SCHEME OF MINING

(Under Rule 12 of MCDR 1988)

&

PROGRESSIVE MINE CLOSURE PLAN

(Under Rule 23 of MCDR 1988)

Volume - I (Text)

Nuagaon Iron Ore Mines

(In villages - Nuagaon, Guali etc in Keonjhor District, Odisha)

Mining Lease area - 767.284 Ha)

Date of Lease Execution - 04.03.1959 to 03.03.1979

Renewal of ML executed on 07.09.1981 (04.03.1979 to 03.03.1999)

Renewal of ML filed on 28.02.1998 (04.03.1999 to 03.03.2019)

Forest Land - 525.762 Ha

Non Forest Land - 241.522 Ha

Category - A (Fully Mechanized)

Prepared by

Sri P. S. Acharya, RQP/NGP/027/87/A & Sri S. M. Patro, RQP/CAL/175/93/A

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HIG A/10, Baramunda Housing Board Colony, Baramunda

Bhubaneswar – 751 003 (Odisha)

Tel – (0674) 2552054 / Mobile No – 09437008179/09861093020

K. J. S. Ahluwalia

Mining Lessee

Barbil, Dist - Keonjhor, Odisha

Prepared for the Period from 2014-15 to 2018-19

Certificate

This is to certify that the provisions of Mineral Conservation and Development Rules, 1988 have been observed in preparation of the Scheme of Mining and Progressive Mine Closure Plan of Nuagaon Iron Ore Mines of M/s KJS Ahluwalia for the period from 20014-15 to 2018-19 over an area of 767.284 Ha, situated in villages Nuagaon, Guali etc in Keonjhor District in Orissa and wherever specific permission is required, the applicant will approach the Regional Controller of Mines, Indian Bureau of Mines Govt. of India, Bhubaneswar for granting permission.

Bhubaneswar
27.03.2013

P. S. Acharya
RQP/NGP/027/87/A

S. M. Patro
RQP/CAL/175/93/A

KAMALJEET SINGH AHLUWALIA

Mines Owner & Exporter

Office : P. B. No.: 3, In front of MMTC Weigh Bridge, At/Po.: Barbil - 758 035, Dist.: Keonjhar, Odisha, India

Telefax : 06767 - 270049, E - mail : kjsahluwalia@rediffmail.com

Certificate by the Lessee

The provisions of Mines Act, Rules and Regulations made there under have been observed in the Scheme of Mining along with Progressive Mine Closure Plan of Nuagaon Iron ore Mines of M/S Kamaljeet Singh Ahluwalia for the period of 2014-15 to 2018-19 over an area of 767.284 Ha, in villages Nuagaon, Guali etc in Keonjhor District in Orissa and wherever specific permission is required, the applicant will approach to the D.G.M.S. Further, standards prescribed by DGMS in respect of miner's health will be strictly implemented. The information furnished in the Scheme of Mining is true & correct to best of our knowledge.

Bhubaneswar
27.03.2013

P. S. Acharya
RQP/NGP/027/87/A

S. M. Patro
RQP/CAL/175/93/A

K.J.S.Ahluwalia
Mining Lessee

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CONSENT LETTER FROM THE APPLICANT

The Scheme of Mining along with Progressive Mine Closure Plan of Nuagaon Iron ore Mines of M/S Kamaljeet Singh Ahluwalia for the period of 2014-15 to 2018-19 over an area of 767.284 Ha, in villages Nuagaon, Guali etc in Keonjhor District in Orissa have been prepared under Rule 12 of MCDR 1988, by Sri S. M. Patro and Sri P. S. Acharya, Consulting Geologist of M/s GEMTECH Consultants Pvt. Ltd., Bhubaneswar and the Qualified Person Recognized under Rule 22 C of MCR 1960. We request the Regional Controller of Mines, Bhubaneswar region, Orissa to make further correspondence with the RQPs regarding modification/rectification of the mining scheme in the following address.

Sri S. M. Patro; RQP/CAL/175/93/A;
Sri P. S. Acharya; RQP/NGP/027/87/A
GEMTECH Consultant Pvt. Ltd.
HIG A/10, Baramunda HB Colony,
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Mobile – 09861093020 / 09437008179

We hereby undertake that the scheme of mining prepared by the RQPs shall be deemed to have been made with our knowledge and consent and shall be acceptable to us and binding on us in all respect.

Bhubaneswar
27.03.2013

K.J.S.Ahluwalia
Mining Lessee.

KAMALJEET SINGH AHLUWALIA

Mines Owner & Exporter

Office : P. B. No.: 3, In front of MMTC Weigh Bridge, At/Po.: Barbil - 758 035, Dist.: Keonjhar, Odisha, India

Telefax : 06767 - 270049, E - mail : kjsahluwalia@rediffmail.com

UNDERTAKING REGARDING SUBMISSION OF GEO – REFERRED CADASTRAL MAP

We shall submit the geo-referred cadastral map of the mining lease area to Indian Bureau of Mines as soon as the necessary survey work is completed by a Recognized Agency (ORSAC) of the State Government as stipulated by the Indian Bureau of Mines in circular No 2 / 2010 dated 06.04.2010. Boundary Pillars have already been posted as per the addendum of Circular No. 2/2010 dt. 06.04.2010.

27.03.2013
Bhubaneswar

K.J.S.Ahluwalia
Mining Lessee

KAMALJEET SINGH AHLUWALIA

Mines Owner & Exporter

Office : P. B. No.: 3, In front of MMTC Weigh Bridge, At/Po.: Barbil - 758 035, Dist.: Keonjhar, Odisha, India

Telefax : 06767 - 270049, E - mail : kjsahluwalia@rediffmail.com

UNDERTAKING TO COMPLETE THE EXPLORATION (DRILLING) PROPOSED IN SCHEME OF MINING OF THE TEXT IN A TIME BOUND MANNER

We undertake to complete the drill holes proposed under para 3.9 of the text In order to generate data of expected sporadic /scanty mineral occurrences covering the total leasehold area in a time bound period. The execution of the same depends on availability of required forest permission/ clearances.

27.03.2013
Bhubaneswar

K.J.S.Ahluwalia
Mining Lessee.

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RQP/NGP/027/87/A

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RQP/NGP/027/87/A

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INTRODUCTION

(a) Mining lease over 767.284 Ha areas in Keonjhar district in Odisha of M/S K.J.S.Ahluwalia was initially granted and executed in favor of M/S Karam Chand Thapar on 04.03.1959 for a period of 20 years i.e. up to 03.03.1979 **(Annexure-1).** In 1967, the mining lease was transferred in favor of M/S Hindustan General Electric Corporation with due approval from the State Government vide their proceeding No. 8164/MG dt. 29.12.1966. Subsequently, the lease was renewed in their favor for a period of 20 years with effect from 04.03.1979 vide lease deed dt. 07.09.1981 **(Annexure-2).** During this lease period, the said lease again stood transferred and vested in M/S Karam Chand Thapar and Brothers Ltd, another company by virtue of an order of the Kolkata High Court in Company petition no. 570 of 1983, connected with company application no. 274 of 1981. Subsequently, the mining lease was transferred in the name of Sri K.J.S.Ahluwalia, Barbil after obtaining permission from the State Government vide order No.11541/MG dt.01.12.1984 and through transfer deed dated 18.12.1984 **(Annexure-3).**

अनुमोदित
APPROVED
22/2/14
क्षेत्रीय खान नियंत्रक
REGIONAL CONTROLLER OF MINE
भारतीय खान ब्यूरो
INDIN BUREAU OF MINES
भुवनेश्वर/BHUBANESWAR

(b) The lease period of Nuagaon iron ore mines expired on 04.03.1999 and the lessee Shri K.J.S.Ahluwalia filed application for renewal of the mining lease over the entire area of 767.284 Ha on 28.02.1998 which is under process and the lease is in operation under deemed renewal clause. A copy of the ML renewal application in Form 'J' dt. 28.02.1998 and Form D by the district authorities dt. 02.03.1998 is enclosed as **Annexure-4.**

(c) The last scheme of mining under Rule 12 of MCDR, 1988 and modifications of scheme of mining under rule 10 of MCDR, 1988 have been prepared as below:

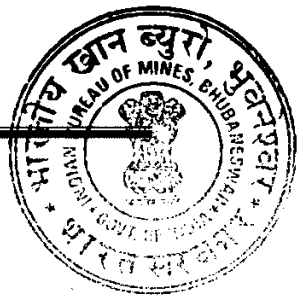
Type of Document	Under Rule	Period	Approval	Remarks
Mining Scheme	12 of MCDR'1988	2010-11 to 2013-14	314(3)/2009-MCCM(CZ)/MS-02 dt.13.06.2009	Annexure-9
Mod. Mining Scheme	10 of MCDR'1988	2010-11 to 2013-14	314(3)/2010-MCCM(CZ)/MS-14 dt.18.08.2010	In the interest of systematic & scientific mining- Annexure-10
Mod. Mining Scheme	10 of MCDR'1988	2012-13 to 2013-14	314(3)/2013-MCCM (CZ)/MS-50 dt. 05.07.2013	In the interest of systematic & scientific mining- Annexure-11

(d) The validity of the last approved Scheme of mining and its modifications is up to the period 2013-14 i.e. 31.03.2014. The lessee is therefore submitting a scheme of mining for the balance period of deemed renewal lease period i.e. 01.04.2014 to 03.03.2019 under rule 12 of MCDR, 1988.

(e) Other statutory Clearances:

The status of statutory clearances from other concerned authorities like forest diversion from MoEF, Govt. of India, environmental clearance from MoEF, Govt. of India and consent to establish/operate from State Pollution Control Board (SPCB) are as below:

Clearances	Status	Reference
Forest Diversion	1. Forest land : 525.762 ha, N.F. land : 241.522 Ha 2. Forest land broken up prior to 1980: 114.857 Ha 3. Forest Diversion approved over 371.192 Ha on 21/22.04.2004. 4. Diversion proposal filed by lessee over additional 134.919 Ha on 19.07.2010. 5. Map of broken up area/diverted forest/virgin forest applied for diversion attached. 6. Tree felling permission obtained over 64.207 Ha & mining operation confined to 179.064 Ha area including broken up area. 7. Application for tree felling permission over additional 83.221 Ha filed with DFO on 16.02.2012 which is under process.	Annexure-12 Annexure-13 Plate-2C. Annexure-14
Environmental clearance	1. EC over 767.284 Ha ML area for a production capacity of 5.62 MTPA has been obtained on 02.02.2010. 2. EC for establishment of 2 MTPA beneficiation plant has been obtained on 16.02.2012. 3. Lessee has been submitting six monthly compliance report to MOEF regularly. Report for april to Sep'2013 attached.	Annexure-15 Annexure-16 Annexure - 17
SPCB clearance	1. Consent for discharge of sewage and trade effluent under section 25/26 of the water (PCP) Act 1974 and for existing/ new operation of the plant under Section 21 of Air (PCP) Act 1981 has been obtained from State Pollution Control Board, Orissa Bhubaneswar vide their revised consent order No 1594 and letter No 9478/IND-I-CON-2320 dated 15.05.2012 for 5.62 MTPA iron ore & 2.0 MTPA Iron ore beneficiation plant. The consent order is valid up to 31.03.2016.	Annexure– 18



PART – I

REVIEW OF MINING SCHEME

1.1 Name of Mine : Nuagaon Iron Ore Mines

Area : 767.284 Ha

1.2 Particulars of approval of Mining Plan

The last mining plan in respect of Nuagaon iron ore mines was prepared under Rule 24A of MCR, 1960 with detailed proposal for the periods from 1999-2000 to 2003-04 and was approved by the Controller of Mines (Central Zone) of Indian Bureau of Mines on 10.05.2005 vide letter No.BBS/KJ/Fe/MP-133, dated 10.05.2005. Subsequently, schemes of mining under Rule 12 of MCDR, 1988 and modifications of scheme of mining under rule 10 of MCDR, 1988 have been prepared from time to time which are summarized below:

Type of Document	Under Rule	Period	Approval	Remarks
Mining Plan	24A of MCR' 1960	1999-00 to 2003-04	BBS/KJ/Fe/MP-133 dt.10.05.2005	Annexure-5
Mining Scheme	12 of MCDR' 1988	2004-05 to 2008-09	BBS/KJ/FE/MS-153 dt.31.05.2006	Annexure-6
Mod. Mining Scheme	10 of MCDR '1988	From 2006-07 to 2008-09	314(3)/2007 dt.15.10.2007	In the interest of systematic & scientific mining- Annexure-7
Mod. Mining Scheme	10 of MCDR '1988	From 2007-08 to 2008-09	314(3)/2009-MCCM(CZ)/MP-26/1255 dt.23.10.2008	In the interest of systematic & scientific mining - Annexure-8
Mining Scheme	12 of MCDR' 1988	2009-10 to 2013-14	314(3)/2009-MCCM(CZ)/MS-02 dt.23.06.2009	Annexure-9
Mod. Mining Scheme	10 of MCDR' 1988	2010-11 to 2013-14	314(3)/2010-MCCM(CZ)/MS-14 dt.18.08.2010	In the interest of systematic & scientific mining- Annexure-10
Mod. Mining Scheme	10 of MCDR' 1988	2012-13 to 2013-14	314(3)/2013-MCCM (CZ)/MS-50 dt. 05.07.2013	In the interest of systematic & scientific mining - Annexure-11

1.3 Date of commencement of mining operations

Mining operation by the original Lessee M/s Karam Chand Thapar and Brothers (P) Ltd has been started in the area since 1960. Surface right permission over a total of 416.604 Ha has been obtained from the district authorities time to time. The surface right permission letters are attached as Annexure-19 and the plan showing surface right areas granted so far, is attached as Plate – 2B.

1.4 (a) Deficiencies if any that existed in the approved mining scheme

There were no deficiencies in the last approved scheme of mining.

(b) Review of compliance position of salient features of the mining scheme.

As the review of compliance position has already been indicated for the period 2009-2012 in the approved modification of Scheme of Mining (2012-13 to 2013-14), the compliance position from 2012-13 to 2013-14 has been given in this Scheme of mining.

(i) Exploration:

Commitment

As per the approved modification of Scheme of Mining, it was proposed to drill a total of 176 boreholes/ drill holes during the period 2013-14. No borehole was envisaged during the year 2012-13.(Para 3.5 of the modified mining scheme approved on 05.07.2013.

Compliances

The lessee has started the exploration work during the later part of 2011-12 and could complete 60 bore holes during 2012-13 with a cost involvement of Rs 1,50,000,00/-. In regard to the exploratory evidence, the work order to the agency, cost involvement and payment details have been enclosed as Annexure- 20 and copies of Form J & K with chemical analysis results from NABL accredited laboratory are enclosed as Annexure-21.

No bore holes have been drilled during 2013-14 i.e. up to September 2013. The proposed exploration vis a vis completion of BHs are tabulated below:

Year	Proposal as per approved Mod. MS on 05.07.2013	Bore holes drilled
2011-12	----	3 BHs
2012-13	----	57 BHs
2013-14	176 Nos	-----

Reasons for deviation

All the boreholes, as proposed in the year 2013-14, have not been drilled due to non availability of forest clearance. However, after getting the tree felling order from state forest department the lessee has already deployed drilling rigs within the diverted forest area and drilling has been continued.

(ii) Development of the mine - (Ref. Para 5.2 of the last approved mining scheme)

Commitment

It was proposed to develop the quarry in the iron ore zone in nine quarries (five Nos of Blocks) by opencast mechanized mining method for production of 5.62 million tonnes of iron ore in the year 2012-13 onwards. The quarries proposed to be exploited were Chanaguda & Dhabalgiri block (Chanaguda-Dhabalgiri quarries), Katesahi block (katesahi A & B quarries), Sonukocha block (Topadihi, Sonukocha, Gangeiguda & Guali quarries), Dumka block (Dumka Top-MDH & Barpada bottom quarries) and Kanhusai block (Kanhusai quarry). Benches were proposed to be developed at 6 m height with individual bench slope at 70° and overall bench slope at 45°. RL of quarry floor was planned at different levels for different quarries, the lowest RL being at Gangeigoda (525 mRL) and highest at Kanhusahi (642 mRL) at the end of scheme period.

The mining operation was proposed by fully mechanized method with regular drilling and blasting and by deploying machinery like hydraulic shovels, dumpers, loaders etc.

Beside the raisings from the different quarries, it was also proposed to produce some salable ore by crushing and screening of the sub grade materials generated from the working mines and lying in the different stacks in the lease area. A quantity of 0.8 MTPA beneficiated ore was planned to be recovered from this plant from 2013-14.

Compliance

The development of the mine during the period 2012-14 was carried out as per the approved scheme of mining except few deviations due to certain ground difficulties as well as due to delay in getting statutory clearances like tree felling permissions, closure of mining operations for short periods due to orders of various statutory authorities etc. There was also certain deviation in orientation of the quarries, particularly in Gangaigoda quarry. The following table shows the proposal and achievement of development during 2012-13 and 2013-14 year.

Financial Year	Commitment	Compliances	Deviation
2012-13	Mining in five blocks i.e Chanaguda-Dhabalgiri, Katesahi, Sonukocha, Dumka & Kanhusai blocks within 9 working pits.	Development confined to the blocks with slight deviation in orientation of mines	Around 38% of the targeted development achieved.
2013-14	Mining in five blocks i.e Chanaguda-Dhabalgiri, Katesahi, Sonukocha, Dumka & Kanhusai blocks within 9 working pits.	Development confined to the blocks with slight deviation in orientation of mines	Around 53% of the targeted development achieved up to Oct'13.

The targeted generation of sub grade ore & overburden/waste vis-a-vis the actual generation is as below:

Year	Planned generation(CuM)		Actual generation (Tonnes)	
	Sub Grade ore	Waste	Sub Grade ore	Waste
2012-13	769900.000	769900.000	245484.500	---
2013-14 (up to Oct'2013)	535383.000	339399.000	96661.050	12070.500

Reasons for deviation

The development of the mine during the period has been done more or less as per the approved modified scheme of mining with slight deviation in orientation of some of the quarries. The sub grade and waste generation during the period are less than the planned quantity due to want of statutory clearances like tree felling permission etc for which the workings could not be extended laterally. The year wise development plan with sections showing extent of forest clearance and proposed development is shown in Plate – 6A to 10F & 11)

(iii) Production of iron ore (Lump ore and Fines/Soft ore)

Commitment

(Refer Para 4.2 of last approved scheme of mining and modification of the approved scheme of mining)

It was proposed to produce 5.62 Million tones of marketable iron ore per annum during the period from the mines by mining from different quarries as well as from the proposed beneficiation plant by beneficiating the low and sub grade ore generated during mining operations. The details of target of production of ore are as per the table below.

Compliance

The following table shows the achievements in production of ore against the targets from the mines during the scheme period.

Year	Production – Planned(Tonnes)	Production – Achieved (Tonnes)	Remarks
2012-13	5620000	2156653.760	Less by 62%
2013-14 (up to Oct'13)	5618438	2998191.564	Less by 47% (up to Oct'13)

The ROM ore produced in the mines are processed in the crushing/ screening plant to obtain the sized ore and iron ore fines of salable grade. The sized ore as well as iron ore fines are regularly analyzed in the Lessee's in house laboratory and at Government laboratory at Joda. A few analysis of different stacks of iron ore by the Government laboratory at Joda are attached as Annexure-22 which show that the sized ore are mostly of +62% Fe while the iron ore fines have a varying Fe content from 56.56% to around 62.72%.

Reasons of variation

The production during the scheme period (2012-13 to 2013-14) was around 54 % less than the targeted quantity due to certain ground difficulties as well as due to delay in getting statutory clearances like tree felling permissions, closure of mining operations for short periods due to orders of various statutory authorities etc.

(iv) Dump Management

(Refer Chapter – 7 of last approved mining scheme)

There were four numbers of dumps (Dump Nos 23, 27, 28 & 30) in the lease hold area at the end of 2009-10 with a total quantity of 1.127 MCuM. Out of these dump materials, the entire quantity in Dump 23 and part of Dump 27 & 28 as well as the materials generated during scheme period was utilized by the lessee for road making etc during the scheme period up to October'2013. Since mining operation during last few years i.e. from 2010-11 to October, 2013 has been mainly confined to depth and no lateral extension was possible due to want of tree felling permission, there was practically no waste generation during the period of 2010-11 to 2012-13 and only 12070 tonnes or say 6035 CuM of waste has been generated till October 2013. The details of available waste quantities in last approved mining scheme, dump quantities utilized during scheme period and balance dump quantity in the mine presently are as below:

Dump No.	Location	Quantity of Dump Materials(CuM)				Area (Ha)	Fe %	Remarks
		As on 31.05.2010	Generated in Scheme period	Utilized in Scheme Period	Balance as on 31.10.2013			
23	Udalbadi	45,413	-------	45,413	Nil	-------	-------	Road making
27	Udalbadi	291,646	-------	146,388	145,258	1.0991	30-40	Road making
28	Udalbadi	187,325	-------	131,865	55,460	1.4404	30-40	Road making
30	Udalbadi	602,927	6,035	6,035	602,927	1.7700	30-40	Road making
Total		**1,127,311**			**803,645**	**4.3095**		

(v) Drilling & blasting

(Refer Chapter – 5.4.1 of last approved mining Scheme)

Commitment:

It was proposed to conduct drilling deploying wagon drill with 115 mm dia. Hole length was proposed for 6.6 m with 2.6 m burden and 3.25 m spacing. Taking into consideration of maximum volume of excavation in any year and assuming the requirement of drilling & blasting of 45% of the total volume, a total of 6 wagon drills with required compressors were projected to be deployed during the scheme period.

Compliance: Drilling and blasting were carried out in the mines more or less as per the proposal taking adequate precautionary measures as proposed.

(vi) Machinery utilization

(Refer Para 5.4 of last approved mining scheme)

Commitment:

Required numbers of drill machine, compressors, excavators, dumpers along with other mining equipments were proposed during the scheme period for achieving the targeted production of ore.

Compliance

The lessee has deployed the machineries & equipments as per requirement and presently the lessee is having the following fleet of machinery in the mine. Stationary and mobile crushers and screens of higher capacity are in use for crushing & re screening of the ROM to recover more salable ore.

Sl.No.	Name of Machinery	Type/ Model	Capacity of each unit	No. of units	H.P. of each unit	Electrical/non electrical
1.	Stationery Crusher	Svedala	400 TPH	01	1118 HP	Electrical
2.	Stationery Crusher	Metso	150 TPH	01	420 HP	Electrical
3.	Stationery Crusher	Toriun	80 TPH	01	200 HP	Non Electrical
4.	Mobile Crusher	Terex Pegson	150 TPH	04	135 HP	Non Electrical
5.	Mobile Crusher	Terex Pegson	200 TPH	02	180 HP	Non Electrical
6.	Stationery Screen	Local made	80 TPH	01	90 HP	Non Electrical
7.	Mobile Screen	Chiftain	100 TPH	02	100 HP	Non Electrical
8.	Mobile Screen	BHP	150 TPH	01	140 HP	Non Electrical
9.	Mobile Screen	Sandvik	250 TPH	01	350 HP	Non Electrical
10.	Stationary Screen	Horizon 6203	200 TPH	02	300 HP	Non Electrical
11.	Mobile Screen	Extac S-5	300 TPH	06	400 HP	Non Electrical
12.	Hydraulic Excavator	Hitachi 870	4.5 CuM	01	400 HP	Non Electrical
13.	Hydraulic Excavator	PC-200, Tata Hitachi-210	0.9 CuM	15	128 HP	Non Electrical
14.	Hydraulic Excavator	PC-200	1.0 CuM	14	130 HP	Non Electrical
15.	Hydraulic Excavator	Kobelco-290	1.5 CuM	01	140 HP	Non Electrical
16.	Hydraulic Excavator	Volvo-290	1.6 CuM	02	145 HP	Non Electrical
17.	Hydraulic Excavator	PC-300 Tata Hitchi-Zaxic-370	2.1 CuM	07	180 HP	Non Electrical
18.	Rock Breaker	Hitachi, Atlas Copco	N/A	07	150 HP	Non Electrical

Sl.No.	Name of Machinery	Type/ Model	Capacity of each unit	No. of units	H.P. of each unit	Electrical/non electrical
19.	Loader	L&T, Hindustan, Tata-3036	1.5 CuM	18	130 HP	Non Electrical
20.	Loader	XCMG, SDLG	2.5 CuM	01	180 HP	Non Electrical
21.	Dumper	L&T Kamatsu	85 Tonne	02	500 HP	Non Electrical
22.	Dumper	L&T Kamatsu	35 Tonne	02	360 HP	Non Electrical
23.	Dumper (Volvo)	Volvo	30 Tonne	06	300 HP	Non Electrical
24.	Dumper (Hyva)	Hyva/AMW	20 Tonne	47	150 HP	Non Electrical
25.	Tipper	Tata	10 Tonne	23	110 HP	Non Electrical
26.	Compressor	XAH-210	450 cfm	06	180 HP	Non Electrical
27.	Drilling machine	Atlas Copco	115 mm	06	N/A	Non Electrical
28.	Drill machine	Sandvik DP-1100	100 mm	01	N/A	Non Electrical
29.	Water Tanker	Tata	10000 lts.	10	110 HP	Non Electrical
30.	Water Tanker	L&T Kamatsu	25000 lts.	01	300 HP	Non Electrical
31.	Water Tanker	L&T Kamatsu	28000 lts.	01	350 HP	Non Electrical
32.	Dozer	DI-155	50 Tonne	02	315 HP	Non Electrical
33.	Lighting DG	Atlas Copco	10 KW	07	10 HP	Non Electrical

(vii) Environmental aspects:

Sl No	Commitment	Compliance
1.	**Water management**	
	Construction of boulder walls with garland drains and retaining wall around the waste dumps near Udalbari, Dumka top, Chanaguda & Katesahi over a length of 2700 mts were proposed to be built during the 1st year of the scheme period i.e. 2009-10. Beside 4 nos of check dams around the quarries and 3 nos around the dumps were proposed during the 1st year of scheme period i.e. 2009-10. Regular monitoring of surface as well as ground water was proposed to be continued beside desilting of garland drains & maintenance of retaining walls.	Construction of retaining walls with garland drains around the different dumps, sub grade stacks near the quarry workings inside the mining lease area have been done over a length of 5058 mts (Ref item xi of Annexure-17). Besides, 9 nos of check dams involving 397.74 CuM and 11 nos. of check weirs involving 90.37 Cum have been built around the different quarries and being de-silted after each monsoon based on the average rain fall data (Ref item x of Annexure-17). Regular monitoring of surface as well as ground water is being done.
2.	**Dust management**	
	As there was a chance of air pollution due to fully mechanized method of mining preventive measures were proposed for dust management	Due precaution are being taken, such as – proper up keeping of machinery maintenance, compactness of road surfaces, regular water spraying on roads and waste dumps by auto fixed water sprinklers (2500 mts) as well as through six numbers of water tankers, controlled blasting and Plantation along the dump sites, roads etc.

<table>
<tr><td>3.</td><td colspan="2">Programme of Afforestation</td></tr>
<tr><td></td><td>Phase-wise plantation program was chalked out during the five year scheme period covering an area of 34.98 Ha green belt area with 56,000 saplings and 32,000 saplings in 20 Ha area outside the dumps.</td><td>Plantation of saplings carried out during the scheme period within the lease area as well as outside the lease in nearby villages. A total of 193,200 saplings have been planted during the scheme period with survival rate varying from 40% to 80%. The year wise break up of plantation is as below:
<table>
<tr><td>Year</td><td>No.</td><td>Area(Ha)</td><td>Remark</td></tr>
<tr><td>2009-10</td><td>22400</td><td>19.30</td><td>2400 Gap Plantation</td></tr>
<tr><td>2010-11</td><td>32150</td><td>27.64</td><td>6200 Gap Plantation</td></tr>
<tr><td>2011-12</td><td>65000</td><td>45.95</td><td>18200 Gap Plantation</td></tr>
<tr><td>2012-13</td><td>50150</td><td>16.72</td><td>8000 Gap Plantation</td></tr>
<tr><td>2013-14 (up to Sept'2013)</td><td>26900</td><td>6.30</td><td>7200 Gap Plantation
2100 outside ML area</td></tr>
</table></td></tr>
<tr><td>4.</td><td colspan="2">Mitigation measures for reduction of noise level</td></tr>
<tr><td></td><td>Sources of noise in the area are drilling/ blasting, operation of compressor, crushing/ screening, loading/ unloading etc. which were found to be below the prescribed limit. Precautionary measures to control the noise level were suggested with regular monitoring of noise level.</td><td>Delay detonators during blasting are provided. Plantation has been done. Machinery and vehicles are being checked regularly. Regular noise level monitoring is being done</td></tr>
<tr><td>5.</td><td colspan="2">Vibrations / Blasting precautions</td></tr>
<tr><td></td><td>Shallow hole blasting proposed with proper charging, stemming and muffle blasting and danger from fly rocks were proposed to be minimized, while marking danger zones, giving warning signal. making blasting sheds were the proposals</td><td>Blasting is being done taking precautionary measures as proposed</td></tr>
<tr><td>6.</td><td colspan="2">Environmental monitoring (Monitoring the quality of air, water and noise level throughout the life of the mine)</td></tr>
<tr><td></td><td>Water monitoring</td><td>Regular monitoring for water quality being carried out for both upstream and downstream of different water bodies on seasonal basis. Besides, monitoring of water level at 6 locations (open wells/bore wells) & water quality at 9 locations for ground water) as per guidelines are being conducted.</td></tr>
<tr><td></td><td>Air monitoring</td><td>Regular monitoring AAQ (8 stations) as per guidelines are being conducted.</td></tr>
</table>

	Noise monitoring	Regular monitoring of noise level (16 stations) as per guidelines are being conducted.
	Rain water harvesting	Suitable rain water harvesting measures along with roof top rain water harvesting structures for the camp area & nearby school area have been implemented. De-siltation of village ponds surrounded by the ML area has been undertaken towards percolation cum rain water harvesting purposes and it is being de-silted after each monsoon.
	-	Team of officers and staff are looking after the environmental monitoring works as per proposal. The six monthly compliance report for the period Apr'2013 to Sept'2013 is attached as Annexure- 17

7. **Land use**

Land use at the end of scheme period as was envisaged (Commitment)		Land use by end of Scheme period up to Feb'2014 (Compliance)	
Proposed utilization	**Area in Ha**	**Actual utilization**	**Area in Ha**
Quarry / mining	170.778	Quarry / mining	152.655
Storage of Top soil	Nil	Storage of Top soil	0.000
Over burden Dumping	20.040	Dumping	4.310
Sub grade stacking/ Mineral Storage	51.684	Sub grade stacking and Mineral storage	61.350
Infrastructure (Work shop, Admn. building etc.	7.750	Camp office, workshop etc.	6.423
Construction of road	11.500	Construction of road	11.500
Mineral separation plant	4.000	Mineral separation plant	4.000
Town ship area	3.290	Town ship area	3.290
Others (magazine etc.)	0.077	Magazine	0.077
Sub Total	269.119	Sub Total	243.605
Green belt	28.100	Green belt and Safety zone	24.500
		Plantation on Reclaimed area	2.218
		Land use for public purpose i.e. agriculture etc.	98.348
Balance undisturbed	470.065	Balance undisturbed	398.613
Total	**767.284**	**Total**	**767.284**

1.4 (c) Review of the compliance position of condition and stipulations imposed

The last approved modifications in scheme of mining for the period from 2012-13 to 2013-14 was approved with normal and regular conditions. Compliance positions of some of the important conditions are tabulated below:

Condition No.	Condition imposed	Compliance
vii.	Approval of mining operations and associated activities is restricted to the ML area only and also within the diverted area by the competent authorities of forest department till the requisite permission is granted by such authorities in additional areas as proposed in the document.	Mining operations and all associated activities are restricted in the diverted forest within the mining lease area.
x.	The approval is subject to the compliance of CCOM's circular No. 2/2010 regarding Geo-referenced cadastral map within 6 months from the date of approval.	Survey by ORSAC is in progress. Undertaking to submit the geo-referenced cadastral map has been given. Boundary Pillars have been posted as per the addendum of Circular No. 2/2010.
xi.	Yearly report as required under rule 23E(2) of MCDR,1988 setting forth the extent of protection and rehabilitation works carried out as envisaged in the approved PMCP shall be submitted before 1st July of every year to the Regional office, IBM, Bhubaneswar.	Yearly report as required under rule 23E(2) of MCDR,1988 giving the extent of protection and rehabilitation works carried out is being submitted to the Regional office of IBM before 1st July every year.
xiv.	The environmental monitoring cell of the Company shall continue monitoring of AAQ, dust fall, water quality, soil sample & noise level at various stations established in core and buffer zone as per requirement of Environment guide lines and keeping in view of IBM's circular Nos. 3/92 & 2/93 season wise every year by an Env. Laboratory approved by MOEF/CPCB. Data so generated shall be maintained in a bound paged register and shall be made available to the inspecting officer on demand.	Environmental monitoring of all required parameters are being carried out season wise by laboratory approved by MOEF and the data so generated are being kept in bound paged register. The same is being made available to the Inspecting officers on demand.
xvii.	Next scheme of mining will be due for submission on 01.12.2013.	Scheme of mining for the period 2014-15 to 2018-19 has been submitted on 29.11.2013.

1.4 (d) Compliance of violations:

(i) By IBM : The mine was last inspected by IBM on 04.09.2013. During this inspection, it was found that the fines stock/ sub grade dump No. 20 was not properly secured by retaining wall, garland drains etc and the Annual return for 2012-13 was not complete due to absence of registration numbers of the buyers, thereby violation of the provisions of rule 33(2) and 45(5)(b) of MCDR,1988 were given.

These violations have been duly complied by the lessee and the same was communicated to IBM vide Lessee's letter dt. 12.12.2013.

(ii) By other authorities : A part of safety zone was disturbed (encroached) by dumping and dumping also has been found to be carried out across and outside the ML boundary at places near and between ML boundary pillars No. 96 to 97, 98 to 99 and 106 to 110. These have been pointed out by the office of the Forest Range Officer, Barbil in his show cause notice vide Memo No. 560 dt. 07.06.2012. The lessee has submitted his reply to the show cause notice mentioning that (i) the area between B.P. 95-97 was broken up prior to 1980 by the ex-lessee, (ii) area outside the ML area between B.P. 98-99 was purchased by the lessee for dumping purpose and due to a mistake in demarcation, part of the dump might have been kept in forest area and (iii) dumping between B.P. 106-110 was an old dump. The lessee has taken steps to rectify the violations by fencing over the total safety zone area and plantation has been taken up over these areas (Photographs shown in Annexure-32/10).

The lessee has also submitted the revenue due of Rs.25, 23,368/- on 06.03.2013 for encroachment of Government land as per demand notice No.196 dt.27.02.2013 of Revenue Inspector, Joda. The show cause notice of the Forest Range Office, its reply and demand notice of the Revenue Inspector, Joda with its reply are attached as Annexure-23.

PART- II

2.0 PROPOSAL UNDER SCHEME OF MINING FOR THE NEXT FIVE YEAR.

2.1 Name and address of the Applicant	:	Shri Kamal Jeet Singh Ahluwalia; Office – P.B.No.3,At/PO: Barbil, Dist: Keonjhar- 758 035 Tel – (+91) 6767 – 275348(O)/275659,Fax: 273692
Mine office	:	Nuagaon Iron Ore Mines, At/PO: Guali, Dist: Keonjhar.

Address Proof of the Applicant : Copy of Photo ID attached as **Annexure-24.**

2.2 Name and address, Registration No of the recognized persons together with validity date / person employed under Rule 42 (1) (b), who has prepared the Mining Scheme.

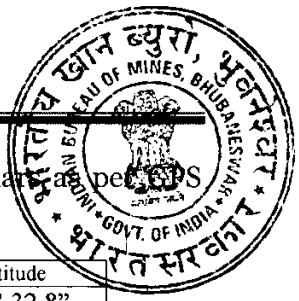
Sri P. S. Acharya, RQP/NGP/027/87/A, Valid up to 09.12.2019 (M) 9437008179, Sri S.M.Patro, RQP/CAL/175/93/A, Valid up to 19.04.2021 (M) 9861093020, GEMTECH Consultants Pvt. Ltd., A/10, Baramunda Housing Board Colony, Baramunda, Bhubaneswar – 751 003 (Orissa). E mail – gemtech consultant@yahoo.co.in;. **Copy of RQP certificates along with surveyor's certificate attached as Annexure-25.**

2.3 Minerals to be mined : Iron ore

2.4 Area and date of expiry of lease

Nuagaon iron ore mining lease over 767.284 Ha area was initially executed in favour of M/s Karam Chand Thapar and Brothers (P) Ltd for a period of 20 years with effect from 04.03.1959 and was subsequently renewed for another 20 years up to 03.03.1999. The lease in the mean time was transferred in favour of Shri Kamal Jeet Singh Ahluwalia on 18.12.1984 with prior approval of the State Government. Since the lease period of Nuagaon iron ore mines expired on 03.03.1999, the lessee Shri Kamal Jeet Singh Ahluwalia filed application for renewal of the mining lease on 03.03.1998 (one year before the expiry of the lease) over the entire area of 767.284 Ha which is under process.

Boundary pillars have been erected as per the addendum of Circular No. 2/2010 dt. 06.04.2010. DGPS survey of the lease area has not been finalized and shall be submitted after finalization. An undertaking for implementation of Circular 2/2010 has been given at the



beginning of this scheme of mining. The co-ordinates of all the boundary pillars as per GPS readings are as below:

M.L. Pillar No	Longitude	Latitude	M.L. Pillar No	Longitude	Latitude
1	85°16'06.1"	21° 58' 36.4"	68	85° 18' 31.6"	21° 57' 32.8"
2	85°16'08.3"	21° 58' 36.3"	69	85° 18' 39.6"	21° 57' 33.0"
3	85° 16'12.6"	21° 58' 36.4"	70	85° 18' 45.4"	21° 57' 32.6"
4	85°16'13.9"	21° 58' 36.4"	71	85° 18' 50.1"	21° 57' 32.4"
5	85°16'15.1"	21° 58' 36.5"	72	85° 18' 54.3"	21° 57' 30.7"
6	85°16'19.1"	21° 58' 36.4"	73	85° 18' 58.9"	21° 57' 28.1"
8	85°16'28.6"	21° 58' 36.3"	74	85° 19' 0.4"	21° 57' 27.4"
10	85° 16' 39.2"	21° 58' 36.2"	75	85° 19' 0.6"	21° 57' 28.3"
11	85°16' 50.6"	21° 58' 40.9"	76	85° 19' 1.8"	21° 57' 30.4"
13	85° 17' 1.5"	21° 58' 45.4"	77	85° 19' 3.2"	21° 57' 33.3"
15	85° 16' 56.6"	21° 58' 55.2"	78	85° 19' 6.1"	21° 57' 31.7"
16	85° 16' 51.0"	21° 59' 2.1"	79	85° 19' 8.9"	21° 57' 28.5"
17	85° 16' 47.7"	21° 59' 8.7"	80	85° 19' 14.5"	21° 57' 27.5"
19	85° 16' 55.7"	21° 59' 22.3"	81	85° 19' 19.5"	21° 57' 25.8"
20	85° 17' 4.7"	21° 59' 18.6"	82	85° 19' 20.0"	21° 57' 28.8"
21	85° 17' 18.0"	21° 59' 18.9"	83	85° 19' 24.9"	21° 57' 33.9"
25	85° 17' 37.1"	21° 58' 54.4"	84	85° 19' 21.5"	21° 57' 40.9"
26	85° 17' 41.4"	21° 58' 44.4"	85	85° 19' 20.3"	21° 57' 46.1"
30	85° 17' 4.1"	21° 58' 24.4"	86	85° 19' 13.8"	21° 57' 53.1"
31	85° 17' 10.7"	21° 58' 14.8"	87	85° 19' 10.1"	21° 57' 55.7"
32	85° 17' 19.1"	21° 58' 21.3"	89	85° 18' 51.9"	21° 58' 1.1"
40	85° 18' 0.5"	21° 58' 6.3"	91	85° 18' 54.3"	21° 57' 49.0"
42	85° 17' 55.4"	21° 57' 57.1"	95	85° 18' 22.1"	21° 57' 45.1"
43	85° 17' 53.1"	21° 57' 53.0"	96	85° 18' 18.7"	21° 57' 56.5"
46	85° 17' 45.9"	21° 57' 40.0"	98	85° 18' 12.8"	21° 58' 14.9"
49	85° 17' 37.8"	21° 57' 25.4"	99	85° 18' 9.9"	21° 58' 24.7"
53	85° 17' 30.9"	21° 57' 12.9"	100	85° 18' 19.3"	21° 58' 26.7"
54	85° 17' 33.7"	21° 57' 12.4"	101	85° 18' 27.2"	21° 58' 28.0"
55	85° 17' 36.3"	21° 57' 11.9"	106	85° 18' 21.7"	21° 58' 50.3"
56	85° 17' 39.8"	21° 57' 11.3"	107	85° 18' 20.9"	21° 58' 53.3"
57	85° 17' 49.3"	21° 57' 11.9"	108	85° 18' 18.9"	21° 59' 1.5"
58	85° 17' 53.8"	21° 57' 11.1"	109	85° 18' 18.2"	21° 59' 4.5"
59	85° 18' 0.6"	21° 57' 14.6"	110	85° 18' 16.7"	21° 59' 10.2"
60	85° 18' 2.8"	21° 57' 16.4"	111	85° 18' 16.0"	21° 59' 13.5"
61	85° 18' 5.1"	21° 57' 18.6"	112	85° 18' 15.4"	21° 59' 15.7"
62	85° 18' 9.6"	21° 57' 22.1"	113	85° 18' 15.0"	21° 59'17.0"
63	85° 18' 16.8"	21° 57' 22.9"	114	85° 18' 14.8"	21° 59' 18.3"
64	85° 18' 18.8"	21° 57' 23.4"	115	85° 18' 14.0"	21° 59' 23.2"
65	85° 18' 21.8"	21° 57' 25.5"	116	85° 18' 9.9"	21° 59' 22.9"
66	85° 18' 26.7"	21° 57' 28.5"	117	85° 18' 2.3"	21° 59' 22.5"
67	85° 18' 29.5"	21° 57' 30.5"	118	85° 17' 55.6"	21° 59' 22.6"

M.L. Pillar No	Longitude	Latitude	M.L. Pillar No	Longitude	Latitude
119	85° 17' 52.1"	21° 59' 22.5"	141	85° 16' 30.8"	21° 59' 23.0"
120	85° 17' 49.8"	21° 59' 22.5"	142	85° 16' 29.1"	21° 59' 20.1"
121	85° 17' 44.6"	21° 59' 22.8"	143	85° 16' 27.0"	21° 59' 13.9"
122	85° 17' 34.1"	21° 59' 22.6"	144	85° 16' 23.8"	21° 59' 6.7"
123	85° 17' 30.3"	21° 59' 22.7"	145	85° 16' 19.7"	21° 59' 5.1"
124	85° 17' 26.6"	21° 59' 22.6"	146	85° 16' 18.9"	21° 59' 3.6"
125	85° 17'22.1"	21° 59' 26.6"	147	85° 16' 16.9"	21° 59' 3.8"
127	85° 17' 4.2"	21° 59' 21.9"	148	85° 16' 14.2"	21° 59' 3.3"
128	85° 17' 3.6"	21° 59' 23.3"	149	85° 16' 14.6"	21° 59' 1.6"
129	85° 17' 2.4"	21° 59' 27.0"	150	85° 16' 13.7"	21° 58' 59.6"
130	85° 17' 2.3"	21° 59' 32.4"	151	85° 16' 13.4"	21° 58' 56.7"
131	85° 16' 59.2"	21° 59' 34.2"	152	85° 16' 13.0"	21° 58' 54.6"
132	85° 16' 51.4"	21° 59' 32.4"	153	85° 16' 12.6"	21° 58' 52.8"
133	85° 16' 48.2"	21° 59' 34.3"	154	85° 16' 12.5"	21° 58' 50.4"
134	85° 16' 46.8"	21° 59' 34.1"	155	85° 16' 12.0"	21° 58' 49.2"
135	85° 16' 40.3"	21° 59' 34.3"	156	85° 16' 11.1"	21° 58' 46.5"
136	85° 16' 35.6"	21° 59' 32.1"	157	85° 16' 10.7"	21° 58' 44.7"
137	85° 16' 34.8"	21° 59' 31.0"	158	85° 16' 9.2"	21° 58' 41.0"
138	85° 16' 33.6"	21° 59' 28.3"	159	85° 16' 8.6"	21° 58' 40.0"
139	85° 16' 34.0"	21° 59' 25.6"	160	85° 16' 7.7"	21° 58' 38.8"
140	85° 16' 34.0"	21° 59' 22.9"			

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

The last mining scheme in respect of Nuagaon iron ore mines was prepared under Rule 12 of MCDR, 1988 for the periods from 2009-10 to 2013-2014 and was approved by the Controller of Mines of Indian Bureau of Mines (Central Zone) on 23.06.2009 vide letter No. No.314(3)/2009-MCCM(CZ)/MS-02 dt. 23.06.2009. Subsequently, the scheme of mining was modified under rule 10 of MCDR,1988 on 18.08.2010 and 05.07.2013 in the interest of systematic & scientific mining . As such, the validity of the approved scheme of mining is going to expire on 31.03.2014 (2013-14). The Lessee is now submitting a scheme of mining scheme under Rule 12 of MCDR, 1988 for continuance of mining operation during next five years in a safe and scientific method.

3.0 RESERVES

3.1 Category wise (Proved, Probable and Possible) reserves/ resources as on 01.04.2013 estimated in the last approved modification of mining scheme that was approved on 05.07.2013.

The category wise Proved , Probable and possible geological as well as mine able reserves at cut off grade +45% Fe(i.e. above threshold value) was calculated for the lease area as on 01.04.2013 after depletion of reserves during the scheme period was below.

Type of Ore	Quantity of Ore (in Million Tonnes)								Average Grade (Fe %)
	Geological				Mineable				
	Proved	Probable	Possible	Total	Proved	Probable	Possible	Total	
Salable Ore (+58% Fe)	37.545	30.034	21.257	88.836	31.743	28.658	20.171	80.572	62.48%
Sub Grade Ore (45-58% Fe)	17.756	12.514	8.857	39.127	15.338	11.940	8.404	35.682	55.14%

3.2 UNFC Classification for Insitu Ore

Geological and mineable reserves/ resources of iron ore in the lease area under proved and probable categories was estimated to be as per above table (as on 01.04.2013). Based on the depletion of ore, an attempt was made to allocate the salable iron ore (+58% Fe) reserves as well as sub grade ore (45-58% Fe) resources under UNFC codes. The mineable proved, probable and possible reserves of +58% Fe ore was assigned 111,121 & 333 categories respectively while the locked up ores of +58% Fe was placed under 211, 221 & 334 categories. The proved, probable and possible mineable resources of sub grade ore which are potentially not economic at that time was kept under 211, 221 & 333 categories while the locked up resources of sub grade ore was placed under 331, 332 & 334 categories. The reserves/ resources as per UNFC as reported in last approved modification to approved scheme of mining was as below.

Description	UNFC Code	Updated Reserves/ Resources Quantity in Million Tonnes	Av. Grade Fe %
A. Mineral Reserves			
(1)Proved Mineral Reserves	111	31.743	62.48
(2)Probable Mineral Reserves	121	28.658	62.48
Sub Total (A)	111+121	60.401	**62.48**
B. Remaining Resources			
(1)Feasibility Mineral Resource	211	5.803	62.48
		15.338	55.14
(2)Pre-feasibility Mineral Resources	221	1.376	62.48
		11.940	55.14
(3)Measured Mineral Resources	331	2.418	55.14
(4)Indicated Mineral Resources	332	0.574	55.14
(5)Inferred Mineral Resources	333	20.171	62.48
		8.404	55.14
(6)Reconnaissance Mineral Resources	334	1.086	62.48
		0.453	55.14
Total Mineral Resources (A+B)		**88.837**	**62.48**
		39.127	**55.14**

3.3 Balance of Geological resources and Mineable Reserves of Ore after Depletion of Reserves during 2013-14

It is envisaged that the mining is continuing to recover ore from Measured / Proved category of resources/ reserves. Accordingly the proposal for 2013-14, achievement till 31.10.2013 and achievable during the balance period of 2013-14 (from 01.11.2013 to 31.03.2014) under Measured/ proved category in regards to ROM, Salable (+58% Fe) ore and sub grade (45 to 58% Fe) ore is as per the following table.

Category of ore	Quantity of Ore (in Million Tonnes)								Av. Fe %)
	Measured Resources				Proved Reserves				
	Assessed 01.04.13	Achieved 01.04.13 to 31.10.13	Achievable 01.11.13 to 31.03.14	Balance as on 01.04.14	Assessed 01.04.13	Achieved 01.04.13 to 31.10.13	Achievable 01.11.13 to 31.03.14	Balance as on 01.04.14	
Salable Ore (+58% Fe)	37.545	2.998	2.620	31.927	31.743	2.998	2.620	26.125	62.48
Sub Grade Ore (45-58% Fe)	17.756	0.096	1.242	16.418	15.338	0.096	1.242	14.000	55.14

3.4 Re-assessment of Resources under Measured, Indicated and Inferred & Reserves under Proved and Probable are done based on the results of additional boreholes completed during the last scheme period.

3.4.1 Details of Bore Holes / Drill holes completed during 2012-13 in the leasehold area along with Form J, K and analysis results are enclosed as Annexure-21. The location and details of boreholes are summarized below.

Sl. No.	Block	BH-No	Quarry wise location	Co-ordinate		Depth (m)	Ore Zone (m)		Thickness (m)	Av grade (Fe %
				Nortlfing	Easting		From	To		
1	III	KBH-1	Sonukocha	1300 N	800E	73.10	0.00	66.1	66.10	63.51
2	III	KBH-9	Sonukocha	1700 N	600 E	152.20	7.20	142.4	135.20	56.86
3	III	KBH-11	Sonukocha	1700 N	800 E	55.60	0.00	48.8	48.80	57.94
4	III	KBH-12	Sonukocha	1600 N	600 E	63.44	0.00	59.10	59.10	62.26
5	III	KBH-13	Sonukocha	1600 N	700 E	48.20	0.00	46.20	46.20	62.84
6	III	KBH-15	Sonukocha	1500 N	600 E	89.60	0.00	83.2	83.20	62.95
7	III	KBH-16	Sonukocha	1500 N	800 E	63.30	0.00	51.3	51.30	63.41
8	III	KBH-17	Sonukocha	1400 N	600 E	66.70	0.00	55.50	50.50	62.62
9	III	KBH-24	Sonukocha	1200 N	00	29.40	0.00	29.40	29.40	62.73
10	III	KBH-30	Sonukocha	1200 N	600 E	55.80	0.00	42.00	42.00	61.74
11	III	KBH-34	Sonukocha	1100 N	700 E	54.50	0.00	48.25	48.25	62.72
12	III	KBH-35	Sonukocha	1100 N	800 E	80.00	0.00	60.2	60.20	62.97
13	III	KBH-45	Kaliakocha	900 N	700 E	115.20	9.90	110.2	100.30	60.91
14	III	KBH-47	Kaliakocha	800 N	600 E	73.50	0.00	67.6	67.60	63.43
15	III	KBH-49	Kaliakocha	700 N	500 E	61.00	4.80	54	49.20	59.68
16	III	KBH-50	Kaliakocha	700 N	700 E	69.10	0.00	63	63.00	58.95
17	III	KBH-51	Topadih	700 N	900 E	95.10	4.80	93.6	88.80	60.54
18	III	KBH-53	Topadih	600 N	700 E	27.70	0.00	21.30	21.30	59.97
19	III	KBH-54	Topadih	600 N	800 E	36.50	0.00	30.40	30.40	58.71
20	III	KBH-55	Topadih	600 N	900 E	25.40	0.00	13.9	13.90	61.25
21	III	KBH-56	Topadih	600 N	1000 E	31.30	0.00	24.2	24.20	52.60
22	III	KBH-57	Topadih	500 N	700 E	40.40	0.00	28.7	28.70	39.21
23	III	KBH-186	Topadih	500 N	900 E	37.10	0.00	25	25.00	55.98
24	III	KBH-187	Gangeigoda	800 N	00	26.70	10.10	13	2.90	42.38
25	III	KBH-188	Gangeigoda	800 N	200 E	60.30	0.00	8.2	8.20	64.04
26	III	KBH-189	Gangeigoda	800 N	400 E	50.00	0.00	40.9	40.90	61.21
27	III	KBH-190	Gangeigoda	900 N	100 E	76.00	0.00	66.2	66.20	58.49
28	III	KBH-191	Gangeigoda	1000 N	100E	39.10	0.00		0.00	18.58
29	II	KBH-142	Katasahi	500 S	2000 E	78.00	4.90	74.1	69.20	61.41
30	II	KBH-143	Katasahi	500 S	2100 E	47.36	2.70	44.40	41.70	63.37
31	II	KBH-144	Katasahi	500 S	2200 E	28.00	0.00	12.40	12.40	59.15
32	II	KBH-145	Katasahi	600 S	2000 E	52.50	0.00	48.2	48.20	54.80
33	II	KBH-146	Katasahi	600 S	2200 E	18.40	0.00	10.8	10.80	48.14
34	II	KBH-147	Katasahi	600 S	2300 E	27.40	0.00	21.4	21.40	51.89
35	II	KBH-148	Katasahi	700 S	2300 E	23.90	0.00	18.40	18.40	59.80
36	II	KBH-149	Katasahi	700 S	2200 E	29.10	0.00	27.50	27.50	57.63
37	II	KBH-152	Katasahi	800 S	1900 E	39.00	9.10	28.4	19.30	39.26
38	II	KBH-153	Katasahi Q-A	800 S	2100 E	36.60	0.00	31.9	31.90	60.20
39	II	KBH-154	Katasahi	800 S	2300 E	7.80	0.00	7.80	7.80	58.29
40	II	KBH-156	Katasahi	900 S	2200 E	38.70	0.00	17.7	17.70	55.21
41	II	KBH-164	Katasahi Q-A	1000 S	2100 E	48.50	0.00	35.6	35.60	41.18
42	I	KBH-60	MDH	300 N	1000 W	31.60	0.00	29.1	29.10	56.74
43	I	KBH-61	MDH	300 N	800 W	80.00	0.00	75.8	75.80	63.16
44	I	KBH-62	MDH	300 N	900 W	38.00	5.00	33.80	28.80	60.09

Sl. No.	Block	BH-No	Quarry wise location	Co-ordinate		Depth (m)	Ore Zone (m)		Thickness (m)	Av grade (Fe %)
				Northing	Easting		From	To		
45	I	KBH-63	MDH	400 N	600 W	52.90	0.00	40.7	40.70	62.61
46	I	KBH-65	MDH	400 N	900 W	55.15	1.20	50.65	49.45	59.00
47	I	KBH-66	MDH	400 N	800 W	79.20	0.00	71.7	71.70	59.81
48	I	KBH-67	MDH	500 N	800 W	99.50	12.30	99.5	87.20	55.41
49	I	KBH-68	MDH	500 N	900 W	60.80	0.00	59.00	59.00	60.84
50	I	KBH-69	MDH	500 N	1000 W	61.40	0.00	60	60.00	58.59
51	I	KBH-70	MDH	200 N	500 W	35.20	0.00	35.20	35.20	61.77
52	I	KBH-71	MDH	300 N	400 W	33.40	0.00	33.40	33.40	61.39
53	I	KBH-73	B - Bottom	100 N	400 E	138.10	0.00	131.4	131.40	62.64
54	I	KBH-80	B - Bottom	200 N	300 E	45.80	0.00	43.90	43.90	63.77
55	I	KBH-81	B-Bottom	300 N	400 E	92.60	0.00	92.60	92.60	60.97
56	I	KBH-88	D - Top	400 N	100 W	54.50	11.10	43.8	32.70	36.85
57	I	KBH-90	B-Bottom	400 N	100 E	150.50	0.00	146.20	146.20	61.90
58	I	KBH-92	B - Bottom	400 N	400 E	80.20	0.00	74.2	74.20	54.17
59	I	KBH-94	Chanagoda	300 S	400 E	35.70	0.00	31.90	31.90	62.05
60	I	KBH-195	Gangeigoda	200 N	500 E	91.00	0.00	72.4	72.40	62.52

For the proof, the name of the agency, work order, cost involvement and payment details etc have been enclosed as **Annexure-20.**

3.4.2 A total of 136 BHs and DTH holes have been drilled in the lease area during this renewal lease period which is summarized below:

Year	Exploration		Cumulative meterage
	No. of BHs	No. of DTH holes	
2004-05 to 2005-06	29	--	1740.20
2008-09	15	32	1537.35
2011-12 to 2012-13	60	--	3487.05
Total	**104**	**32**	**6764.60**

Considering the data of these exploratory holes, the reserves have been re-estimated. To arrive at the average recovery of grade-wise ore reserves, statistical approach has been taken. On computation of the results of the DTH / Bore Holes statistically, the incidence of recovery percentage of different grade of ore arrives as follows.

3.4.3 Computation of Grade-Wise Run for DTH and Core Drilling Completed in the lease area during last scheme period (2008-09)

Hole No	<45% Fe	45 – 50% Fe		50 – 55% Fe		55 – 58% Fe		+ 58% Fe	
	Length (m)	Length (m)	Av. Fe%	Length (m)	Av. Fe%	Length (m)	Av. Fe%	Length (m)	Av. Fe%
DTH – 1 (CS EF)	1.50			5.00	51.54			3.00	63.22
								6.50	62.20
								9.40	63.85
DTH – 2 (CS EF)	8.50					12.00	55.98	7.00	61.39
	3.00					1.30	57.23	4.50	63.10
								3.00	64.00
								3.00	61.38
								3.70	62.89
DTH – 3 (CS GH)	1.00			4.50	54.22	3.00	57.35	5.50	62.70
								3.00	60.52
								9.00	62.50
DTH – 8 (CS CD)	1.10					3.00	56.54	6.00	61.23
								2.90	60.11
DTH – 9 (CS EF)	0.50			1.00	51.30	3.00	56.54	3.50	62.20
								1.00	60.15
								1.00	62.30
DTH – 10 (CS IJ)						3.50	57.35	5.00	61.50
								2.50	62.89
								2.00	63.39
DTH – 16 (CS KL)	5.50			3.50	52.35	2.50	56.00	5.00	60.10
								3.00	61.50
								4.50	62.81
DTH – 21 (CS OP)	1.00					3.00	55.25	5.00	59.98
	3.00					2.50	57.23	3.50	62.58
								1.00	61.23

Hole No	<45% Fe	45 – 50% Fe		50 – 55% Fe		55 – 58% Fe		+ 58% Fe	
	Length (m)	Length (m)	Av. Fe%	Length (m)	Av. Fe%	Length (m)	Av. Fe%	Length (m)	Av. Fe%
DTH – 22 (CS OP)						3.00	55.89	7.00	62.98
								2.00	61.15
DTH – 27 (CS YZ)				3.00	54.89			7.00	63.85
								2.00	61.65
DTH – 28 (CS YZ)	5.00					4.50	57.10	5.50	62.30
DTH – 32 (CS WX)	1.00					3.00	55.67	5.00	61.00
	3.00					2.50	57.23	3.50	62.55
								1.00	61.67
Bore Hole No – 6 (CS Z1Z2)	1.00	1.00	45.04	1.00	54.33	4.00	57.08	4.70	62.96
	1.00			2.00	54.35	1.00	57.25	4.00	61.05
				0.30	54.78	2.00	56.39	6.00	62.86
						1.00	56.13	1.00	64.45
								9.00	63.99
Bore Hole No – 7 (CS UV)	7.00					2.80	56.78	6.50	63.12
						3.70	57.25	2.30	63.85

Hole No	<45% Fe	45 – 50% Fe		50 – 55% Fe		55 – 58% Fe		+ 58% Fe	
	Length (m)	Length (m)	Av. Fe%	Length (m)	Av. Fe%	Length (m)	Av. Fe%	Length (m)	Av. Fe%
Bore Hole No – 9 (CS UV)	2.25					5.70	57.25	4.00	63.79
						1.30	57.75	6.55	62.59
						1.40	56.58	4.20	61.79
								6.30	63.78
Bore Hole No – 11 (CS Z1 Z2)	1.00	1.00	45.04	1.00	54.33	4.00	57.08	4.70	62.96
	1.00			2.00	54.35	1.00	57.25	4.00	61.05
	9.00			0.30	54.78	2.00	56.39	6.00	62.86
						1.00	56.13	1.00	64.45
								8.00	63.24
Bore Hole No – 13 (CS ST)	1.00	1.00	45.38	1.00	51.61	2.00	56.33	5.00	63.21
	1.00					3.00	56.65	14.00	62.92
	6.00					2.00	56.61	14.00	62.72
	12.00					1.00	57.75		
	18.00					1.00	56.00		

Hole No	<45% Fe	45 – 50% Fe		50 – 55% Fe		55 – 58% Fe		+ 58% Fe	
	Length (m)	Length (m)	Av. Fe%	Length (m)	Av. Fe%	Length (m)	Av. Fe%	Length (m)	Av. Fe%
Bore Hole No -- 14 (CS ST)	1.00	1.00	46.80	12.00	53.95			8.00	60.34
	4.00	4.00	49.58	4.00	52.58			2.00	58.83
	15.00							12.00	63.03
	11.00							7.00	62.46
	6.50							6.00	63.19
Total	131.85	8.00	47.57	40.60	53.43	86.70	56.65	282.75	62.48
Recovery (%)/Av Fe%	23.98% by volume with <45% Fe	1.45% by volume	47.57% Fe	7.38% by volume	53.43% Fe	15.77% by volume	56.65 % Fe	51.42% by volume	62.48% Fe
Weighted Average		**At 58% Fe cut off volume of ore is 51.42% with Av Fe of 62.48%**							
		At 45% Fe cut off volume of ore is 76.02% with Av. Fe of 60.10% Fe							

3.4.5 Computation of Grade-Wise Run of Core Drilling Completed during the last scheme period of 2009-10 to 2013-14

TOPADIHI BLOCK											
Sl.No	BH-No	Total Length	Ore (+58% Fe)			Sub Grade (-58 to +45 Fe%)			Mineral Reject in Iron ore (-45% Fe)		
			Length (m)	Recovery (%)	Average (Fe%)	Length (m)	Recovery (%)	Average (Fe%)	Length (m)	Recovery (%)	Average (Fe%)
1	KBH-1	66.30	66.10	92.99	63.51	0.00	0.00	0.00	0.00	0.00	0.00
2	KBH-9	142.40	121.30	79.70	59.24	12.30	8.08	54.82	8.80	5.78	26.95
3	KBH-11	48.80	26.00	46.76	63.17	22.80	41.01	51.97	0.00	0.00	0.00
4	KBH-12	59.10	56.10	94.92	63.84	0.70	1.18	53.20	2.30	3.89	43.48
5	KBH-13	45.25	42.70	94.36	62.65	1.85	4.09	54.56	0.70	1.55	44.41
6	KBH-15	83.20	74.00	82.59	65.11	3.20	3.57	53.20	6.00	6.70	41.46
7	KBH-16	51.30	51.30	81.04	63.41	0.00	0.00	0.00	0.00	0.00	0.00
8	KBH-17	50.50	46.60	92.28	64.53	0.00	0.00	0.00	3.90	7.72	40.64
9	KBH-24	28.50	28.50	100.00	62.73	0.00	0.00	0.00	0.00	0.00	0.00
10	KBH-30	42.00	39.50	94.05	62.53	2.50	5.95	54.11	0.00	0.00	0.00
11	KBH-34	48.25	41.95	86.94	63.59	6.30	13.06	57.70	0.00	0.00	0.00
12	KBH-35	60.20	52.00	65.00	64.98	6.10	7.63	57.17	2.10	2.63	30.09
13	KBH-45	110.20	87.80	76.22	64.41	11.30	9.81	53.81	11.10	9.64	40.46
14	KBH-47	67.60	63.60	86.53	65.29	2.40	3.27	56.58	1.60	2.18	
15	KBH-49	54.00	34.90	57.21	65.01	14.30	23.44	52.26	4.80	7.87	43.06
16	KBH-50	63.00	49.10	71.06	62.70	4.80	6.95	50.86	9.10	13.17	43.04
17	KBH-51	93.60	71.40	75.08	64.46	16.50	17.35	53.78	5.70	5.99	30.98
18	KBH-53	21.30	17.70	83.10	60.63	3.60	16.90	54.10	0.00	0.00	0.00
19	KBH-54	34.20	23.00	67.25	62.24	10.30	30.12	51.75	0.90	2.63	31.08
20	KBH-55	13.90	13.90	100.00	61.25	0.00	0.00	0.00	0.00	0.00	0.00
21	KBH-56	24.20	13.50	43.13	60.75	5.00	15.97	50.23	5.70	18.21	35.38

Sl.No	BH-No	Total Length	Ore (+58% Fe)			Sub Grade (-58 to +45 Fe%)			Mineral Reject in Iron ore (-45% Fe)		
			Length (m)	Recovery (%)	Average (Fe%)	Length (m)	Recovery (%)	Average (Fe%)	Length (m)	Recovery (%)	Average (Fe%)
22	KBH-57	28.70	0.00	0.00	0.00	9.10	22.52	51.80	19.60	48.51	33.36
23	KBH-186	25.00	20.70	55.80	62.64	0.00	0.00	0.00	4.30	11.59	23.93
24	KBH-187	13.00	0.00	0.00	0.00	2.90	10.86	46.03	10.10	37.83	41.33
25	KBH-188	8.20	8.20	13.60	64.04	0.00	0.00	0.00	0.00	0.00	0.00
26	KBH-189	40.90	33.90	67.80	64.80	3.80	7.60	57.48	3.20	6.40	27.59
27	KBH-190	66.20	57.90	76.18	64.46	2.50	3.29	55.90	5.80	7.63	0.00
28	KBH-191	39.10	0.00	0.00	0.00	0.00	0.00	0.00	39.10	100.00	18.58
Weighted Average		**1428.90**	**1141.85**	**79.91**	**63.37**	**142.25**	**9.96**	**53.28**	**144.80**	**10.13**	**29.57**
Weighted Average			**At 58% Fe cut off volume of ore is 79.91% with Av Fe of 63.37%**								
			At 45% Fe cut off volume of ore is 89.87% with Av. Fe of 62.25% Fe								
			At no cut off (ROM) volume of ore is 100% with Av. Fe of 58.94% Fe								

BARAPADA BLOCK											
Block	BH-No	Total Length	Ore (+58% Fe)			Sub Grade (-58 to +45 Fe%)			Mineral Reject in Iron ore (-45% Fe)		
			Length (m)	Recovery (%)	Average (Fe%)	Length (m)	Recovery (%)	Average (Fe%)	Length (m)	Recovery (%)	Average (Fe%)
1	KBH-60	29.10	24.60	77.85	61.41	0.00	0.00	0.00	4.50	14.24	31.21
2	KBH-61	75.80	69.20	86.50	64.10	6.60	8.25	53.34	0.00	0.00	0.00
3	KBH-62	33.80	26.30	77.81	61.97	3.80	11.24	55.17	3.70	10.95	35.63
4	KBH-63	40.70	38.20	72.21	64.04	0.00	0.00	0.00	2.50	4.73	40.64
5	KBH-65	50.65	35.65	70.38	61.01	11.90	23.49	54.10	3.10	6.12	39.07
6	KBH-66	71.70	52.90	66.79	63.29	15.00	18.94	54.61	3.80	4.80	31.99
7	KBH-67	99.50	54.50	54.77	62.74	26.90	27.04	52.84	18.10	18.19	37.14
8	KBH-68	59.00	48.40	82.03	62.48	10.60	17.97	54.27	0.00	0.00	0.00
9	KBH-69	61.40	56.10	91.37	61.28	3.10	5.05	51.62	2.20	3.58	
10	KBH-70	35.20	32.10	91.19	62.26	3.10	8.81	55.68	0.00	0.00	0.00
11	KBH-71	33.40	26.90	80.54	62.85	6.50	19.46	53.32	0.00	0.00	0.00
12	KBH-73	138.10	112.50	81.46	65.15	23.20	16.80	54.45	2.40	1.74	24.02
13	KBH-80	43.90	40.80	92.94	64.29	3.10	7.06	57.55	0.00	0.00	0.00
14	KBH-81	92.60	75.80	81.86	63.73	11.50	12.42	51.72	5.30	5.72	41.54
15	KBH-88	43.80	3.10	5.69	62.84	5.60	10.28	49.71	35.10	64.40	32.51
16	KBH-90	146.20	116.80	77.61	64.80	21.70	14.42	53.90	7.70	5.12	40.56
17	KBH-92	74.20	39.80	49.63	64.37	9.50	11.85	53.17	24.90	31.05	38.26
18	KBH-94	31.90	31.30	98.12	62.26	0.60	1.88	55.68	0.00	0.00	0.00
19	KBH-195	86.00	78.20	85.93	65.50	2.50	2.75	54.11	5.30	5.82	22.45
Weighted Average		**1246.95**	**963.15**	77.24	**63.64**	**165.20**	**13.25**	**53.62**	**118.60**	**9.51**	**34.50**
Weighted Average				**At 58% Fe cut off volume of ore is 77.24% with Av Fe of 63.64%**							
				At 45% Fe cut off volume of ore is 90.49% with Av. Fe of 62.17% Fe							
				At no cut off (ROM) volume of ore is 100% with Av. Fe of 59.54% Fe							

KATASAHI BLOCK											
Sl.No	BH-No	Total Length	Ore			Sub Grade			Mineral Reject in Iron ore		
			(+58% Fe)			(-58 to +45 Fe%)			(-45% Fe)		
			Length (m)	Recovery (%)	Average (Fe %)	Length (m)	Recovery (%)	Average (Fe%)	Length (m)	Recovery (%)	Average (Fe %)
1	KBH-142	74.10	60.10	77.05	65.01	9.10	11.67	50.47	4.90	6.28	37.64
2	KBH-143	44.40	40.70	91.67	63.54	3.70	8.33	49.70	0.00	0.00	0.00
3	KBH-144	12.40	11.60	93.55	59.85	0.80	6.45	55.45	0.00	0.00	0.00
4	KBH-145	48.20	11.30	21.52	61.65	36.90	70.29	52.70	0.00	0.00	0.00
5	KBH-146	10.80	2.30	12.50	61.29	8.50	46.20	44.58	0.00	0.00	0.00
6	KBH-147	21.40	5.20	18.98	59.81	12.70	46.35	53.17	3.50	12.77	35.48
7	KBH-148	18.40	17.30	94.02	59.97	1.10	5.98	57.48	0.00	0.00	0.00
8	KBH-149	27.50	10.90	39.64	60.00	16.60	60.36	56.16	0.00	0.00	0.00
9	KBH-152	28.40	3.70	9.49	61.09	5.10	13.08	47.95	19.60	50.26	32.87
10	KBH-153	31.90	26.60	72.68	62.12	5.30	14.48	50.52	0.00	0.00	0.00
11	KBH-154	7.80	5.40	69.23	61.23	2.40	30.77	53.87	0.00	0.00	0.00
12	KBH-156	17.70	4.10	10.59	61.05	13.60	35.14	53.44	0.00	0.00	0.00
13	KBH-164	35.60	4.70	9.69	59.06	10.30	21.24	51.26	20.60	42.47	32.05
Weighted Average		**378.60**	**203.90**	**53.86**	**62.60**	**126.10**	**33.31**	**52.17**	**48.60**	**12.84**	**33.19**
Weighted Average			**At 58% Fe cut off volume of ore is 53.86% with Av Fe of 62.60%**								
			At 45% Fe cut off volume of ore is 87.16% with Av. Fe of 58.61% Fe								
			At no cut off (ROM) volume of ore is 100% with Av. Fe of 55.35% Fe								

To know the quality of ore, analysis of core of the drilled bore holes have been done from NABL Accredited certified laboratory. The copy of chemical analysis reports are enclosed as Annexure-21.

Summary

Block	At 58% Fe Cut off			At 45% Fe Cut off		
	Length of ore intercepted in bore hole	volume of ore	Av Fe	Length of ore intercepted in bore hole	volume of ore	Av Fe
Earlier DTH & BHs drilled during 2008-09 in entire lease area	282.75	51.42%	62.48%	418.05	76.02%	60.10%
TOPADIHI BLOCK	1141.85	79.91%	63.37%	1284.10	89.87%	62.25%
BARAPADA BLOCK	963.15	77.24%	63.64%	1128.35	90.49%	62.17%
KATASAHI BLOCK	203.90	53.86%	62.60%	330.00	87.16%	58.61%
Total	**2591.65**	73.76%	**63.31%**	**3160.50**	**87.98%**	**61.56%**

3.5 Reserves with Grade (As on 1.04.2014)

Updated iron ore reserve with Grade (indicate end use grade with analysis) as well as marginal grades:

Based on the past five years of mine working in the area and the exploration work carried out in the iron ore zones, five blocks of iron ore zone have been delineated for working in the scheme period by combining some of the earlier quarries. The updated geological resources as well as mineable reserves have been re estimated in the entire lease area under measured, indicated and inferred resource categories and proved, probable reserves categories as on 01.04.2014 based on the following parameters.

- A total of 43 geological cross sections have been drawn at every 100 m interval based on the present quarry positions and taking in to account the bore holes drilled in the lease area.
- The resources have been re calculated by cross sectional area method.
- The Measured limit has been taken based on the exploration data and the extent of the existing quarry floor while the Indicated limit has been taken 10m below the measured limit where the bore holes have been closed in ore itself. The lateral extension for measured ore limit has been considered as 50 m on both sides while the indicated ore limit has been considered between 50m to 100m on both sides.
- The inferred resources have been estimated up to a depth of 10m from surface level where occurrences of ore is indicated by geological mapping but no sub surface data is presently available.
- The mineralization factor for salable grade ore (>58% Fe) has been taken as 70% as per the exploration data as well as the past mining experience.
- The threshold limit for iron ore is taken as 45% Fe and accordingly, the material between 45% Fe to 58% Fe has been considered as sub grade ore. Resources of sub grade ore with 45% to 58% Fe have been estimated by applying recovery factor of 20% as determined from the exploration data while the generation of waste materials/ rejects is estimated to be 10% of the total excavation.
- Tonnage factor of 3.0 has been applied to the volume of ore while for sub grade ore, the same has been taken as 2.5 to get the quantity of ore and sub grade ores.
- Out of the geological resources under measured & indicated categories, the mineable reserves under Proved & Probable categories have been estimated by considering the ore blocked under mining benches, safety zone, public roads etc.

3.5.1 The category wise Geological Measured, Indicated and Inferred Resources as well as Mineable Proved and probable Reserves at 45% Fe threshold value as per notification dated 16.10.2009, have been calculated for the lease area as on 01.04.2014. The following table shows the detailed estimates.

3.5.2 Resources

(a) Measured Geological Resources .

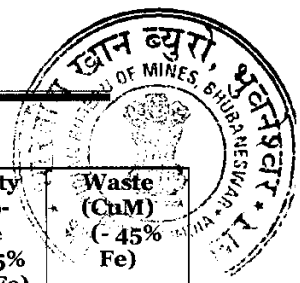
SEC	Area (sq.m)	Length of influence (m)	Volume of ore zone (CuM)	Volume of Saleable (+58% Fe) ore (CuM)	Quantity of Saleable (+58% Fe) ore (Tonne)	Volume of Sub-grade ore(CuM) (+45% to 58% Fe)	Quantity of Sub-grade ore(+45% to 58% Fe) (Tonne)	Quantity of Waste (- 45% Fe) (CuM)
1	2	3	4 (2x3)	5 (4x70%)	6 (5x3.0)	7 (4`x20%)	8 (7x2.5)	9(4X10%)
2400N	0	100	0	0	0	0	0	0
2300N	0	100	0	0	0	0	0	0
2200N	0	100	0	0	0	0	0	0
2100N	0	100	0	0	0	0	0	0
2000N	1621	100	162100	113470	340410	32420	81050	16210
1900N	1625	100	162500	113750	341250	32500	81250	16250
1800N	0	100	0	0	0	0	0	0
1700N	11473	100	1147300	803110	2409330	229460	573650	114730
1600N	9060	100	906000	634200	1902600	181200	453000	90600
1500N	9263	100	926300	648410	1945230	185260	463150	92630
1400N	4624	100	462400	323680	971040	92480	231200	46240
1300N	7238	100	723800	506660	1519980	144760	361900	72380
1200N	7164	100	716400	501480	1504440	143280	358200	71640
1100N	10432	100	1043200	730240	2190720	208640	521600	104320
100N	0	100	0	0	0	0	0	0
900N	17323	100	1732300	1212610	3637830	346460	866150	173230
800N	12553	100	1255300	878710	2636130	251060	627650	125530
700N	16864	100	1686400	1180480	3541440	337280	843200	168640
600N	8154	100	815400	570780	1712340	163080	407700	81540
500N	21126	100	2112600	1478820	4436460	422520	1056300	211260
400N	31153	100	3115300	2180710	6542130	623060	1557650	311530
300N	21440	100	2144000	1500800	4502400	428800	1072000	214400

(a) Measured Geological Resources (contd.....)

SEC	Area (sq.m)	Length of influence (m)	Volume of ore zone (CuM)	Volume of Saleable (+58% Fe) ore (CuM)	Quantity of Saleable (+58% Fe) ore (Tonne)	Volume of Sub-grade ore(CuM) (+45% to 58% Fe)	Quantity of Sub-grade ore(+45% to 58% Fe) (Tonne)	Waste (CuM) (-45% Fe)
1	2	3	4 (2x3)	5 (4x70%)	6 (5x3.0)	7 (4`x20%)	8 (7x2.5)	9 (4x10%)
200N	17640	100	1764000	1234800	3704400	352800	882000	176400
100N	12834	100	1283400	898380	2695140	256680	641700	128340
OO	2032	100	203200	142240	426720	40640	101600	20320
100S	2357	100	235700	164990	494970	47140	117850	23570
200S	16758	100	1675800	1173060	3519180	335160	837900	167580
300S	7331	100	733100	513170	1539510	146620	366550	73310
400S	4213	100	421300	294910	884730	84260	210650	42130
500S	11874	100	1187400	831180	2493540	237480	593700	118740
600S	6989	100	698900	489230	1467690	139780	349450	69890
700S	5003	100	500300	350210	1050630	100060	250150	50030
800S	6545	100	654500	458150	1374450	130900	327250	65450
900S	3315	100	331500	232050	696150	66300	165750	33150
1000S	3145	100	314500	220150	660450	62900	157250	31450
1100S	0	100	0	0	0	0	0	0
1200S	0	100	0	0	0	0	0	0
1300S	0	100	0	0	0	0	0	0
1400S	0	100	0	0	0	0	0	0
1500S	575	100	57500	40250	120750	11500	28750	5750
1600S	9980	100	998000	698600	2095800	199600	499000	99800
1700S	1023	100	102300	71610	214830	20460	51150	10230
1800S	0	100	0	0	0	0	0	0
Total			**30,272,700**	**21,190,890**	**63,572,670**	**6,054,540**	**15,136,350**	**3,027,270**

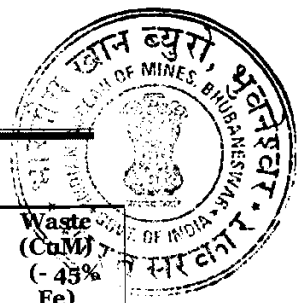
(b) **Indicated Geological Resources**

SEC	Area (sq.m)	Length of influence (m)	Volume of ore zone (CuM)	Volume of Saleable (+58% Fe) ore (CuM)	Quantity of Saleable (+58% Fe) ore (Tonne)	Volume of Sub-grade ore(CuM) (+45% to 58% Fe)	Quantity of Sub-grade ore(+45% to 58% Fe) (Tonne)	Waste (CuM) (-45% Fe)
1	2	3	4 (2x3)	5(4x70%)	6 (5x3.0)	7 (4`x20%)	8 (7x2.5)	9 (4x10%)
2400N	0	100	0	0	0	0	0	0
2300N	0	100	0	0	0	0	0	0
2200N	0	100	0	0	0	0	0	0
2100N	0	100	0	0	0	0	0	0
2000N	5179	100	517900	362530	1087590	103580	258950	51790
1900N	6732	100	673200	471240	1413720	134640	336600	67320
1800N	0	100	0	0	0	0	0	0
1700N	9681	100	968100	677670	2033010	193620	484050	96810
1600N	3802	100	380200	266140	798420	76040	190100	38020
1500N	7162	100	716200	501340	1504020	143240	358100	71620
1400N	7772	100	777200	544040	1632120	155440	388600	77720
1300N	8177	100	817700	572390	1717170	163540	408850	81770
1200N	9110	100	911000	637700	1913100	182200	455500	91100
1100N	7574	100	757400	530180	1590540	151480	378700	75740
100N	0	100	0	0	0	0	0	0
900N	18954	100	1895400	1326780	3980340	379080	947700	189540
800N	13890	100	1389000	972300	2916900	277800	694500	138900
700N	12249	100	1224900	857430	2572290	244980	612450	122490
600N	0	100	0	0	0	0	0	0
500N	4140	100	414000	289800	869400	82800	207000	41400
400N	38545	100	3854500	2698150	8094450	770900	1927250	385450
300N	33265	100	3326500	2328550	6985650	665300	1663250	332650



Indicated Geological Resources (contd.....)

SEC	Area (sq.m)	Length of influence (m)	Volume of ore zone (CuM)	Volume of Saleable (+58% Fe) ore (CuM)	Quantity of Saleable (+58% Fe) ore (Tonne)	Volume of Sub-grade ore(CuM) (+45% to 58% Fe)	Quantity of Sub-grade ore(+45% to 58% Fe) (Tonne)	Waste (CuM) (- 45% Fe)
1	2	3	4 (2x3)	5 (4x70%)	6 (5x3.0)	7 (4`x20%)	8 (7x2.5)	9 (4x10%)
200N	20336	100	2033600	1423520	4270560	406720	1016800	203360
100N	21123	100	2112300	1478610	4435830	422460	1056150	211230
OO	6232	100	623200	436240	1308720	124640	311600	62320
100S	5844	100	584400	409080	1227240	116880	292200	58440
200S	6114	100	611400	427980	1283940	122280	305700	61140
300S	5811	100	581100	406770	1220310	116220	290550	58110
400S	10558	100	1055800	739060	2217180	211160	527900	105580
500S	12418	100	1241800	869260	2607780	248360	620900	124180
600S	14466	100	1446600	1012620	3037860	289320	723300	144660
700S	6157	100	615700	430990	1292970	123140	307850	61570
800S	5209	100	520900	364630	1093890	104180	260450	52090
900S	7584	100	758400	530880	1592640	151680	379200	75840
1000S	4000	100	400000	280000	840000	80000	200000	40000
1100S	0	100	0	0	0	0	0	0
1200S	0	100	0	0	0	0	0	0
1300S	0	100	0	0	0	0	0	0
1400S	0	100	0	0	0	0	0	0
1500S	2000	100	200000	140000	420000	40000	100000	20000
1600S	5488	100	548800	384160	1152480	109760	274400	54880
1700S	4475	100	447500	313250	939750	89500	223750	44750
1800S	0	100	0	0	0	0	0	0
Total			**32,404,700**	**22,683,290**	**68,049,870**	**6,480,940**	**16,202,350**	**3,240,470**

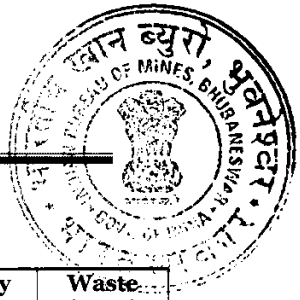


(c) **Inferred Geological Resources**

SEC	Area (sq.m)	Length of influence (m)	Volume of ore zone (CuM)	Volume of Saleable (+58% Fe) ore (CuM)	Quantity of Saleable (+58% Fe) ore (Tonne)	Volume of Sub-grade ore(CuM) (+45% to 58% Fe)	Quantity of Sub-grade ore(+45% to 58% Fe) (Tonne)	Waste (CuM) (- 45% Fe)
1	2	3	4 (2x3)	5 (4x70%)	6 (5x3.0)	7 (4`x20%)	8 (7x2.5)	9 (4x10%)
2400N	0	100	0	0	0	0	0	0
2300N	0	100	0	0	0	0	0	0
2200N	826	100	82600	57820	173460	16520	41300	8260
2100N	3013	100	301300	210910	632730	60260	150650	30130
2000N	1071	100	107100	74970	224910	21420	53550	10710
1900N	4014	100	401400	280980	842940	80280	200700	40140
1800N	7125	100	712500	498750	1496250	142500	356250	71250
1700N	2604	100	260400	182280	546840	52080	130200	26040
1600N	0	100	0	0	0	0	0	0
1500N	0	100	0	0	0	0	0	0
1400N	3497	100	349700	244790	734370	69940	174850	34970
1300N	5773	100	577300	404110	1212330	115460	288650	57730
1200N	2391	100	239100	167370	502110	47820	119550	23910
1100N	2622	100	262200	183540	550620	52440	131100	26220
1000N	8624	100	862400	603680	1811040	172480	476200	95240
900N	0	100	0	0	0	0	0	0
800N	0	100	0	0	0	0	0	0
700N	0	100	0	0	0	0	0	0
600N	0	100	0	0	0	0	0	0
500N	0	100	0	0	0	0	0	0
400N	0	100	0	0	0	0	0	0
300N	0	100	0	0	0	0	0	0

Inferred Geological Resources (contd.....)

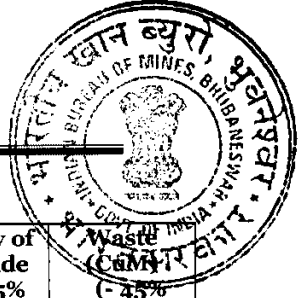
SEC	Area (sq.m)	Length of influence (m)	Volume of ore zone (CuM)	Volume of Saleable (+58% Fe) ore (CuM)	Quantity of Saleable (+58% Fe) ore (Tonne)	Volume of Sub-grade ore(CuM) (+45% to 58% Fe)	Quantity of Sub-grade ore(+45% to 58% Fe) (Tonne)	Waste (CuM) (- 45% Fe)
1	2	3	4 (2x3)	5 (4x70%)	6 (5x3.0)	7 (4`x20%)	8 (7x2.5)	9 (4x10%)
200N	1810	100	181000	126700	380100	36200	90500	18100
100N	0	100	0	0	0	0	0	0
OO	0	100	0	0	0	0	0	0
100S	0	100	0	0	0	0	0	0
200S	0	100	0	0	0	0	0	0
300S	0	100	0	0	0	0	0	0
400S	0	100	0	0	0	0	0	0
500S	0	100	0	0	0	0	0	0
600S	0	100	0	0	0	0	0	0
700S	0	100	0	0	0	0	0	0
800S	2583	100	258300	180810	542430	51660	129150	25830
900S	0	100	0	0	0	0	0	0
1000S	0	100	0	0	0	0	0	0
1100S	6527	100	652700	456890	1370670	130540	326350	65270
1200S	9524	100	952400	666680	2000040	190480	476200	95240
1300S	7556	100	755600	528920	1586760	151120	377800	75560
1400S	4061	100	406100	284270	852810	81220	203050	40610
1500S	2362	100	236200	165340	496020	47240	118100	23620
1600S	0	100	0	0	0	0	0	0
1700S	1845	100	184500	129150	387450	36900	92250	18450
1800S	4402	100	440200	308140	924420	88040	220100	44020
Total			**8,223,000**	**5,756,100**	**17,268,300**	**1,644,600**	**4,111,500**	**822,300**



3.5.3 Reserves

(a) Proved Mineable Reserves

SEC	Area (sq.m)	Length of influence (m)	Volume of ore zone (CuM)	Volume of Saleable (+58% Fe) ore (CuM)	Quantity of Saleable (+58% Fe) ore (Tonne)	Volume of Sub-grade ore(CuM) (+45% to 58% Fe)	Quantity of Sub-grade ore(+45% to 58% Fe) (Tonne)	Waste (CuM) (- 45% Fe)
1	2	3	4 (2x3)	5 (4x70%)	6 (5x3.0)	7 (4`x20%)	8 (7x2.5)	9 (4x10%)
2400N	0	100	0	0	0	0	0	0
2300N	0	100	0	0	0	0	0	0
2200N	0	100	0	0	0	0	0	0
2100N	0	100	0	0	0	0	0	0
2000N	1272	100	127200	89040	267120	25440	63600	12720
1900N	830	100	83000	58100	174300	16600	41500	8300
1800N	0	100	0	0	0	0	0	0
1700N	10282	100	1028200	719740	2159220	205640	514100	102820
1600N	9048	100	904800	633360	1900080	180960	452400	90480
1500N	8457	100	845700	591990	1775970	169140	422850	84570
1400N	4522	100	452200	316540	949620	90440	226100	45220
1300N	7047	100	704700	493290	1479870	140940	352350	70470
1200N	7164	100	716400	501480	1504440	143280	358200	71640
1100N	10432	100	1043200	730240	2190720	208640	521600	104320
100N	0	100	0	0	0	0	0	0
900N	17323	100	1732300	1212610	3637830	346460	866150	173230
800N	12535	100	1253500	877450	2632350	250700	626750	125350
700N	16738	100	1673800	1171660	3514980	334760	836900	167380
600N	6876	100	687600	481320	1443960	137520	343800	68760
500N	20963	100	2096300	1467410	4402230	419260	1048150	209630
400N	30705	100	3070500	2149350	6448050	614100	1535250	307050



Proved Mineable Reserves (contd.....)

SEC	Area (sq.m)	Length of influence (m)	Volume of ore zone (CuM)	Volume of Saleable (+58% Fe) ore (CuM)	Quantity of Saleable (+58% Fe) ore (Tonne)	Volume of Sub-grade ore(CuM) (+45% to 58% Fe)	Quantity of Sub-grade ore(+45% to 58% Fe) (Tonne)	Waste (CuM) (- 45% Fe)
1	2	3	4 (2x3)	5 (4x70%)	6 (5x3.0)	7 (4`x20%)	8 (7x2.5)	9 (4x10%)
300N	21190	100	2119000	1483300	4449900	423800	1059500	211900
200N	17311	100	1731100	1211770	3635310	346220	865550	173110
100N	12834	100	1283400	898380	2695140	256680	641700	128340
OO	2032	100	203200	142240	426720	40640	101600	20320
100S	1157	100	115700	80990	242970	23140	57850	11570
200S	16130	100	1613000	1129100	3387300	322600	806500	161300
300S	6909	100	690900	483630	1450890	138180	345450	69090
400S	3363	100	336300	235410	706230	67260	168150	33630
500S	11494	100	1149400	804580	2413740	229880	574700	114940
600S	6989	100	698900	489230	1467690	139780	349450	69890
700S	5003	100	500300	350210	1050630	100060	250150	50030
800S	6545	100	654500	458150	1374450	130900	327250	65450
900S	3315	100	331500	232050	696150	66300	165750	33150
1000S	3145	100	314500	220150	660450	62900	157250	31450
1100S	0	100	0	0	0	0	0	0
1200S	0	100	0	0	0	0	0	0
1300S	0	100	0	0	0	0	0	0
1400S	0	100	0	0	0	0	0	0
1500S	477	100	47700	33390	100170	9540	23850	4770
1600S	9889	100	988900	692230	2076690	197780	494450	98890
1700S	1023	100	102300	71610	214830	20460	51150	10230
1800S	0	100	0	0	0	0	0	0
Total			**29,300,000**	**20,510,000**	**61,530,000**	**5,860,000**	**14,650,000**	**2,930,000**

(b) Probable Mineable Reserves

SEC	Area (sq.m)	Length of influence (m)	Volume of ore zone (CuM)	Volume of Saleable (+58% Fe) ore (CuM)	Quantity of Saleable (+58% Fe) ore (Tonne)	Volume of Sub-grade ore(CuM) (+45% to 58% Fe)	Quantity of Sub-grade ore(+45% to 58% Fe) (Tonne)	Waste (CuM) (- 45% Fe)
1	2	3	4 (2x3)	5 (4x70%)	6 (5x3.0)	7 (4`x20%)	8 (7x2.5)	9 (4x10%)
2400N	0	100	0	0	0	0	0	0
2300N	0	100	0	0	0	0	0	0
2200N	0	100	0	0	0	0	0	0
2100N	0	100	0	0	0	0	0	0
2000N	4729	100	472900	331030	993090	94580	236450	47290
1900N	4630	100	463000	324100	972300	92600	231500	46300
1800N	0	100	0	0	0	0	0	0
1700N	9468	100	946800	662760	1988280	189360	473400	94680
1600N	2651	100	265100	185570	556710	53020	132550	26510
1500N	6879	100	687900	481530	1444590	137580	343950	68790
1400N	5401	100	540100	378070	1134210	108020	270050	54010
1300N	7806	100	780600	546420	1639260	156120	390300	78060
1200N	7921	100	792100	554470	1663410	158420	396050	79210
1100N	7460	100	746000	522200	1566600	149200	373000	74600
100N	0	100	0	0	0	0	0	0
900N	18801	100	1880100	1316070	3948210	376020	940050	188010
800N	13737	100	1373700	961590	2884770	274740	686850	137370
700N	12200	100	1220000	854000	2562000	244000	610000	122000
600N	0	100	0	0	0	0	0	0
500N	3174	100	317400	222180	666540	63480	158700	31740
400N	38136	100	3813600	2669520	8008560	762720	1906800	381360

Probable Mineable Reserves (Contd.....)

SEC	Area (sq.m)	Length of influence (m)	Volume of ore zone (CuM)	Volume of Saleable (+58% Fe) ore (CuM)	Quantity of Saleable (+58% Fe) ore (Tonne)	Volume of Sub-grade ore(CuM) (+45% to 58% Fe)	Quantity of Sub-grade ore(+45% to 58% Fe) (Tonne)	Waste (CuM) (-45% Fe)
1	2	3	4 (2x3)	5 (4x70%)	6 (5x3.0)	7 (4`x20%)	8 (7x2.5)	9 (4x10%)
300N	32729	100	3272900	2291030	6873090	654580	1636450	327290
200N	18604	100	1860400	1302280	3906840	372080	930200	186040
100N	18967	100	1896700	1327690	3983070	379340	948350	189670
OO	6072	100	607200	425040	1275120	121440	303600	60720
100S	5177	100	517700	362390	1087170	103540	258850	51770
200S	2284	100	228400	159880	479640	45680	114200	22840
300S	4744	100	474400	332080	996240	94880	237200	47440
400S	8554	100	855400	598780	1796340	171080	427700	85540
500S	9588	100	958800	671160	2013480	191760	479400	95880
600S	13969	100	1396900	977830	2933490	279380	698450	139690
700S	5660	100	566000	396200	1188600	113200	283000	56600
800S	4486	100	448600	314020	942060	89720	224300	44860
900S	7566	100	756600	529620	1588860	151320	378300	75660
1000S	3966	100	396600	277620	832860	79320	198300	39660
1100S	0	100	0	0	0	0	0	0
1200S	0	100	0	0	0	0	0	0
1300S	0	100	0	0	0	0	0	0
1400S	0	100	0	0	0	0	0	0
1500S	1768	100	176800	123760	371280	35360	88400	17680
1600S	4902	100	490200	343140	1029420	98040	245100	49020
1700S	3748	100	374800	262360	787080	74960	187400	37480
1800S	0	100	0	0	0	0	0	0
Total			29,577,700	20,704,390	62,113,170	5,915,540	14,788,850	2,957,770

3.6 Summary of Resources & Reserves as on 01.04.2014

Grade Range & Reserves Category	Resources				Reserves		
	Measured	Indicated	Inferred	Total	Proved	Probable	Total
+ 58% Fe (million tonnes)	63.573	68.050	17.268	148.891	61.530	62.113	123.643
45 to 58% Fe (million tonnes)	15.136	16.202	4.112	35.450	14.650	14.789	29.439
Total +45% Fe (million tonnes)	78.709	84.252	21.380	184.341	76.180	76.902	153.082

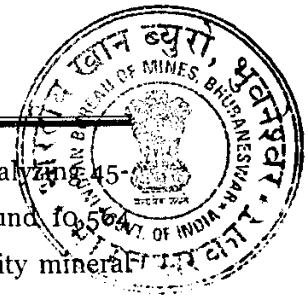
3.7 Justification for increase in Reserve and Resources

During last scheme period, the total resource and reserve estimated as 88.837 and 60.401 million tonne respectively. The resource and reserves of salable grade ore (+58% Fe) as on 01.04.2014 has been estimated to be 148.891 and 123.643 million tones respectively. The increase in reserve and resources are due to following reason:

a. During the financial year 2012-13, the lessee has drilled 60 nos of bore holes within the lease area majority of which have proved occurrence of ore at depth.
b. The total meterage of drilling is 3487.05m.
c. The data of bore holes drilled indicated depth ward and lateral extension of ore.
d. The recovery % of salable ore was earlier taken as 50% of the ROM while that of sub grade and waste was taken as 25% & 25% respectively. The data of present bore holes indicates a recovery of salable ore (+58% Fe) at 70% with sub grade and waste at 20% & 10% respectively. This has also contributed an increase of resources/ reserves in the area.

3.8 UNFC Classification for Insitu Ore

Geological resources under measured, indicated and inferred categories and mineable reserves under Proved and probable categories of insitu iron ore in the lease area have been estimated. Based on the exploration work as well as quarry workings, an attempt has been made to allocate the salable iron ore (+58% Fe) reserves as well as sub grade ore (45-58% Fe) resources under UNFC codes. The mineable proved and probable reserves of +58% Fe ore has been assigned 111 &122 categories respectively while the locked up ores of +58% Fe are placed under 211, 222 categories. The proved and probable reserves of insitu sub grade ore which are potentially not economic presently has been kept under 221, 222 (pre feasibility mineral resources) while the balance insitu resources of sub grade ore are placed under 331, 332 & 333 categories. The resources of sub grade ore (kept within bracket) are presently brought under UNFC considering the revised threshold limit with respect to mineral conservation point of view. Beside the insitu



sub grade ores, there are a number of sub grade ore stacks within the lease area analyzing 45-58% Fe and the quantity of these ores are estimated to be 5.282 MCuM or around 10.564 Million tonnes. These sub grade ores are presently being kept under pre- feasibility mineral resource category (221) and are proposed to be utilized in the beneficiation plant of the lessee in due course. The reserves/ resources as per UNFC as reported in last approved modified scheme of mining and updated reserves/ resources of insitu ore are tabulated below.

Classification	UNFC Code	Quantity in Million Tonnes					Av. Grade Fe %
		Last Approved modified Mining Scheme	Addition/ Depletion of Insitu ore	Addition/ depletion of sub grade stocks	Updated Insitu Reserves/ Resources	Updated sub grade ore Resources	
A. Mineral Reserves							
(1)Proved Mineral Reserves	111	31.743	(+)29.787	------	61.530	------	+58
(2)Probable Mineral Reserves	122	28.658	(+)33.455	------	62.113	------	+58
Sub Total (A)	111+122	60.401	(+)63.242	------	123.643	------	+58
B. Remaining Resources							
(1)Feasibility Mineral Resource	211	5.803	(-)3.760	------	2.043	-----	+58
		(15.338)	(-)15.338	------	----	-----	45-58
(2)Pre-feasibility Mineral Resources	221	----	-----	(+)10.564	----	(10.564)	45-58
		----	(+)14.650	-----	(14.650)	-----	45-58
	222	1.376	(+)4.561	-----	5.937	-----	+58
		(11.940)	(+)2.849	-----	(14.789)	-----	45-58
(3)Measured Mineral Resources	331	(2.418)	(-)1.932	-----	(0.486)	-----	45-58
(4)Indicated Mineral Resources	332	(0.574)	(+)0.839	-----	(1.413)	-----	45-58
(5)Inferred Mineral Resources	333	20.171	(-)2.903	-----	17.268	-----	+58
		(8.404)	(-)4.292	-----	(4.112)	-----	45-58
(6)Reconnaissance Mineral Resources	334	1.086	(-)1.086	-----	----	-----	+58
		(0.453)	(-)0.453	-----	----	-----	45-58
Total Mineral Resources (A+B)		88.837	(+)60.054	-----	148.891	-----	+58
		39.127	(-)3.677	(+)10.564	35.450	10.564	45-58
GRAND TOTAL		127.964	(+)56.377	(+) 10.564	184.341	10.564	+45

Summary of updated reserves/ resources as on 01.04.2014 is tabulated below:

Classification	UNFC Code	Quantity in Million Tonnes			Av. Grade Fe %
		Updated Insitu Reserves/ Resources	Updated Resources of SG stacks	Total Reserves/ Resources in ML area	
A. Mineral Reserves					
(1)Proved Mineral Reserves	111	61.530	----	61.530	+58
(2)Probable Mineral Reserves	122	62.113	----	62.113	+58
Sub Total (A)	111+122	123.643	----	123.643	+58
B. Remaining Resources					
(1)Feasibility Mineral Resource	211	2.043	----	2.043	+58
(2)Pre-feasibility Mineral Resources	221	(14.650)	(10.564)	(25.214)	45-58
	222	5.937	----	5.937	+58
		(14.789)	----	(14.789)	45-58
(3)Measured Mineral Resources	331	(0.486)	----	(0.486)	45-58
(4)Indicated Mineral Resources	332	(1.413)	----	(1.413)	45-58
(5)Inferred Mineral Resources	333	17.268	----	17.268	+58
		(4.112)	----	(4.112)	45-58
Total Mineral Resources (A+B)		148.891	----	148.891	+58
		(35.450)	(10.564)	(46.014)	45-58
GRAND TOTAL		184.341	10.564	194.905	+45

Detailed feasibility report in support of reserves estimation under UNFC system is annexed as Annexure- 27.

Proved Mineral Reserves - (111)

Classification / UNFC Code	Economic Axis	Feasibility Axis	Geological Axis
	E1 (Economic)	F1 (Feasibility study)	G1 (Detail exploration)
Proved Mineral Reserves (111)	1. Exploration carried out by the lessee since commencement of the lease by opening of number of pits and conducting exploration in the area by drilling of 136 nos of bore hole/ drill holes in the area during last 10 years of scheme period. 2. Mining report/ mining plan has been prepared time to time and approved by the authorities of Indian Bureau of Mines. 3. Proved mineral reserves with 100 m influence of sampling points are 61.530 million tonnes with average grade of +58% Fe_2O_3. 4. Knowledge of forest & non forest & other land use data are available. Diversion of forest land has been obtained from Department of Forests, MoEF New Delhi	Geology : 1. Exploration carried out by geological mapping and study of working quarries and exploratory holes sunk in the area during the mining lease period. 2. Mining: Open cast mechanized method of mining with formation of 6m high benches is being followed. Tentative production plan prepared. 3. Environmental: Base line data on environment has been collected. 4. Processing : Detail screen tests on the ROM ores from the mine has been done which has indicated its amenability to segregate the mineral in different sizes. 5. Infrastructure and Services and construction activities: Infrastructural facilities are available since the mine operation in the area and surrounding areas are continuing since last around 50 years. 6. Costing: The cost of mining shall be economical as being done since last several years. 7. Economic viability: The mining project shall be economically viable since the ore will be supplied for production of sponge iron and steel, the market of which shows an upward trend.	1. Geological Survey : Mapping has been done on 1:2000 Scale. 2. Geochemical Survey : Samples collected from drill holes and quarry workings have been analyzed for different constituents. 3. Geophysical Survey: Not required 4. Technological: i)Pitting/Trenching- Trial mining with development of quarries have been established since commencement of mining operations. ii) Drilling- A total of 136 nos of bore holes/ drill holes have been drilled during last two scheme periods. iii) Sampling- Sampling of ROM ore, screened ores and drill hole cuttings are being done. 5. Petrography : Not done as not necessary 6. Reserves under proved category has been calculated based on quarry workings and bore holes/ drill holes at 100 m influence.

Feasibility & Pre feasibility Mineral Resources– (211 & 222)

Feasibility Mineral Resources (211)	**E2 (Potentially Economic)** 1. Exploration is general. Mining Plan/ schemes have been approved. 2. Geological interpretation has been done to have a detail idea about the reserves and grade of ore but the ore is locked within the mining benches and 7.5m safety zone. 3. Feasibility Mineral Resources of 2.043 MT (+58% Fe) ore have been estimated under this category. 4. The resources are non mineable but potentially economic .	**F1 (Feasibility Study)** 1. Geological and chemical analysis data of the ore body is incorporated. Topographical setting and nature of land has been given. 2. Environmental study has been done. 3. Feasibility study has been done.	**G1 (Detail exploration)** 1. Geological mapping has been done on 1:2000 scale. 2. Geological plan has been prepared showing topographical and geological features, contacts of ore & no ore zones, location of exploratory holes etc. 3. Geological sections have been prepared showing the mine developments and exploratory hole data.
Pre-feasibility Mineral Resources (221 & 222)	**E2 (Potentially Economic)** 1. Exploration is general. Mining Plan/ schemes have been approved. 2. Geological interpretation has been done to have a detail idea about the reserves and grade of ore but the ore is locked within the mining benches and 7.5m safety zone. The resources of sub grade ore stacked within the lease area are also kept under these categories. 3. Pre Feasibility resources of 10.564 MT of sub grade ore stacked in the lease area and 14.650 MT of insitu sub grade ore are kept under 221 category while 5.937 MT of +58% Fe grade ore & 14.789 MT (45-58% Fe) ore have been estimated under 222 category. 4. The resources are non mineable but potentially economic.	**F2 (Pre Feasibility Study)** 1. Geological and chemical analysis data of the ore body is incorporated. Topographical setting and nature of land has been given. 2. Environmental study has been done.	**G1 (Detail exploration)** 1. Geological mapping has been done on 1:2000 scale. 2. Geological plan has been prepared showing topographical and geological features, contacts of ore & no ore zones, location of exploratory holes etc. 3. Geological sections have been prepared showing the mine developments and exploratory hole data.

Probable Mineral Reserves (122)

Classification / UNFC Code	Economic Axis	Feasibility Axis	Geological Axis
	E1 (Economic)	**F1 (Feasibility study)**	**G1 (Detail exploration)**
Probable Mineral Reserves (122)	1. Exploration carried out by the lessee since commencement of the lease by opening of number of pits and conducting exploration in the area by drilling of 136 nos of bore hole/ drill holes in the area during last 10 years of scheme period. 2. Probable mineral reserves estimated between 100-200 m influence of sampling points & 10m below the proved limit where bore holes are terminated at ore itself. 3. Probable mineral reserves are 62.113 million tonnes with average grade of +58% Fe_2O_3. 4. Knowledge of forest & non forest & other land use data are available. Diversion of forest land has been obtained from Department of Forests, MoEF New Delhi	Geology : 1. Exploration carried out by geological mapping and study of working quarries and exploratory holes sunk in the area during the mining lease period. 2. Mining: Open cast mechanized method of mining with formation of 6m high benches is being followed. Tentative production plan prepared. 3. Environmental: Base line data on environment has been collected. 4. Processing : Detail screen tests on the ROM ores from the mine has been done which has indicated its amenability to segregate the mineral in different sizes. 5. Infrastructure and Services and construction activities: Infrastructural facilities are available since the mine operation in the area and surrounding areas are continuing since last around 50 years. 6. Costing: The cost of mining shall be economical as being done since last several years. 7. Economic viability: The mining project shall be economically viable since the ore will be supplied for production of sponge iron and steel, the market of which shows an upward trend.	1. Geological Survey : Mapping has been done on 1:2000 Scale. 2. Geochemical Survey : Samples collected from drill holes and quarry workings have been analyzed for different constituents. 3. Geophysical Survey: Not required 4. Technological: i)Pitting/Trenching- Trial mining with development of quarries have been established since commencement of mining operations. ii) Drilling- A total of 136 nos of bore holes/ drill holes have been drilled during last two scheme periods. iii) Sampling- Sampling of ROM ore, screened ores and drill hole cuttings are being done. 5. Petrography : Not done as not necessary 6. Reserves under probable category has been calculated 10m below the quarry floors and the limit of proved reserves where boreholes are terminated in ore itself.

Measured & Indicated Mineral Resources– (331 & 332)

MeasuredMineral Resources (331)	E3 (Intrinsically Economic) 1. Exploration is general. Mining Plan/ schemes have been approved. 2. Geological interpretation has been done to have a detail idea about the resources and grade of sub grade ore but the ore is locked within the mining benches and 7.5m safety zone. 3. Measured Mineral Resources of 0.486 MT (45-58% Fe) ore have been estimated under this category. 4. The resources are non mineable & intrinsically economic .	F3 (Geological Study) 1. Geological and chemical analysis data of the ore body is inferred. Topographical setting and nature of land has been given. 2. Environmental study has been done. 3. Feasibility study has been done.	G1 (Detail exploration) 1. Geological mapping has been done on 1:2000 scale. 2. Geological plan has been prepared showing topographical and geological features, contacts of ore & no ore zones, location of exploratory holes etc. 3. Geological sections have been prepared showing the mine developments and exploratory hole data.
Indicated Mineral Resources (332)	E3 (Intrinsically Economic) 1. Exploration is general. Mining Plan/ schemes have been approved. 2. Geological interpretation has been done to have a detail idea about the resources and grade of sub grade ore but the ore is locked within the mining benches and 7.5m safety zone. 3. Indicated Mineral resources of 1.413 MT (45-58% Fe) ore have been estimated under this category. 4. The resources are non mineable & intrinsically economic.	F3 (Geological Study) 1. Geological and chemical analysis data of the ore body is inferred. Topographical setting and nature of land has been given. 2. Environmental study has been done.	G2(General exploration) 1. Geological mapping has been done on 1:2000 scale. 2. Geological plan has been prepared showing topographical and geological features, contacts of ore & no ore zones, location of exploratory holes etc. 3. Geological sections have been prepared showing the mine developments and exploratory hole data.

Inferred Mineral Resources– (333)

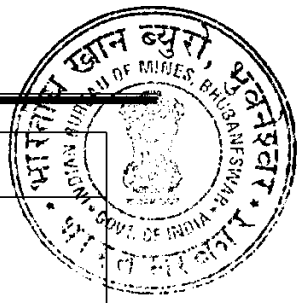
	E3 (Intrinsically Economic)	F3 (Geological Study)	G3 (Prospecting)
Inferred Mineral Resources (333)	1. Exploration is of prospecting nature. Mining Plan/ schemes have been approved. 2. Geological interpretation has been done to have a general idea about the reserves and grade of ore below the probable limit. 3. Inferred Mineral Resources of 17.268 MT (+58% Fe) & 4.112 MT (45-58% Fe) have been estimated under this category. 4. The resources are of inferred nature.	1. Geological and chemical analysis data of the ore body is not available presently. Topographical setting and nature of land has been given. 2. Environmental study has been done. 3. Feasibility study has been done.	1. Geological mapping has been done on 1:2000 scale. 2. Geological plan has been prepared showing topographical and geological features, contacts of ore & no ore zones, location of exploratory holes etc. 3. Geological sections have been prepared showing the mine developments and exploratory hole data.

3.5 Future Exploration Programme

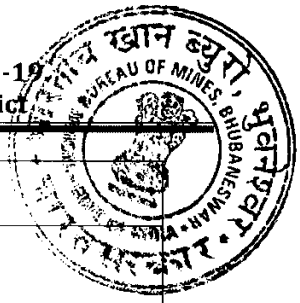
During the scheme period of it was proposed to complete 177 boreholes in 100m x 100 m grid pattern in ore zone to prove ore length and 10 boreholes in the dumping area to prove the barrenness for continuation of dumping operations. Computation of Grade-Wise run for DTH and Core Drilling of 18 holes were mentioned in last approved modified scheme of mining for 2013-14 and at Para 3.4.4 above. 60 boreholes were completed in all respect during 2012-13. Details of these boreholes are at Para 3.4.1 of the text. Computation of Grade-Wise Run of boreholes completed by end of 2012-13 has been done. Considering the recovery of different grade of ore grade wise resources and reserves has been calculated. The year wise boreholes completed in all respect of by end of 2013 March are shown in Plate-4. The run-wise sampling and analysis of all 60 bore holes have been enclosed. In the proposed scheme of mining, a tentative exploration proposal has been worked out for the entire lease area on a regular grid pattern (excluding the area already covered) for assessing the total mineral reserves/ resources as per the CCOM's guide lines under UNFC. 25 nos of check bore holes have also been proposed in the inferred non-mineralized zone to prove presence or absence of mineralization in the area (Plate-4). Co-ordinates of proposed boreholes are as under which may change depending on site condition.

PROPOSED EXPLORATION SCHEDULE

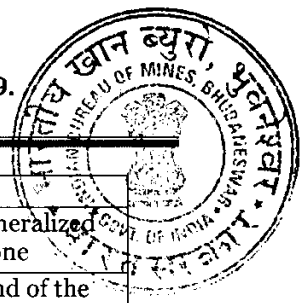
Year	BH No	Co-ordinate		Depth (M)
2014-15	PBH 1	00	1800S	Upto end of the Mineralization
	PBH 2	100W	1800S	
	PBH 3	200W	1800S	
	PBH 4	300W	1800S	
31 nos. in mineralized area & 6 nos in non-mineralized area	PBH 5	300W	1700S	
	PBH 6	200W	1700S	
	PBH 7	100W	1700S	
	PBH 8	00	1700S	
	PBH 9	100E	1600S	
	PBH 10	00	1600S	
	PBH 11	100W	1600S	
	PBH 12	200W	1600S	
	PBH 13	200W	1500S	
	PBH 14	100W	1500S	
	PBH 15	00	1500S	
	PBH 16	100E	1500S	
	PBH 17	100E	1400S	
	PBH 18	00	1400S	
	PBH 19	100W	1400S	
	PBH 20	00	1300S	
	PBH 21	500E	1300S	
	PBH 22	600E	1300S	
	PBH 23	700E	1300S	
	PBH 24	800E	1300S	
	PBH 25	900E	1200S	
	PBH 26	800E	1200S	
	PBH 27	700E	1200S	
	PBH 28	600E	1200S	
	PBH 29	500E	1100S	
	PBH 30	600E	1100S	
	PBH 31	700E	1100S	
	PBH 182	400E	600N	Non mineralized zone
	PBH 183	600E	900S	
	PBH 184	200E	800S	
	PBH 185	300E	1100S	
	PBH 186	400E	1600S	
	PBH 187	2400E	700S	
2015-16	PBH 32	2000E	1200S	Upto end of the Mineralization
	PBH 33	1900E	1200S	
37 nos. in mineralized area & 2 nos in non-mineralized area	PBH 34	2000E	1100S	
	PBH 35	1900E	1100S	
	PBH 36	1700E	1100S	
	PBH 37	1600E	1100S	
	PBH 39	1600E	1000S	
	PBH 40	1700E	1000S	
	PBH 41	1800E	1000S	
	PBH 42	1900E	1000S	
	PBH 43	2000E	1000S	
	PBH 44	2200E	1000S	



	PBH 46	2300E	900S	
	PBH 47	2100E	900S	
	PBH 48	1800E	900S	
	PBH 49	1600E	900S	
	PBH 50	1700E	800S	
	PBH 51	1800E	800S	
	PBH 52	700E	800S	
	PBH 53	700E	700S	
	PBH 54	600E	700S	
	PBH 55	500E	600S	
	PBH 56	600E	600S	
	PBH 57	700E	600S	
	PBH 58	400E	500S	
	PBH 59	500E	500S	
	PBH 60	400E	400S	
	PBH 61	500E	400S	
	PBH 62	600E	400S	
	PBH 63	600E	300S	
	PBH 64	500E	300S	
	PBH 65	300E	00	
	PBH 66	600E	100S	
	PBH 67	500E	100S	
	PBH 68	400E	100S	
	PBH 69	500E	00	
	PBH 70	400E	00	
	PBH 38	1300E	1100S	Non mineralized zone
	PBH 45	2400E	1100S	
2016-17 31 nos. in mineralized area & 1 no in non-mineralized area	PBH 71	300E	100N	Upto end of the Mineralization
	PBH 72	100E	100N	
	PBH 73	00	100N	
	PBH 74	100W	100N	
	PBH 75	100E	200N	
	PBH 76	00	200N	
	PBH 77	100W	200N	
	PBH 78	200W	200N	
	PBH 79	300W	200N	
	PBH 80	400W	200N	
	PBH 81	600W	300N	
	PBH 82	500W	300N	
	PBH 83	300W	300N	
	PBH 84	200W	300N	
	PBH 85	100W	300N	
	PBH 86	00	300N	
	PBH 87	100E	300N	
	PBH 88	200E	300N	
	PBH 89	200E	400N	
	PBH 90	00	400N	
	PBH 91	200W	400N	
	PBH 92	300W	400N	
	PBH 93	400W	400N	
	PBH 94	500W	400N	



	PBH 95	700W	400N	
	PBH 96	1100W	300N	
	PBH 97	1000W	400N	
	PBH 98	1100W	400N	
	PBH 99	700W	500N	
	PBH 100	500W	500N	
	PBH 102	300W	500N	
	PBH 101	300W	700N	Non mineralized zone
2017-18 43 nos. in mineralized area & 2 no in non-mineralized area	PBH 103	300E	800N	Upto end of the Mineralization
	PBH 104	500E	800N	
	PBH 105	600E	900N	
	PBH 106	400E	900N	
	PBH 107	300E	900N	
	PBH 108	700E	1000N	
	PBH 109	600E	1000N	
	PBH 110	500E	1000N	
	PBH 111	400E	1000N	
	PBH 112	300E	1000N	
	PBH 113	200E	1000N	
	PBH 114	200E	1100N	
	PBH 115	400E	1100N	
	PBH 116	500E	1100N	
	PBH 117	500E	1100N	
	PBH 118	400E	1100N	
	PBH 119	300E	1100N	
	PBH 120	200E	1100N	
	PBH 121	100E	1300N	
	PBH 122	200E	1300N	
	PBH 123	300E	1300N	
	PBH 124	400E	1300N	
	PBH 125	500E	1300N	
	PBH 126	600E	1300N	
	PBH 128	100E	1400N	
	PBH 129	500E	1600N	
	PBH 130	500E	1700N	
	PBH 131	500E	1800N	
	PBH 132	600E	1800N	
	PBH 133	700E	1800N	
	PBH 134	700E	1900N	
	PBH 135	600E	1900N	
	PBH 136	100E	1800N	
	PBH 138	00	1900N	
	PBH 139	100E	1900N	
	PBH 140	200E	1900N	
	PBH 141	300E	2000N	
	PBH 142	200E	2000N	
	PBH 143	100E	2000N	
	PBH 144	00	2000N	
	PBH 145	00	2100N	
	PBH 146	100E	2100N	



	PBH 147	200E	2100N	
	PBH 127	200E	1400N	Non mineralized zone
	PBH 137	00	1800N	
2018-19 30 nos. in mineralized area & 14 no in non-mineralized area	PBH 148	400w	1900N	Upto end of the Mineralization
	PBH 149	500w	1900N	
	PBH 150	600w	1900N	
	PBH 151	500w	1800N	
	PBH 152	400w	1800N	
	PBH 153	2200w	800N	
	PBH 154	2300w	800N	
	PBH 155	2600w	800N	
	PBH 156	2700w	800N	
	PBH 157	2700w	900N	
	PBH 158	2600w	900N	
	PBH 159	2500w	900N	
	PBH 160	2400w	900N	
	PBH 161	2300w	900N	
	PBH 162	2200w	900N	
	PBH 163	2700w	1000N	
	PBH 164	2600w	1000N	
	PBH 165	2500w	1000N	
	PBH 166	2400w	1000N	
	PBH 167	2300w	1000N	
	PBH 168	2600w	1100N	
	PBH 169	2500w	1100N	
	PBH 170	2400w	1100N	
	PBH 171	1700W	1200N	
	PBH 172	1600W	1200N	
	PBH 173	1500W	1100N	
	PBH 174	1700W	1100N	
	PBH 175	2100W	1300N	
	PBH 176	2100W	1400N	
	PBH 177	2100W	2100N	
	PBH 178	1900W	2000N	Non mineralized zone
	PBH 179	2600W	1400N	
	PBH 180	2600W	1200N	
	PBH 181	300W	2000N	
	PBH 188	600E	1500S	
	PBH 189	100E	1100S	
	PBH 190	1100E	1000S	
	PBH 191	1100E	1200S	
	PBH 192	100E	600N	
	PBH 193	2400W	1400N	
	PBH 194	500W	700N	
	PBH 195	300E	1300S	
	PBH 196	2500E	900S	
	PBH 197	200E	1700S	

4.0 CONCEPTUAL MINING PLAN

4.1 The demonstrated mineral reserves as on 31.03.2014 are estimated at 128.643 million tones. It has been proposed to produce 24.625 million tonnes during the next scheme period leaving a balance mineral reserve of 99.018 million tonnes for the conceptual period. These reserves will last for more than 20 years after the scheme period and if combined with the inferred mineral resource of 17.268 million tones shall last for 24 years after the proposed scheme period maintaining the production level at around 4.92 million tonnes per annum from the quarries.

The conceptual planning thus has been projected up to the year 2038-39 by which time, the entire mineable reserve shall be depleted and the deepest level of the mine shall be at 413 mRL near Barapada bottom quarry. Beside the above there is proposal to recover marketable grade ore from the sub and low grade ores by beneficiating about 2 million tonnes per year. Screening of sub grade ores is also proposed by the lessee to recover marketable grade ore. All these activities combined together shall produce marketable grade ore to a maximum of 5.62 tonnes per annum.

4.2 The ultimate extent and size of the pit

During conceptual period, a number of small pits in Blocks –I, II, III, IV & VI are to be combined and worked as individual blocks. Due to discontinuous occurrences and separation by NH/ nalas etc, Block Nos V (Guali), VII (Camphudi) & VIII (Panduliposhi) are to be worked as separate blocks. The ultimate size of the different quarries/ blocks with their ultimate co-ordinates, top & bottom RLs with depth of working are tabulated as below:

S.L NO	Block No.	Pits to be Combined	Ultimate size of Pits (mts)	Ultimate Co-ordinates	Top RLs (mts)	Bottom RLs (mts)	Ultimate depth (m)	Co-ordinates of reclaimed area with reclaimed area RL
1	I	Barapada Block	1900 X 750	830S-600N & 1240W-800E	670M-600M	547M-413M	118-159	830S-600N & 1240W-800E RL: 670m, Bottom 413m
2	II	Katasahi Block	890 X590	420S-1360S& 1400E-2325E	600M-570M	510M-490M	80-90	420S-1360S& 1400E-2325E RL: 580m Bottom: 544m
3	III	Topadihi Block	1575 X 940	2020N-425N & 120W-1020E	605M-570M	534M-485M	71-85	2020N-425N & 120W-1020E RL: 590m
4	IV	Kanhusahi Block	1090 X 830	1040S-1880S &465W-945E	690M-635M	580M-600M	35M-110M	1040S-1880S &465W-945E RL: 680m

S.L NO	Block No.	Pits to be Combined	Ultimate size of Pits (mts)	Ultimate Co-ordinates	Top RLs (mts)	Bottom RLs (mts)	Ultimate depth (m)	Co-ordinates of reclaimed area with reclaimed area RL
5	V	Guali Block	1100 X 500	1610N-2148N &635W-460E	560M	487M	73M	1610N-2148N &635W-460E RL:560m
6	VI	Udalbari Block	820 X750	720N 1520N &2000W-2855W	565M	520M	45M	720N 1520N &2000W-2855W RL:550m
7	VII	Camphudi Block	215 X 330	1010N-12030N &1445W-1775W	550M	525M	25M	1010N-12030N &1445W-1775W RL:550m
8	VIII	Pandulipos hi Block	200 X 150	1980N-2200N &1945W-2130W	560M	545M	15M	1980N-2200N &1945W-2130W RL:560m

As per the proposed quarry workings during the scheme period, (Plate No.6A to 10F & 11), it is estimated that starting from 2014-15 during the scheme period, parts of Udalbari Block, Topadihi Block and Barapada Block shall reach ultimate pit limit and shall be back filled to varying heights over an area of 8.452 ha. The back filling of other pits which reach UPL during the conceptual period shall be simultaneously back filled.

4.3 Ultimate capacity of dump:

i)	Total Mineable Reserves	=	123.643 million tonnes
ii)	Production Planned during the scheme period	=	24.625 million tonnes
iii)	Total waste to be excavated during the scheme period	=	1.172MCuM
iv)	Mineable reserves during conceptual period	=	99.018 million tonnes
v)	Total volume of ore zone during conceptual period	=	99.018 ÷ 3.0 =33.006 CuM (70% of the total volume of excavation)
vi)	Total waste to be generated during conceptual period (10% of total excavation)	=	4.715 MCuM
vii)	Total sub grade generation (20% of total volume)	=	9.430 MCuM
viii)	Total waste to be generated during the entire life of the mine (iii+vi)	=	5.887MCuM

Out of these generated waste from the ore zone, around 20% i.e. 1.177 MCuM has been proposed for road maintenance and 60% i.e. 3.532 MCuM has been proposed for reclamation of the worked out pits and the balance waste of 1.177 MCuM shall be dumped at the earmarked sites given in Plate No – 11,13 &14. Beside these waste materials, a total quantity of 3.952 MCuM of rejects are expected to be generated from the beneficiation plant during the entire life of the mine. Major part of these rejects

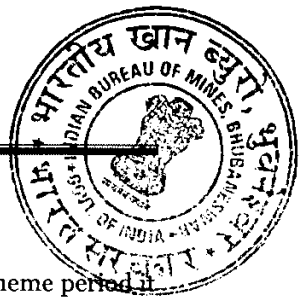
/waste materials are proposed to be utilized for road making and back filling and it is expected that around 10% of the materials will be required to be dumped. Thus a total quantity of 1.583 CuM of waste are likely to be dumped during the conceptual period. In the scheme period as tabulated in para 6.2, three locations have been identified over 6.555 Ha area to accommodate about 1.578 MCuM waste/OB. These three dumps will be utilized for keeping the waste materials during conceptual period by increasing the heights and laterally extending PD/2 over a length of around 100 m towards North West direction. Dumping of waste has been proposed by retreating method maintaining the ultimate dump slope at 20-22° with individual terrace slopes not exceeding 37° for systematic and scientific dumping. Each terrace is planned to have inward slope with catch drains at the inward side of the terrace. The catch drains of individual terrace shall be connected to the garland drain outside the periphery of the dump. The details of the dumps during conceptual period shall be as under

Dump No	Location	Spread (m)		Area (Ha)	Proposed ultimate height (m)	Capacity to accommodate waste (Cu.M) applying 70% slope factor	RLs
		Length	width				
PD/1	141N-330N/1140W-940W	176	96	1.68	30	354816	545-575m
PD/2	465N-690N/260E-590E	294	100	2.940	30	617400	554-584m
PD/3	335S-635S/1890E-2070E	217	135	2.935	30	615195	557-587m
Total				**7.555**		**1,587,411**	

4.4 Protective Measures for dumping

Retaining walls & garland drains with settling tanks shall be constructed during scheme period which will be cleaned regularly. Besides, protective measures shall also be undertaken during conceptual period and maintained regularly. The details of protective measures to be constructed around proposed dump during scheme period and conceptual period will be as follows:

Period	Retaining wall			Garland drain			Settling pond		
	L(m)	B(m)	H(m)	L(m)	B(m)	D(m)	L(m)	B(m)	D(m)
Scheme Period	1800	1.0	2.0	2100	1.0	1.5	10	10	2
Conceptual period	300	1.0	2.0	400	1.0	1.5	10	10	2
TOTAL	**2100**			**2500**			**3 Nos.**		



4.4.1 Sub grade stack yard

Sub grade ore account to about 20 % of the total excavation of the ore zone. During the scheme period it is calculated to recover about 2.345 MCuM sub grade materials. Presently, around 28 sub grade stacks are there near different pits which are shown in the surface plan. The total volume of the existing sub grade stack is 5.28 MCum. During ensuing scheme period, it has been proposed to re-handle the sub grade dump which will be directly fed to the beneficiation plant to upgrade the ore.

The requirement of beneficiation plant will be 1,250,000tonne of sub-grade ore. From re-handling yearly feeding of sub-grade ore will be 600,000tonne. Balance 650,000t/annum will be fed from the generated sub-grade during scheme period. The remaining sub grade ore generated per annum during the scheme period can be stacked temporarily over the existing sub-grade stack for future beneficiation. The details of sub-grade ore stack have been shown in the Plate No-14A.

As shown in the surface plan there are 28 sub-grade stacks. After re-handling the numbers of stack will be reduced to 18. Also, it has been proposed to re-handle the small stacks and stored at few locations to further reduce the number. As a result of which the sub-grade stacks can be stored in a systematic and scientific manner.

4.4.2 Management sub-grade stack during Conceptual period:

4.4.2.1 Total generation of sub grade during conceptual period is 9,430,000 Cu.m or 23,575,000 tonnes. It has been estimated that at the end of the present scheme period, a total quantity of 12,127,580 tonnes of sub grade ore shall be there within the lease area (Ref: Para 6.7.4), thus making the total sub grade ore available during conceptual period at 35,702,580 tonnes. These sub grade ore will be stacked temporarily and shall be utilized in the Lessee's beneficiation plant at the rate of 1,250,000 tonnes per annum as discussed in previous paragraph. Considering the same capacity of the beneficiation plant to continue and life of the mine at 20 years after present scheme period, a total quantity of 26,250,000 tonnes of sub grade ore would be utilized at the end of conceptual period leaving a balance of 9,452,580 tonnes of ore which would require another 8 years for beneficiation. The lessee has a proposal of doubling the capacity of the beneficiation plant after the present scheme period after the present plant is stabilized. In such case, all the sub grade ore can be utilized during the life of the mine.

4.4.2.2 The sub grade ore generated during the conceptual period shall be stored in the existing stacks as well as in some additional areas nearby in a systematic and scientific manner and their heights shall be restricted to 30m with terraces at 10m interval. To store the sub-grade ore during conceptual period, an additional area of 33.825 Ha is required taking the total requirement of area to 95.175 Ha. After all the

sub grade ore is exhausted, these areas shall be rehabilitated by plantation during final mine closure.

4.5 Land use pattern :

The existing land use as well as the land use during the scheme period is changed since most of the dumps have been found to be that of sub grade ores, fines, scalp, blue dust etc. Since these stacks are of temporary in nature and shall be beneficiated/ utilized by the lessee during both scheme period and conceptual period, the land use during conceptual period will not be affected much.

Description	Existing	Scheme Period	Additional area for conceptual period	Conceptual
Area under mining	152.655	188.637	253.66	442.297
Storage of topsoil	0.000	0.00	0.000	0.000
Overburden dumping including Retaining wall, garland drain etc.	4.310	10.865	1.000	11.865
Sub grade stacking/ Mineral storage	61.350	61.350	33.825	95.175
Infrastructure (Workshop, crusher, admn. Building etc)	6.423	7.523	0.227	7.750
Mines Roads / haulage road	11.500	14.000	Nil	14.000
Railways	0.000	0.000	Nil	0.000
Tailing Pond	0.000	0.000	Nil	0.000
Effluent Treatment Plant	0.000	0.000	Nil	0.000
Mineral Separation Plant	4.000	6.000	33.75	39.75
Township area	3.290	3.290	Nil	3.290
Magazine	0.077	0.077	Nil	0.077
Sub Total	243.605	291.742	322.462	614.204
Green belt & Safety zone/ Plantation	24.500	28.100	15.453	43.553
Plantation on Reclaimed area	2.218	2.218	Nil	2.218
Land use for public purpose i.e. agriculture etc.	98.348	98.348	Nil	98.348
Area proposed for plantation	-	-	8.961	8.961
Others, Undisturbed	398.613	346.876	-	-
Total	**767.284**	**767.284**	-	**767.284**

4.6 Reclamation & Rehabilitation measures

During the conceptual period, an area of 614.204 hectares will be degraded/ utilized due to quarry, dump, sub grade stack, road, infrastructure and afforestation. Out of these, 243.615 hectares is already degraded/ utilized, 291.742 hectares land will be degraded/ utilized during scheme period and 614.204 hectares during the conceptual period. At the end of the conceptual period, 596.914 ha. will be rehabilitated with plantation and the remaining 17.290 ha. will be kept for public use after plantation such as 3.29 ha for camp site and 14.00 ha. as road out of the above 614.204 ha,. In addition to above, an area of 8.961 ha. of non forest area will be covered under plantation during the scheme/ conceptual period. The reclamation and afforestation programme will be started from the year 2014-15 onwards in the mined out area and the programme will be continued in phase wise manner.

Period	Mining/Excavation (in hectares)	Additional area during the year (in hectares)	Total excavated area at the end of the year	Reclamation/ Rehabilitation (in hectares)
2014-15	152.655	9.643	162.298	0.650
2015-16	161.648	7.308	165.956	1.302
2016-17	164.654	5.657	170.311	0.535
2017-18	169.776	6.130	175.906	1.875
End of Scheme period(2018-19)	174.031	7.244	181.275	4.090
End of conceptual Period (2019-20 to 2040-41)	177.184	256.761	433.945	433.945

Reclamation of the quarries will be done by the freshly generated waste from 2014-15 onwards as per the programme given below. The pits which reaches UPL shall be back filled with the waste materials generated from the mine workings from 2014-15 and shall continue throughout the conceptual period.

Year	Area(m)	Height(m)	Back Filling In Cu.m	Top RL of Back-filled area(m)	Location
2014-15	6500	23	150000	653	UDALBARI
2015-16	5350	28	150000	558	UDALBARI
	7667	18	138000	543	G.GODA
2016-17	5350	28	150000	558	UDALBARI
2017-18	18750	8	150000	592	CHANAGODA
2018-19	40906	8	326400	592	CHANAGODA
Total	**84523 or 8.452HA**		**1094400**		

The reclamation measures will include

i) Provision of garland drain to regulate and to drain the rain water from the quarry and direct its course away from the dumping areas. This will avoid carrying of silt to the nearby fields.

ii) The dump will be designed to have reverse slope so that the rain water does not flow on the dump slopes. This will also help in retaining the moisture and help in afforestation.

iii) The dump area of 29.530 hectares will be covered under plantation of around 48000 saplings after stabilization of the dumps. The dump will be in two terraces of 20m height. The ultimate dump slope at the conceptual period shall be maintained at 20°-22° with individual slopes not exceeding 37°. Each terrace will have provision of catch drains at the inward side of the terrace. The catch drains of the individual terrace will be connected to garland drain outside the periphery of the dump. These catch drains will be preferably half concrete open pipes followed by settling tanks to avoid wash offs.

iv) Provision of retention walls at the foot of the dumps to arrest loose particles and check dams to check silt flowing along with the surface run off in the valleys shall be there.

v) The proposed dumps have been projected in retreating manner having minimum required calculated area for the five years of the scheme period. This will ensure quick availability of dead terraces, which will be stabilized by plantation and coir matting along the slopes.

4.7 Post Mining Land Use

At the end of mining, the voids of the quarry will be over 442.297 Ha and the deepest MRL will be 413 m . Since the ore have been recovered, the quantity of OB & waste shall not be sufficient to fill up the voids. Moreover, the overburden dumps have been planted and by the end of mining, there would be luxuriant growth of trees on the dumps which may not be allowed by the forest department to cut and use the debrises to reclaim the total voids. However, as per the proposal given at para 4.6, concurrent reclamation of quarry voids for around 35.61 Ha can be achieved. At the end, the top RL of the reclaimed area will be at 620 m. Top two benches of the quarry over a length of 44860 m shall be planted with local variety of trees. By that time, overburden dumps over 11.865 Ha would have fully grown trees and shall be used by public as a sightseeing area. The sub grade stack and mineral storage area over 95.175 Ha shall be planted with trees since these areas would have been cleared of ores. Infrastructure, magazine and mineral separation plant shall be shifted at the last stage of mining and an area over 47.577 Ha shall be planted. Township area, green belt area shall remain as it is and be maintained properly

for public use. Both sides of the roads shall be planted over a length of 12500 m. All the plantation work shall be done in due consultation with forest department as is being done now. The post mining land use pattern after the rehabilitation and reclamation measures shall be as below:

Sl. No.	Description	Area in Ha.	Post Mining Land Use
1.	Area under mining	442.297	35.61 Ha Back filling & balance 406.687 Ha reclaimed by Plantation and partly converted to water bodies.
2.	Storage of topsoil	0.000	----------
3.	Overburden dumping	11.865	Rehabilitation by Plantation
4.	Sub grade stacking/Mineral storage	95.175	Rehabilitation by Plantation after sub grade & minerals are exhausted
5.	Infrastructure (Workshop, admn. Building etc)	7.750	To be shifted if required or left for public use after plantation
6.	Mines Roads/ haulage roads	14.00	Plantation on road side & Public use
7.	Magazine	0.077	To be shifted & rehabilitated with plantation
8.	Township area	3.290	Public use
9.	Mineral separation Plant	39.75	To be shifted & rehabilitated with plantation
	Sub Total	614.204	
8.	Green belt & Safety zone	43.553	Plantation
9.	Reclaimed area	2.218	Plantation
10.	Land use for public purposes i.e. agriculture etc.	98.348	Public use
11.	Others, Undisturbed	8.961	Plantation
Total		**767.284**	

4.8 Safety & Environmental Measures

1. Comprehensive post plantation care is to be undertaken.
2. Monitoring for ambient air, noise, dust and water are to be done regularly.
3. Proper maintenance of the road surface will be done by spraying water periodically.
4. Muffle blasting will be adopted so as to reduce fly rock movement.
5. Proper manuring and watering at the plantation sites will be done to achieve 80% survival of planted saplings.

5.0 MINING

5.1 Salient description of present mining methods

5.1.1 Brief description of mining operation

(a) The mining in the lease area from 31st March, 2009 to Oct-2013 of last scheme period (2009-14) was carried out by mechanized method in Block – Barapada (pit Chanaguda, B Top & B Bottom), in Katasahi Block (Pit Katasahi), in Block – Topadihi (Pit Sonukocha, Gangeiguda and Topadihi), in Block Dumka (Pit MDH and D Top), in Kanhusahi Block (Pit Kanhusahi) and Guali Block (Pit Guali). Mining operation in a single location was not possible in this lease due to constraints for large scale mechanized mining operation at one place because of discontinuous patchy ore occurrence at various locations.

During last scheme period of 5 years it was targeted to produce 5.62MTPA of iron ore by developing 7 numbers of quarries. The quarries have been developed by maintaining 6m high benches for supplying continually quality materials from different quarries.

The ore used to be extracted by using HEM machinery. Deep hole drilling and blasting was being conducted followed by excavation and loading of ores by high capacity shovels and excavators. 6.6 m deep, 115 mm dia holes are drilled with burden x spacing of 2.6 m x 3.25 m. Blasting is done by OCG & PG combination for which nonel & excel detonators are used. Powder factor for hard formations comes to 5.5 t/Kg while for the soft formations, it comes to around 10 t/Kg, the average powder factor being around 8.5 tonnes / kg. Rock breakers are in use for reducing the size of the larger boulders. Before the loading operation starts the blasted face is cleared by bulldozer. The ore is transported by dumpers.

Salient features of the existing mining practices are given below:

Method of Mining

Present mining method is by open cast fully mechanized in six numbers of working blocks i.e. Barapada Block (pit Chanaguda, B Top & B Bottom), Katasahi Block (Pit Katasahi), Topadihi Block (Pit Sonukocha, Gangeiguda and Topadihi), Dumka Block (Pit MDH and D Top), Kanhusahi Block (Pit Kanhusahi) and Guali Block (Pit Guali). The workings in number of quarries are being done due to the discontinuous patchy ore occurrence of the ore bodies within the lease area.

Block	Existing pit Dimension in meter(L x W)	Depth of Pit (m)	Working/ non working	Contractor/ departmental
Barpada Block-I	1200 x 415	109	Working	Contractor
Katesahi Block-II	540 x 240	54	Working	Contractor
Topadihi Block-III	325 x 280	65	Working	Departmental
Dumka Block-IV	980 x 280	65	Working	Contractor
Kanhusai Block-V	280 x 210	46	Working	Departmental
Guali Block-VI	270 x 230	30	Working	Departmental

Mine working presently is being carried out within the above six blocks. Based on the proposed exploration to be undertaken during the scheme period, the Lessee will plan to combine / merge some of the scattered quarries and shall limit the working in five blocks during this scheme period.

Development

The working pits in all these quarries have been developed with 8m height in Barpada block and in other Blocks the height of the benches are 6m. The highest R.L. of the quarry top is at 690 mRL in Kanhusahi block while the lowest RL of quarry bottom is at 510 mRL near the pillar no 129.

Drilling & Blasting

Blast holes of 115 mm dia up to around 6.6/ 8.8 m deep are drilled by number of wagon drills powered by 450 cfm compressors. Blasting is done by OCG & PG combination for which nonel & excel detonators are used. Powder factor for hard formations comes to 5.5 t/Kg while for the soft formations; it comes to around 10 t/Kg, the average powder factor being around 8.5 tonnes / kg.

Excavation

After blasting of the ore zones, the materials (ore and waste) are excavated from different benches by using number of excavators of capacity ranging from 0.9 CuM to 4.3 CuM.

Transportation

The R.O.M. ore is transported to the screening & crushing plants by a number of 10t, 20t & 35t capacity dumpers while the waste materials are directly shifted to the dumping yard. The finished ore after screening & crushing is transported to the consumers/ railway siding/ port by the conventional dumpers. The Lessee has a proposal to transport the processed iron ore to their sister concern M/s KJS Steel & Power's steel plant which is set up adjacent to the lease, by conveyor belt and detail study on this is in progress.

(b) The sub grade materials generated from the working mines and lying in the lease area of +55% Fe and 58 to 60% Fe grade ore were planned for crushing and screening to produce salable ore of (+) 62 % Fe.

(c) A beneficiation plant has been established which has been operational from later part of 2012-13 within the leasehold area. The capacity of this plant is 2 x 185 TPH and a total quantity of 1 MTPA beneficiated ore is planned to be recovered from this plant.

5.1.2. Waste Dumps/ Sub grade stacks/ Fines stacks

The waste material from the quarries as well as from screening plant are scattered in 3 numbers of OB dumps near Udalbari area and their quantity as on 31st January 2014 are as below.

- Dump No – 27 (Udalbadi) Av. grade 30-40% Fe Quantity – 145,258 CuM over 1.0991 Ha.
- Dump No – 28 (Udalbadi) Av. grade 30-40% Fe Quantity – 55,460 CuM over 1.4404 Ha.
- Dump No – 30 (Udalbadi) Av. grade 30-40% Fe Quantity – 602,927 CuM over 1.7700 Ha.

The total waste materials dumped in these three dumps is 0.804 M.CuM over 4.31 Ha area.

Besides these waste dumps, there are 48 numbers of sub grade, scalp, fines and ROM stacks lying within the ML area as on 31.01.2014, as tabulated below:

Sl No	Stack No	Location	Average grade (Fe%)	Type	Quantity (CuM)	Area (Ha.)
ROM/Blue dust/ Fines/ scalp etc analyzing >58% Fe						
1	1	Topadihi	58-60	ROM	25369	0.6752
2	3	G.Goda	63.43	Fines	76298	0.9435
3	4	Guali	58-60	Fines	25142	0.5923
4	6	Sonukocha	58-60	Scalp	8456	0.2367
5	15	D Top	58-60	Scalp	125942	5.1336
6	21	Udalbadi	59.98	Fines	1790	Over D-30
7	22	Udalbadi	64.06	Fines	2256	0.1541
8	23	Kaliakocha	63.65	Fines	6596	0.0000
9	24	Udalbadi	58-60	Scalp	115233	0.0000
10	26	Udalbadi	63.12	Fines	53806	0.8416
11	31	MDH	62.65	Fines	10523	0.0000
12	31A	MDH	63.25	Fines	52500	0.4720
13	32	Dumuka Top	62.54	Fines	868985	0.0000
14	34	Sonukocha	61.67	Fines	20101	0.0000
15	40	Katasahi Crusher	63.15	Fines	348129	2.8870
16	41	G.Goda	62.15	Fines	11955	0.3210
17	42	Sonukocha	62.78	Fines	46287	0.0000
18	46	Barapada Top	63.25	Fines	25000	Over SG-35
19	47	Barapada Top	62.65	Fines	133656	0.3540
20	48	Chanagoda	63.55	Fines	28098	0.0000
Total					**1986122**	**12.6110**

Sl No	Stack No	Location	Average grade (Fe%)	Type	Quantity (CuM)	Area (Ha.)
Sub Grade stacks analyzing 45 – 58% Fe						
21	2	G. Goda	50-55	Sub grade/Scalp	230952	2.1232
22	5	Guali	50-55	Sub grade	322733	2.6606
23	7	Topadihi	50-55	Sub grade	50207	1.4768
24	8	Katasahi	55-58	Sub grade	412589	3.7465
25	9	Katasahi	50-53	Sub grade	129109	1.6581
26	10	Katasahi	45-50	Sub grade	8249	0.4708
27	11	Dumka Top	50-53	Sub grade	76000	0.8843
28	12	B Bottom	48-52	Sub grade	209735	1.7933
29	13	Dumka Top	45-50	Sub grade	263532	2.4691
30	14	Dumuka Top	46.67	Sub grade	327418	3.5171
31	16	Chanagoda	50-55	Sub grade	1397122	5.3706
32	17	MDH	50-53	Sub grade	277192	2.3656
33	18	MDH	55-58	Scalp	147346	1.8834
34	19	Topadihi	52-55	Sub grade	106835	1.3409
35	20	Topadihi	55-58	Scalp	12553	0.6160
36	25	Udalbadi	48.25	ROM	4500	0.1276
37	29	Barpada Bottom	53.18	Scalp	12589	0.1556
38	33	Gangaigoda	48.33	Sub grade	10100	0.3453
39	35	Barapada Top	45-50	Sub grade	176634	2.1920
40	36	Chana goda	45-50	Sub grade/scalp	194896	1.4584
41	36A	Chanagoda	45-50	Sub grade	63600	0.4122
42	36B	Chanagoda	55-58	Sub grade	105910	1.3933
43	37	kanhusahi	48.31	Sub grade	13397	0.3723
44	38	Kanhusahi	45-50	Sub grade	320661	4.1704
45	39	Sonukocha	50-55	Sub grade	307174	4.5409
46	43	Guali	45-50	Sub grade	1525	0.0680
47	44	Guali	53-55	Sub grade	19969	0.3973
48	45	Guali	45-50	Sub grade	79493	0.7292
Total					**5282022**	**48.7388**

Thus it is estimated that the total ROM/Blue dust/ fines etc analyzing >58% Fe is around 3.089 M.CuM spread over 12.6110 Ha area while the sub grade ore between 45-58% Fe is around 5.282 M.CuM over an area of 48.7388 Ha. These dumps/ stacks are temporary in nature and shall be utilized by the lessee as and when required by blending, screening as well as by beneficiation in the already established beneficiation plant. The area occupied by these dumps/ stacks shall ultimately be mined in the conceptual period.

As shown in the surface plan there are 28 sub-grade stacks. A total quantity of around 3.0 MT of sub grade ore out of the stacked 10.564 MT ore has been proposed to be re handled from different stacks like 2,5,7,11,19,35,36,36A,37 & 38 and fed to the beneficiation plant during the ensuing scheme period. The detail year wise rehandling of sub grade ore is discussed in Para 6.6.2 of the present report. These sub grade ore will be fed to the beneficiation plant for up gradation. After re-handling for

beneficiation plant, the numbers of stacks will be reduced to 18. It has also been proposed to re-handle the small stacks i.e. 18, 43, 36B & 10 which will be stored near the Udalbari Quarry at stock No-25 to further reduce the number. As a result of which the sub-grade stacks can be stored in a systematic and scientific manner. The ultimate height of the sub-grade stack will be 30m.

5.2 Yearly pit wise development plan proposed for the scheme period

With the increase in demand of iron ore from steel plants and sponge iron plants, the lessee has decided to continue mining operation in the lease area with the already approved production target of 5.62 million tonne during the scheme period i.e. 2014-15 to 2018-19. During this scheme period, the mining operations have been planned in six blocks where all the pits are there. The details of blocks with respective pits are as follows.

Barapada Block-I (Pit Chanaguda, B Top & B Bottom)
Katasahi Block-II (Pit Katasahi)
Topadihi Block - III (Pit Sonukocha, Gangeiguda and Topadihi)
Dumuka Block-IV (Pit MDH and D Top)
Kanhusahi Block - V (Pit Kanhusahi)
Guali Block - VI (Pit Guali)

However, it has been planned to merge the Barpada bottom quarry with Chanaguda-Barpada bottom during 5th year of Scheme period. Accordingly, year wise development and production planning has been projected based on the following parameters.

- Development during the scheme period shall be by mechanical means in open pit method.
- Road, ramp etc shall be maintained at suitable gradient for easy movement of loaded dumpers.
- Keeping safety point of view, gradient of ramp is proposed to be 1: 16 and gradient of road is proposed to be 1: 20.
- Ramps are proposed from existing road to the individual bench floors, for easy access of heavy machinery to move from place to place without any hindrance.
- Motor graders with tilting blade facility shall be deployed to maintain smooth haul roads and pit floors for ensuing efficient cost effective operation.
- Maximum excavating heights of the shovels (1.9 CuM and 2.6 CuM) are 10.25 m and 11.25 m respectively.

- Benches shall presently continue with 6 m high. Except the Chanaguda – Dhabalgiri quarry where the bench height will be 8m.
- Individual bench slope shall be 70°
- Production of iron ore shall be around 5.62 million tones per annum with highest production during 2018-19, which is 5.618 million tones.

Ore produced shall be subjected to crushing & screening. Blue dust recovery, if any, shall also be subjected to screening. So, from mines the ore, irrespective of size shall directly go to crushing and screening plant by dumper and after screening the sized materials shall be transported to ore stack yard and kept size-wise. These stacks shall be analyzed and transported to using industries as per their specifications.

5.2.1 Development during the year 2014-15 (1st year)

During first year of the scheme period, it has been planned to work at four discontinue patches namely Barapada Block (pit Chanaguda, B Top & B Bottom), Katasahi Block (Pit Katasahi) Topadihi Block (Pit Sonukocha, Gangeiguda and Topadihi), Dumka Block (Pit MDH and D Top) to achieve the targeted production by mechanized means. In proposed Barpada Block it has been planned to develop the benches with 8m height and 15m width. In other Blocks the height of the benches will be 6m & 12m width. However, the bench height may fluctuate to some extent as per the boom height of the excavator deployed. The details of workings are tabulated below:

Development during the year 2014-15							
Parameters	**Barpada block (chanaguda, b.top, & b bottom)**	**Katasahi block**	**Topadihi block (sonukocha, gangei goda & topadihi)**	**Dumka block (mdh & d top)**	**Kanhusahi block**	**Guali block**	**Total**
Co-Ordinate	300N TO 800S 300E TO 800E	500S to 100S 1875E to 2275E	1800 N to 400 N 100W to 1020E	250N to 500N 440W to 950W	--	--	--
Overall direction of excavation	East - West	South-West	North - West	North - South	--	--	--
No. of benches	8	5	11	7	--	--	--
RL of the Quarry Top(m)	634	600	580	583	--	--	--
RL of Quarry Bottom (m)	560	564	530	542	--	--	--
Section considered	200N,100N & 200S to 600S	600S, 900S	1700N,1600N,1500N,1300N, 1200N,900N,600N,500N	400 N, 300N	--	--	--
Qty. of salable ore (Tonnes)	2652930.000	334740.000	1390410.000	490770.000	--	--	4868850.000
Qty. of sub grade ore (CuM)	252660.00	31880.00	132420.00	46740.00	--	--	463700.00
Qty. of waste (CuM)	126330	15940.00	66210.00	23370.00	--	--	231850.00
Qty. of over burden(CuM)	--	--	--	--	--	--	--

Scheme of Mining with PMCP For the Period of 2014-15 to 2018-19.
Lessee Sri K.J. S. Ahluwalia over 767.284 Ha in Keonjhar District

Details of section wise ore to be raised with Development during 2014-15

Sl. No	Quarry	Name of the Section	RL	Cross Sectional Area (m^2)	Length of Influences (m)2	Volume of Excavation (m3)3=1x2	Qty of Salable ore@70% (Tonnes) (+58% Fe)	Qty of sub grade ore @20%(Tonnes) (+45% -58Fe)	Qty of intercalated waste@10% (Tonnes) (-45% fe)	Qty of ROM(MT)
				a	b	c=a x b	d=c X 70% X 3	e=c X 20% X 2.5	f= c X 10% X 2	g = d+e+f
Barpada block (chanaguda, b.top, & b bottom)										
1	Barpada Block (Chanaguda, B.Top, & B Bottom)	200N	589-560	745	100.00	74500	156450	37250	14900	208600
		100N	598-584	945	100.00	94500	198450	47250	18900	264600
		200S	630-600	310	100.00	31000	65100	15500	6200	86800
		300S	633-600	3564	100.00	356400	748440	178200	71280	997920
		400S	640-592	4142	100.00	414200	869820	207100	82840	1159760
		500S	600-592	1852	100.00	185200	388920	92600	37040	518560
		600S	622-600	1075	100.00	107500	225750	53750	21500	301000
		Total				1263300	2652930	631650	252660	3537240
Total Katasahi block										
2	Katasahi Block	600S	571-564	316	100.00	31600	66360	15800	6320	88480
		900S	600-582	1278	100.00	127800	268380	63900	25560	357840
						159400	334740	79700	31880	446320
Topadihi Block (Sonukocha, Gangei goda & Topadihi)										
3	Topadihi Block (Sonukocha, Gangei goda & Topadihi))	1700N	583-558	1711	100.00	171100	359310	85550	34220	479080
		1600N	582-552	1805	100.00	180500	379050	90250	36100	505400
		1500N	580-558	405	100.00	40500	85050	20250	8100	113400
		1300N	574-550	525	100.00	52500	110250	26250	10500	147000
		1200N	577-550	975	100.00	97500	204750	48750	19500	273000
		900N	542-534	81	100.00	8100	17010	4050	1620	22680
		600N	571-548	739	100.00	73900	155190	36950	14780	206920
		500N	565-548	380	100.00	38000	79800	19000	7600	106400
		Total				662100	1390410	331050	132420	1853880
Dumka block (mdh & d top)										
4	Dumka block (mdh & D Top)	400N	556-542	1462	100.00	146200	307020	73100	29240	409360
		300N	565-542	875	100.00	87500	183750	43750	17500	245000
						233700	490770	116850	46740	654360
Grand total							**4868850**	**1159250**	**463700**	**6491800**
End product of beneficiation plant							**750140**			
Total production							**5618990**			

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5.2.2 Development during the year 2015-16 (2nd year)

During 2nd year 2015-16 of the scheme period, it has been planned to work at six discontinue patches namely Barapada Block (pit Chanaguda, B Top & B Bottom), Katasahi Block (Pit Katasahi), Topadihi Block (Pit Sonukocha, Gangeiguda and Topadihi), Dumka Block (Pit MDH and D Top), Kanhusahi Block (Pit Kanhusahi) and Guali Block (Pit Guali) to achieve the targeted production by mechanized means. During this year the Kanusahi Block and Guali Block will be developed. In proposed Barpada Block and Kanusahi block has been planned to develop the benches with 8m height and 15m width. In other Blocks the height of the benches will be 6m & 12m width. However, the bench height may fluctuate to some extent as per the boom height of the excavator deployed. The details of workings are tabulated below:

Development during the year 2015-16							
Parameters	**Barpada block (chanaguda, b.top, & b bottom)**	**Katasahi block**	**Topadihi block (sonukocha, gangei goda & topadihi)**	**Dumka block (mdh & d top)**	**Kanhusahi block**	**Guali block**	**Total**
Co-Ordinate	400N to 800S 150E to 800E	500S to 1000S 1875 E to 2250E	1750N to 400N 100W to 1060E	180N to 500N 375 W to 800W	1700S to 1400S 400W to 180W	1870N to 2100N 140E to 300E	--
Overall direction of excavation	West- South	West – south East	East- NorthWest	North-SouthEast	North- West	South – West	--
No. of benches	12	3	7	6	2	1	--
RL of the Quarry Top(m)	664	582	586	614	688	558	--
RL of Quarry Bottom (m)	560	558	538	536	672	552	--
Section considered	00 to 300 N & 00 to 700S	600S,800S,900S	1500N to 1800N, 900N to 1300N , 600N, 500N	200 N to 400N	1500S,1600S	1900 N ,2000 N	--
Qty. of salable ore (Tonnes)	2638650.000	331170.000	1268190.000	430710.000	150150.000	120120.000	4938990.000
Qty. of sub grade ore (CuM)	251300.00	31540.00	120780.00	41020.00	14300.00	11440.00	470380.00
Qty. of waste (CuM)	125650.00	15770.00	60390.00	20510.00	7150.00	5720.00	235190.00
Qty. of over burden(CuM)	--	--	--	--	--	--	--

Details of section wise ore to be raised during Development during 2015-16

Sl. No	Quarry	Name of the Section	RL	Cross Sectional Area (m^2)	Length of Influences (m)2	Volume of Excavation (m3)3=1x2	Quantuty of Salable ore@70% (Tonnes) (+58% Fe)	Quantuty of subgrade ore @20%(Tonnes) (+45% -58Fe)	Quantuty of intercalated waste@10% (Tonnes) (-45% fe)	Quntity of ROM(MT)
				a	b	c=a x b	d=c X 70% X 3	e=c X 20% X 2.5	f= c X 10% X 2	g = d+e+f
Barpada block (Chanaguda, B.Top, & B Bottom)										
1	Barpada Block (Chanaguda, B.Top, & B Bottom)	300N	566	220	100.00	22000	46200	11000	4400	61600
		200N	560	460	100.00	46000	96600	23000	9200	128800
		100N	576	726	100.00	72600	152460	36300	14520	203280
		0	608	187	100.00	18700	39270	9350	3740	52360
		100S	600	125	100.00	12500	26250	6250	2500	35000
		200S	600	475	100.00	47500	99750	23750	9500	133000
		300S	600	845	100.00	84500	177450	42250	16900	236600
		400S	592	2047	100.00	204700	429870	102350	40940	573160
		500S	592	2880	100.00	288000	604800	144000	57600	806400
		600S	592	3255	100.00	325500	683550	162750	65100	911400
		700S	600	1345	100.00	134500	282450	67250	26900	376600
		Total				**1256500**	**2638650**	**628250**	**251300**	**3518200**
Katasahi block										
2	Katasahi Block	600S	564-558	215	100.00	21500	45150	10750	4300	60200
		800S	581-570	519	100.00	51900	108990	25950	10380	145320
		900S	582-570	843	100.00	84300	177030	42150	16860	236040
		Total				**157700**	**331170**	**78850**	**31540**	**441560**

Sl. No	Quarry	Name of the Section	Bottom RL (m)	Cross Sectional Area (m^2)1	Length of Influences (m)2	Volume of Excavation (m3)3=1x2	Quantuty of Salable ore@70% (Tonnes) (+58% Fe)	Quantuty of subgrade ore @20%(Tonnes) (+45% -58Fe)	Quantuty of intercalated waste@10% (Tonnes) (-45% fe)	Quntity of ROM(MT)
				a	b	c=a x b	d=c X 70% X 3	e=c X 20% X 2.5	f= c X 10% X 2	g = d+e+f
Topadihi Block (Sonukocha, Gangei goda & Topadihi)										
3	Topadihi Block (Sonukocha, Gangei goda & Topadihi)	1800N	558	220	100.00	22000	46200	11000	4400	61600
		1700N	552	745	100.00	74500	156450	37250	14900	208600
		1600N	552	1145	100.00	114500	240450	57250	22900	320600
		1500N	552	1295	100.00	129500	271950	64750	25900	362600
		1300N	544	215	100.00	21500	45150	10750	4300	60200
		1200N	538	510	100.00	51000	107100	25500	10200	142800
		1100N	568	120	100.00	12000	25200	6000	2400	33600
		1000N	568	145	100.00	14500	30450	7250	2900	40600
		900N	568	549	100.00	54900	115290	27450	10980	153720
		600N	542	250	100.00	25000	52500	12500	5000	70000
		500N		845	100.00	84500	177450	42250	16900	236600
		Total				**603900**	**1268190**	**301950**	**120780**	**1690920**
DUMKA BLOCK (MDH & D Top)										
4	Dumka block (mdh & d top)	400N	536	1441	100.00	144100	302610	72050	28820	403480
		300N	590	405	100.00	40500	85050	20250	8100	113400
		200N	602	205	100.00	20500	43050	10250	4100	57400
						205100	430710	102550	41020	574280
KANHUSAHI BLOCK										
5	Kanhusahi block (kanhusahi pit)	1500S	672	533	100.00	53300	111930	26650	10660	149240
		1600S	672	182	100.00	18200	38220	9100	3640	50960
		Total				**71500**	**150150**	**35750**	**14300**	**200200**

Sl. No	Quarry	Name of the Section	RL	Cross Sectional Area (m^2)1	Length of Influences (m)2	Volume of Excavation (m3)3=1x2	Quantuty of Salable ore@70% (Tonnes) (+58% Fe)	Quantuty of subgrade ore @20%(Tonnes) (+45% -58Fe)	Quantuty of intercalated waste@10% (Tonnes) (-45% fe)	Quntity of ROM(MT)
				a	b	c=a x b	d=c X 70% X 3	e=c X 20% X 2.5	f= c X 10% X 2	g = d+e+f
GUALI BLOCK										
6	Guali block (Guali pit)	2000N	552	87	100.00	8700	18270	4350	1740	24360
		1900N	552	485	100.00	48500	101850	24250	9700	135800
		Total				**57200**	**120120**	**28600**	**11440**	**160160**
Grand total							**4938990**	**1175950**	**470380**	**6585320**
End product of beneficiation plant							**680000**			
Total production							**5618990**			

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5.2.3 Development during the year 2016-17 (3rd year)

During third year (2016-17) of the scheme period, it has been planned to work at six discontinue patches namely namely Barapada Block (pit Chanaguda, B Top & B Bottom), Katasahi Block (Pit Katasahi), Topadihi Block (Pit Sonukocha, Gangeiguda and Topadihi), Dumka Block (Pit MDH and D Top), Kanhusahi Block (Pit Kanhusahi) and Guali Block (Pit Guali) to achieve the targeted production by mechanized means. In proposed Barpada Block and Kanusahi block has been planned to develop the benches with 8m height and 15m width. In other Blocks the height of the benches will be 6m & 12m width. However, the bench height may fluctuate to some extent as per the boom height of the excavator deployed. The details of workings are tabulated below:

Development during the year 2016-17

Parameters	Barpada block (Chanaguda, B.Top, & B Bottom)	Katasahi block	Topadihi block (Sonukocha, Gangei goda & Topadihi)	Dumka block (MDH & D Top)	Kanhusahi block	Guali block	Total
Co-Ordinate	400N to 800S 200E to 800E	400S to 950S 1900E to 2300E	1730N to 400N 100W to 1060W	120N to 500N 330W to 800W	1720S to 1400S 400W to 100W	1880 N to 2100N 150E to 350E	--
Overall direction of excavation	East - South West	East- Southwest	North West – South	South East	North West,	South - West	--
No. of benches	8	3	7	8	1	1	--
RL of the Quarry Top(m)	632	576	590	626	672	552	--
RL of Quarry Bottom (m)	560	546	532	560	664	546	--
Section considered	300N,200N & 00 to 700S	500S,600S, 800S,900S	1500N to 1700N,800N to 1300N, 500N,600N	400N,300N	1500S to 1700S	1900N,2000N	--
Qty. of salable ore (Tonnes)	2639910.000	324870.000	1271130.00	432600.00	150360.000	120120.000	4938990.000
Qty. of sub grade ore (CuM)	251420.00	30940.00	121060.00	41200.00	14320.00	11440.00	470380.00
Qty. of waste (CuM)	125710	15470.00	60530.00	20600.00	7160.00	5720.00	235190.00
Qty. of over burden (CuM)	--	--	--	--	--	--	

Details of section wise ore to be raised during Development during 2016-17

Sl. No	Quarry	Name of the Section	RL	Cross Sectional Area (m^2)1	Length of Influences (m)2	Volume of Excavation (m3)3=1x2	Quantuty of Salable ore@70% (Tonnes) (+58% Fe)	Quantuty of subgrade ore @20%(Tonnes) (+45% -58Fe)	Quantuty of intercalated waste@10% (Tonnes) (-45% fe)	Quntity of ROM(MT)
				a	b	c=a x b	d=c X 70% X 3	e=c X 20% X 2.5	f= c X 10% X 2	g = d+e+f
Barpada block (Chanaguda, B.Top, & B Bottom)										
1	Barpada Block (Chanaguda, B.Top, & B Bottom)	300N	568	88	100.00	8800	18480	4400	1760	24640
		200N	560	690	100.00	69000	144900	34500	13800	193200
		0	600	475	100.00	47500	99750	23750	9500	133000
		100S	600	750	100.00	75000	157500	37500	15000	210000
		200S	600	1035	100.00	103500	217350	51750	20700	289800
		300S	592	2578	100.00	257800	541380	128900	51560	721840
		400S	584	1460	100.00	146000	306600	73000	29200	408800
		600S	592	2795	100.00	279500	586950	139750	55900	782600
		700S	592	2700	100.00	270000	567000	135000	54000	756000
		TOTAL				**1257100**	**2639910**	**628550**	**251420**	**3519880**

Katasahi block										
2	Katasahi Block	500S	546	305	100.00	30500	64050	15250	6100	85400
		600S	546	755	100.00	75500	158550	37750	15100	211400
		800S	570	219	100.00	21900	45990	10950	4380	61320
		900S	570	268	100.00	26800	56280	13400	5360	75040
							324870	77350	30940	433160
Topadihi Block (Sonukocha, Gangei goda & Topadihi)										
3	Topadihi Block (Sonukocha, Gangei goda & Topadihi)	1700N	546	334	100.00	33400	70140	16700	6680	93520
		1600N	546	1152	100.00	115200	241920	57600	23040	322560
		1500N	546	735	100.00	73500	154350	36750	14700	205800
		1300N	552	665	100.00	66500	139650	33250	13300	186200
		1200N	532	288	100.00	28800	60480	14400	5760	80640
		1100N	560	208	100.00	20800	43680	10400	4160	58240
		1000N	550	241	100.00	24100	50610	12050	4820	67480
		900N	550	745	100.00	74500	156450	37250	14900	208600
		800N	550	345	100.00	34500	72450	17250	6900	96600
		600N	552	645	100.00	64500	135450	32250	12900	180600
		500N	542	695	100.00	69500	145950	34750	13900	194600
		TOTAL				**605300**	**1271130**	**302650**	**121060**	**1694840**

DUMKA BLOCK (MDH & D Top)										
4	DUMKA BLOCK (MDH & D Top)	400N	560	535	100.00	53500	112350	26750	10700	149800
		300N	560	1525	100.00	152500	320250	76250	30500	427000
		TOTAL				206000	432600	103000	41200	576800
KANHUSAHI BLOCK										
5	KANHUSAHI BLOCK Kanhusahi pit	1500S	664	415	100.00	41500	87150	20750	8300	116200
		1600S	664	273	100.00	27300	57330	13650	5460	76440
		1700S	664	28	100.00	2800	5880	1400	560	7840
		TOTAL				71600	150360	35800	14320	200480
GUALI BLOCK										
6	GUALI BLOCK (Guali pit)	2000N	546	200	100.00	20000	42000	10000	4000	56000
		1900N	546	372	100.00	37200	78120	18600	7440	104160
		TOTAL				**57200**	**120120**	**28600**	**11440**	**160160**
GRAND TOTAL							**4938990**	**1175950**	**470380**	**6585320**
END PRODUCT OF BENEFICIATION PLANT							**680000**			
TOTAL PRODUCTION							**5618990**			

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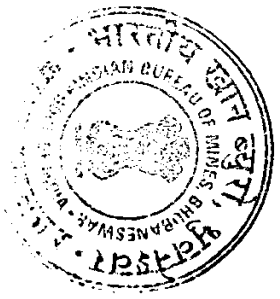

5.2.4 Development during the year 2017-18 (4th year)

During 4th year(2017-18) of the scheme period, it has been planned to work at six discontinue patches namely Barapada Block (pit Chanaguda, B Top & B Bottom), Katasahi Block (Pit Katasahi), Topadihi Block (Pit Sonukocha, Gangeiguda and Topadihi), Dumka Block (Pit MDH and D Top), Kanhusahi Block (Pit Kanhusahi) and Guali Block (Pit Guali) to achieve the targeted production by mechanized means. In proposed Barpada Block and Kanusahi block has been planned to develop the benches with 8m height and 15m width. In other Blocks the height of the benches will be 6m & 12m width. However, the bench height may fluctuate to some extent as per the boom height of the excavator deployed. The details of workings are tabulated below:

Development during the year 2017-18							
Parameters	**Barpada block (Chanaguda, B.Top, & B Bottom)**	**Katasahi block**	**Topadihi block (Sonukocha, Gangei goda & Topadihi)**	**Dumka block (MDH & D Top)**	**Kanhusahi block**	**Guali block**	**Total**
Co-Ordinate	400N to 800S 200E to 800E	700S to 1050S 1875E to 2200E	1520N 550N 00 to 1050E	250N to 500N 380W to 810W	1780S to 1500S 425W 90W	1830N to 2100N 100E to 300E	--
Overall direction of excavation	East - North	South West	Northwest-East	South-East	South West	South West	--
No. of benches	6	3	9	4	1	2	--
RL of the Quarry Top(m)	624	606	590	560	664	555	--
RL of Quarry Bottom (m)	552	588	532	536	656	546	--
Section considered	00 to 300N, 100S to 700S	900S, 1000S	800N to 1500N, 500N ,600N	400 N 300 N	1600S, 1700S	2000 N, 1900 N	--
Qty. of salable ore (Tonnes)	2639070.000	328860.000	1268400.000	432600.000	150360.000	119700.000	4938990.000
Qty. of sub grade ore (CuM)	251340.00	31320.00	120800.00	41200.00	14320.00	11400.00	470380.00
Qty. of waste (CuM)	125670.00	15660.00	60400.00	20600.00	7160.00	5700.00	235190.00
Qty. of over burden(CuM)	--	--	--	--	--	--	--

Details of section wise ore to be raised during Development during 2017-18

Sl. No	Quarry	Name of the Section	Bottom RL	Cross Sectional Area (m^2)1	Length of Influences (m)2	Volume of Excavation (m3)3=1x2	Quantuty of Salable ore@70% (Tonnes) (+58% Fe)	Quantuty of subgrade ore @20%(Tonnes) (+45% -58Fe)	Quantuty of intercalated waste@10% (Tonnes) (-45% fe)	Quntity of ROM(MT)
				a	b	c=a x b	d=c X 70% X 3	e=c X 20% X 2.5	f= c X 10% X 2	g = d+e+f
BARPADA BLOCK (Chanaguda, B.Top, & B Bottom)										
1	Barpada Block (Chanaguda, B.Top, & B Bottom)	300N	660	712	100.00	71200	149520	35600	14240	199360
		200N	552	880	100.00	88000	184800	44000	17600	246400
		0	608	75	100.00	7500	15750	3750	1500	21000
		100S	608	415	100.00	41500	87150	20750	8300	116200
		200S	600	1790	100.00	179000	375900	89500	35800	501200
		300S	584	2530	100.00	253000	531300	126500	50600	708400
		400S	584	430	100.00	43000	90300	21500	8600	120400
		500S	584	2315	100.00	231500	486150	115750	46300	648200
		600S	584	2445	100.00	244500	513450	122250	48900	684600
		700S	584	975	100.00	97500	204750	48750	19500	273000
		TOTAL				**1256700**	**2639070**	**628350**	**251340**	**3518760**
KATASAHI BLOCK										
2	Katasahi Block	900S	588	172	100.00	17200	36120	8600	3440	48160
		1000S	588	1394	100.00	139400	292740	69700	27880	390320
		TOTAL				**156600**	**328860**	**78300**	**31320**	**438480**
Topadihi Block (Sonukocha, Gangei goda & Topadihi)										
3	Topadihi Block (Sonukocha, Gangei goda & Topadihi)	1500N	552	12	100.00	1200	2520	600	240	3360
		1400N	552	1742	100.00	174200	365820	87100	34840	487760
		1300N	552	705	100.00	70500	148050	35250	14100	197400
		1200N	552	345	100.00	34500	72450	17250	6900	96600
		1100N	531	415	100.00	41500	87150	20750	8300	116200
		1000N	531	282	100.00	28200	59220	14100	5640	78960
		900N	532	952	100.00	95200	199920	47600	19040	266560
		800N	538	380	100.00	38000	79800	19000	7600	106400
		600N	542	1015	100.00	101500	213150	50750	20300	284200
		500N	542	192	100.00	19200	40320	9600	3840	53760
		TOTAL				**604000**	**1268400**	**302000**	**120800**	**1691200**

DUMKA BLOCK (MDH & D Top)										
4	DUMKA BLOCK (MDH & D Top)	400N	536	705	100.00	70500	148050	35250	14100	197400
		300N	554	1355	100.00	135500	284550	67750	27100	379400
		TOTAL				**206000**	**432600**	**103000**	**41200**	**576800**
KANHUSAHI BLOCK										
5	KANHUSAHI BLOCK Kanhusahi pit	1600S	556	431	100.00	43100	90510	21550	8620	120680
		1700S	556	285	100.00	28500	59850	14250	5700	79800
		TOTAL				**71600**	**150360**	**35800**	**14320**	**200480**
GUALI BLOCK										
6	GUALI BLOCK (Guali pit)	2000N	546	220	100.00	22000	46200	11000	4400	61600
		1900N	546	350	100.00	35000	73500	17500	7000	98000
		TOTAL				**57000**	**119700**	**28500**	**11400**	**159600**
Grand total							**4938990**	**1175950**	**470380**	**6585320**
End product of beneficiation plant							**680000**			
Total production							**5618990**			

5.2.5 Development during the year 2018-19 (5th year) (upto 03.03.2019)

During 5th year(2018-19) of the scheme period, it has been planned to work at six discontinue patches namely Barapada Block (pit Chanaguda, B Top & B Bottom), Katasahi Block (Pit Katasahi), Topadihi Block (Pit Sonukocha, Gangeiguda and Topadihi), Dumka Block (Pit MDH and D Top), Kanhusahi Block (Pit Kanhusahi) and Guali Block (Pit Guali) to achieve the targeted production by mechanized means. In proposed Barpada Block and Kanusahi block has been planned to develop the benches with 8m height and 15m width. In other Blocks the height of the benches will be 6m & 12m width. However, the bench height may fluctuate to some extent as per the boom height of the excavator deployed. The details of workings are tabulated below:

Development during the year 2018-19 (upto 03.03.2019)							
Parameters	**Barpada block (Chanaguda, B.Top, & B Bottom)**	**Katasahi block**	**Topadihi block (Sonukocha, Gangei goda & Topadihi)**	**Dumka block (MDH & D Top)**	**Kanhusahi block**	**Guali block**	**Total**
Co-Ordinate	400N TO 725 S 300E TO 800E	700S to 1000S 1900E to 2200E	1700N to 400N 100W 1060E	300N to 500N 750W to 1100W	1820S to 1400S 450W to 00 E	1800N to 2100 N 75E to 225E	--
Overall direction of excavation	West South	South West	SouthWest - NorthEast	West	Southwest -East	South West	--
No. of benches	7	4	8	3	5	2	--
RL of the Quarry Top(m)	640	588	592	554	664	555	--
RL of Quarry Bottom (m)	584	564	530	536	624	546	--
Section considered	100N, 00, 100S, 200S, 700S, 800S	800S, 900S	900 N to 1600 N 500N & 600N	400 N	1500S,1600S, 1700S	2000 N, 1900 N	--
Qty. of salable ore (Tonnes)	1678950.000	333690.000	1283520.000	431550.000	1090950.000	120330.000	4938990.000
Qty. of sub grade ore (CuM)	159900.00	31780.00	122240.00	41100.00	103900.00	11460.00	470380.00
Qty. of waste (CuM)	79950.00	15890.00	61120.00	20550.00	51950.00	5730.00	235190.00
Qty. of over burden (CuM)	--	--	--	--	--	--	--

Details of section wise ore to be raised during Development during 2018-19 (upto 03.03.2019)

Sl. No	Quarry	Name of the Section	Bottom RL	Cross Sectional Area (m2)1	Length of Influences (m)2	Volume of Excavation (m3)3=1x2	Quantuty of Salable ore@70% (Tonnes) (+58% Fe)	Quantuty of subgrade ore @20%(Tonnes) (+45% -58Fe)	Quantuty of intercalated waste@10% (Tonnes) (-45% fe)	Quntity of ROM(MT)
				a	b	c=a x b	d=c X 70% X 3	e=c X 20% X 2.5	f= c X 10% X 2	g = d+e+f
BARPADA BLOCK (Chanaguda, B.Top, & B Bottom)										
	Barpada Block (Chanaguda, B.Top, & B Bottom)	100N	592	72	100.00	7200	15120	3600	1440	20160
		00	592	2328	100.00	232800	488880	116400	46560	651840
		100S	592	1980	100.00	198000	415800	99000	39600	554400
		200S	592	1060	100.00	106000	222600	53000	21200	296800
		700S	584	750	100.00	75000	157500	37500	15000	210000
		800S	584	1805	100.00	180500	379050	90250	36100	505400
		TOTAL				**799500**	**1678950**	**399750**	**159900**	**2238600**
KATASAHI BLOCK										
2		800S	564	375	100.00	37500	78750	18750	7500	105000
		900S	564	1214	100.00	121400	254940	60700	24280	339920
		TOTAL				**158900**	**333690**	**79450**	**31780**	**444920**
Topadihi Block (Sonukocha, Gangei goda & Topadihi)										
3	Topadihi Block (Sonukocha, Gangei goda & Topadihi)	1600N	540	874	100.00	87400	183540	43700	17480	244720
		1500N	546	452	100.00	45200	94920	22600	9040	126560
		1400N	546	1015	100.00	101500	213150	50750	20300	284200
		1300N	546	305	100.00	30500	64050	15250	6100	85400
		1200N	546	144	100.00	14400	30240	7200	2880	40320
		1100N	546	547	100.00	54700	114870	27350	10940	153160
		1000N	568	295	100.00	29500	61950	14750	5900	82600
		900N	568	945	100.00	94500	198450	47250	18900	264600
		600N	536	1045	100.00	104500	219450	52250	20900	292600
		500N	536	490	100.00	49000	102900	24500	9800	137200
		TOTAL				**611200**	**1283520**	**305600**	**122240**	**1711360**

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Scheme of Mining with PMCP For the Period of 2014-15 to 2018-19.
Lessee Sri K.J. S. Ahluwalia over 767.284 Ha in Keonjhar District

Sl. No	Quarry	Name of the Section	Bottom RL	Cross Sectional Area (m^2)1	Length of Influences (m)2	Volume of Excavation (m3)3=1x2	Quantuty of Salable ore@70% (Tonnes) (+58% Fe)	Quantuty of subgrade ore @20%(Tonnes) (+45% -58Fe)	Quantuty of intercalated waste@10% (Tonnes) (-45% fe)	Quntity of ROM(MT)
				a	b	c=a x b	d=c X 70% X 3	e=c X 20% X 2.5	f= c X 10% X 2	g = d+e+f
BARPADA BLOCK (Chanaguda, B.Top, & B Bottom)										
DUMKA BLOCK (MDH & D Top)										
4	DUMKA BLOCK (MDH & D Top)	400N	536	2055	100.00	205500	431550	102750	41100	575400
		TOTAL				**205500**	**431550**	**102750**	**41100**	**575400**
KANHUSAHI BLOCK										
5	KANHUSAHI BLOCK (Kanhusahi pit)	1500S	556	805	100.00	80500	169050	40250	16100	225400
		1600S	624	3125	100.00	312500	656250	156250	62500	875000
		1700S	640	1265	100.00	126500	265650	63250	25300	354200
		TOTAL				**519500**	**1090950**	**259750**	**103900**	**1454600**
GUALI BLOCK										
6	GUALI BLOCK (Guali pit)	2000N	546	248	100.00	24800	52080	12400	4960	69440
		1900N	546	325	100.00	32500	68250	16250	6500	91000
		TOTAL				**57300**	**120330**	**28650**	**11460**	**160440**
Grand total							**4938990**	1175950	470380	6585320
End product of beneficiation plant							**680000**			
Total production							**5618990**			

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5.3 Year wise production plan proposed from the different Blocks in next five years along with grade, blending proposal if any, may be indicated.

Material	Block	2014-15	2015-16	2016-17	2017-18	2018-19 (upto 02.03.19)	Grade (Fe %)
Quantity of Ore(Million Tonnes))	Barpada block (Chanaguda, B.Top, & B Bottom	2.653	2.639	2.640	2.639	1.679	>58% Fe
	Katasahi block	0.335	0.331	0.325	0.329	0.334	
	Topadihi Block (Sonukocha, Gangei goda & Topadihi)	1.390	1.268	1.271	1.268	1.284	
	Dumka block (MDH & D Top)	0.491	0.431	0.433	0.433	0.432	
	Kanhusahi block	0.0	0.150	0.150	0.150	1.091	
	Guali block	0.000	0.120	0.120	0.120	0.120	
	Sub Total (from mines)	4.869	4.939	4.939	4.939	4.939	
	Beneficiation Plant	0.750	0.680	0.680	0.680	0.680	
	Total	**5.619**	**5.619**	**5.619**	**5.619**	**5.619**	
Quantity of Ore(Million CuM)	Barpada block (Chanaguda, B.Top, & B Bottom	0.884	0.880	0.880	0.880	0.560	
	Katasahi block	0.112	0.110	0.108	0.110	0.111	
	Topadihi Block (Sonukocha, Gangei goda & Topadihi)	0.463	0.423	0.424	0.423	0.428	
	Dumka block (MDH & D Top)	0.164	0.144	0.144	0.144	0.144	
	Kanhusahi block	0.0	0.050	0.050	0.050	0.364	
	Guali block	0.000	0.040	0.040	0.040	0.040	
	TOTAL	**1.623**	**1.647**	**1.646**	**1.647**	**1.647**	
Sub Grade Ore(Million CuM)	Barpada block (Chanaguda, B.Top, & B Bottom	0.253	0.251	0.251	0.251	0.160	45-58% Fe
	Katasahi block	0.032	0.032	0.031	0.031	0.032	
	Topadihi Block (Sonukocha, Gangei goda & Topadihi)	0.132	0.121	0.121	0.121	0.122	
	Dumka block (MDH & D Top)	0.047	0.041	0.041	0.041	0.041	
	Kanhusahi block	0.000	0.014	0.014	0.014	0.104	
	Guali block	0.000	0.011	0.011	0.011	0.011	
	Total	**0.464**	**0.470**	**0.470**	**0.470**	**0.470**	

Material	Block	2014-15	2015-16	2016-17	2017-18	2018-19 (upto 03.03.19)	Grade (Fe %)
Overburden (Million CuM)	Barpada block (Chanaguda, B.Top, & B Bottom	0.126	0.126	0.126	0.126	0.080	<45%
	Katasahi block (Katasahi)	0.016	0.016	0.015	0.016	0.016	
	Topadihi Block (Sonukocha, Gangei goda & Topadihi)	0.066	0.060	0.061	0.060	0.061	
	Dumka block (MDH & D Top)	0.023	0.021	0.021	0.021	0.021	
	Kanhusahi block	0.000	0.007	0.007	0.007	0.052	
	Guali block	0.000	0.006	0.006	0.006	0.006	
	Total	**0.232**	**0.235**	**0.235**	**0.235**	**0.235**	

5.3.1 Summarized statement of Saleable ore, sub-grade, intercalated waste ROM, tripping Ratio etc

Year	Quantity of Saleable ore from mines (million tonne)	Quantity of sub grade (M.Cum)	Quantity of sub grade (million tonne)	Intercalated waste (M.Cum)	Intercalated waste (million tonne)	Quantity of ROM (million tonne)	Stripping Ratio (MT/m3)
1	2	3	4	5	6	7=2+4+6	8=(2+4)/5
2014-15	4.869	0.464	1.16	0.232	0.464	6.493	1:0.038
2015-16	4.939	0.47	1.175	0.235	0.47	6.584	1:0.038
2016-17	4.939	0.47	1.175	0.235	0.47	6.584	1:0.038
2017-18	4.939	0.47	1.175	0.235	0.47	6.584	1:0.038
2018-19 (upto 03.03.19)	4.939	0.47	1.175	0.235	0.47	6.584	1:0.038
Total	**24.625**	**2.344**	**5.86**	**1.172**	**2.344**	**32.829**	**1:0.038**

Note: Stripping ratio has been calculated by considering saleable ore + sub-grade ore (in tonnes) with intercalated waste (in CuM))

5.4 Extent of mechanization

5.4.1 Wagon drill (blast hole) required to be deployed in the present scheme period

Specification of blast hole drill	
Diameter of blast hole drill	115 mm
Air consumption	12.5 CuM/min
Pressure supplied up to	14.5 kg f/sq.cm.
Drilling parameters	
Dia. of blast hole (D)	115 mm
Height of the bench	6 m
Additional drilling required (sub grade) (A)	0.6 m
Length of the hole (H + A)	6.6 m
Burden (B)	2.6 m

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INDIN BUREAU OF MINES
भुवनेश्वर / BHUBANESWAR

Spacing (S)	3.25 m
Volume of earth to be broken/loosen per hole	B x S x H = 2.6 x 3.25 x 6 = 50.7 CuM or say 50 CuM
Description	
Total volume of material (maximum in any year)	6585320
Drilling & Blasting required (45% of total volume)	2963394
Number of holes to be drilled (Vol / 50.7)	58449.58
Number of holes to be drilled per day of 300 days in a year	194.83
Total meterage of drilling per day (length of blast hole = 6.6 m)	1168.99
Drilling penetration rate of the wagon drill	15m/ hr
Effective drilling hr / day (8 hrs shift of which effective working hrs = 6 hrs / shift)	18 hrs in 3 shifts
Meterage of drilling to be effected / day	270m
Number of drills required	1168.99/270= 4.32 say 4
Keep standby to overcome running break down	2
Dia of each wagon drill	115 mm
One 115 mm dia wagon drill requires compressed air	12.5-15.0 Cum/ min

Description	BARPADA BLOCK (Chanaguda, B.Top, & B Bottom	KATASAHI BLOCK (Katasahi)	Topadihi Block (Sonukocha, Gangei goda & Topadihi)	DUMKA BLOCK (MDH & D Top)	KANHUSAHI BLOCK	GUALI BLOCK
Total volume of material (maximum in any year)	1257100	159400	662100	233700	519500	57300
Drilling & Blasting required (45% of total volume)	565695	71730	297945	105165	233775	25785
Number of holes to be drilled (Vol / 50.7)	11314	1435	5959	2103	4676	516
Number of holes to be drilled per day of 300 days in a year	38	5	20	7	16	2
Total meterage of drilling per day (length of blast hole = 6.6 m)	250	33	132	46	105	13

Drilling penetration rate of the wagon drill	15m/ hr	15m/ hr	15m/ hr	15m/ hr	15m/ hr	15m/ hr
Effective drilling hr / day (8 hrs shift of which effective working hrs = 6 hrs / shift)	18 hrs in 3 shifts	12 hrs in 2 shifts	12 hrs in 2 shifts	12 hrs in 2 shifts	12 hrs in 2 shifts	12 hrs in 2 shifts
Meterage of drilling to be effected / day	270	180 m	180 m	180 m	180 m	180 m
Number of drills required	250/270= 0.925 say 1	33 /180= 0.183	132/180= 0.733	46/180= 0.255	105 /180= 0.583	13 /180= 0.072
	1	1	1		1	
Keep standby to overcome running break down	-	-	-	-	-	-
Dia of each wagon drill	115 mm	115 mm	115 mm	115 mm	115 mm	115 mm
One 115 mm dia wagon drill requires compressed air	12.5-15.0 Cum/ min	12.5-15.0 Cum/ min	12.5-15.0 Cum/ min	12.5-15.0 Cum/ min	12.5-15.0 Cum/ min	12.5-15.0 Cum/ min

5.4.2 Requirement of air compressors

Description	BARPADA BLOCK (Chanaguda, B.Top, & B Bottom	KATASAHI BLOCK (Katasahi)	Topadihi Block (Sonukocha, Gangei goda & Topadihi)	DUMKA BLOCK (MDH & D Top)	KANHUSAHI BLOCK	GUALI BLOCK
Number of wagon drills will be in operation	1+1=2 Nos	1+1=2 Nos			1+1=2 Nos	
Dia of each wagon drill	115 mm	115 mm			115 mm	
One 115 mm dia wagon drill requires compressed air	12.5 Cu.m	12.5 Cu.m			12.5 Cu.m	
Compressor unit required	2 Nos	2 Nos			2 Nos	

5.4.3 Excavators required to be deployed in the present scheme period

5.4.3.1 Excavation by 4.3 Cum Shovel

Hydraulic shovels of 4.3m³ bucket capacity are proposed to be used for excavation and loading.

Excavating Parameters

C =	Nominal Bucket Capacity	=	4.3 m³
F =	Bucket fill factor	=	0.80
S =	Swell factor	=	0.85
t =	Time cycle per pass at 90⁰ swing	=	30 sec
e =	Overall efficiency for three working shift	=	0.80
T =	Seconds per hour	=	3600
n =	Number of working shifts/day	=	3
h =	Hours per shift	=	8
W =	Working days in a year	=	300
A =	Availability of machine	=	0.80
U =	Utilization Factor	=	0.80
B.D=	Bulk Density	=	3

Rate of Production

Output of Shovel/hour = (C x F x S x T)/(t)
= 4.3x0.80x0.85x3600/30
= 350.88 say 351 m³

Output of Shovel/year = 350x h x n x w x e x A x U x BD
= 350 x 8 x 3 x 300 x 0.80 x 0.80 x 0.80 x 3
= 3880452.09 MT say 3.88 Million tons

5.4.3.2 Excavation by 2.1 Cum Shovel

Hydraulic shovels of 2.1 m³ bucket capacity are proposed to be used for excavation and loading.

Excavating Parameters

C =	Nominal Bucket Capacity	=	2.1 m³
F =	Bucket fill factor	=	0.80
S =	Swell factor	=	0.85
t =	Time cycle per pass at 90⁰ swing	=	30 sec
e =	Overall efficiency for three working shift	=	0.80
T =	Seconds per hour	=	3600
n =	Number of working shifts/day	=	2
h =	Hours per shift	=	8
W =	Working days in a year	=	300
A =	Availability of machine	=	0.80
U =	Utilization Factor	=	0.80
B.D=	Bulk Density	=	3

Rate of Production

Output of Shovel/hour = (C x F x S x T)/(t)
= 2.1x0.80x0.85x3600/30
= 171.36, say 171 m³

Output of Shovel/year = 171x h x n x w x e x A x U x BD
= 171 x 8 x 2 x 300 x 0.80 x 0.80 x 0.80 x 3
= 1260749 MT say 1.26 Million tons

Number of excavators required						
Description	**BARPADA BLOCK (Chanaguda, B.Top, & B Bottom**	**KATASAHI BLOCK (Katasahi)**	**Topadihi Block (Sonukocha, Gangei goda & Topadihi)**	**DUMKA BLOCK (MDH & D Top)**	**KANHUSAHI BLOCK**	**GUALI BLOCK**
Maximum excavation in any of the year	1257100	159400	662100	233700	519500	57300
Total excavation by one 4.3 CuM per annum	1293484 CuM	-	-	-	-	-
Total excavation by one 2.1 CuM per annum	--	420249.6	420249.6	420249.6	420249.6	420249.6
Requirement of excavators	0.97 No Say 1 No	0.379 Nos	1.57 Nos Say 2Nos	0.55 Nos	1.23 Nos Say 1 Nos	0.13 Nos
Keep standby to overcome running break down	1 No (2.1cum)	1 Nos		1Nos		1 No
Total Number of excavators required	2 Nos	2+1 =3 Nos		1+1 = 2 Nos		1+1 = 2Nos
Present fleet of excavators	3 nos 2.1 CuM/ 1 nos 1.6 CuM / 4 nos 1.0 CuM/ 3 nos 0.9CuM	1 no 1.6 CuM/ 4 nos 1.0 CuM/ 3 nos 0.9 CuM, 1 no.2.1 Cu.M	2 no 2.1 CuM/ 1 no 1.5 CuM/ 3 nos 0.9 CuM	1 no.2.1 CuM/ 4 nos 1.0 CuM/3 nos 0.9 CuM	--	2 nos. 1.0 CuM/ 3 nos 0.9 CuM

5.4.4 Transportation

Overburden, sub grade ore and ore shall be generated during the proposed period of mining. The distance of the location of crushers has been considered as 2 km as the lead distance for hauling of ore from the mine face.

5.4.4.1 Number of Passes (for 4.3 cum capacity shovel)

Number of passes required for one trip

$$= \frac{\text{Nominal dumper capacity}}{\text{Bucket capacity x Bucket fill factor x swell factor x material factor.}}$$

$$\text{Dumpers} = \frac{35}{4.3 \times 0.85 \times 0.8 \times 3} = 3.98 \text{ say } 4 \text{ passes}$$

Dumper Cycle

Dumper cycle includes loading, hauling, unloading, returning and spotting.

Loading time	= Number of passes x Time cycle per pass
	= 4x 30 = 119 Sec
Hauling time	= Lead (Km)/Average haul speed (Kmph)
	= 2/15= 0.1 hr =8 Min or 480 Sec
Un-loading time	= 30 Sec
Returning time	= Lead (Km)/average empty travel speed (Kmph)
	= 2 /20 = 4.8 Min or 288 Sec
Spotting time	= 60 Sec
Dumper cycle time	= Loading time + Hauling + Unloading time + Returning time + spotting time
	= 119 + 480 + 30 + 288 + 60 = 978 Sec
No of Shifts	=3
Efficiency	= 0.8
Availability	= 0.8
No of Trips per day	= nxhxTx E xAvail /Dumper Cycle
	=3x8x3600x0.8x0.8/985= 56.5 say 56 trips per day
Material handled by Dumper/day	= 56 *35 = 1980MT
Material handled by Dumper/year	= 1980*300 = 593851 MT or 197950Cu.m

5.4.4.2 Number of Passes (for 2.1 cum capacity shovel)

Number of passes required for one trip

$$= \frac{\text{Nominal dumper capacity}}{\text{Bucket capacity x Bucket fill factor x swell factor x material factor.}}$$

$$\text{Dumpers} = \frac{35}{2.1 \times 0.85 \times 0.8 \times 3} = 8.1 \text{ say } 8 \text{ passes}$$

Dumper Cycle

Dumper cycle includes loading, hauling, unloading, returning and spotting.

Loading time	= Number of passes x Time cycle per pass
	= 8x 30 = 240 Sec
Hauling time	= Lead (Km)/Average haul speed (Kmph)
	= 2/15= 0.1 hr =8 Min or 480 Sec
Un-loading time	= 30 Sec
Returning time	= Lead (Km)/average empty travel speed (Kmph)
	= 2 /20 = 4.8 Min or 288 Sec
Spotting time	= 60 Sec
Dumper cycle time	= Loading time + Hauling + Unloading time + Returning time + Spotting time
	= 240 + 480 + 30 + 288 + 60 = 1098 Sec
No of Shifts	=2
Efficiency	= 0.8
Availability	= 0.8
No of Trips per day	= nxhxTx E xAvail /Dumper Cycle
	=2x8x3600x0.8x0.8/1098= 33.57 say 34 trips per day

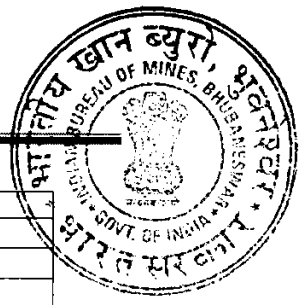
Material handled by Dumper/day = 34 x35 = 1190MT

Material handled by Dumper/year = 1190x300 = 357000 MT

Requirement of Dumpers Block wise	BARPADA BLOCK (Chanaguda, B.Top, & B Bottom	KATASAHI BLOCK (Katasahi)	Topadihi Block (Sonukocha, Gangei goda & Topadihi)	DUMKA BLOCK (MDH & D Top)	KANHUSAH I BLOCK	GUALI BLOCK
Number of 4.3 CuM excavators required	1 Nos	--		--		--
Number of 2.1 CuM excavators required	--	1 Nos		1Nos		1 Nos
Number of 35 t capacity dumpers required	6.5 Nos say 7	3.5 Nos say 4		3.5 Nos (35 t) say 4		3.5 Nos say 4
Present fleet of dumpers	85t =2 35t =2 30t =6 20t =5 10t =5	20t=8 10t=8	20t=15 10t=06	20t=12 10t=4	--	20t =7
The lessee is having 50 nos of dumpers of different capacities. Additional numbers of higher capacity dumpers i.e. 35t capacity shall be deployed as and when required to minimize deployment of number of dumpers. The lessee has proposed to install a conveyor belt for transportation of material to their sister concern's Sponge Iron Plant nearby.						

5.4.5 List of machinery existing in the mines

The machinery requirements particularly for drilling, excavation and transportation has been done based on a particular capacity of the machines i.e. 4.3 CuM& 2.1cum excavators, 35 t dumpers etc. The Lessee is having different capacity machineries with him to tackle break down problems and other eventualities. A list of existing machinery of different capacities is given below:



Sl.No.	Machinery	Capacity	Existing
1.	Excavator	0.9 CuM	15
2.	Excavator	1.0 CuM	14
3.	Excavator	1.5 CuM	01
4.	Excavator	1.6 CuM	02
5.	Excavator	2.1 CuM	07
6.	Excavator	4.5 CuM	01
7.	Rock Breaker	----	07
8.	Loaders	1.5 CuM	18
9.	Loader	2.5 CuM	01
10.	Dumper	85 Tonne	02
11.	Dumper	35 Tonne	02
12.	Dumper (Volvo)	30 Tonne	06
13.	Dumper (Hyva)	20 Tonne	47
14.	Tipper	10 Tonne	23
15.	Compressor	450 cfm	06
16.	Drilling machine (Atlas Copco)	115 mm	06
17.	Drill machine (Sandvik)	100 mm	01
18.	Water Tanker	10000 lts.	10
19.	Water Tanker	25000 lts.	01
20.	Water Tanker	28000 lts.	01
21.	Lighting DG	10 KW	07
22.	Dozer	50 tonne	02
23.	Stationery Crusher	400 TPH	01
24.	Stationery Crusher	150 TPH	01
23.	Stationery Crusher	80 TPH	01
24.	Mobile Crusher	150 TPH	04
25.	Mobile Crusher	200 TPH	02
26.	Stationery Screen	80 TPH	01
27.	Mobile Screen	300 TPH	06
28.	Mobile Screen	200 TPH	02
29.	Mobile Screen	250 TPH	01
30.	Mobile Screen	150 TPH	01
31.	Mobile Screen	100 TPH	02

5.4.6 List of machinery proposed in the mines

The existing machinery is sufficient for the excavation program given during the scheme period. However, the lessee has been advised to engage higher capacity machineries for ease in mine working and less generation of dust and other pollutants. The existing lower capacities machines shall be utilized in stack yard, crusher etc and shall be phased out in due course. A list of proposed machinery is given below:

Sl.No.	Machinery	Capacity	Proposed
1.	Excavator	2.1 CuM	07
2.	Excavator	4.5 CuM	02
3.	Rock Breaker	----	06
4.	Loaders	1.5 CuM	12
5.	Dumper	35 Tonne	19+ 3(stand by)

6.	Compressor	450 cfm	06
7.	Drilling machine (Atlas Copco)	115 mm	06
8.	Water Tanker	10000 lts.	08
9.	Lighting DG	10 KW	07
10.	Dozer	50 tonne	01
11.	Stationery Crusher	400 TPH	01
12.	Stationery Crusher	150 TPH	01
13.	Stationery Crusher	80 TPH	01
14.	Mobile Crusher	150 TPH	04
15.	Mobile Crusher	200 TPH	03
16.	Stationery Screen	80 TPH	01
17.	Mobile Screen	300 TPH	06
18.	Mobile Screen	200 TPH	03
19.	Mobile Screen	250 TPH	02
20.	Mobile Screen	150 TPH	01
21.	Mobile Screen	100 TPH	02

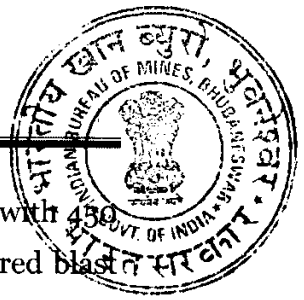
5.5 Blasting

Controlled blasting with NONEL system of initiation is in use and the same has been proposed to be continued during the scheme period. Use of rock breakers have been proposed to avoid secondary blasting.

Proper charging, stemming and controlled blasting with NONEL system of initiation is proposed for getting optimum blast results and minimization of hazards while preventive measures like marking of danger zone, arrangement of warning signals by hooting etc shall be adopted. Blasting shelters will be provided within the blasting zone. Based on the prevailing geological conditions like soft nature of ore bodies and experience over the past years, the quantity of materials likely to be blasted is assumed to be 45% of the total excavation. The blasting parameters are as below.

5.5.1 Broad Blasting Parameters

Height of bench	6 m
Sub-drilling (@10%)	0.6 m
Depth of Blast hole	6.6 m
Burden	2.6 m
Spacing	3.25 m
Hole diameter	115 mm
Diameter of the cartridge	83 mm
Yield per hole (Loosening of rock mass per hole):	50.7 m^3
Powder Factor achieved/ Projected	8.5 Tonnes/Kg



As discussed in Para 5.4.1 & 5.4.2, 7nos of 115 mm dia drilling machines with 450 cfm compressors shall be utilized in the mines for carrying out the desired blast hole drilling. Besides, 7 nos. of rock breakers are proposed (Para 5.4.5) and are in use in the mines to avoid secondary blasting.

5.5.2 Type of explosives to be used

SMS/SME is being used for primary blasting. Bulk ANFO is also proposed to be for future after obtaining due permission from the statutory authorities.

5.5.3 Charge Factor

Based on the parameters above and past mining experiences, the charge factor is expected to be 0.7 Kg/m^3 of material.

5.5.4 Annual explosive consumption

Handling of ore (45% of the total volume of maximum excavation in any year	2963394MT or 987798 Cum
Charge factor	0.7 Kg/ m^3
Yearly requirement of explosive	987798x 0.7= 691458.6 Kg or 691.45Tonnes
Explosive consumption per day	691.45 ÷ 300 = 2.3Tonnes

5.5.5 Type and storage of explosives

There exists a 0.750 Tonne magazine which is not being used presently as the lessee is using explosive under agreement with a local party under rule 22. The Lessee however is planning to upgrade the existing magazine to 5 Tonnes capacity to take care of the explosive requirement in future. The item wise breakup of the explosive to be stored in the proposed magazine at mines shall be as below:

Class	Commercial terms	Quantity
Class – II	High explosives	5 Tonnes
Class – VI (Division – 1)	Detonating fuses	5,000 m
Class – VI (Division – 3)	detonators	1000 nos.
Class – VI (Division – 2)	Safety fuses	200 m

5.5.6 Blasting Procedure

Blasting holes will be drilled according to the bench height, 10% sub grade drill shall be required to avoid crater formation. Diameter of the holes will be 115 mm. Slurry and emulsion type explosives in cartridge form will be used for blasting. Booster will be used as prime charge and column as secondary charge. Ordinary detonator as well as electric detonator and NONEL system will be used for initiation/ ignition. SME/SMS with Nonel initiation systems will be adopted for getting optimum blast result and minimization of hazards. The stemming length is proposed to be one third of the hole depth. Ground vibration, fly rocks will be controlled by using nonel cords. The explosive column will be blasted under 'V' type blasting pattern initiated by detonator & NONEL. The design of nonel detonators incorporates patented technology including the cushion disk (CD) and Delay ignition Buffer (DIB) to provide reliability and accuracy in all blasting applications. This system will have the following advantages

a) High blasting efficiency
b) Minimized ground vibration
c) Better fragmentation
d) Safe to handle

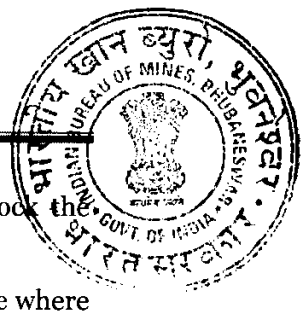
5.5.7 Fly rock Problems & Precautions:

Fly rock fragments during blasting may create problems to nearby men and machinery. Therefore, precautionary measures to be adopted are as below:

a) Proper blast design results in lower ground vibrations and avoids the fly rock.
b) Controlled blasting technique with SME/SMS Nonel system of initiation.
c) Drill holes will be located in weaker planes.
d) No loose materials will be kept on the bench floors during blasting.
e) Optimum stemming length and stemming material will be chosen.
f) Safe ratio (stemming length to burden of hole) shall be kept at more than 0.6.
g) Proper compaction of the stemming material will be undertaken before blasting.

5.5.8 Safety Precautions

a) Boards displaying (in Odiya& English) Blasting time will be kept at the places where required
b) Blasting time will be fixed and intimated to all concerned



c) At the time of blasting, security guards will be deployed in order to block the vehicle movement on the public road

d) In order to indicate the blasting operation, Red flags will be kept at the time where ever required

e) A Siren will be used to blow at the beginning and end of the blasting operation.

5.6 Employment potential

As the entire mining operation shall be mechanized, employment shall be directly and indirectly in the form of management (statutory and functional), supervisory personnel and other face workers which include excavator operators/ helpers, loader operators/ helpers, dumper operators/ helpers, water tanker operators/ helpers, drill operators/ helpers & other mining supervisors. The different category of employees currently engaged shall continue with the following distribution.

Sl No	Position	Numbers	Qualification/Experience
		Supervisory Personnel	
1	Mines Manager	1	First Class certificate of competency from DGMS
2	1st Class Manager	4	Degree in Mining Engineering with Ist class competency certificate
3	2nd Class Manager	7	Second Class certificate of competency from DGMS
4	Mining Engineer	2	Degree in Mining Engineering with required qualification as per rule 42 (1) of MCDR.1988.
5	Geologist	1	Post Graduate degree in Geology with required qualification as per rule 42 (1) of MCDR.1988.
6	Mines Foreman	7	Foreman's competency certificate
7	Mining Mate & Supervisors	42	Mining Mate's certificate & supervisory experience
8	Mechanical Engineers	7	Degree/ Diploma in Mechanical Engineering
9	Electrical Engineers	2	Degree/ Diploma in Electrical Engineering
10	Civil Engineers	2	Degree/ Diploma in Civil Engineering
11	Degree/ Dip. Mining Trainee	6	Diploma in Mining Engineering
12	Surveyor	2	Surveyor's certificate of competency
		Other Face Workers	
13	Clerical Staff	16	Literate & experienced
14	Sub ordinate supporting staff	164	Literate & experienced
15	Other face workers/ operators/Helpers of HEMM	520	Literate & experienced
16	Engaged workers for miscellaneous jobs	22	Literate & experienced

5.7 Prevention and regularization of wash offs from the excavated area during rains. - To prevent and regularize the wash offs from the excavated areas during rains garland drains and retaining wall shall be constructed all around the pits and stacks. A series of check dams and settling tanks shall also be provided at the end of each garland drain in order to allow clean water to escape from the lease area.

5.8 Land Use

Land use at present and at the end of proposed scheme period is as below

Description	At present (Ha)	At the end of proposed scheme period (Ha)
Area under mining	152.655	188.637
Storage of topsoil	0.000	0.00
Overburden dumping	4.310	10.865
Sub grade stacking/Mineral storage	61.350	61.350
Infrastructure (Workshop, admn. Building etc)	6.423	7.523
Roads	11.500	14.000
Railways	0.000	0.000
Tailing Pond	0.000	0.000
Effluent Treatment Plant	0.000	0.000
Mineral Separation Plant	4.000	6.000
Township area	3.290	3.290
Others (Magazine)	0.077	0.077
Sub Total	**243.605**	**291.742**
Green belt & Safety zone/Plantation	24.500	28.100
Plantation on reclaimed area	2.218	2.218
Land use for public purposes i.e. agriculture etc.	98.348	98.348
Others, Undisturbed	398.613	346.876
Total	**767.284**	**767.284**

6.0 HANDLING OF WASTE / SUBGRADE MATERIAL

This mine is under active production since long by fully mechanized opencast method. It is already established that the grade of the iron ore increases at depth. From the drill holes as well as past mine workings, it has now been established that out of total excavation, saleable grade ore accounts to 70%, sub grade ore 20% and waste 10%. However the generation of overburden/ waste and sub grade ore during the last scheme period was not as per the planned program due to the continuation of working at depth without any lateral extension for want of tree felling permission.

There were four numbers of dumps (Dump Nos 23, 27, 28 & 30) in the lease hold area at the end of 2009-10 with a total quantity of 1.127 MCuM. Out of these dump materials, the entire quantity in Dump 23 and part of Dump 27 & 28 as well as the materials generated during scheme period was utilized by the lessee for road making etc during the scheme period up to October'2013. Since mining operation during last few years i.e. from 2010-11 to October, 2013 has been mainly confined to depth and no lateral extension was possible due to want of tree felling permission, there was practically no waste generation during the period of 2010-11 to 2012-13 and only 12070 tonnes or say 6035 CuM of waste has been generated till October 2013. The details of available waste quantities in last approved mining scheme, dump quantities utilized during scheme period and balance dump quantity in the mine presently are as below:

Dump No.	Location	Quantity of Dump Materials (CuM)				Area Ha)	Fe %	Remark
		As on 31.05.2010	Generated in Scheme period	Utilized in Scheme Period	Balance as on 31.10.2013			
23	Udalbadi	45,413	-------	45,413	Nil	-------	-------	Road making
27	Udalbadi	291,646	-------	146,388	145,258	1.0991	30-40	Road making
28	Udalbadi	187,325	-------	131,865	55,460	1.4404	30-40	Road making
30	Udalbadi	602,927	6,035	6,035	602,927	1.7700	30-40	Road making
Total		**1,127,311**			**803,645**	**4.3095**		

6.1 Rate of yearly generation of wastes and proposal of waste for scheme period

During scheme period, waste generation will be from quarry development as intercalated waste. Further, waste/mineral rejects will be obtained from the beneficiation plant as below:

Year	Feed to COBP(MCuM)	Salable ore (+62% Fe) @ 46% recovery		Sub product (56-58% Fe) @ 23.78% recovery		Rejects (-45% Fe) @ 30.22% recovery	
		M.CuM	Tonnes	M.CuM	Tonnes	M.CuM	Tonnes
2014-15	0.543	0.25	0.75	0.129	0.323	0.164	0.328
2015-16	0.493	0.227	0.68	0.117	0.293	0.149	0.298
2016-17	0.493	0.227	0.68	0.117	0.293	0.149	0.298
2017-18	0.493	0.227	0.68	0.117	0.293	0.149	0.298
2018-19	0.493	0.227	0.68	0.117	0.293	0.149	0.298
Total	**2.515**	**1.158**	**3.47**	**0.597**	**1.495**	**0.76**	**1.52**

Therefore the detail generation of waste year wise will be as follows:

Year	Quantity of intercalated waste (M.Cum)	Quantity of intercalated waste (million tonne)	Waste/ Mineral rejects from Beneficiation plant (Million cu.m)	Waste/ Mineral rejects from Beneficiation plant (Million tonne)	Total waste (Million Cu.m)	Total waste (Million tonne)
1	2	3=2x 2.0	4	5	6=2+4	7=3+5
2014-15	0.232	0.464	0.164	0.328	0.396	0.792
2015-16	0.235	0.47	0.149	0.298	0.384	0.768
2016-17	0.235	0.47	0.149	0.298	0.384	0.768
2017-18	0.235	0.47	0.149	0.298	0.384	0.768
2018-19	0.235	0.47	0.149	0.298	0.384	0.768
Total	**1.172**	**2.344**	**0.76**	**1.52**	**1.932**	**3.864**

6.2 Management of waste

Year	Total waste(Cu.m)	Road Maintenance @15%	Balance waste(Cu.m)	Waste to be dumped during scheme period	Back Filling In Cu.m	Location
2014-15	396000	59400	336600	186600	150000	UDALBARI
2015-16	384000	57600	326400	38400	288000	UDALBARI & G.GODA
2016-17	384000	57600	326400	176400	150000	UDALBARI
2017-18	384000	57600	326400	176400	150000	CHANAGODA
2018-19	384000	57600	326400	0	326400	CHANAGODA
Total	**1932000**	**289800**	**1642200**	**577800**	**1094400**	

As can be seen in the above table, it is calculated that around 1.932 M. CuM waste shall be generated during the proposed scheme period of which around 15% i.e 289800 Cum

of the materials are expected to be utilized for road construction and maintenance, 577800 Cum will be utilized for dumping and 1094400 Cu.m will be utilized for backfilling of exhausted mined out land. The details of year wise back filling have been shown in Environment Management Plan , Conceptual Plan & section (Plate-13, 12 & 12A).

6.3 Build-up of dump, designed capacity and precaution envisaged

6.3.1 It is proposed to continue dumping and management of waste / OB in a scientific manner by identifying 3 locations for the purpose (Plate No.11, 12, 12A, 13 & 14). Waste generated during scheme period from all the workings are proposed to be dumped in these 3 waste dumps depending on the haul distance as close as to the working pit and the dump. The details of the proposed dumps are tabulated below.

Dump	Location	Spread (m)		Area (Ha)	Proposed ultimate height (m)	Capacity to accommodate waste (Cu.M) applying 70% slope factor	RL (m)
		Length (m)	Breadth (m)				
PD/1	141N-330N/1140W-940W	132	128	1.68	10	148560	545-555
PD/2	465N-640N/350E-590E	194	100	1.94	20	203200	554-574
PD/3	335S-635S/1890E-2070E	217	135	2.935	10	226040	557-567
Total				**6.555**		**577800**	

6.3.2 Details of Back-filling

Year	Area(m)	Height(m)	Back Filling In Cu.m	Top RL of Back-filled area(m)	Location
2014-15	6500	23	150000	653	UDALBARI
2015-16	5350	28	150000	558	UDALBARI
	7667	18	138000	543	G.GODA
2016-17	5350	28	150000	558	UDALBARI
2017-18	18750	8	150000	592	CHANAGODA
2018-19	40906	8	326400	592	CHANAGODA
Total	**84523 or 8.452HA**		**1094400**		

6.3.3 Method of dumping

Dumping is proposed by retreating method maintaining the ultimate dump slope at 20-22° with individual terrace slopes not exceeding 37°. Each terrace is planned to have inward slope with catch drains at the inward side of the terrace. The catch drains of individual terrace is planned to connect to the garland drain outside the periphery of the dump.

6.4 Precautionary Measures

(a) Existing

The retaining wall, garland drain and settling tank around the waste dump and the sub grade stacks have been constructed and are being maintained. The detail existing precautionary measures adopted in the mines are as follows:

Details	Area (Hect.)		Quantity		Expenditure (Rs in Lakhs)	
	Achieved 2013-14	Cumulative	Achieved 2013-14	Cumulative	Achieved 2013-14	Cumulative
Parapet walls/ retaining walls at toe of dump & sub grade stack	0.00	0.555	0.00	5550m	0.00	11.98
Garland drains at toe of dump & SG stacks	0.350	0.555	3500m	5550m	2.00	8.47
Check dams along slope valleys	Nil	17 nos	Nil	17 nos.	Nil	11.98
Settling ponds & Garland drains	2 nos.	4 nos.	420 CuM	3197 CuM	1.5	4.5

(b) Proposed

Reclamation of worked out pits shall be started from the year 2014-15 onwards with the waste materials to be generated during the years. Retaining wall of 1800 m long all around the bottom periphery of waste dumps followed by garland drains of 2100m shall be constructed during the scheme period of 2014-16. Water in the rainy season that will be percolated through the wastes in the waste dump shall be drained to the garland drain and the retaining wall shall help in arresting movement of waste materials along with water. The garland drains shall be canalized in such a way that the water flows to an area which will be on non-ore bearing and a wasteland. Regular cleaning of the drain shall be done for easy flow of water. Besides the garland drains and the retaining walls, three settling ponds

of 10 m x 10m x 2m size will be constructed at the end of garland drain, which will accumulate water. Alum shall be added here for settlement of suspended solids. After suspended solids are settled, the water shall be discharged outside the lease area. In the rainy season the water from the pits shall be pumped out to the garland drain at the top of the quarry so that entire water flows to outside the working area keeping the bottom of the pit in dry condition. The dimensions of the precautionary measures to be constructed and its design details will be as follows:

Period	Retaining wall			Garland drain			Settling pond*		
	L(m)	B(m)	H(m)	L(m)	B(m)	D(m)	L(m)	B(m)	D(m)
2014-15	1250	1.0	2.0	1500	1.0	1.5	10	10	2
2015-16	550	1.0	2.0	600	1.0	1.5	Maintenance		
2016-17	Maintenance								
2017-18	Maintenance								
2018-19	Maintenance								
Total									
Conceptual period	300	1.0	2.0	400	1.0	1.5	10	10	2
TOTAL	**2100**	**1.0**	**2.0**	**2500**	**1.0**	**1.5**	**10**	**10**	**2**

*During scheme and conceptual period a total of 4 nos of settling pond will be constructed.

6.4.1 Engineering details of retaining walls & Garland drains

The average rain fall during last seven years (2004-2010) in Keonjhar district is 1600 with rainy seasons during June to September months. The historic maximum rain fall recorded in the month of September' 2005 is around 631.6 mm. Since the proposed waste dumps are located in areas which is gently sloping, maximum flow of water in rainy season will not endanger the retaining walls. However, the following precautionary measures shall be taken while designing the retaining walls and garland drains.

Retaining Walls

Retaining boulder wall (2.0 m high and 1.0 m width) of substantial strength shall be constructed all around the bottom periphery of waste dumps with locally available boulders mixed with sand and cement, to arrest any rolling down of the dump materials. Perforation shall be left at around 10 m intervals to allow for passage of water.

Garland drains

Garland drains of 1.5 m deep and 1.0 m wide shall be constructed all along the bottom periphery of waste dumps followed by the retaining wall to prevent any wash off or leaching of dump materials during heavy rains. Side walls and the base shall be pitched with locally available boulders. Joints shall be filled up with cement and sand mixture so that water cannot percolate.

Settling Tank

The garland drain shall be channelized to a settling tank of 12m long, 8m width and 4m deep. Side walls and base shall be packed with locally available boulders mixed with cement and sand. Engineering drawing of the retaining wall, garland drain and settling tank are provided in Plate No.-17.

6.5 Reclamation & Rehabilitation of existing dumps:

There is no proposal to reclaim or re-habilitate any dumps during ensuing scheme period. The three existing dumps 27, 28 and 30 has already been stabilized and reclaimed by means of plantation.

6.6 Rate of yearly generation of sub grade ore with reference to threshold value and proposal of its stacking.

6.6.1 Existing

During the past mine workings, there have been a number of sub grade ore stacks near all the working pits, the details of which are as below.

Sl No	Stack No	Location	Average grade (Fe%)	Type	Quantity (CuM)	Area (Ha.)
Sub Grade stacks analyzing 45 – 58% Fe						
1	2	G. Goda	50-55	Sub grade/Scalp	230952	2.1232
2	5	Guali	50-55	Sub grade	322733	2.6606
3	7	Topadihi	50-55	Sub grade	50207	1.4768
4	8	Katasahi	55-58	Sub grade	412589	3.7465
5	9	Katasahi	50-53	Sub grade	129109	1.6581
6	10	Katasahi	45-50	Sub grade	8249	0.4708
7	11	Dumka Top	50-53	Sub grade	76000	0.8843
8	12	B Bottom	48-52	Sub grade	209735	1.7933
9	13	Dumka Top	45-50	Sub grade	263532	2.4691

Sl No	Stack N	Location	Average g (Fe%)	Type	Quantity (CuM)	Area (Ha.)
Sub Grade stacks analyzing 45 – 58% Fe						
10	14	Dumuka Top	46.67	Sub grade	327418	3.5171
11	16	Chanagoda	50-55	Sub grade	1397122	5.3706
12	17	MDH	50-53	Sub grade	277192	2.3656
13	18	MDH	55-58	Scalp	147346	1.8834
14	19	Topadihi	52-55	Sub grade	106835	1.3409
15	20	Topadihi	55-58	Scalp	12553	0.6160
16	25	Udalbadi	48.25	ROM	4500	0.1276
17	29	Barpada Bottom	53.18	Scalp	12589	0.1556
18	33	Gangaigoda	48.33	Sub grade	10100	0.3453
19	35	Barapada Top	45-50	Sub grade	176634	2.1920
20	36	Chana goda	45-50	Sub grade/scalp	194896	1.4584
21	36A	Chanagoda	45-50	Sub grade	63600	0.4122
22	36B	Chanagoda	55-58	Sub grade	105910	1.3933
23	37	kanhusahi	48.31	Sub grade	13397	0.3723
24	38	Kanhusahi	45-50	Sub grade	320661	4.1704
25	39	Sonukocha	50-55	Sub grade	307174	4.5409
26	43	Guali	45-50	Sub grade	1525	0.0680
27	44	Guali	53-55	Sub grade	19969	0.3973
8	45	Guali	45-50	Sub grade	79493	0.7292
Total					**5282022**	**48.7388**

These sub grade stacks are of different heights, average being around 25m. It is estimated that a total of around 5.28 MCuM of sub grade ore are lying in the mines in the above yards. Since these sub grade materials are lying within the mineralized zones, it is proposed to re-handle these materials and process the materials in the beneficiation plant and sold as per the market demand as and when required. During development of quarries some of the sub-grade material shall be re-handled to utilize in the beneficiation plant.

6.6.2 Details of re-handling of sub-grade:

As described earlier, the total available sub-grade within the ML area is 5282022 Cum or 10564044 (MT).During ensuing scheme period, it has been proposed to re-handle the sub grade dump which will be directly fed to the beneficiation plant to upgrade the ore. The details of re-handling will be as follows:

Year	Stock No	Total existing Quantity (MT)	Height (m)	Re-handling	Balance Quantity (MT)	Height After Re-handling (m)
2014-15	38	641322	40	600000	41322	5
2015-16	38	41322	5	41322	0	0
	37	26794	5	26794	0	0
	35	353268	30	353268	0	0
	36	389792	27	178616	211176	15
2016-17	36	211176	15	211176	0	0
	36A	127200	14	127200	0	0
	11	152000	12	152000	0	0
	19	213670	17	109624	104046	8
2017-18	19	109624	8	109624	0	0
	7	100414	12	100414	0	0
	2	476304	44	389962	88280	10
2018-19	2	86342	10	86342	0	0
	5	660192	25	513658	146534	10
Total				**3000000**		

The requirement of beneficiation plant will be 12, 50,000 tonne of sub-grade ore. From re-handling yearly feeding of sub-grade ore will be 6, 00,000 tonne. Balance 6, 50,000t/annum will be fed from the generated sub-grade during scheme period.

6.6.3 Generation of sub-grade ore during ensuing scheme period and its management

Besides the waste/overburden, the ore zone itself contains sub grade ore (between 45-58% Fe), which shall be separated out. Sub grade ore account to about 20 % of the total excavation of the ore zone. During the scheme period it is calculated to recover about 2.345 MCuM sub grade materials. Presently, around 28 sub grade stacks are there near different pits which are shown in the surface plan. The total volume of the existing sub grade stack is 5282022 Cum or 10564044 (MT). The generation of sub-grade ore during ensuing scheme period will be as follows:

6.6.3.1 Sub-grade generation due to mining operation vis-à-vis utilization in the beneficiation plant and available sub-grade at the end of each year:

Year	Generation of sub-grade (MT)	To be Fed to the plant (MT)	Balance quantity of sub-grade after plant feeding	Generation of Sub-grade from beneficiation plant after fed to the plant (MT)	Available stock at the end of each year
1	2	3	4= 2-3	5	6= 4+5
2014-15	1159250	650000	509250	150000	659250
2015-16	1175950	650000	525950	150000	675950
2016-17	1175950	650000	525950	150000	675950
2017-18	1175950	650000	525950	150000	675950
2018-19	1175950	650000	525950	150000	675950
TOTAL	**5863050**	**3250000**	**2613050**	**750000**	**3363050**

6.6.3.2 Sub-grade ore available in the old stock within lease area vis-à-vis Re-handling and utilization in the beneficiation plant and closing stock at the end of the year

YEAR	Re-handling and Utilisation in the beneficiation plant during the year (MT)	Closing stock at the end of the year at old stock site (MT)	Generation of Sub-Grade Ore From Plant (MT)	Closing stock at the end of the year (MT)
1	2	3	4	5= 3+4
Stock available as on 01.01.2014 10564044 (MT)				
2014-15	600000	9964044	150000	10114044
2015-16	600000	9514044	150000	9664044
2016-17	600000	9064044	150000	9214044
2017-18	600000	8614044	150000	8764044
2018-19	600000	8164044	150000	8314044

6.7 Management of sub-grade ore during Scheme period:

6.7.1 Available Year wise sub-grade ore

Quantity of sub grade mineral in the mine within the range of 45% to 58% Fe which are available during each year of the scheme period (2014-15 to 2018-19), are as follows:

Year	Available Sub-grade ore from the mines after utilisation in the beneficiation plant (MT)	Generation of Sub-Grade Ore From Plant (MT)	Total sub-grade ore (MT)	Total sub-grade ore (Cu.m)
1	2	3	4	5
2014-15	659250	150000	809250	404625
2015-16	675950	150000	825950	412975
2016-17	675950	150000	825950	412975
2017-18	675950	150000	825950	412975
2018-19	675950	150000	825950	412975
TOTAL	**3363050**	**7,50,000**	**4113050**	**2056525**

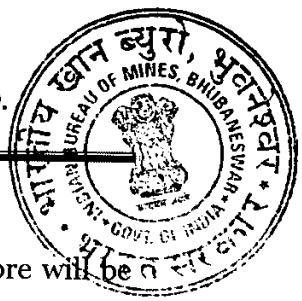
6.7.2 Year wise stacking of Sub-grade ore during ensuing scheme period (2014-19)

Year	Total sub-grade ore (Cu.m)	Area of Stacking (m2)	Ultimate Height (m)	Location
1	2	3	4	5
2014-15	404625	34125	20	At Stock No. 9,12,17 & 20
2015-16	412975	32786	20	At Stock No. 9,12,17, 20 & 5
2016-17	412975	32786	20	
2017-18	412975	32786	30	
2018-19	412975	32786	30	
TOTAL	**2056525**	**165270**		

6.7.3 Proposal for re-handling of sub-grade stack and their further stacking to keep the sub-grade in a systematic and scientific manner during ensuing scheme period

As shown in the surface plan there are 28 sub-grade stacks. After re-handling the numbers of stack will be reduced to 18. Also, it has been proposed to re-handle the small stacks i.e. 18, 43, 36B & 10 which will be stored near the Udalbari Quarry at stock No-25 to further reduce the number. As a result of which the sub-grade stacks can be stored in a systematic and scientific manner. The ultimate height of the sub-grade stack will be 30m.

To stack the sub grade ore, no additional land is required. The remaining sub grade ore generated per annum during the scheme period can be stacked temporarily over the existing sub-grade stack for future beneficiation.



6.7.4 Total stack within the lease area at the end of scheme period

At the end of the scheme period, a total of 12127580 MT of sub-grade ore will be stocked within the lease area which consists of 7764530 MT of old stock and 4363050MT generated from the mines.

This is a temporary allotment as the sub grade ores shall be beneficiated and sold as and when there will be demand from market. Stacking of sub grade ore shown in Plate No 3, 4, 11, 13 & 14A.

6.8 Precautionary Measures:

Existing:

Though the sub grade stacks are temporary in nature, protective measures have been taken at the toe of most of the stacks to prevent flow of the loose materials during rainy season. Retaining wall & parapet walls over 900 m around sub grade stack near MDH quarry and over 200 m around the sub grade stack near Katasahi quarry have been constructed during scheme period. De-silting of garland drains over 4650 m have also been done during scheme period and the same shall be continued.

Proposed

Period	Retaining wall			Garland drain			Settling pond*		
	L(m)	B(m)	H(m)	L(m)	B(m)	D(m)	L(m)	B(m)	D(m)
2014-15	1000	1.0	2.0	1200	1.0	1.5	10	10	2
2015-16	500	1.0	2.0	500	1.0	1.5	10	10	2
2016-17	Maintenance								
2017-18	Maintenance								
2018-19	Maintenance								
Total	**1500**	**1.0**	**2.0**	**1700**	**1.0**	**1.5**	**10**	**10**	**2**

*Settling ponds of 6 nos will be constructed during ensuing scheme period.

6.6 Land use pattern :

The present land use, land use at the end of proposed scheme period and that at conceptual stage will be as follows:

Area in ha.

Description	Existing	Scheme Period	Addl area for conceptual period	End of Conceptual
Area under mining	152.655	188.637	253.66	442.297
Storage of topsoil	0.000	0.0	Nil	Nil
Overburden dumping including Retaining wall, garland drain etc.	4.310	10.865	18.665	29.53 (will be rehabilitated by plantation during conceptual period)
Sub grade stacking/ Mineral storage	61.350	61.350	16.160	77.510 (will be planted at the end after mining activities)
Infrastructure (Workshop, Conveyor belt, crusher, admn. Building etc)	6.423	7.523	0.227	7.750 (will be planted in conceptual period after mining activities is ceased)
Mines Roads / haulage road	11.500	14.000	Nil	14.00
Railways	0.000	0.000	Nil	0.000
Tailing Pond/ Effluent Treatment Plant etc	0.000	0.000	Nil	0.000
Mineral Separation Plant	4.000	6.000	33.75	39.75 (will be planted at the end after mining activities)
Township area	3.290	3.290	Nil	3.290
Magazine	0.077	0.077	Nil	0.077 (will be planted at the end after mining activities)
Sub Total	**243.605**	**291.742**	**322.462**	**614.204**
Green belt & Safety zone/ Plantation	24.500	28.100	15.453	43.553
Plantation on Reclaimed area	2.218	2.218	Nil	2.218
Land use for public purpose i.e. agriculture etc.	98.348	98.348	Nil	98.348
Area proposed for Plantation	-	-	8.961	8.961
Others, Undisturbed	398.613	363.811	-	-
Total	**767.284**	**767.284**	-	**767.284**

7.0 USE OF MINERAL

7.1 End use of Minerals

Iron ore mined out from the lease area are of both hard laminated type as well as of fine variety. These ores can be used in steel plants, pig iron plants and in sponge iron manufacturing units depending on its grade and physical properties. The hard laminated ore with +63% Fe can be utilized in Sponge iron industries while the other ore would be utilized in steel plants and pig iron industries. Some ore would also be exported as and when there is demand for it.

7.2 Physical & Chemical specifications

The end use and specification of iron ore for different user industries is outlined below.

Name of the buyer/consumer	Industrial/commercial specification
Nova	+65% Fe, SiO_2 + Al_2O_3 = 5% (Max), P=0.05%, size = 5 – 20 mm
KJSA Ispat (P) Ltd	+64% Fe, SiO_2 = 2.5%, Al_2O_3 =2%, P=0.05%, size = 5-15 mm
IDCOL Kalinga Iron Works	+64% Fe, SiO_2 + Al_2O_3 = 5% (Max), P=0.05%, size = 5 – 20 mm and 10-60 mm
TTL Minerals	+63% Fe, SiO_2 + Al_2O_3 = 5%, size = - 5 mm
Sri Jagannath Sponge & Power Pvt. Ltd	+64% Fe, SiO_2 + Al_2O_3 = 5%, size = 25 – 150 mm
R.Pyarelal International	+63% Fe, SiO_2 = 3%, Al_2O_3 = 3.5%, P=0.05%, size = - 5mm
Kamal Sponge Steel & Power (P)Ltd.	+64% Fe, SiO_2 + Al_2O_3 = 5% (Max), P=0.05%, size = 5 – 20 mm

8.0 MINERAL PROCESSING

The Iron ore raised from the mines are being sized, dressed, sorted/screened and blended as per requirement of end users, prior to dispatch. For this purpose, one stationary ore crushing plant of 400 TPH capacity and two numbers of stationary crusher units of 150 TPH & 80 TPH capacities have been set up in the lease area. In addition to this, there are 6 numbers of mobile crusher units of 150 & 200 TPH in the lease hold area for sizing of the ROM materials from the different quarries. A stationary screen of 80 TPH capacity alongwith 6 nos of 300 TPH and 6 nos of 100TPH, 150 TPH, 200 TPH and 250TPH mobile screens are utilized within the lease area. The lessee has proposed to install 1 mobile crusher of 200 TPH and 2 nos of mobile screens of 200 TPH & 250 TPHs each. 2 x 185 TPH beneficiation plant have been set up within the lease hold area, in addition to the existing crushing and screening units.

8.1.1 The general process flow chart/ material balance diagram of the 2 x 185 TPH beneficiation plant are at **Annexure - 28.**

8.1.2 Description of 400 TPH crushing plant

The ROM ore (- 500mm) is fed to the hopper, which is passed through a 150mm aperture vibrating grizzly via apron feeder. In vibrating grizzly, the materials of 0-150mm and 150-500mm sizes are separated. The 150-500mm size materials go to jaw crusher and 0-150 mm size materials are fed to screens, which separates 0-10mm, 10-30mm, 30-80mm and 80-150mm sized ores. The three products of 0-80 mm sizes are kept separately while the 80-150 mm materials and the output of the jaw crusher are again fed to the secondary cone crusher. The secondary crusher out put goes to the III deck screen and separates 0-6mm and 6-18mm as final products. The +18mm size materials go to the tertiary crusher. The tertiary crusher output goes to the other III deck screen and again separates 0-6, 6-18 and +18mm sized materials. The entire process is a closed circuit operation. The 0-6mm materials are fed to one single deck screen to separate 0-3 and 3-6mm. The 0-3 mm materials are considered as low grade fines.

8.1.3 Brief Description of 2 x 185 TPH Beneficiation Plant

The planned production of Iron ore from the mine is 5.62 MTPA of +58% Fe grade. Out of these, +62% Fe grade ore are easily marketable. Considering the present market trend, the lessee has established a beneficiation plant to beneficiate / wash 2.0 MTPA ore of +45 to -62% Fe grade iron ore material including sub grade generated during mining for improving its quality to +62% Fe. Keeping in view of the mineral conservation and proper environmental preservation points of view, as well as effective utilization of low grade / sub grade iron ore, a State of Art and sophisticated beneficiation plant for 2.0 MTPA capacity has been established in this area from which the final product suitable for direct use in steel plants will be 1.0 MTPA and the final ore dispatch from Nuagaon iron ore mine will not exceed 5.62 MTPA. This plant has become operational during the year 2012-13.

Beneficiation is being carried out for iron ore between +45 to 62% Fe (Low grade/Sub grade) generated during mining to upgrade its quality to +62% Fe, so that it is immediately marketable for domestic and export purpose. The rejects generated from beneficiation plant will be stacked separately and can be used in future as feed in the pellatisation plant after necessary pre-process.

With the establishment of this beneficiation plant, up gradation and conversion of low grade iron ore is achieved for higher grade recovery which otherwise would have found no industrial use and would have lying in stacks forever. This will also help to achieve creation of useful mineral wealth from waste, which will pave way to conserve the overall mineral potential of the country in a healthy and useful way, in respect of iron ore.

By above beneficiation of low grade ore/sub grade ore, the land status of the mine area will also improve greatly due to release of more land for greenery and reclamation purposes as otherwise these areas would have been land locked for ever for want of market of the low/ sub grade ore.

The main features of the established plant is as below:

1.	**Hourly feed in Beneficiation Plant(TPH)**	:	370
2.	**Working hour per day**	:	18
3.	**No. of working days in a year**	:	300
4.	**Annual Raw material feed**	:	2.00 MTPA (Av.56% Fe)
5	**Of this, the salable materials are**		
	(a) Product from the beneficiation plant @ 46 % recovery of concentrate	:	0.92 MTPA (+62% Fe)
	(b) Sub product from the beneficiation plant @ 23.78% recovery	:	0.476 MTPA (between 56 to 58% Fe)
	(c) Rejects @ 30.22 % recovery	:	0.604 MTPA (-45% Fe)

The setting up of this plant will result in:

(a) Conserving the overall mineral potential of the country in a useful way with respect to iron ore.

(b) Conversion of lower grade ore/ sub grade ores into directly usable higher grade iron ore for steel making purposes.

(c) Land status will also improve due to release of more land because of utilization of low grade ore which is being stacked outside presently.

The beneficiation plant is adopting wet process with latest state of art technology comprising of Drum scrubbers, double deck wet screens, jigs, dewatering and rinsing screens, Hydro-cyclones, Hi-frequency screens, Thickener, Filter press etc. This technology has been selected due to the following reasons:

- No fugitive dust emission due to wet process technology.
- The entire water circuit will be closed cycle and the entire waste water will be reused/ recycled. Resultant Zero Effluent Discharge. As such no water pollution.
- Chemicals are not used for washing.
- No tailing dam is involved due to installation of filter press.
- Better ore recovery.
- Less land requirement since tailing dam is not required.
- Due to its process simplicity and compact in nature, it can be integrated with the existing mining activity.

On the whole, it can be concluded that this technology is environment friendly with better ore recovery due to the following facts:

1. Greatly improve the environmental status of the area by converting low grade/ sub-grade iron ores into marketable higher grade iron ore.
2. Mineral conservation will be achieved by the low/ sub grade ore getting enriched to marketable iron ore for use in exports/ steel making etc which otherwise would have been stacked in dumps without any mineral use.

The general process flow chart/ material balance diagram is shown in **Annexure-28.**

8.1.4 Performance of the beneficiation plant during last scheme period

The performance of the beneficiation plant during 2012-13 & 2013-14(up to Oct'13) is tabulated below:

Item	Quantity in tones (2012-13)	Quantity in tones (2013-14) up to Oct'13)	Average Grade
Feed	43,026.000	32,965.000	Below 58% Fe
Concentrates	27,316.050	13,949.500	62-65% Fe
By products/co-products	8,501.00	6,945.000	55-58% Fe
Rejects	7,208.950	12070.500	Below 45% Fe

8.1.5 Description of Screening of sub grade ore

Beside the above beneficiation plant, some sub grade materials generated from the working mines and lying in the lease area comprising of (+) 55% Fe and 58 to 60% Fe grade ore shall be subjected to crushing and screening to produce salable ore of (+) 62 % Fe.

8.1.6 The average grade of the ore is observed to be 62.48% Fe, the cut off being fixed at 58% Fe. The generation of sub grade material is 15%, taking the threshold value at 45% Fe. These sub grade ore can be blended, after sorting, sizing, screening and processing etc, with high grade ores in future and can be marketed. Therefore the stacking of sub grade materials shall be of temporary nature.

9.0 Environmental Management Plan

Salient items to be covered	Proposal as per Scheme of Mining (2013-14)	Position as on 31.03.2014	Proposal for the Scheme period (2014-15 to 2018-19)
Topsoil storage preservation and utilization.	Top soil as and when generated shall be stored and utilized for plantation program.	Some top soil generated during the last scheme period has been stored over an area of 0.100 Ha for future use.	Top soil as and when generated shall be stored and utilized for plantation program.
Land reclamation and rehabilitation.	By the end of the scheme period the UPL might be reached and as such, after the proposed scheme period there will be concurrent reclamation of mined out area, the tentative figures of which are given in Chapter – 4 (Conceptual Plan)	Presently the mine has not reached UPL. So, no reclamation has been done in any part of working quarry.	During ensuing scheme period, it has been proposed to reclaim 8.84Ha by means of back filling and plantation.
Waste dump management.	It has been proposed to continue dumping and management of waste / OB in a scientific manner. Waste generated during scheme period from all the workings shall be dumped in 3 earmarked waste dumps over 5.313 Ha non-ore bearing area depending on the haul distance as close as to the working pit and the dump. It has been calculated that about 0.340 million CuM waste/OB shall be removed during the scheme period. By end of the scheme period, the dump will have 10 m height and dead end slopes shall be ready for stabilization by plantation. Retaining wall with garland drains over a length of 1100 m on the toe of the dumps shall be constructed during the year 2013-14.	There were 4 numbers of Waste / OB dumps near Udalbari quarry which are dormant. Out of these four dumps, materials from dump No. 23 has been utilized for road making. Compaction, terracing & leveling of dumps have been done and plantation on the dump slopes have been carried out. The precautionary measures already adopted in the mines are given in Para 6.4 and the existing measures are summarized below: **Details** / **Cumulative** Retaining walls at toe of dumps & SG stacks: 5550 m Garland drains: 5550 m Settling Ponds: 4 nos. 3197 CuM Check dams: 17 nos.	There is no proposal to reclaim or re-habilitate any dumps during ensuing scheme period. The three existing dumps 27,28 and 30 has already been stabilized and reclaimed by means of plantation. It is calculated that around 1.922 M. CuM OB/waste shall be generated during the proposed scheme period of which around 10% i.e 289,800 cum of the materials are expected to be utilized for road construction and maintenance, 577,800 Cum will be utilized for dumping and 1094400 Cu.m will be utilized for backfilling of exhausted mined out land. The waste of 577,800 cum will be utilized for dumping at three different places I.e at PD-1,PD-2 and PD-3.The details of dumping has been explained in chapter-6. The details of precautionary measures to be adopted around dump has been explained in ch-6.

Salient items to be covered	Proposal as per Scheme of Mining (2013-14)	Position as on 31.03.2014	Proposal for the Scheme period (2014-15 to 2018-19)
Sub grade/ Low grade ore management	It is planned to process the sub and low grade materials in beneficiation plant to produce marketable ore. As per the proposal it is also calculated that on beneficiation of 5.848 MCuM ore of low and sub grade ore about 2.924 MCuM waste/rejects shall be recovered during the scheme and conceptual period which is proposed to be dumped on existing dormant dumps lying near Udalbari quarries. Besides, the sub grade ore which would be generated in future shall also be processed and waste generated from these shall be dumped in the earmarked places. In case of inadequacy of space to accommodate the wastes/rejects, the lessee shall identify some area outside the lease or resort to backfill some of the abandoned quarries by then.	The operation of the beneficiation plant has been delayed due to statutory clearances. The plant is expected to start operation by November 2012. The sub grade and low grade ore lying in the mine shall be processed in this plant. It has been estimated that around 5.28 MCuM of sub grade ore are presently stacked within the lease hold area.	A total of 28 sub-grade stacks are there with around 5.28 MCuM/10.564 MT of SG ore. Re-handling of 10 stacks have been proposed during the scheme period to feed around 3.0 MT of SG ore to the beneficiation plant thereby reducing the numbers of stacks to 18. It has also been proposed to re-handle the small stacks i.e. 18, 43 & 10 which will be stored near the Udalbari Quarry at stock No-25. The sub-grade stacks are proposed to be stored in a systematic and scientific manner with ultimate height of 30m. The generation of SG ore during the scheme period is 2.345 MCum out of which 1.300 MCuM of materials will be directly fed to the beneficiation plant and around 0.3 MCuM of SG ore will be generated as sub ore. Thus at the end of scheme period, around 1.345 MCuM of sub grade ore will be additionally generated which is proposed to be stacked at earmarked 5 existing stacks limiting the height of stacks to 30m. The details of precautionary measures like construction of retaining wall & garland drains with settling tanks around sub grade stacks have been explained in chapter-6.

Salient items to be covered	Proposal as per Scheme of Mining (2013-14)	Position as on 31.03.2014	Proposal for the Scheme period (2014-15 to 2018-19)
Afforestation programme with precaution proposed for survival and protection of plantation.	Afforestation shall be continued. In the proposed scheme period, all the vacant areas where there will be no working (any type related to mining) has been proposed with dead end slopes of the dump for plantation. Plantation during the scheme period i.e. 2013-14 shall be undertaken as below. Safety zone – 10,000 Nos. Nala & Road side- 2,000 Nos. Gap plantation- 8,000 Nos. Outside lease – 5,000 Nos.	During the 4 years of the scheme period, 136,700 saplings were planted over 88.11 Ha area within the lease area and 33,000 saplings were planted over 21.50 Ha outside the lease area.	During the scheme period i.e. 2013-14 plantation was undertaken as below. Safety zone – 5,000 Nos. Nala & Road side- 1,000 Nos. Gap plantation- 8,000 Nos. Outside lease – 10,000 Nos
Quality of air.	Water spraying shall be continued and plantation shall be done. Water spraying is being carried out by installing automatic and revolving water spraying system on some of the roadsides and over dumps for suppression of dust. Installation of automatic water spraying system all along the haul roads shall be done in a phased manner during the scheme period.	Water spraying 3 times minimum per day is being done on the haul roads and dust generating points through water tanker and fixed auto sprinklers. Besides, plantation was done inside and outside the leasehold for suppression of air pollution. Other measures like maintenance of well compacted roads, controlled blasting etc are being done.	Water spraying shall be continued and plantation shall be done. Water spraying shall be carried out by automatic and revolving water spraying system on some of the roadsides and over dumps for suppression of dust which have been installed. Installation of automatic water spraying system all along the haul roads shall be done in a phased manner during the proposed scheme period. To minimize the effect of air pollution, water injection system/dust extractor system in drills will be adopted. Further, drillers will wear PPE to control air pollution and minimization of its effect.
Quality of make up water including surface and ground water.	Garland drains as well check dams shall be maintained regularly.	Surface run-off around the mine in rainy season was allowed to flow through the garland drain. Regular and seasonal monitoring of water was conducted. Check dam as proposed have been constructed.	Garland drains as well check dams shall be maintained regularly.

Salient items to be covered	Proposal as per Scheme of Mining (2013-14)	Position as on 31.03.2014	Proposal for the Scheme period (2014-15 to 2018-19)
Vibrations	The same processes will be continued during the scheme period.	All the proposals are being carried out as outlined in the scheme.	The same processes will be continued during the scheme period.
Treatment of mine water & effluent toxic substance before discharge	The new beneficiation plant in the lease area will have some slurry discharge which is proposed to be pumped to filter press to recover the water which will be recycled in the process. Care will be taken to ensure minimum slime discharge.	There is no industrial use of water; hence no effluent treatment proposal has been carried out.	The new beneficiation plant in the lease area will have some slurry discharge which is proposed to be pumped to filter press to recover the water which will be recycled in the process. Care will be taken to ensure minimum slime discharge.
Noise level	Blast vibration study shall be undertaken by competent laboratory and precautionary measures to be taken up	All precautions were taken to keep noise level and vibration under control	Blast vibration study shall be undertaken by competent laboratory and precautionary measures to be taken up

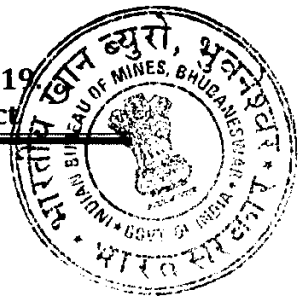
9.1 Monitoring schedule for different environmental components:

Monitoring of environmental aspects is being done as per guidelines of SPCB/CPCB and IBM. This will be continued. Environmental Monitoring Stations with their station code, location and frequency of monitoring is as below.

Sl No	Station Code	Location	Frequency of Monitoring
River flow rate monitoring			
01	Malda	Suna nadi	Pre monsoon & Post Monsoon
02	Kakrapani	Kakrapani Nallah	
03	Tehrai	Teherai Nallah	
04	Utalwadi	Karo river	
05	Topadihi	Topadihi Nallah	
Surface Water Monitoring			
1	SW1	Karo River up stream	Once in a month in 3 seasons excepting monsoon
2	SW2	Karo River down stream	
3	SW3	Topadih Nala up stream	
4	SW4	Topadih Nala down stream	
5	SW5	Suna Nadi	
6	SW6	Kakarpani Nala	
7	SW7	Teherei Nala	

Ground Water Monitoring			
1	GW1	D-Top	Once in a month in 3 seasons excepting monsoon
2	GW2	KJSA office	
3	GW3	Near Barapada village	
4	GW4	Near Katasahi village	
5	GW5	Near Rugudih Village	
6	GW6	Near Loidapada village	
7	GW7	Near Panduliposhi village	
8	GW8	Near Rangelbeda village	
9	GW9	Monnet	
Ground Water Level Measurement Monitoring			
1	Open well	Malda	Once in every season
2	Open well	Katasahi	
3	Open well	Rudkela	
4	Bore well	Nilachal High School, Guali	
5	Open well	Guali village	
6	Open well	Rangelbeda	
7	Open well	Panduliposhi	
8	Open well	Nuagaon	
Ambient Air Monitoring			
1	A1	Mines office	Twice in a week for a month in each season
2	A2	Site Mines Office, Nuagaon	
3	A3	Inside ML Area	
4	A4	Village - Katesahi	
5	A5	Vilage Loidapada	
6	A6	Village Panduliposi	
7	A7	Village Rangalbeda	
8	A8	Village Malda	
Noise Monitoring – Work zone			
1	N1	Mines Pit	Twice in a month, consecutive 2 days, 8 hrs exposure
2	N2	Operator's Cabin	
3	N3	Weigh Bridge	
4	N4	Crusher & Screen area	
5	N5	Work shop	
6	N6	Loading Point	
Noise Monitoring – Buffer zone			
1	N7	Rugudi Village	Twice in a month, consecutive 2 days, 8 hrs exposure
2	N8	Loidapada Village	
3	N9	Topadih Village	
4	N10	Panduliposi Village	
5	N11	Guali Village	
6	N12	Katasahi Village	
7	N13	Rangelbeda village	

10.0 Any other information - No



PROGRESSIVE MINE CLOSURE PLAN
[Under Rule 23 B (1) of MCDR 1988]

Contents

1.0 INTRODUCTION

(a) Name and address of the lessee: Sri K.J.S.Ahluwalia, Mine Owner, P.B.No.3, At/PO: Barbil, District – Keonjhar – 758 035, Tel: 06767-275348(O), 275438®, Fax: 06767-276392

(b) Location and extent of the lease area

District and State	Keonjhor, Orissa	
Taluk	Barbil	
Village	Guali, Nuagaon, Barpada, Katesahi, Topadihi, etc.	
Khasra No/Plot No/Block/Range	Champua Range, Barbil Tahasil, Joda P.S. Keonjhor district, Orissa.	
Lease area	767.284 Hectares.	
Whether the area is recorded as forest and initial land use pattern of the lease area.	Reserve Forest, village forest, non-forest (agricultural land, waste land/hilly area, pond (low lying area), village site and road.	
	Type of land	Area (Ha)
	Forest	525.762
	Agricultural Land	124.584
	Grazing land	85.980
	Water Bodies	9.692
	Others	21.266
	Total	767.284
Ownership occupancy	Major portion of the lease area belongs to State Govt., under forest and non-forest category and rest is private plots under agriculture fields.	
Survey of India Toposheet No in which the area is featured	73 G/5	
Latitude & Longitude of the area	$21^0 57'11.1"$ to $21^0 59'34.3"$N $85^0 16'6.1"$ to $85^0 19'24.9"$E	
Existence of Public Road/Railway Line, if any, and approximate distance	The mining lease area is approachable from Barbil town covering a distance of 23 km by Barbil – Rourkela NH – 215. Also the area can be approachable from Koira which is on NH – 215 at a distance of 11 km. Nearest Rail Head is at Barbil (both Passenger and goods train)	
Infrastructural facilities around the area	Located adjacent to several working mines. Connected by road from Panikoili-Barbil-Koira-Rajamunda NH-215. District headquarters is at Keonjhor – 60 km from lease area. Market facilities are available at Bhadrasahi at a distance of 12 km from the lease area. Education upto higher secondary level, medical facilities, post office etc is available at nearby Nuagaon village, which is at a distance of 1.5 km from the lease area. Hospital and	

	college facilities are available at Joda and Barbil. Local weekly market sits at village Nuagaon. CESCO power line and BSNL telephone line have passed adjacent to lease area. Almost all the cellular phone tower is there nearby. In adjacent villages there are a number of tube wells, dug wells. Facilities for available skilled, semi-skilled and un-skilled workers are there.

(c) Method of mining

Opencast and fully mechanized method of mining has been proposed in the scheme period. For details of method of mining and machinery to be used in the mine please refer Chapter – 5 of the scheme of mining.

(d) Mineral processing

For details of processing of ore please refer Chapter – 9 of the scheme of mining.

1.1 Reason of closure

(a) Reserves and resources assessed as on 01.04.2014 is 153.082 million tons at 45% Fe Cutoff & reserves of +58% Fe ores are 123.643 million tonnes as mentioned below.

Grade Range & Reserves Category	Reserves		
	Proved	Probable	Total
+ 58% Fe (million tonnes)	61.530	62.113	123.643
45 to 58% Fe (million tonnes)	14.650	14.789	29.439
Total +45% Fe (million tonnes)	76.180	76.902	153.082

Production of +58% ore has been assessed to be 24.625 million tonnes as mentioned below with an overall stripping ratio 1 : 0.038 (tonne of ore : CuM of intercalated waste).

Year	Quantity of Saleable ore from mines (million tonne)	Quantity of sub grade (M.Cum)	Quantity of sub grade (million tonne)	Intercalated waste (M.Cum)	Intercalated waste (million tonne)	Quantity of ROM (million tonne)	Stripping Ratio (MT/m3)
1	2	3	4	5	6	7=2+4+6	8=(2+4)/5
2014-15	4.869	0.464	1.16	0.232	0.464	6.493	1 : 0.038
2015-16	4.939	0.47	1.175	0.235	0.47	6.584	1 : 0.038
2016-17	4.939	0.47	1.175	0.235	0.47	6.584	1 : 0.038
2017-18	4.939	0.47	1.175	0.235	0.47	6.584	1 : 0.038
2018-19	4.939	0.47	1.175	0.235	0.47	6.584	1 : 0.038
Total	24.625	2.344	5.86	1.172	2.344	**32.829**	1 : 0.038

(b) Balance reserve of +58% grade ore as on 01.04.2019 shall be 99.018 million tonnes which can be recovered in about 20 years from 2019-20 @ 5.0 million tonnes per year. So for next 25 years from start of proposed scheme of mining there is no reason of closure on account of exhaustion of iron ore.

Final closure however is expected after 2038-39 after assessing the quality and quantity of ore at that time remaining in the leasehold area.

1.2 Statutory obligations

As of now there is no such order from any statutory authority/ies for closing down the mines. The mine is being run obliging statutory formalities under rule 23 B (1) of MCDR'1988.

1.3 Closure plan preparation

(a) Name and address of the lessee

Sri K.J.S.Ahluwalia, Mine Owner, P.B.No.3, At/PO : Barbil, District – Keonjhar – 758 035, Tel: 06767-275348(O), 275438®, Fax: 06767-276392

(b) Name and address of the RQP preparing the Progressive Mine Closure Plan

Sri P. S. Acharya, RQP/NGP/027/87/A, Valid up to 09.12.2019 (M) 9437008179
Sri S.M.Patro, RQP/CAL/175/93/A, Valid up to 19.04.2021 (M) 9861093020
GEMTECH Consultants Pvt. Ltd., A/10, Baramunda Housing Board Colony
Baramunda, Bhubaneswar – 751 003 (Orissa). E mail – gemtech_consultant@yahoo.co.in;

(c) Name of the executing agency

Progressive Mine Closure Plan will be implemented by the lessee, Sri K.J.S.Ahluwalia, Mine Owner.

2.0 MINE DESCRIPTION

2.1 Geology

The lease area is characterized by hilly as well as flat ground having elevation from 520m to 702m above M.S.L. The hills and hill ranges located within the lease area are Udalbari, Guali, Topadihi, Dumkahudi, Barpada, Kanhusahi & Bichhagarh-Katasahi.

The M.L. area discerns a fairly wide range of rock types of the iron ore group. The area has a geomorphic trend of North-North-East to South-South-West which is almost conformable with the strike trend of the rock types. The different rock types observed in field from the exposures and mine working areas are as follows:

Soil alluvium
Laterite
Iron ore
Banded iron formations (BIF)
Shale

The prominent rock types observed around the area are -

i) Soil & Alluvium

These are found in the low lying areas and are mostly cultivated lands.

ii) Laterite

Extensive capping of Laterite are observed along the hill ranges. Iron ore exposures are bounded by this Lateritic zone. The Lateritic patches observed in the area are ferruginous and at places manganiferrous.

iii) Iron Ore

A total of twelve iron ore exposures covering an area of about 310 Hectares have been identified in the mining lease area. The exposures are massive as well as laminated type and mostly observed along hill slopes and on the hill top.

iv) Banded Iron Formations

Banded iron ore formations in form of Banded Hematite Jasper (BHJ) have been found to occur in southern side of Barpada top quarry in the lease area.

v) A patch of shale is exposed between Barpada top and Kanhusahi quarry.

2.2 Reserves estimation

For details of estimation of reserves refer Chapter 3 of the scheme of mining and alsot para 1.1 (a) above.

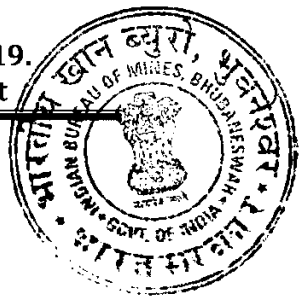
3.0 REVIEW OF IMPLEMENTATION OF FIVE YEARS PROGRESSIVE CLOSURE PLAN UP TO THE FINAL CLOSURE OF THE MINE:

Reviews of implementation of five years progressive mine closure plan have been discussed in Chapter – 1 of the scheme of mining.

4.0 CLOSURE PLAN

4.1 Mined out land

At present there are mine working & allied activities covering 243.938 Ha and by end of proposed scheme period about 266. 609 Ha for mining purpose shall be degraded. During conceptual period 767.284 Ha shall be degraded for mining and allied activities. The land utilization for the proposed scheme period is as as below.



4.2 Land Use

(a) Land use at present and at the end of proposed scheme period is as below

Description	Existing	End of Scheme Period
Area under mining	152.655	188.637
Storage of topsoil	0.000	0.00
Overburden dumping including Retaining wall, garland drain etc.	4.310	10.865
Sub grade stacking/ Mineral storage	61.350	61.350
Infrastructure (Workshop, crusher, admn. Building etc)	6.423	7.523
Mines Roads / haulage road	11.500	14.000
Railways	0.000	0.000
Tailing Pond	0.000	0.000
Effluent Treatment Plant	0.000	0.000
Mineral Separation Plant	4.000	6.000
Township area	3.290	3.290
Magazine	0.077	0.077
Sub Total	243.605	291.742
Green belt & Safety zone/ Plantation	24.500	28.100
Plantation on Reclaimed area	2.218	2.218
Land use for public purpose i.e. agriculture etc.	98.348	98.348
Area proposed for plantation	-	-
Others, Undisturbed	398.613	346.876
Total	767.284	767.284

(b) Reclamation & Rehabilitation measures

The reclamation and afforestation programme will be started from the year 2014-15 onwards in the mined out area and the programme will be continued in phase wise manner.

Period	Mining/Excavation (Ha)	Additional area during the year (Ha)	Total excavated area at the end of the year (Ha)	Reclamation/ Rehabilitation (Ha)
2014-15	152.655	9.643	162.298	0.650
2015-16	161.648	7.308	165.956	1.302
2016-17	164.654	5.657	170.311	0.535
2017-18	169.776	6.130	175.906	1.875
End of Scheme period(2018-19)	174.031	7.244	181.275	4.090
Conceptual Period (2019-20 to 2040-41)	177.184	256.761	433.945	433.945

Reclamation of the quarries will be done by the freshly generated waste from 2014-15 onwards as per the programme given below. The pits which reaches UPL shall be back filled with the waste materials generated from the mine workings from 2014-15 and shall continue throughout the conceptual period. The reclamation measures will include

i) Provision of garland drain to regulate and to drain the rain water from the quarry and direct its course away from the dumping areas. This will avoid carrying of silt to the nearby fields.

ii) The dump will be designed to have reverse slope so that the rain water does not flow on the dump slopes. This will also help in retaining the moisture and help in afforestation.

iii) The dump area will be covered under plantation of after stabilization of the dumps. Formation of terraces are proposed with ultimate dump slope at 20°-22° with individual slopes not exceeding 37°. Each terrace will have provision of catch drains at the inward side of the terrace. The catch drains of the individual terrace will be connected to garland drain outside the periphery of the dump. These catch drains will be preferably half concrete open pipes followed by settling tanks to avoid wash offs.

iv) Provision of retention walls at the foot of the dumps to arrest loose particles and check dams to check silt flowing along with the surface run off in the valleys shall be there.

The proposed dumps have been projected in retreating manner having minimum required calculated area for the five years of the scheme period. This will ensure quick availability of dead terraces, which will be stabilized by plantation and coir matting along the slopes.

(c) The quarry faces in each of the quarries shall expand in all directions. The 7.5 m barriers all around the outer periphery of the ML boundary shall be the safety zone area.

(d) After cessation of opencast mining activity, it can be reclaimed with special type of plantation to abate the land scar extent and to absorb air / noise pollution to some extent.

Continued access to the bottom of the quarry for regular pumping after opencast limit till the closure of mining shall be maintained.

4.3 Water quality management:

(i) Existing water bodies / source of water

There are dry nalas in the leasehold area. Surface run off during rainy seasons follow the gradient of the terrain and pass through the natural nalas which are existing in the lease area. These nalas finally fall in to two rivers called Karo nadi & Suna Nadi. Northern part of the lease area is drained by Karo river which is a perennial water source and flows due north lying parallel to the western lease boundary. Similarly, southern part of the lease area is drained by another perennial river called Suna Nadi which flows due east. There are no perennial nalas within the lease area. Drinking water source for the area is tube wells sunk by the Lessee Shri K.J.S.Ahluwalia. The process water shall be sourced partly from the surface water and also from the rain water during the rainy seasons.

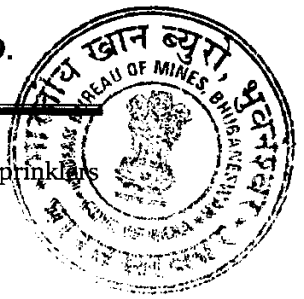
(ii) Hydrological study report – Hydrography

The surface run off of the surrounding areas flows through number of nalas which finally falls in to two rivers called Karo and Suna River. Northern part of the lease area is drained by Karo river which flows due north lying parallel to the western lease boundary. Similarly southern part of the lease area is drained by Suna nadi which flows due east. There is no perennial nala within the lease area. Apart from these two main rivers there are other streams to serve the irrigation needs of the study area. There are several streams and canals crisscrossing the buffer zone. These waterways are Kundra, Kakarpani, Topadihi, Lakra Ghat and Karo. Apart from these sources there are two more distinct open ponds in the NW side of the study area. The ground water level varies from 11 to 15 m below ground in the study area. The water table within the lease area is found to occur at 480 mRL. The upper aquifer has been formed consisting of laterite forming top mantle, which has high porosity and good permeability. Limonite under the laterite have a high content of clay material as such they are impervious and impermeable in nature. The ore body in the core area does not indicate any ground water seepage. Ground water and surface water samples were collected from various points for the purpose of assessing water quality in the study area. Results obtained are at Annexure - 17. As per the test report, drinking water quality is found to be potable i.e. within permissible limit of standard prescribed.

(c) Water balance chart

(i) For Mines

The total water requirement for the mine is 95 CUM per day. The water will be stored in a 300 KL storage tank for meeting the 3 days requirement. Besides, 50% of water will be met from the rain water harvesting. Consumption of water will be mainly for Plantation, dump and reclamation measures and drinking water, haul road sprinkling, which includes permanent sprinkling at main



roads, haul roads and dust prone crushing and screening units. Permanent type of water sprinklers are proposed to be installed on road sides.

(ii) Flow chart of water use

Surface water and rain water → Water sprinkler
Surface water and rain water → Green belt
Mine pit water → Water sprinkler
Mine pit water → Green belt

(d) Break up of water requirement

(i) For Mines - Total 95 CuM/day shall be required for both industrial and residential uses in the mines which is as follows.

(a)	Residential / Domestic use	-	4 CuM / day
(b)	Green belt development/Env. maintenance	-	91 CuM / day
Total		-	95 cuM / day

(ii) For Beneficiation Plant

The total make up water requirement for the plant is expected to be 54 CuM/ Hr. The total daily water requirement is as follows:

(a)	Make up water @ 54 CuM/ Hr x 18 hrs/day	-	972 CuM / day
(b)	Domestic use	-	3 CuM / day
(c)	Green belt/Dust suppression & other miscellaneous	-	50 CuM / day
Total		-	1025 CuM / day

The entire water requirement of the mine and beneficiation plant shall be sourced from ground water sources by sinking bore well within the lease area. Permission for withdrawal of ground water has been obtained from the Executive Engineer, Baitarani Division for drawl of 1225 CuM/ day and NoC from CGWA, Govt. of India has also been obtained vide letter No. 21-4(92)/SER/CGWA/2008-1729 dt. 18.12.2008. The lessee has also applied to the Department of water resources, Govt. of Orissa for drawal of surface water from nearby Karo river which flows at a distance of 1.1 Km in the western direction. This would reduce the intake from ground water sources and the permission for the same from the State water resources department is under process. Effective storm water collection network has been designed to collect the rain water from

the mining and screening plant areas. The collected rainwater will be diverted to the proposed rainwater harvesting pits for recharging the ground water. Water harvesting structures can be developed for storage of rain water for use. Similarly, rain water collected in opened up pits can be pumped for settling and used afterwards. Holding pools with retention walls, pumping and distributing system have also been planned for this. The total water requirement can be summarized as below:

Class of use	Place	Purpose	Av. Demand (CuM)/day
Domestic	Mine site & Plant	Drinking	7
Mining	Haul road and plantation	Dust Suppression and plantation	91
Make up water	Plant	Beneficiation process	972
Miscellaneous	Plant	Green belt/ Dust suppression	50
Total			1120

(e) Expected impact on quality & Quantity

Since the ground water table shall not be crossed with regard to mining/quarrying during the course of mining, water pollution will be negligible. There is also no chance of occurrence of toxic material, which can pollute the water and jeopardize the human health.

(f) Rain water management

During rainy season only the rain water passing through the working benches and waste dump yard might carry certain quantities of wash off consisting of loose sediments through the seasonal dry nala ultimately joining with the perennial sources. Since the materials to be handled in the lease area consists of iron ore and associated rocks, the leachets coming out of the loose sediments do not have any toxic substance, which would have any adverse impact on ground water. At present all parameters are within specified limits. The excavation pit shall also serve as an additional rainwater harvesting structure. The surface run off and pumped out water from the pit will be collected through garland drains and will be collected in mine pit. The check dams will restrict the erosion of soil and will also increase the infiltration of rainwater to the ground. A substantial amount of ground water recharge will take place through this pit.

Four Check dams for the quarries and three for the waste dumps were proposed to be constructed for settlement of sediments flowing alongwith the water. The following check dams & settling pits around the different quarries have been built during the last scheme period which will be continued to be maintained during the scheme period.

Year	Location	Check Dams		Settling Pits	
		Nos.	Volume(CuM)	Nos.	Volume(CuM)
2014-15	Topadihi/Sonukocha	3	110		
	Udalwadi	3	70	1	40
	Dumka Top	2	80	2	320
2015-16	Chenagoda	1	20		
	Sonukocha(Near NH)	-	-	1	400
2016-17	Barpada	3	70	3	150
2017-18	-	Nil	-	Nil	-

The Check dams around the proposed waste dumps have not been built since these waste dumps are not utilized so far. These will be constructed during 2014-15 as below

Year	Location	Particulars and size (L x B x H) of check dam to be constructed (m)
2014-15	For waste dump	10 x 6 x 3 – 3 no.

Rainwater passing from the waste dump shall be collected in the garland drain and sediments shall be arrested in the check dams provided. From the quarry, the seepage water shall be pumped out and be allowed to pass through the garland drain to the check dams where sediments shall be settled. Regular cleaning of sediments shall be done. The constituents of water discharge out of the ML area shall be kept with in permissible limit, by constituting a series of settling tanks and regular analysis.

4.4 Air quality study and management :

(a) Ambient Air Quality

Ambient air quality study has been done after developing a network and monitoring the existing AAQ within the impacted region which is 10 km from the lease area. The present AAQ status in core area is comparatively much less than that of residential areas of buffer zone area. The major source of pollution of the buffer area is due to emission sources of the other industries and the vehicular movement in the area. However, concentrations of pollutants monitored are within the National AAQ standard specified for residential and industrial areas.

(b) Air quality status

Proposed mining shall be fully mechanized. Machinery like shovel and tippers shall be deployed. Generation of dust during transportation by tippers cannot be avoided along with dumping of excavated materials. Regular monitoring is being done

(c) Suitable measures for dust suppression are being carried out by spraying water at dust generating points. Installation of automatic and revolving water spraying system on major part of the road sides has been done for continuous water spraying for suppression of dust. The balance

road sides will be covered by automatic water spraying systems during the scheme period. Emission of noxious gas from vehicles can be controlled by regular maintenance.

4.5 Waste Management

(a) Recovery of waste in scheme per

Around 1.932 MCuM OB/waste shall be generated during the proposed scheme period as mentioned below.

Year	Quantity of intercalated waste (MCuM)	Waste/ Mineral rejects from Beneficiation plant (MCuM)	Total waste (MCuM)
2014-15	0.232	0.164	0.396
2015-16	0.235	0.149	0.384
2016-17	0.235	0.149	0.384
2017-18	0.235	0.149	0.384
2018-19	0.235	0.149	0.384
Total	1.172	0.76	1.932

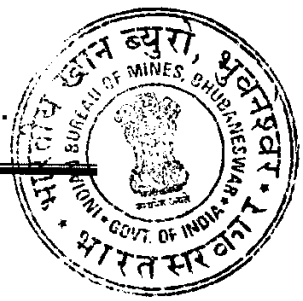
(b) Utilization of wastes in the scheme period

Year	Total waste (CuM)	Road Maintenance @15% (CuM)	Balance waste (CuM)	Waste to be dumped in scheme period (CuM)	Back Filling In (CuM)	Location
2014-15	396000	59400	336600	186600	150000	UDALBARI
2015-16	384000	57600	326400	38400	288000	UDALBARI & G.GODA
2016-17	384000	57600	326400	176400	150000	UDALBARI
2017-18	384000	57600	326400	176400	150000	CHANAGODA
2018-19	384000	57600	326400	0	326400	CHANAGODA
Total	1932000	289800	1642200	577800	1094400	

(c) Build-up of dump, designed capacity and precaution envisaged

It was proposed to continue dumping and management of waste / OB in a scientific manner by identifying 3 locations for the purpose (Plate No.11, 12, 12A, 13 & 14). Waste generated during scheme period from all the workings were proposed to be dumped in these 3 waste dumps depending on the haul distance as close as to the working pit and the dump. The details of the proposed dumps are tabulated below.

Dump No	Location	Spread (m)		Area (Ha)	Proposed ultimate height (m)	Capacity to of dump (CuM) applying 70% slope factor	mRL
		Length (m)	Breadth (m)				
PD/1	141N-330N/1140W-940W	132	128	1.68	10	148560	545-555
PD/2	465N-640N/350E-590E	194	100	1.94	20	203200	554-574
PD/3	335S-635S/1890E-2070E	217	135	2.935	10	226040	557-567
Total		6.555				577800	



(d) Details of Back-filling

Year	Area (m)	Height(m)	Back Filling In CuM	Top RL of Back-filled area(m)	Location
2014-15	6500	23	150000	653	UDALBARI
2015-16	5350	28	150000	558	UDALBARI
	7667	18	138000	543	G.GODA
2016-17	5350	28	150000	558	UDALBARI
2017-18	18750	8	150000	592	CHANAGODA
2018-19	40906	8	326400	592	CHANAGODA
Total	84523 or 8.452 Ha		1094400		

(e) Method of dumping

Dumping is proposed by retreating method maintaining the ultimate dump slope at 20-22° with individual terrace slopes not exceeding 37°. Each terrace is planned to have inward slope with catch drains at the inward side of the terrace. The catch drains of individual terrace is planned to connect to the garland drain outside the periphery of the dump.

(f) Precautionary Measures

Garland drain and retaining wall etc shall be constructed during the scheme period of 2014-16. Galand drain will collect water in the rainy season that will be percolated through the wastes in the waste dump and retaining wall shall arrest movement of waste materials along with water. Three settling ponds of 10 m x 10m x 2m size will be constructed at the end of garland drain, which will accumulate water. Alum shall be added here for settlement of suspended solids. After suspended solids are settled, the water shall be discharged outside the lease area. In the rainy season the water from the pits shall be pumped out to the garland drain at the top of the quarry so that entire water flows to outside the working area keeping the bottom of the pit in dry condition. The dimensions of the precautionary measures to be constructed and its design details will be as follows:

Period	**Retaining wall (m)**			**Garland drain (m)**			**Settling pond* (m)**		
	L	**B**	**H**	**L**	**B**	**D**	**L**	**B**	**D**
2014-15	1250	1.0	2.0	1500	1.0	1.5	10	10	2
2015-16	550	1.0	2.0	600	1.0	1.5	Maintenance		
2016-17	Maintenance								
2017-18	Maintenance								
2018-19	Maintenance								
Total	1800	2.0	4.0	2100	2.00	3.0	10	10	2
Conceptual period	300	1.0	2.0	400	1.0	1.5	10	10	2
TOTAL	**2100**	**3.0**	**6.0**	**2500**	**3.0**	**4.5**	**20**	**20**	**4**

*During scheme and conceptual period a total of 4 nos of settling pond will be constructed.

(g) Engineering details of retaining walls & Garland drains

The average rain fall during last seven years (2004-2010) in Keonjhar district is 1600 with rainy seasons during June to September months. The historic maximum rain fall recorded in the month of September' 2005 is around 631.6 mm. Since the proposed waste dumps are located in areas which is gently sloping, maximum flow of water in rainy season will not endanger the retaining walls. However, the following precautionary measures shall be taken while designing the retaining walls and garland drains.

(i) Retaining Walls

Retaining boulder wall (2.0 m high and 1.0 m width) of substantial strength shall be constructed all around the bottom periphery of waste dumps with locally available boulders mixed with sand and cement, to arrest any rolling down of the dump materials. Perforation shall be left at around 10 m intervals to allow for passage of water.

(ii) Garland drains

Garland drains of 1.5 m deep and 1.0 m wide shall be constructed all along the bottom periphery of waste dumps followed by the retaining wall to prevent any wash off or leaching of dump materials during heavy rains. Side walls and the base shall be pitched with locally available boulders. Joints shall be filled up with cement and sand mixture so that water cannot percolate.

(iii) Settling Tank

The garland drain shall be channelized to a settling tank of 12m long, 8m width and 4m deep. Side walls and base shall be packed with locally available boulders mixed with cement and sand. Engineering drawing of the retaining wall, garland drain and settling tank are provided in Plate No.-17.

4.6 Topsoil management

There is no topsoil that may require removal in the ML area.

4.7 Tailing dam management

The beneficiation plant set up in the lease area will have some slurry discharge which shall be pumped to tailing thickener. The overflow clarified water from thickener shall be discharged to process water tank and shall be recycled. The slurry from the sump shall be pumped to filter press to recover the maximum amount of water. In case of emergency, the underflow from the thickener shall be discharged to the emergency slime pond.

4.8 Facilities

(a) Existing infrastructure

The area is well connected by road. Railway siding. Postal facilities are available. Local market is there. Water is available from bore wells inside the lease and dug wells, which are located within 1 km from the lease hold area. Schooling facilities are available. College facilities are also available. Medical facilities are available in the same nearby towns. Statutory and essential infrastructures like rest shed, first aid center, crèche, latrine / urinal and drinking water facilities etc for workers, are provided in the work site and site office.

4.9 Disposal of mining machinery

(a) Decommissioning

There will be no decommissioning of mining machinery during the scheme period.

(b) Disposal

Life of the mines at the present rate of working has been calculated to be around 35 years from this year (2013-14). The equipment supplier shall withdraw machines deployed on hire basis. Departmental machines shall be shifted to other locations of the lessee.

4.10 Safety and security

During mining, proper haulage roads will be provided for movement of machinery and workers between the benches with or with out load. Exhaust of ore will result deep quarry floor. Therefore, there will be risk of falling down of man or animal to the quarries. So, barbed wire fencing shall be required all around the working quarry.

4.11 Disaster management and risk management

4.11.1 Landslides

Monitoring of geo-technical parameters including hydrostatic pressure will be carried regularly and stability status will be computed and if any time, it appears that slide may take place, the slopes will be adequately flattened.

4.11.2 Subsidence

Not applicable

4.11.3 Flood and inundation

No natural nala, lake or surface water body is there in the leasehold area. Hence, there is absolutely no scope of endangering the mines.

4.11.4 Fire

There will be absolutely no danger of fire. Sources of fire are power line, machinery, workshop, oil depot, store, transformer house etc. Fire extinguishers are provided in such areas in sufficient number.

4.11.5 Seismic activities

The area is not falling within seismic zone. So, adverse impact on the structure due to seismicity is not anticipated.

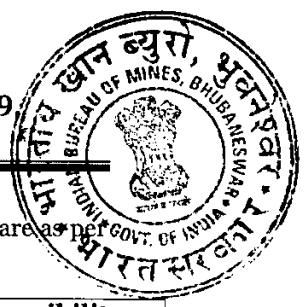
4.11.6 Care and maintenance during temporary discontinuation

(a) At any time temporary discontinuance of mines may be required for any of the causes as mentioned below.

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

(b) During temporary discontinuance, the following measures can be undertaken partly/fully depending upon the causes

- ✓ Intimation to local mine and legal administrative authorities regarding the discontinuance.
- ✓ Listing of machineries and materials.
- ✓ Care & 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.
- ✓ Continue repair and maintenance of haul roads.
- ✓ Continue regular monitoring of air, water, noise etc in the permitted zones.
- ✓ Fencing of quarries shall be done
- ✓ Mines gates, barricade guard, parapet wall etc shall be checked and maintained.
- ✓ Mine benches shall be ensured that no collapse or slide is taking place.
- ✓ Fire fighting devices shall be kept at sensitive places to control fire in case that occurs. Pumps shall be checked and maintained on regular basis so that there will be no failure in discharging water.
- ✓ Stationary machinery shall be checked and maintained.
- ✓ Electrical circuits shall be checked and maintained on regular basis.
- ✓ Vegetative materials in places such as electric substation, magazine, stores shall be cleared and the premises kept clean.



(c) The persons responsible for disaster management and their detailed address are as per following table.

Name of the Person	Designation	Address	Phone No	Responsibility
Mr Sahadat Mandal	Mines anager	Vill: Atbeharia, P.O. Fatehpur, via: Subarnapur P.S. Haringhata, Dist: Nadia, W.B.	+919437536205	Day to day monitoring of mines safety
Mr Ratikanta Mohanta	Asst. Manager, Geology	At/PO: Tulasichaura, Baripada, Dist: Mayurbhanj, Odisha	+919437545363	Day to day monitoring of Environmental aspects of the mines
Mr Abionash Das	Environment Engineer	Plot No. 198/A, Saheed Nagar, Bhubaneswar, Odisha	+918763208816	Day to day monitoring of Environmental aspects of the mines

5.0 ECONOMIC REPERCUSSION OF CLOSURE OF MINE AND MANPOWER RETRENCHMENTS –

These aspects are required to be described either in case of preparation of Final Mine Closure Plan or in case of Progressive Mine Closure Plan where manpower will be reduced in a phased manner.

5.1 Number of local residents employed in the mine, status of the continuation of family occupation and scope of joining the occupation back - Not applicable

5.2 Compensation to be given to the employees connecting with sustenance of himself and their family members - Not applicable

5.3 Satellite occupation connected to the mining industry, number of persons engaged therein, continuance of such business after mine closes - Not applicable

5.4 Continued engagement of employment in the rehabilitated status of the mining lease area and any other remnant activities - Not applicable

5.5 Envisaged repercussions on the expectation of the society around due to closure of mine - Not applicable

6.0 TIME SCHEDULING FOR ABANDONMENT

6.1 Time scheduling

As far as present exploration status is concerned, quarry and facilities shall be abandoned at the end of the life of the mine. These abandoned areas will be under reclamation and rehabilitation including their protection, maintenance and monitoring throughout the life of the mine.

6.2 Manpower required for abandonment

Required number of workers drawn from the locality will operate the mine and shall be engaged for abandonment operation also in future.

6.3 Other resources required

Man, money, materials and machinery are required for the completion of the job. Money required for the job is estimated at para 7.0. Material required for abandonment is equipment for collection of stone chips, leveling, pitting and development of drains and settling tanks, sapling, fertilizer and pesticides (for plantation) and boulders (for construction of check dams). Sapling will be purchased from nearby nursery. Cow dung, sweet soil, sand and fertilizer will be purchased and will be used for survival and growth of saplings. Pesticides will be utilized for protecting the plants from termites and other pests. The mining operation has been projected for about 21 years from 2019-20. Abandonment of the mined out areas are not contemplated during the present scheme period and shall be started before one year of the mine closure. This shall be continued for 2 years after the mining operation is completed.

7.0 ABANDONMENT COST

Mined out area and waste dumps will be reclaimed and rehabilitated partly during the scheme period. Final abandonment of mined out areas, waste dumps etc, will be done during the conceptual period. The tentative cost of each important activity of reclamation and rehabilitation of mining area, dumps and environmental measures have been indicated in the table as follows to provide the idea of the funds which will be required for the scheme Period.

(a) First Year (2014-15) Proposal for Item no. 6 & 7 of PMCP.

Items	Details	Area (ha.)	Quantity	Expenditure (Rs.)
		Proposed	Proposed	Proposed
A) Reclamation & Rehabilitation of Mined out area.	(i) Backfilling	0.650 Ha	150000 CuM	150000.00
	(ii) Aforestation on the backfilled areas.	Nil	Nil	0
	(iii) Other (Please specify)e.g. Aforestation on exhausted benches.	Nil	Nil	0
	(iv) Pisciculture.	Nil	Nil	0
	(v) Convention into water reservoir.	Nil	Nil	0
	(vi) Picnic Spot.	Nil	Nil	0
B)Stabilization & rehabilitation of Dumps (Within Lease)	(i) Terracing /Pitching	0.40 Ha	400 m	80000.00
	(ii) Construction of paper walls/ Retaining wall at toe of dumps	0.125 Ha	1250mx1mx2m	250000.00
	(iii) Construction of garland drain .	0.15 Ha	1500mx1mx1.5m	225000.00
	(iv) Check Dams	10 numbers	440 CuM	44000.00
	(v) De-silting of settling ponds, channels.	0.02 Ha	10mx10mx2m (2 numbers)	40000.00
	(vi) Aforestation on old dump No. 27	0.2 Ha	300	60000.00
	(vii) others (Nala, Road side and Safety zone)	1.5 Ha	1500	300000.00
C) Rehabilitation of barren area within lease	(i) A forestation (Gap fill up)	1.5 Ha	1500	300000.00
D) Environmental monitoring (Core zone & Buffer zone separately)	(i) Ambient air quality	Quarterly		900000.00
	(ii) Water quality			
	(iii) Noise level survey			
	(iv) Ground vibration			0
	(v) Other (Please specify)			0
Total				**2349000.00**

(b) Second Year (2015-16) Proposal for Item no. 6 & 7 of PMCP.

Items	Details	Area (ha.)	Quantity	Expenditure (Rs.)
		Proposed	Proposed	Proposed
A) Reclamation & Rehabilitation of Mined out area.	(i) Backfilling	1.302 Ha	**288000 CuM**	288000.00
	(ii) Aforestation on the backfilled areas.	0.650 Ha	1040 numbers	208000.00
	(iii) Other (Please specify)e.g. Aforestation on exhausted benches.	Nil	Nil	0
	(iv) Pisciculture.	Nil	Nil	0
	(v) Convention into water reservoir.	Nil	Nil	0
	(vi) Picnic Spot.	Nil	Nil	0
B)Stabilization & rehabilitation of Dumps (Within Lease)	(i) Terracing /Pitching	0.40 Ha	400 m	80000.00
	(ii) Construction of paper walls/ Retaining wall at toe of dumps	0.05 Ha	550mx1mx2m	110000.00
	(iii) Construction of garland drain .	0.06 Ha	600mx1mx1.5m	90000.00
	(iv) Check Dams	1 number	20 CuM	2000
	(v) De-silting of settling ponds, channels.	Maintenance		0
	(vi) Aforestation on old dump dump No. 28	0.15 Ha	240	48000.00
	(vii) others (Nala, Road side and Safety zone)	1.5 Ha	1500	300000.00
C) Rehabilitation of barren area within lease	(i) A forestation (Gap fill up)	1.5 Ha	1500	300000.00
D) Environmental monitoring (Core zone & Buffer zone separately)	(i) Ambient air quality	**Quarterly**		900000.00
	(ii) Water quality			
	(iii) Noise level survey			
	(iv) Ground vibration			0
	(v) Other (Please specify)			0
Total				**2326000.00**

(c) Third Year (2016-17) Proposal for Item no. 6 & 7 of PMCP.

Items	Details	Area (ha.)	Quantity	Expenditure (Rs.)
		Proposed	Proposed	Proposed
A) Reclamation & Rehabilitation of Mined out area.	(i) Backfilling	0.535 Ha	150000 CuM	150000.00
	(ii) Aforestation on the backfilled areas.	1.302	2084 numbers	416800.00
	(iii) Other (Please specify)e.g. Aforestation on exhausted benches.	Nil	Nil	0
	(iv) Pisciculture.	Nil	Nil	0
	(v) Convention into water reservoir.	Nil	Nil	0
	(vi) Picnic Spot.	Nil	Nil	0
B)Stabilization & rehabilitation of Dumps (Within Lease)	(i) Terracing /Pitching	0.40 Ha	400 m	80000.00
	(ii) Construction of paper walls/ Retaining wall at toe of dumps	0.05 Ha	550mx1mx2m	110000.00
	(iii) Construction of garland drain .	0.06 Ha	600mx1mx1.5m	90000.00
	(iv) Check Dams	3 numbers	70 CuM	14000.00
	(v) De-silting of settling ponds, channels.	Maintenance		0
	(vi) Aforestation on old dump dump No. 30	0.15 Ha	240	48000.00
	(vii) others (Nala, Road side and Safety zone)	1.5 Ha	1500	300000.00
C) Rehabilitation of barren area within lease	(i) A forestation (Gap fill up)	1.5 Ha	1500	300000.00
D) Environmental monitoring (Core zone & Buffer zone separately)	(i) Ambient air quality	**Quarterly**		900000.00
	(ii) Water quality			
	(iii) Noise level survey			
	(iv) Ground vibration			0
	(v) Other (Please specify)			0
Total				**2408800.00**

(d) Fourth Year (2017-18) Proposal for Item no. 6 & 7 of PMCP.

Items	Details	Area (ha.)	Quantity	Expenditure (Rs.)
		Proposed	Proposed	Proposed
A) Reclamation & Rehabilitation of Mined out area.	(i) Backfilling	1.875 Ha	150000 CuM	150000.00
	(ii) Aforestation on the backfilled areas.	0.535	860 numbers	172000.00
	(iii) Other (Please specify)e.g. Aforestation on exhausted benches.	Nil	Nil	0
	(iv) Pisciculture.	Nil	Nil	0
	(v) Convention into water reservoir.	Nil	Nil	0
	(vi) Picnic Spot.	Nil	Nil	0
B)Stabilization & rehabilitation of Dumps (Within Lease)	(i) Terracing /Pitching	0.40 Ha	400 m	80000.00
	(ii) Construction of paper walls/ Retaining wall at toe of dumps	0.05 Ha	550mx1mx2m	110000.00
	(iii) Construction of garland drain .	0.06 Ha	600mx1mx1.5m	90000.00
	(iv) Check Dams	Maintenance		0
	(v) De-silting of settling ponds, channels.	Maintenance		0
	(vi) Aforestation on old dump No. 27	0.15 Ha	240	48000.00
	(vii) others (Nala, Road side and Safety zone)	1.5 Ha	1500	300000.00
C) Rehabilitation of barren area within lease	(i) A forestation (Gap fill up)	2.0 Ha	1500	300000.00
D) Environmental monitoring (Core zone & Buffer zone separately)	(i) Ambient air quality	Quarterly		900000.00
	(ii) Water quality			
	(iii) Noise level survey			
	(iv) Ground vibration			0
	(v) Other (Please specify)			0
	Total			**2150000.00**

(e) Fifth Year (2018-19) Proposal for Item no. 6 & 7 of PMCP (upto 03.03.2019)

Items	Details	Area (ha.)	Quantity	Expenditure (Rs.)
		Proposed	Proposed	Proposed
A) Reclamation & Rehabilitation of Mined out area.	(i) Backfilling	4.09 Ha	326400 CuM	326400.00
	(ii) Aforestation on the backfilled areas.	1.875 Ha	3000 numbers	600000.00
	(iii) Other (Please specify)e.g. Aforestation on exhausted benches.	Nil	Nil	0
	(iv) Pisciculture.	Nil	Nil	0
	(v) Convention into water reservoir.	Nil	Nil	0
	(vi) Picnic Spot.	Nil	Nil	0
CB)Stabilization & rehabilitation of Dumps (Within Lease)	(i) Terracing /Pitching	0.395 Ha	395 m	79000.00
	(ii) Construction of paper walls/ Retaining wall at toe of dumps	0.05 Ha	550mx1mx2m	110000.00
	(iii) Construction of garland drain .	0.06 Ha	600mx1mx1.5m	90000.00
	(iv) Check Dams	Maintenance		0
	(v) De-silting of settling ponds, channels.	Maintenance		0
	(vi) Aforestation on old dump No. 28	0.15 Ha	240	48000.00
	(vii) others (Nala, Road side and Safety zone)	1.5 Ha	1500	300000.00
C) Rehabilitation of barren area within lease	(i) A forestation (Gap fill up)	2.0 Ha	2000	400000.00
D) Environmental monitoring (Core zone & Buffer zone separately)	(i) Ambient air quality	Quarterly		900000.00
	(ii) Water quality			
	(iii) Noise level survey			
	(iv) Ground vibration			0
	(v) Other (Please specify)			0
	Total			2853400.00

Financial assurance

Financial assurance

(a) Calculation of amount of surety as approved in last modification of scheme of mining

Sl No	Head	Area put on use at start of scheme (Ha)	Additional requirement during scheme period (Ha)	Total (Ha)	Area considered as fully reclaimed & rehabilitated (Ha)	Net area considered for calculation (Ha)
1	Area under mining	152.655	15.804	168.459	0.000	168.459
2	Storage of topsoil	0.100	0.000	0.100	0.000	0.100
3	Overburden/ dump	4.310	5.540	9.850	0.000	9.850
4	Sub grade stacking/ Mineral storage	61.583	0.000	61.583	0.000	61.583
5	Infrastructure (Workshop,Conveyor belt, admn. Building etc)	6.423	1.327	7.750	0.000	7.750
6	Roads	11.500	0.000	11.500	0.000	11.500
7	Railways	0.000	0.000	0.000	0.000	0.000
8	Green Belt	18.000	10.100	28.100	0.000	28.100
9	Tailing pond	0.000	0.000	0.00	0.000	0.00
10	Effluent Treatment Plant	0.000	0.000	0.000	0.000	0.000
11	Mineral separation plant	4.000	0.000	4.000	0.000	4.000
12	Township area	3.290	0.000	3.290	0.000	3.290
13	Others - Magazine	0.077	0.000	0.077	0.000	0.077
		261.938	**32.771**	**294.709**	**0.000**	**294.709**

The financial assurance for Rs 73, 67,725.00 (294.709 Ha @ Rs 25000.00 per Ha) was submitted in the office of the regional controller of Mines IBM Bhubaneswar Odisha in shape of bank guarantee after the actual value of guarantee required was assessed and intimated by the by Controller of Mines, Indian Bureau of Mines, Nagpur. (**Annexure - 32**)

(b) Calculation of amount of surety for the proposed scheme period

Sl No	Head	Area put on use at start of scheme (Ha)	Additional requirement during scheme period (Ha)	Total (Ha)	Area considered as fully reclaimed & rehabilitated (Ha)	Net area considered for calculation (Ha)
1	Area under mining	152.655	35.982	188.637	0.000	188.637
2	Storage of topsoil	0.000	0.000	0.00	0.000	0.00
3	Overburden/ dump	4.310	6.555	10.865	0.000	10.865
4	Sub grade stacking/ Mineral storage	61.350	0.000	61.350	0.000	61.350
5	Infrastructure (Workshop,Conveyor belt, admn. Building etc)	6.423	1.100	7.523	0.000	7.523
6	Roads	11.500	2.500	14.000	0.000	14.000
7	Railways	0.000	0.000	0.000	0.000	0.000
8	Green Belt	24.500	3.600	28.100	0.000	28.100
9	Tailing pond	0.000	0.000	0.00	0.000	0.00
10	Effluent Treatment Plant	0.000	0.000	0.000	0.000	0.000
11	Mineral separation plant	4.000	2.000	6.000	0.000	6.000
12	Township area	3.290	0.000	3.290	0.000	3.290
13	Others - Magazine	0.077	0.000	0.077	0.000	0.077
		268.105	51.737	319.842	0.000	319.542

The mine is under Category "A" (MECH). For 319.842 Ha area as above the financial assurance @ Rs 25000/- per Ha amounting to Rs 79,96,050/- (Rupees seventy nine lakhs ninety six thousand and fifty only in shape of Bank Guarantee is submitted by the lease to the Regional Controller of Mines, Bhubaneswar Odisha **(Annexure – 33).**

अनुमोदित
APPROVED

22/8/14

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

KAMALJEET SINGH AHLUWALIA
Mines Owner & Exporter
Office : P. B. No.: 3, In front of MMTC Weigh Bridge, At/Po.: Barbil - 758 035, Dist.: Keonjhar, Odisha, India
Telefax : 06767 - 270049, E - mail : kjsahluwalia@rediffmail.com

9.0 CERTIFICATE

This is to certify that the Progressive Mine Closure Plan complies all statutory Rules, Regulations, Orders made by the Central or State Government, Statutory Organizations, Court etc. have been taken into consideration and wherever any specific permission is required, the lessee will approach the concerned authorities.

K.J.S.Ahluwalia
Mining Lessee

The lessee also undertakes that all the measures in this mine closure plan will be implemented in a time bound manner as proposed.

K.J.S.Ahluwalia
Mining Lessee

10.0 Plans and sections etc

This progressive mine closure plan is submitted as per the Rule of 23 (1) of MCDR 1988 alongwith the scheme of mining for the period from 2014-15 to 2018-19. Plans and sections for this PMCP have been referred to that of the scheme of mining plan as enclosed.