00,000	
	(ii) Afforestation on the backfilled area	-	-	-	
	(iii) Others (please specify) e.g. Afforestation on exhausted benches	Nil	Nil	Nil	
	(iv) pisciculture	Nil	Nil	Nil	
	(v) Covering into water reservoir	Nil	Nil	Nil	
	(vi) Picnic Spot	Nil	Nil	Nil	
(B) STABILISATION & REHABILATION OF DUMPS (with Sesse)	(i) Terracing	-	1 No	00000	
	(ii) Pitching	-	-	-	
	(iii) Construction of Parapet wals/Retaining wall at toe of dumps	-	-	-	
	(iv) Construction of Check Dams along slope at valies etc.	-	-	Nil	
	(v)Construction of Setting Ponds (Garland drains etc.)	-	-	-	
	(vi) Desilting of setting ponds, Channels	Nil	Nil	Nil	
	(vii)Afforestation of dumps	Nil	Nil	Nil	
	(viii)Others (Please specify)				
(C) REHABI-LATION OF BARREN AREA WITHIN LEASE	(i) Afforestation (green belt building)	-	288 nos	Rs 200000/-	Safety Zone
	(ii) Others (Please specify)	-	-	-	
(D)ENVIRONMENTAL MONITORING (core zone	(i) Ambient air quality	-	3	30000	
	(ii) Water Quality	-	2	10000	
	(iii) Noise Level Survey	-	4	30000	
	(iv) Ground Vibration	-	-	-	-
	(v) Others (Soil & Dust)	-	-	-	-
(D)ENVIRONMENTAL MONITORING (buffer zone	(i) Ambient air quality	-	1	10000	-
	(ii) Water Quality	-	2	20000	-
	(iii) Noise Level Survey	-	1	10000	-
	(iv) Ground Vibration	-	-	-	-
	(i) Others, Soil Dust	-	2 1	20000 10000	-
	TOTAL			50,30,000	

PROPOSAL FOR ITEM NO. 6 & 7 OF PMCP FOR THE YEAR 2015-16

ITEMS	DETAILS	AREA (HECT.) PROPOSED	QUANTITY IN m3 PROPOSED	EXPENDITURE (Rs.) PROPOSED	
[A] RECLAMATION & REHABILATION OF MINED OUT LAND AREA	(i) Backfilling	1.9265	191240	106,00,000	
	(ii) Afforestation on the backfilled area	0.8075	-	25000	
	(iii) Others (please specify) e.g. Afforestation on exhausted benches	Nil	Nil	Nil	
	(iv) pisciculture	Nil	Nil	Nil	
	(v) Covering into water reservoir	Nil	Nil	Nil	
	(vi) Picnic Spot	Nil	Nil	Nil	
[B] STABILISATION & REHABILATION OF DUMPS (with Sketch)	(i) Terracing	-	-	-	
	(ii) Pitching	-	-	-	
	(iii) Construction of Parapet wall/Retaining wall at toe of dumps	-	-	Nil	
	(iv) Construction of Check Dams along slope of valley etc.	-	-	-	
	(v)Construction of Settling Ponds (Garland drains etc.)	-	-	-	
	(vi) Desilting of settling ponds, Channels	1 no	-	1,00,000	
	(vii)Afforestation of dumps	Nil	Nil	Nil	
	(viii)Others (Please specify)				
(C) REHABILATION OF BARREN AREA WITHIN LEASE	(i) Afforestation (green belt building)	-	2300 nos	Rs 10,00,000/-	Safety Zone & backfilled area
	(ii) Others (Please specify)	-	-	-	
(D)ENVIRONMENTAL MONITORING (core zone	(i) Ambient air quality	-	3	30000	-
	(ii) Water Quality	-	2	16000	-
	(iii) Noise Level Survey	-	4	30000	-
	(iv) Ground Vibration	-	-	-	-
	(v) Others (soil & Dust)	-	-	-	-
(D)ENVIRONMENTAL MONITORING (buffer zone	(i) Ambient air quality	-	1	10000	-
	(ii) Water Quality	-	2	20000	-
	(iii) Noise Level Survey	-	1	10000	-
	(iv) Ground Vibration	-	-	-	-
	(v) Others Soil Dust	-	2	20000	-
			1	10000	
	TOTAL			116,55,000	

PROPOSAL FOR ITEM NO. 6 & 7 OF PMCP FOR THE YEAR 2016-17

ITEMS	DETAILS	AREA (HECT.)	QUANTITY IN m3	EXPENDITURE (Rs.)	
		PROPOSED	PROPOSED	PROPOSED	
(A) RECLAMATION & REHABILATION OF MINED OUT LAND AREA	(i) Backfilling	1.75	190960	10600000	
	(ii) Afforestation on the backfilled area	1.9285	-	50,000	
	(iii) Others (please specify) e.g. Afforestation on exhausted benches	Nil	Nil	Nil	
	(iv) pisciculture	Nil	Nil	Nil	
	(v) Covering into water reservoir	Nil	Nil	Nil	
	(vi) Picnic Spot	Nil	Nil	Nil	
(B) STABILISATION & REHABILATION OF DUMPS (with Sesse)	(i) Terracing	-	-	-	
	(ii) Pitching	-	-	-	
	(iii) Construction of Parapet wall/Retaining wall at toe of dumps	-	-	Nil	
	(iv) Construction of Check Dams along slope of valley etc	-	-	-	
	(v) Construction of Settling Ponds (Garland drain etc.)	1 no	nil	1,00,000	
	(vi) Desilting of settling ponds, Channels	Nil	Nil	Nil	
	(vii) Afforestation of dumps				
	(viii) Others (Please specify)	-	3646 no's	Rs 1600000/-	Safety Zone & backfilled area
(C) REHABILATION OF BARREN AREA WITHIN LEASE	(i) Afforestation (green belt building)	-	-	-	
	(ii) Others (Please specify)				
(D) ENVIRONMENTAL MONITORING (core zone	(i) Ambient air quality	-	3	20000	
	(ii) Water Quality	-	2	10000	
	(iii) Noise Level Survey	-	6	30000	
	(iv) Ground Vibration	-	-	-	
	(v) Others (Soil & Dust)	-	-	-	
(D) ENVIRONMENTAL MONITORING (buffer zone	(i) Ambient air quality	-	1	10000	
	(ii) Water Quality	-	2	20000	
	(iii) Noise Level Survey	-	1	10000	
	(iv) Ground Vibration	-	-	-	
	(i) Others. (Soil Dust)	-	2 1	20000 10000	
	TOTAL			12486000	

PROPOSAL FOR ITEM NO. 6 & 7 OF PMCP FOR THE YEAR 2017-18

ITEMS	DETAILS	AREA (HECT.)	QUANTITY IN m3	EXPENDITURE (Rs.)	
		PROPOSED	PROPOSED	PROPOSED	
(A) RECLAMATION & REHABILATION OF MINED OUT LAND AREA	(i) Backfilling	1.4375	(90640)	406,00,000	
	(ii) Afforestation on the backfilled area	1.35	-	50,000	
	(iii) Others (please specify) e.g. Afforestation on exhausted benches	Nil	Nil	Nil	
	(iv) pisciculture	Nil	Nil	Nil	
	(v) Covering into water reservoir	Nil	Nil	Nil	
	(vi) Picnic Spot	Nil	Nil	Nil	
(B) STABILISATION & REHABILATION OF DUMPS (with Sesse)	(i) Terracing	-	-	-	
	(ii) Pitching	-	-	-	
	(iii) Construction of Parapet wall/Retaining wall at toe of dumps	-	-	Nil	
	(iv) Construction of Check Dams along slope of valley etc.	-	-	-	
	(v)Construction of Settling Ponds (Garland drains etc.)	-	-	1,00,000	
	(vi) Desilting of setting ponds, Channels	1 no	-	Nil	
	(vii)Afforestation of dumps	Nil	Nil		
	(viii)Others (Please specify)				
(C) REHABILATION OF BARREN AREA WITHIN LEASE	(i) Afforestation (green belt building)	-	3184nos	Rs 1500000/-	Safety Zone & backfilled area
	(ii) Others (Please specify)	-	-	-	
(D)ENVIRONMENTAL MONITORING (core zone	(i) Ambient air quality	-	3	20000	
	(ii) Water Quality	-	2	10000	
	(iii) Noise Level Survey	-	4	30000	
	(iv) Ground vibration	-	-	-	
	(v) Others (soil & Dust)	-	-	-	
(D)ENVIRONMENTAL MONITORING (buffer zone	(i) Ambient air quality	-	1	10000	
	(ii) Water Quality	-	2	20000	
	(iii) Noise Level Survey	-	1	10000	
	(iv) Ground Vibration	-	-	-	
	(i) Others, Soil Dust	-	2 1	20000 10000	
	TOTAL			123,80,000	

11.8 FINANCIAL ASSURANCE

The calculation is as below:

(As per CCOM's Circular No.4/2006)

Sl no	Head	As at present (in Ha)	Additional requirement during scheme period (in Ha)	Total (in Ha)	Area considered as fully reclaimed & rehabilitated (in Ha)	Net area considered for calculation (in Ha)
		A	B	C=A+B	D	E=C-D
1	Area under mining	32.861	-7.613	23.96*	0.000	23.96
2	Storage for top soil	0.000	0.000	0.000	0.000	0.000
3	Overburden dump	1.264	2.234	3.49**	0.000	3.49
4	Mineral storage	0.000	0.476	0.476	0.000	0.476
5	Infrastructure (workshop, administrative building etc.)	1.607	0.00	1.607	0.000	1.607
6	Roads	2.460	0.000	2.46	0.000	2.46
7	Railways	0.000	0.000	0.000	0.000	0.000
8	Green belt	0.000	1.60	1.60	0.000	1.60
9	Tailing pond	0.000	0.000	0.000	0.000	0.000
10	Effluent treatment plant	0.000	0.000	0.000	0.000	0.000
11	Mineral separation plant	0.000	0.643	0.643	0.000	0.643
12	Town ship area	0.000	0.000	0.000	0.000	0.000
13	Others i. Subgrade ii. Excavaed area to be backfilled and rehabilitated	2.035 0.0	-0.577 4.698	1.458*** 4.698	0.000 0.000	1.458 4.698
Grand Total		40.227	9.651-8.19=1.461	41.688	0.00	41.688

*This is equal to 32.861- (4.698 [proposed for backfilling] - 0.656 [proposed for backfilling from existing dumps D2 & D3] - 0.36 [proposed for backfilling from existing SG stack=3.682]) - (2.89 [proposed for dumping] - 0.46[proposed for dumping from existing SG stack=2.43]) – 0.643 [proposed

for infrastructure) – 1.458 (proposed for SG stack) – [0.476(proposed for [illegible]
– 0.101(existing outside the excavated area=0.375)] – 0.24 (plantation [illegible]
within the excavated area) + (1.215 (area included in the area to be
excavated which was earlier in the SG stack)= 23.96 Ha
**This is equal to 1.264+ 2.89 – 0.656 (area of Dump 2 & 3 proposed to be
utilized for excavation and backfilling)= 3.498 Ha
***This is equal to 2.035 + 1.458 – {[0.36(proposed for excavation)] + [0.46
(proposed for dumping)] + (1.215 (proposed for future excavation)]} = 1.458
Ha.

As the mine is a **Category-A** mine, financial assurance at the rate of Rs 25,000/- per hectare has been taken into account for calculation of total financial assurance. Therefore, the total financial assurance comes to be 41.688x Rs 25,000/- =Rs 10,42,200/- (Rupees ten Lakh forty two thousand two hundred only) and Bank Guarantee of the above amount has been submitted along with the document.

11.9 CERTIFICATE AND UNDERTAKING.

An undertaking to the effect is attached to implement progressive closure plan in a time bound manner.

11.10 PLANS, SECTIONS ETC.

The plans and sections of this scheme of mining may be referred for different purposes.

अनुमोदित
APPROVED

10/13

क्षेत्रीय खान नियंत्रक
REGIONAL CONTROLLER OF MINES
भारतीय खान ब्यूरो
INDIAN BUREAU OF MINES
भुवनेश्वर/ BHUBANESWAR