पत्र संख्या द्वारा RAN/WSB/Fe/MP 29/2017-18,
File letter No. Date 18.12.2017

TEXT

REVIEW OF THE MINING PLAN

(Submitted Under Rule 17(2) of MCR, 2016)

WITH

PROGRESSIVE MINE CLOSURE PLAN

(Submitted Under Rule 23 of MCDR, 2017)

In respect of

GHATKURI IRON ORE MINES OVER 149.7343 HA IN WEST SINGHBHUM DISTRICT OF JHARKHAND OF NIRMAL KUMAR PRADEEP KUMAR

FINANCIAL YEAR - (2018 -19 to 2019-20)

DATE OF EXPIRY	27.07.1993	
2ND RML APPLIED ON	10.06.1992	
3RD RML APPLIED ON	09.05.2012	
LEASE VALID UPTO	31.03.2020	
CATEGORY OF MINE	GROUP –A (FULLY MECHANIZED)	
TYPE OF LAND	RESERVE FOREST,	
BREAK UP OF LAND	KARAMPADA RF BLOCK	8.80Ac
	GHATKURI RF BLOCK	361.20Ac
	TOTAL AREA	370.00Ac or 149.7343Ha
IBM REGISTRATION NO	IBM/4378/2011	
PRESENT STATUS OF THE MINE	RUNNING	

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APPROVED

AS PER THE MMDR (AMENDMENT) ACT, 2015 AND EXECUTED SUPPLEMENTARY LEASE DEED, THE VALIDITY OF THE MINING LEASE IS UPTO 31.03.2020

Prepared on behalf of

M/S NIRMAL KUMAR PRADEEP KUMAR
(MINING LESSEE)
AT: PO-CHAIBASA, DISTRICT: WEST SINGHBHUM JHARKHAND, PIN: 833201
Email Id: nkpkcbsa@yahoo.in

18/12/2017
क्षेत्रीय खान नियंत्रक
Regional Controller of Mines
भारतीय खान ब्यूरो
Indian Bureau of Mines

Prepared By

SHRI PRADEEPT MOHAPATRA
(QUALIFIED PERSON)
UNCHABALI, BAMEBARI, JODA
KEONJHAR ODISHA

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(PRADEEPT MOHAPATRA)
Qualified Person

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पत्र संख्या द्वारा— KHN/WSB/Fe/MP_28/2017
Vide letter No. — DATE – 18.12.2017

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INTRODUCTORY NOTE

The Mining Lease of Ghatkuri Iron Ore Mines over an area of 149.7343 hectares of M/s Nirmal Kumar Pradeep Kumar falls in Karampada and Ghatkuri Reserved Forest in district Singhbhum West of Jharkhand State. It is an old working mine and the mining activities in this area has all along been in operation since the commencement of mining operation in the year 1953 for the production of Iron ore to cater the requirement of the Indigenous Sponge and Steel Industries of the country. The entire lease area falls in village Sitaldiburu in part area of Ghatkuri RF, Block-10 and part area of Karampada RF, Block - 15 under Saranda Forest division in Singhbhum (W). District.

Grant of Mining Lease, its Renewal and status as on date:

The Ghatkuri Iron Ore mine was to be expired on 27.07.1993, the Lessee has submitted the application for 2nd Renewal on 10.06.1992 over the entire lease area of 149.7343 Ha which is under process and the lease is continuing under the deemed extension under rule 24A (6) of amended Mineral Concession Rules 1960. Further, the lessee has submitted 3rd renewal of mining lease application in due time. Copy of renewal applications (both previous & recent) and its receipt is enclosed as **Annexure – V**. Now as per amendment rule by the **MMDR Amendment Act, 2015**, the lease period has been extended from the date of expiry of the last valid period of lease to 31.03.2020. In this regard, supplementary lease deed has been executed in the favor of lessee vide deed no 271 dated 04.05.2017 .The copy of the supplementary lease deed is enclosed as **Annexure- VI.**

After the extension of the lease, the mining operation in the area was resumed from 01.08.2017 and the work is being carried out by Fully Mechanized Method by deploying HEMM, deep hole drilling by wagon drill, screening & crushing unit etc. Thus the mine has been categorized under Category– A (Fully Mechanized).

History of grant of Mining lease

The Mining Lease was first granted to M/s Ratanlal Surajmull for Iron & Manganese ore over an area of 370.00 Acres or 149.7343 Ha in village Sitaldiburu in Karampada Reserve Forest for a period of 20 years by the Government of Bihar in 1956 effective from 28.07.1953. Thereafter, the mineral – Manganese ore was surrendered from the lease and retained only for Iron ore.

The said lease was then transferred in the name of M/s Ratanlal Tarachand vide GovL order no. 1347 dated 16.02.1970. Renewal application of the lease was filed by M/s Ratanlal Tarachand in due time and the lease was renewed for a period of 10 years from 28.07.1973. After that, on

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representation, the renewed period of the said lease was extended from 10 years to 20 years with effect from 28.07.1973. The lease was transferred in the name of Nirmal Kumar Pradeep Kumar With prior approval from State Government; vide memo no. 1943/M dated 04.05.1987. A copy of the same is enclosed as **Annexure - I.** The mining lease came in operation in the name of M/s Nirmal Kumar Pradeep Kumar vide Registered Deed No. 1989 dated 27.06.1987 a copy of Lease deed & Transfer deed is enclosed as **Annexure – II & III.**

The Deputy Commissioner has allowed working over entire area i.e. over 370 acres or 149.734 Ha in favor of Ratanlal Surajmull vide his Memo No.1856, dated 3rd Sept.1953, copy of the same is enclosed as **Annexure IV.**

The lessee presently holds two mining lease in the state of Jharkhand, the detail of which is given below:

Sl. No	Lease reference No.	Area In Ha	Postal address/ Location	Type of minerals	Status
1	M. L. no. – 1649 Dated 01.05.1980	149.7343	Ghatkuri Iron ore Mines	Iron	Active
2	M. L. no. –1372 dated 12.12.1961	66.781	Bihar Iron Ore Mines Vill. – Meralgara, Dist – Singhbhum(W), Jharkhand.	Iron	Discontinued

Status of Statutory Clearances

Mining Plan/scheme:

i) The Mining Plan of this mine was approved vide Letter No. CAL/SB/Fe/MP-557 dated 18.01.1999 under Rule 22 of MCR 1960 (Amended) by the Regional Controller of Mines, Kolkata. The period of this mining plan was from 1998-99 to 2002-03.

ii) The Scheme of mining was approved by Indian Bureau of Mines vide letter no. CAL/SB/Fe/MP-557 dated 15.10.2004 for the financial year 2003-2008. Accordingly, the period of the scheme of Mining was expired on 31.03.2008. Further, "Modification to the said approved Scheme of Mining" was prepared under Rule 10 of MCDR, 1988 for the rest of the scheme period and approved on 14.03.2007, vide letter no. KOL/SB (W)/Fe/MP-557.

iii) The Next Scheme of Mining of this mine was approved vide Letter No 314(3)/2008-MCCM (C)/MS-16 dated 31.12.2008 under Rule 12 of MCDR 1988 by the Controller of Mines, Nagpur. The

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period of this Scheme of Mining is from 2008-09 to 2012-13. Again, "Modification to the approved Scheme of Mining" was prepared under Rule 10 of MCDR, 1988 which was approved vide letter no. 314(3)/2010-MCCM (CZ)/S-2 dated 21.07.2010 by the Controller of Mines, Nagpur. The validity period of this Modified Scheme of Mining is 31.03.2013.

iv). The scheme of mining under Rule 12 of MCDR, 1988 for Ghatkuri Iron Ore Mines over an area of 149.7343 hectares of M/s Nirmal Kumar Pradeep Kumar was prepared for the period from 01.04.2013 to 27.07.2013. The same was approved vide letter no. 314(3)/2012-MCCM (CZ)/S-63 dated 24.07.2013 by the Controller of Mines, Nagpur. Copy of approved Mining Plan, scheme of mining and modification to the approved scheme of mining is enclosed as **Annexure – VII.**

(v) The Mining Plan under Rule 17(2) of MCR 2016 has been approved vide letter No RAN/WSB/Fe/MP-01 /2017-18, dated 18/05/2017. **(Copy of approved Mining Plan, is enclosed as Annexure – VII).**The validity of this approved Mining Plan is up to 31.03.2018. As per the MCDR 2017, the **Review of the Mining Plan** is to be submitted on or before 180 days of the expiry of the approved Mining Plan.

Therefore, the lessee is now submitting the **Review of the Mining plan** under Rule 17(2) of MCR 2016 for the financial year (2018-19) to (2019-20).

Forest Clearance:

i) Till the enforcement of Forest Conservation Act 1980, an area of 13.960 hectares has been broken due to mining and allied activities. Lessee has obtained a forest clearance from the Ministry of Environment & Forests, Government of India vide order no. 10-119/FCE dated 13/14.07.1995 over broken area of 13.960 ha (broken prior to 25.10.1980) in forest land. **Copy of forest clearance letter and its compliance is enclosed as Annexure – VIII.** The mining lease was expired on 27.07.2013. As per the Forest Conservation Act-1980, the forest clearance is co-terminus with the lease period. As per the MMDR (Amendment) Act 2015, the mining lease period has been extended up to 31.03.2020. Therefore, existing Forest clearance over 13.960Ha is likely to be extended up to the expiry of the lease i.e. up to 31.03.2020 under guidelines dated 01/05/2015 of MoEF & CC, Govt. of India.

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Environment Clearance:

I) Environment clearance for the said project was granted to M/s Nirmal Kumar Pradeep Kumar by MOEF, New Delhi vide order no. J-11015/15/2010-IA.II (M) dated 21.12.2012 with a capacity of 0.403 million tons per annum of iron ore. Lessee has also obtained NOC from Jharkhand State Pollution Control Board for the aforesaid capacity vide letter no. JSPCB/HO/RNC/CTO-1546692/2017/735 dated 31.05.2017. Copy of Environment Clearance and NOC is enclosed as **Annexure – X.**

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ii) Lessee has obtained TOR and Public hearing has been conducted successfully for expansion of iron ore production from 0.403 MTPA to 10.0 MTPA (ROM). **Copy of TOR is enclosed as Annexure – XI.**

Based on the above factors like TOR, and successful public hearing the lessee is now submitting the Review of the Mining plan for the production capacity of 10MTPA which will be achieved during 2020.

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1.0 GENERAL

(a)	Name of Lessee	M/S NIRMAL KUMAR AND PRADEEP KUMAR
	Rule 45 registration No	IBM/5262/2011
	Address	Near Jain Mandir, Gandhi Tola,Chaibasa
	District	West Singbhum
	State	Jharkhand
	Pin code	833201.
	Phone	06582 – 256781
	Fax	06582 – 256781.
	Mobile	9431704516
	Email id	nkpkcbsa@yahoo.in,
(b)	Status of the lessee	The lessee is a private ltd company. Copy of Id address proof is enclosed as (Annexure XII)
(c)	Minerals which ie included in the prospecting license	Not Applicable
(d)	Minerals which is included in the lease deed	Iron and Manganese ore
(e)	Minerals which is applicant intend to mine	Iron ore
(f)	**Name of the Recognized person under Rule 22C of MCR 1960 or a person employed under clause (c) of Sub Rule (1) of Rule 42 of MCDR, 1988 (Applicable) for scheme of Mining**	
	Address	Sri Pradeept Mohapatra Post Box No-1, Joda, At- Unchabali, Keonjhar, Odisha.
	Phone	—
	Fax	---
	Email	E mail – pmohapatra_07@yahoo.com
	Mobile No	+919438149715
	Registration No	Not Applicable
	Date of Grant/Renewal	Not Applicable
	Valid up to	Not Applicable

Self certified copies of working experience along with certificates in support of educational qualifications required as per the Rule 15 of MCR 2016 is attached as **Annexure XIII**

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2.0 LOCATION AND ACCESSIBILITY

(a)	Lease Details	
	Name of the Mine	Ghatkuri Iron ore Mine Name of the lessee: Nirmal kumar pradeep kumar **Postal address** Near Jain Mandir, Gandhi Tola,Chaibasa West Singhbhum Jharkhand - 833201 Mail id : nkpkcbsa@yahoo.in, Mob:9431704516
	Date of Grant of Lease	28.07.1953
	Date of execution of Lease	04.05.2017
	Period/Expiry date	The Mining Lease was first granted to M/s Ratanlal Surajmull for Iron & Manganese ore over an area of 370.00 Acres or 149.7343 Ha. in village Sitaldiburu in Karampada & Ghatkuri Reserve Forest for a period of 20 years by the Government of Bihar in 1956 effective from 28.07.1953. Thereafter, the mineral – Manganese ore was surrendered from the lease and retained only for Iron ore. The said lease was then transferred in the name of M/s Ratanlal Tarachand vide Govt. order no. 1347 dated 16.02.1970. First Renewal application of the lease was filed by M/s Ratanlal Tarachand in due time and the lease was renewed vide Govt. Order no. 7403/M dated 10.08.1978 for a period of 10 years from 28.07.1973. After that, on representation, the renewed period of the said lease was extended from 10 years to 20 years vide Memo No. 10096/M dated 16.11.1979. The lease was again transferred in the name of Nirmal Kumar Pradeep Kumar with prior approval from State Government; vide memo no. 1943/M dated 04.05.1987. A copy of same is enclosed as Annexure - I. Copy of Lease deed &Transfer deed is enclosed as Annexure – II & III. As per the MMDR (Amendment) Act 2015, the lease has been extended by the Govt. of Jharkhand up to 31.03.2020. **(The copy of the supplementary lease deed is enclosed as Annexure- VI**

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	Name of the Lease holder	M/s Nirmal Kumar and Pradeep Kumar
(b)	Details of Applied Lease area with location map (fresh area/mine)	
Total lease area:		149.7343 hectares
District & State :		West Singhbhum & Jharkhand
Taluka :		Gua
Village		Ghatkuri and Karampeda RF
Whether the area falls under Coastal Regulation Zone (CRZ)		No
If yes, details thereof :		Not Applicable
Existence of public road/railway line, if any nearby and approximate distance		**Road link** Ghatkuri Iron Ore Mine lease area is well connected with Hatgamareya – Kiriburu Road (State Highway no. 51 which is passing through the western part of the leasehold area. Barajamda is located in State Highway connecting Barbil – Barajamda – Tata Nagar double laning of which was recently completed. **Rail link** The nearest railway station (both for passenger and goods traffic) Barajamda is about 8.5 kms from the lease area and at about 275 Km from State Capital Ranchi. Besides, Railway sidings namely Bolani RS, Gua, Noamundi, Barbil and Barajamda Railway station / siding are Located within 10km radius. **Air link** Jamshedpur airport (140 km away) is the nearest airport from the area. Ranchi airport is at about 275 kms from the site. There are airstrips and helipads at Tonto & Noamundi respectively.
Topo sheet No. with latitude & longitude of all corner boundary point/ pillar		Old Toposheet No 73 F/8 New toposheet no-F 45 N8 Latitude 22°07'40.09892" to 22°08'42.6321"N Longitude 85°19'25.29432" to 85°20'52.2537"E.

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SL. NO.	PILLAR_ID	WGS-84 COORDINATES	
		Latitude	Longitude
1	1101	22° 08' 42.63213" N	85° 20' 40.53112" E
2	1102	22° 08' 39.71006" N	85° 20' 41.98612" E
3	1103	22° 08' 38.44290" N	85° 20' 43.95937" E
4	1104	22° 08' 38.05937" N	85° 20' 46.18080" E
5	1105	22° 08' 36.93512" N	85° 20' 48.25605" E
6	1106	22° 08' 35.38587" N	85° 20' 50.77911" E
7	1107	22° 08' 32.82426" N	85° 20' 51.89286" E
8	1108	22° 08' 31.45768" N	85° 20' 52.25370" E
9	1109	22° 08' 30.52952" N	85° 20' 50.28365" E
10	1110	22° 08' 28.27368" N	85° 20' 45.84810" E
11	1111	22° 08' 26.75646" N	85° 20' 42.25598" E
12	1112	22° 08' 26.70765" N	85° 20' 39.32605" E
13	1113	22° 08' 27.93645" N	85° 20' 36.51961" E
14	1114	22° 08' 28.73648" N	85° 20' 32.38109" E
15	1115	22° 08' 29.20870" N	85° 20' 29.14728" E
16	1116	22° 08' 30.14594" N	85° 20' 26.59798" E
17	1117	22° 08' 29.56390" N	85° 20' 23.33988" E
18	1118	22° 08' 29.66390" N	85° 20' 20.94127" E
19	1119	22° 08' 29.25352" N	85° 20' 19.30650" E
20	1120	22° 08' 25.36073" N	85° 20' 18.10346" E
21	1121	22° 08' 22.69739" N	85° 20' 17.36160" E
22	1122	22° 08' 19.46732" N	85° 20' 16.49519" E
23	1123	22° 08' 17.58627" N	85° 20' 16.01717" E
24	1124	22° 08' 14.10692" N	85° 20' 16.13713" E
25	1125	22° 08' 10.73325" N	85° 20' 16.48217" E
26	1126	22° 08' 08.05285" N	85° 20' 15.92359" E
27	1127	22° 08' 05.33989" N	85° 20' 14.66937" E
28	1128	22° 08' 02.60106" N	85° 20' 15.21432" E
29	1129	22° 07' 58.96634" N	85° 20' 16.23156" E
30	1130	22° 07' 55.30576" N	85° 20' 16.14662" E
31	1131	22° 07' 52.99887" N	85° 20' 14.94053" E
32	1132	22° 07' 51.88699" N	85° 20' 14.25535" E
33	1133	22° 07' 50.15379" N	85° 20' 13.25918" E
34	1134	22° 07' 48.04856" N	85° 20' 12.10196" E
35	1135	22° 07' 45.81880" N	85° 20' 10.49527" E
36	1136	22° 07' 44.39526" N	85° 20' 09.21576" E
37	1137	22° 07' 42.73053" N	85° 20' 07.29301" E
38	1138	22° 07' 41.69362" N	85° 20' 05.56199" E
39	1139	22° 07' 41.13868" N	85° 20' 04.49248" E
40	1140	22° 07' 40.09892" N	85° 20' 02.08524" E
41	1141	22° 07' 40.49897" N	85° 20' 00.72499" E
42	1142	22° 07' 42.62982" N	85° 19' 56.27882" E
43	1143	22° 07' 43.27683" N	85° 19' 54.40275" E
44	1144	22° 07' 44.29818" N	85° 19' 51.15308" E
45	1145	22° 07' 44.52404" N	85° 19' 50.32374" E
46	1146	22° 07' 44.62940" N	85° 19' 49.49406" E
47	1147	22° 07' 44.81231" N	85° 19' 48.53085" E

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48	1148	22° 07' 45.77615" N	85° 19' 44.78019" E
49	1149	22° 07' 46.20229" N	85° 19' 42.92535" E
50	1150	22° 07' 46.21161" N	85° 19' 41.30483" E
51	1151	22° 07' 45.72519" N	85° 19' 39.71152" E
52	1152	22° 07' 45.16177" N	85° 19' 38.59747" E
53	1153	22° 07' 44.20175" N	85° 19' 38.74082" E
54	1154	22° 07' 43.84222" N	85° 19' 35.81656" E
55	1155	22° 07' 42.87195" N	85° 19' 33.35200" E
56	1156	22° 07' 42.21572" N	85° 19' 29.94754" E
57	1157	22° 07' 41.35697" N	85° 19' 27.45947" E
58	1158	22° 07' 40.29935" N	85° 19' 25.29432" E
59	D	22° 08' 15.10800" N	85° 19' 38.02800" E
60	C	22° 08' 11.59145" N	85° 20' 06.36277" E
61	B	22° 08' 36.11872" N	85° 20' 11.48147" E
62	A9	22° 08' 35.50285" N	85° 20' 13.54219" E
63	A8	22° 08' 35.05565" N	85° 20' 15.34782" E
64	A7	22° 08' 35.14072" N	85° 20' 17.90357" E
65	A6	22° 08' 34.18733" N	85° 20' 19.96526" E
66	A5	22° 08' 33.41358" N	85° 20' 22.59119" E
67	A4	22° 08' 33.16442" N	85° 20' 25.30538" E
68	A3	22° 08' 33.22460" N	85° 20' 28.03169" E
69	A2	22° 08' 31.74450" N	85° 20' 29.91855" E
70	A1	22° 08' 31.58892" N	85° 20' 31.03295" E
71	A	22° 08' 31.72469" N	85° 20' 31.83312" E

(c) Attach a general location map showing area and access routes.	The area has been earmarked on a survey of India topographical map as well as cadastral map. Ref : Plate No-1IK

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3.0 DETAILS OF APPROVED MINING PLAN/SCHEME OF MINING.

3.1 Date and reference of earlier approved Mining Plan/Scheme of Mining

The details of approved Mining Plan/Scheme of Mining in chronological order are as given below:

Document approved	Under Rule	Period	Approval
Mining Plan	Under Rule 22 of MCR 1960	1998-99 to 2002-03.	Approved vide Letter No. CAL/SB/Fe/MP-557 dated 18.01.1999
Scheme of Mining	Under Rule 12 of MCDR 1988	2003-04 to 2007-08.	Approved vide letter no. CAL/SB/Fe/MP-557 dated 15.10.2004
Modification to the approved Scheme of Mining"	Under Rule 10 of MCDR' 1988	2007-08	Approved vide letter no. KOL / SB (W)/Fe/MP-557. dated 14.03.2007
Scheme of Mining	Under Rule 12 of MCDR 1988	2008-09 to 2012-13	Approved vide Letter No 314(3)/2008-MCCM(C)/MS-16 dated 31.12.2008
Modification to the approved Scheme of Mining"	Under Rule 10 of MCDR' 1988	2010-11 to 2012-13	Approved vide letter no. 314(3)/2010-MCCM (CZ)/S-2 dated 21.07.2010.
Scheme of Mining	Under Rule 12 of MCDR 1988	01.04.2013 to 27.07.2013	Approved vide letter no. 314(3)/2012-MCCM (CZ)/S-63 dated 24.07.2013.
Mining Plan	Under Rule 17(2) of MCR 2016	27.07.2013 to 01.04.2018	Approved vide letter no. RAN/WSB/Fe/MP-01 /2017-18, Date:18/05/2017

3.2 Details of Last Modifications if any

During the financial year 2013 – till date no modification of approved mining plan has been undertaken.

3.3 Review of earlier approved proposal in respect of exploration, excavation, reclamation etc.

The earlier Mining Plan was approved vide letter no. RAN/WSB/Fe/MP-01 /2017-18, Date 18/05/2017. The proposal in the approved mining plan was only for 1.04.2017-31.03.2018 Therefore, the review of the approved Mining plan has been made for the said period.

3.3.1 Exploration:

Year	Commitment	Compliance	Remarks
01.04.2017 to 31.03.2018	36	NIL	All the 36 bore holes have been proposed within undiverted forest land. The bore holes were proposed to be undertaken after obtaining the forest clearance. After obtaining forest clearance the same will be carried out to know the ore body configuration.

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3.3.2 Waste Generation

Year	Commitment	Compliance	Remarks
01.04.2017 to 31.03.2018	25728.3 t	NIL	As the production has not been started after the execution of the lease, waste generation is nil.

3.3.3 Production

Year	Commitment	Compliance	Remarks
01.04.2017 to 31.03.2018	428805.00 MT	Nil	After the execution of the lease deed, production has not been started.

3.3.4 Afforestation Programme

Commitment

Year	Location	No. of Plants	Area to be Covered (Ha)	Species of Plant.	Expected Survival Rate (%)
2017-2018	In 7.5m safety zone boundary	6250	3.34 (gap filling)	Jamun, babul, gulmohar, Teak, gamhar, siris etc.	85%

Compliance

Not done.

3.3.5 Blasting

Commitment

For blasting purpose, explosives of desired quality are used as blasting agent in blast holes. Blasting operations are being carried out to dislodge the harder formations, both in overburden as well as in the ore zone. Preventive measures like marking of danger zone, arrangement of warning signals were suggested.

Compliance

Blasting was done as per the proposal.

3.4 Status of compliance of violations pointed by IBM.

3.4.1 Review of the violation pointed out after inspection made under MCDR, 2017 during last 5 years.

Details of violation letters issued by IBM and its reply are given hereunder and copies of the same are also enclosed as **Annexure – XIV.**

Date of Issued of Violation	Nature of Violation	Date of Reply
07.05.2008	Rule 13(1), 42(1)(b)(i)of MCDR,1988	02.06.2008
26.02.2009	Rule 13(1) of MCDR,1988	04.04.2009
28.04.2009	Rule 13(1) of MCDR,1988	23.05.2009
12.11.2009	Rule 13 & 46 of MCDR,1988	21.12.2009
17.12.2009	Rule 13(1) of MCDR,1988	11.01.2010
29.11.2011	Rule 45(5) (b) of MCDR,1988	-
26.12.2011	Rule 45(5) (b) of MCDR,1988	05.01.2012
19.10.2012	Rule 27E(2), 42(1)(c)(i) & 46 of MCDR,1988	19.11.2012
24.02.2013	Rule 13(1), 42(1)(c)(i)of MCDR,1988	20.03.2013

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d) Detail of Prohibitory order imposed by DGMS & its Compliance:

Details of Prohibitory order imposed by DGMS, its Compliance and revocation letter is given hereunder and copies of the same are also enclosed as **Annexure – XV.**

Date of Issued of Violation	Nature of Violation	Date of reply
25.02.2009	Notice under section 22A (1) of Mines Act, 1952	
02.06.2009	Notice under section 22A(2) of Mines Act, 1952	13.07.2009
14.07.2009	Notice under section 22A(2) of Mines Act, 1952	25.01.2010

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Details of discontinuation & re-opening of mining operation during the approved scheme period.

Period of dis-continuation of mining operation	Reason	Date of re-opening
17.12.2009	Suspension order imposed by IBM.	05.04.2010
26.12.2011	Suspension order imposed by IBM.	Suspension order revoked on 01.08.2012 but mining operation is discontinued due to want of environment clearance. Finally re-opened on 24.01.2013.
28.07.2013	–	Mining operation started on 01.08.2017. Only preproduction activities have been started in the lease area. Based on the supplementary lease deed executed in favor of the lessee.

The details of violation letters issued by IBM and its compliances are enclosed as **Annexure-XIV**

3.5 Details of any suspension/closure/prohibitory order issued by any Government agency under any Rule or court of Law.

- IBM Issued order of suspension under Rule 13(2) vide letter no KOL/JHK/SB (W)/Fe(G-12) Dated 17.12.2009. Subsequently, the lessee obtained the revocation of suspension vide letter no KOL/JHK/SB (W)/Fe (G-12) Dated 1.08.2012. **(Ref Annexure-XIV)**

3.6 In case the MP/SOM is submitted under Rule 9 and 10 of the MCDR 1988 or under Rule 22(6) of the MCR' 1960 for approval of Modification, specify reason and justification for modification under these Rule.

The lessee wants to enhance the production of iron ore from 0.403 MTPA to 10MTPA. From 2018-19 onwards, production target shall be enhanced gradually from 5.0 MTPA (2018-19) to max 10.0 MTPA (2019-20) which can be achieved by extending the existing quarries laterally as well as in

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depth. This enhanced production target can only be achieved after getting the forest clearance over total area as well as the environment clearance for the said production. The enhancement of production is proposed to be done due to following reasons:

Business Environment:

India's iron ore production has undergone a wavering pattern owing to imposed temporary suspension on mining operations in different states, like Karnataka & Goa due to bans on iron ore mining imposed through Supreme Court (SC) rulings, and in Odisha due to the lack of requisite clearances pending from the state Government In May 2014

The domestic production of iron ore has seen a major dip since 2010-11. From 208 million tonnes, in 2010-11, it fell to 129million tonnes in the financial year 2015. However the production has shown an upward trend with a total production of 155 Mil.T during the FY 2016. Iron ore demand depends on the production of iron and steel which in turn depends largely on the domestic demand for the same. The prospective investors like Tata steel, Tata-Corus, Jindal Power and Steel, Global steel giants POSCO, Arcelar Mittal and other major industrial houses are to invest in steel sector in India. Recent UNCTAD report states of 375 million tonnes new production capacity round the world is likely to be on board by 2007-09. According to the 11th Plan Working Group on Steel, demand for iron ore would rise to 130 million tonnes by 2011-12. The national steel policy has envisaged the target of steel production at 200 million tonnes by 2020 which will be requiring ~400 million tonnes of processed iron ore. (Source – Vision 2020m report of IBM/FICCI). Further the recent Niti Aayog report suggest projects a production of 300 Mil.t of Steel by the year 2030, which requires 600 Mil.T of Processed Iron ore@ 2T of Iron ore per Tonne of Steel production. Out of 600 MTPA, Jharkhand itself has share more than 150 Million Ton per Annum as per Jharkhand steel policy, whereas present production is about nearly 20.0 Million Ton per annum. So there is a gap of 130 MTPA. Hence, to achieve the goal there will be future demand of iron ore and in which Ghatkuri iron ore can cater partly the need of steel sector on behalf of Jharakhand.

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CHAPTER – I

1.0 GEOLOGY AND EXPLORATION

a) Briefly describe the Topography, Drainage pattern, Vegetation, Climate, Rainfall data of the Mining Lease area.

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Topography:

The area is located at about 2 kms North of Meghatuburu Iron ore ridge, forming a part of the relatively hill slope gently rolling down into the plains of Baraiburu Tatiba valley in the north. The elevations on the hill slope range from 636 m above Mean sea Level in the south-western to 476 m above MSL in the north-eastern part of the area, the major part of the working area in the center being in the elevation range of 500-600m above M.S.L.

The banded hematite, the iron ore band and the overlying laterite occupy the higher elevations in the area whereas the lateritic Iron ore occupy the lowar slopes in the north-eastern part of the area. The area has a gentle general slope towards south, north-east and west. The nearest villages Baraiburu & Tatiba are located about a kilometer to the north east of the area. The mining lease area is covered with a low density forest.

Drainage

There is no river or perennial stream in the area. The general drainage is through small seasonal nalas originating from the margins of the area and flows in the northern side of the area and ultimately joins Karo River. The perennial water source Karo river flows at a distance of 2.75km in the east of the project area and Koina river about 7.5 km NW of the lease boundary. The Karo River enters the buffer zone in the southern sector and flows in a SW-NE direction in jig-jag course seem to be controlled by structural discontinuities. The Karo River flows at a distance of 2.75km in the east of the project area. The Koina River originates in the western sector of the buffer zone flows in SW-NE direction (7.5 km away from the lease boundary) and leaves the buffer zone south of the Baihatu village in the northern sector of the buffer zone. A small seasonal nala is passing through the lease area in the NE part.

Vegetation

Within the virgin land Sal is the most important species found within the lease area. In associates of Sal (*Shorea robusta*), naturally grown plant species like *Shorea Robusta*, *Maduca Indica*, *Diospyros melanoxylon*, *Schleichera oleosa*, *Zyzipus marutiana*, *Cassia*, Adina, etc., are commonly observed. The details of vegetation within the lease area are given below:

Local Name	Botanical Name	Family Name
TREES		
Asan	*Terminalia tomentosa*	Combretaceae
Bel	*Aegle marmelos*	Rutaceae

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Local Name	Botanical Name	Family Name
Char	*Buchnania lanzan*	Anacardiaceae
Dhaura	*Anogeissus latifolia*	Combretaceae
Jamun	*Syzygium cuminii*	Myrtaceae
Kashi	*Bridelia retusa*	Euphorbiaceae
Kendu	*Diospyrus melanoxylon*	Ebenaceae
Mahul	*Madhuca indica*	Sapotaceae
Sal	*Shorea robusta*	Dipterocarpaceae
Piasal	*Pterocarpus marsupium*	Papilionaceae
Bara	*Ficus Benghalensis*	Moraceae
Dhatki	*Woodfordie Fruticosa*	Lythraceae
Dhaman	*Grewia tiliaefolia*	Tiliaceae
Mundi	*Mitragyna parviflora*	Rubiaceae
Sisso	*Dalbergia sisso*	Papillionaceae
Sunari	*Cassia fistula*	Casalpiniaceae
Bahada	*Terminalia belarica*	Combretaceae
Barakoli	*Zizyphus mauritiana*	Rhamnaceae
Kusum	*Schleichera oleosa*	Sapindaceae
Haldu	*Adina cordifolia*	Rubiaceae
GRASSES		
Khara grass	*Imperata cylindrica*	Gramineae
SHRUBS / HERBS		
Anantamula	*Hemidesmus indicus*	Asclepidaceae
Dhatki	*Woodfordia fruticosa*	Lythraceae
CLIMBERS		
Atundi	*Combretum decandrum*	Combretaceae
Bichhuati	*Tragia plukenetii*	Euphorbiaceae

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CLIMATE

The climate of the study area in general is hot and humid. The maximum and minimum temperature is 44.5^{0}C and 27^0 C respectively during April. The temperature falls during winter (Dec). The maximum and minimum temperature is 22^{0}c and 8^{0}c respectively. The average precipitation in the monsoon and non-monsoon season is 993 mm & 275.9 mm respectively. Maximum rainfall of 1871.6mm was recorded during 2011. Very often the bay depressions and cyclones cross over this area affecting weather and causing wide spread rains.

Rainfall Data

From the table it is seen that maximum rainfall occurs during the month of June, July, August and September. Maximum monthly rainfall of 677.5 mm was observed during September 2011.

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ANNUAL RAINFALL DATA (WEST SINGHBHUM DISTRICT)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
2006	0	0	19	50.1	173.9	199.3	287.1	568.2	247	67.4	36	31.6	1680.7
2007	2	94.1	20.6	32.8	110.4	242.9	404.6	355.9	316.5	28.5	77.3	0	1685.6
2008	62.5	11.9	12.7	35.2	98.2	605.1	175.6	193.6	429.1	4.6	15	0	1643.7
2009	0	0	2.6	0.5	133.1	103.6	386	333.4	195.2	123.2	26.8	0	1304.5
2010	1.3	1.3	7.1	0.4	122.1	114.4	269.2	233.1	238.1	125.2	26.6	29.5	1264.2
2011	0	32.6	31.3	121.2	117.6	369.9	157.5	318.7	677.5	55.1	0	0	1871.9
2012	94.7	7.6	0	46.3	9.5	169.7	225	263.6	212.7	66.3	0	0	1115.6
2013	52.3	6.3	0	26.2	7.3	123.7	261.7	383.0	249.4	65.2	0	0	1190
2014	87.1	7.1	0	56.2	9.2	210.8	267	276.2	224.1	62.1	0	0	1200
2015	34.7	4.2	0	26.8	9.5	162.2	215	252.6	221	62.2	0	0	988.2
2016	32.3	4.0	0	43.2	5.2	177.1	240	224.1	193.7	63.5	0	0	984
Average	33.37	16.49	14.31	38.90	72.36	224.42	266.26	311.23	290.75	66.75	16.70	2.88	1353.22

b) Brief description of regional Geology with reference to location of the lease area.

GEOLOGY:

Regional Geology:

The Ghatkuri Iron ore mine under discussion forms a part of the Singbhum - Keonjhar- Bonai group of iron ore is located in the western flank of the western limb of the horse shoe shaped Bonai synclinorium which was recognized by Jones H. C. in 1934. The pre Cambrian schistose rock in which the whole clan of the deposits are nested and which includes schist, tuffs, phyllite, basic rock, BHQ/BHJ have been classified as Iron Ore Series (IOS). The Mesoarchaean Iron Ore Group (IOG) of rocks in Bonai-Keonjhar belt is disposed in a horseshoe shaped synclinorium structure in the western part of the Singhbhum Craton. Morphology of this synclinorium is expressed by a near continuous western ridge and dissected eastern highlands with the broad Jamda-Koira valley at the centre. Detailed structural analysis in the northern part of the belt suggests that the synclinorium is in fact a series of NE-SW to NNESSW trending shallow plunging, second generation (D2) syncline and anticline which have overturned, inclined, relatively tight geometry in the western part and upright, open to gentle in the eastern part. This structure is clearly manifested by synclinal ridges and anticlinal valleys. Evidence of an early deformational event (D1) manifested by the presence of isoclinal folds on outcrop scale has been recorded. D1 and D2 are near co-axial. The last deformational event (D3) has led to dome and basin interference pattern due to cross folding along NW-SE striking axial planes. The volcano-sedimentary package in the belt commenced with platformal package represented by basic volcanic-quartzite association. The Bonai range volcanic, Nuakot volcanic and the Jagannathpur volcanic occurring in the western, southern and eastern parts of the belt has been interpreted to be correlatable representing the basal volcanic suite. The linear body of basic volcanic occurring at the central part of the belt is found to be occupying the

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core part of a shallow plunging anticlinal axial trace and thus has also been equated with the basal volcanic suite. There is but only one major BIF horizon in the Bonai- Keonjhar belt which is structurally repeated across the belt, BIF occurring as NNE-SSW trending synclinal [illegible] on either side by the older phyllitic sequences.The regional stratigraphic successions of the pre-Cambrian rocks have undergone revision by various geologists like J. A. Dunn, S. N. Sarkar, A. K. Saha etc The Generalized chrono-stratigraphic succession of the Singhbhum-Orissa Iron ore craton [GSI's Bulletin series A, No.51 (1988) & saha etal, 1988)

Newer dolerite dyke & sills	-	c.1600-950 Ma
Mayurbhanj Granite	-	c.2100 Ma
Gabbro – an orthosite-Ultramafics		
Kolhan Group	-	c.2100-2200 Ma
..... Unconformity		
Jagannathpur lava	-	Dhanjori simlipal
Malangtoli lava	-	Lavas (c.2300 Ma)
		Dhanjori Group
		Quartzite-Conglomerate
Pelitic and arenaceous meta sediments with	-	Singhbhum mafic sills (c.2300-2400 Ma)
..... Unconformity -----------		
Singhbhum Granite (S BG-B) (Phase-III)	-	c. 3.1 Ga
Mafic lava, tuff, acid volcanics		
Tuffaceous shale, banded knematite		
Jaspar with iron ore, ferruginous		
Chert, local dolomite and quartzitic		
Sandstone	-	Iron ore Group.
Singhbhum Granite (SBG-A)	-	Nilgiri Granite
(Phase I& II) C.3.3 Ga	-	Bonai Granite
Folding & Metamorphism of OMG and OMTG		
Older metamorphic tonalite gneiss (OMTG)	- C (3.4-3.5 Ga)	
Older metamorphic (OMG) : pelitic schist,		
Quartzite, Para-amphibolite, ortho-amphibolite	- C. 4.0 Ga	

Note: Pelitic schist: Older metamorphic Group (OMG) rocks are the oldest rocks that occur south of Singhbhum Shear zone which have been named by Dunn (1929) as the "Older metamorphics". The rocks consist predominantly of amphibolitic facies, pelitic schists, quartz-magnetite-cummingtonite schists, quartzite, banded calc-gneiss and para- and ortho-amphibolites. The siliceous bearing pelitic schists contain elliptical zircon grains. The siliceous aluminous sediments contening detrital zircon were derived from a granitic province suggesting that the existence of older sialic micro continents (Mukhopadhyay, 2001). The 207Pb- 206Pb ages of zircon cluster around 3.5, 3.4 and 3.2 Ga (Mishra et al., 1998).

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As per the above geologic scenario, the Noamundi – Meralgara area is reported to contain the following stratigraphic succession:

Late tertiary – Early quaternary - Soil/ Alluvium
Laterite/canga

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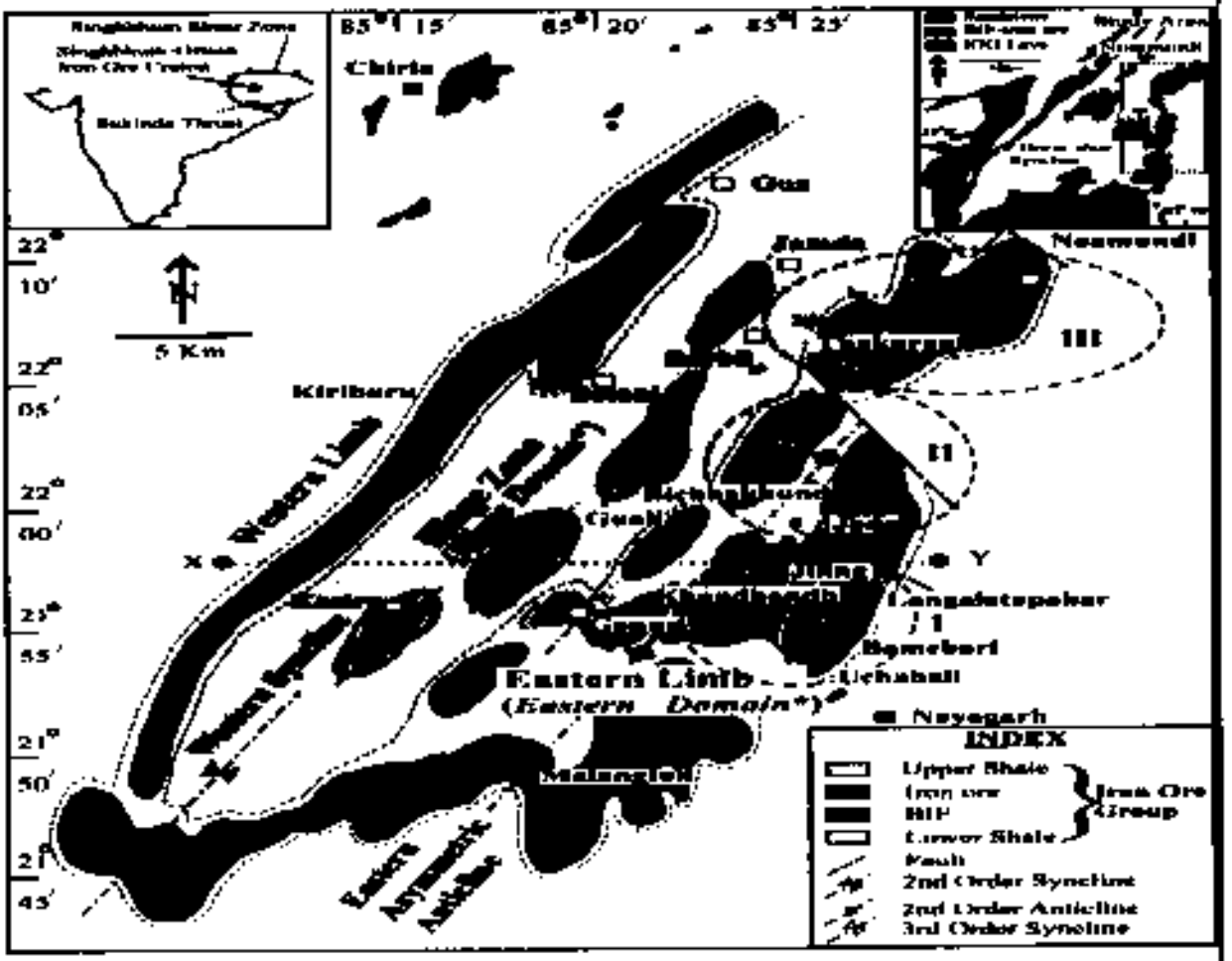
- Surface Erosion –

Kolhan Group : Shale,
: Sandstone
: Conglomerate

.....Unconformity.....

Iron ore Group : Upper shale B.H.J/Q(2)
: Hematite rock (2)
: B.H.J/ Q (1)
: Ferric shale
: Hematite rock (1)
: Lava & Tuff .

- Basement not seen -



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(c) Detail Description of the geology of the lease area such as shape, and size of the mineral/ore deposit, disposition of various litho units indicating structural features if any etc.

Shape and size of the mineral/ore deposit:

During the financial year (2010-11 to 2012-13), a total 21 numbers of bore holes were done in the area up to 09.05.2012. Another two boreholes were drilled during the month of July 2013. Total eleven numbers of pits have been developed for production of iron ore till date. The distribution of pits is in such a way that they yielded valuable information on the nature of the deposit. Based on the existing exploration data the shape and size of the iron ore deposit is zone A (640m X 347m), Zone B (522m X 263m) and Zone C (722m X 230m). The size of the zones has been considered based on the maximum length and width.

Disposition of various litho units indicating structural features if any etc.

Local geology:

The lease area of Ghatkuri Iron Ore Mine, is located at about 2 kms North of Meghatuburu Iron ore ridge, forming a part of the relatively hill slope gently rolling down into the plains of Baraiburu Tatiba valley in the north. The elevations on the hill slope range from 836 m above Mean sea Level in the south-western to 476 m above MSL in the north-eastern part of the area, the major part of the working area in the centre being in the elevation range of 500-600m above M.S.L.

Gnatkuri Iron Ore Mine located in Southern Singhbhum, forming the North – Eastern part of the ridge which carries economic deposits of Iron Ore Series. The area around the northern slope of the ridge is occupied by Banded Hematite Jasper/Banded Hematite Quartzite (BHJ/BHQ). The BHJ/BHQ in Ghatkuri Iron Ore Mine located in middle of the lease exposing as some patches. Iron ore exposures can be seen trending from south western corner to north and also from eastern side of the lease in north south trending. Pockets of float ore occur in south-eastern boundary of the lease. The lateritic soil exposed in middle of the lease and western side of the lease. Phyllite is difficult to delineate, because the Phyllite is highly ferruginous.

From the analysis of bore hole data it is concluded that a major part of the area is covered with iron ore deposit. Phyllite and soil are found in pockets. Local succession of this lease area is as follows.

Soil and Alluvium
Laterite
Banded Hematite
Quartzite
Ferruginous Shale
BHJ

The important ore types are hematite with minor portion of Goethite and limonite. The iron ore is occurring in the form of hard lumpy and soft laminated varieties.

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Control of mineralization

The possible parameters of control of mineralization may be attributed to

(a) Regional and local tectonics, (b) Leaching and metasomatic replacement of BHJ and there by leading to iron ore formations, as evidenced by the presence of un-leached portion of the ore and BHJ in the ore body.

Effects of Weathering

The weathering has led to the formation or Laterite, which is highly erratic in nature, hence irregular/discontinuous pockets of Laterite is a common feature in the iron ore deposits.

Disposition of various litho-units indicating structural features:

The main litho units such as soil and alluvium, Laterite, Hematite, quartzite, BHJ found in Ghatkuri Iron Ore Mine of M/s Nirmal kumar and pradeep kumar are of iron ore series of Singhbhum. The disposition of various litho units are explained below:

(i) Soil and alluvium:

Soil alluvium of 1 to 1.5m thick is occurring in the north western part i.e. near the pillar no 1101 and pillar no 1158 to D.

(ii) Lateritic ore

In the northern part of the lease area lateritic iron ore occurs as capping.

(iii) Float iron ore

In the western part and northern part of the tiger pit, float iron ore occurs with an everage thickness of 8m. The recovery of iron ore above 45%Fe will be around 60%.

(iv) Iron Ore (Hard Laminated ore, and soft laminated iron ore)

As per the geology of the area, exposure of Hard Laminated Iron ore, occurs in the Lucky pit and its surrounding area, tiger pit and its surrounding area and rudi pit and its surrounding areas. As per the bore hole data soft laminated iron ore occurs below the Hard Laminated iron ore. Occurrence of hematite in various forms is noted in the area in the lucky pit located near the ridge, massive ore 36m in thickness has been exposed so far. It is occurring as regular bedding. Further down eastward on the slope of Bottom pit, hematite is occurring as inter-banded with shale. Three hematite bands are exposed in this quarry varying in thickness from 7m to 28m and also the ore body is proved up to a depth of 83m in the bore hole. Iron ore of this pit is laminated with biscuit like appearance. At the eastern slope is the Tiger Pit, where thickness of hematite iron ore is 20m. About 600m north of Tiger Pit is Rurl Pit which is now joined with Kadam Kocha Pit. Occurrence of iron ore band varying in thickness from 30m to 46m is noted in Ruri Pit. In the Kadam Kocha Pit, the

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ore is of biscuit type with siliceous and aluminous matter intercaleted between the layers. Further northward is the Sagwan Pit A & B where flaky / biscuit form of hematite iron ore is noted. Float iron ore is found to be observed at western part of Rudi pit and Tiger pit. However, from quarry face it can be seen that the float ore occurs up to a depth of 5m and below the float ore massive ore occure.

(v) Limonite

Limonite is an iron ore consisting of a mixture of hydrated iron(III) oxide-hydroxides in varying composition. The generic formula is frequently written as $FeO(OH)\cdot nH_2O$, although this is not entirely accurate as the ratio of oxide to hydroxide can vary quite widely. It occurs as patches in the Rudii pit as well as bottom pit.

(vi) **Quartzite**

Quartzite occurs as patches near the pillar no 1107.

(vii) Ferruginous Shale

Shale is occurring in the southern part and eastern part of pillar D. The elongation of shale is due east-west. The length of the shale formation is about 256m.

(vi) Banded Hematite Jasper (BHJ)

The BHQ/BHJ which constitutes the bulk iron ore series formation of this area is composed of interbanded layers of iron oxides and silica in varying proportions. The bands are varying in colour. The individual banding varies in thickness from 3 – 4 Cm. The siliceous bands are extremely fine grained crystalline quartz, apparently originally cherty. They are generally red in colour. The iron oxide layers of the banded rock usually contain hematite. There are three BHJ patches occurring near pillar no B , 328000 to 328100 E and 2448600 to 2448950 and north western part of Zone C.

STRUCTURE:

Near the ridge in lucky pit, the ore body is trending NNE-SSW with westerly dip of 45^0. Down the slope, in the Bottom pit the two bands are trending ENE-WSW with westerly dip changing from 15^0 to 12^0 The trend of the lower band, at the southern end of bottom pit, is sharply changing and is noted to be NNW- SSE in Ulikocha pit, dipping at 45^0 towards SW. Near the southern boundary is Tiger Pit. Here the trend of ore body is changing from N 35° E – S 35° W. The ore body is dipping at 36° towards East. Moving northwards from Tiger Pit, the trend of the rocks in Ruri Pit is almost N – S, and has westward dip of 20°. The ore band is steeply dipping 45° north – westwards, in Sagwan Pit.

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(d)Name of the prospecting/exploration agency

Exploration in the ML area has been done by M/s Thriveni Earth Movers pvt Ltd.

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(a) (i) Name of the exploration agency	(vii) Address	(ix) Email id	(iv) Contact No.
M/s Thriveni Exploration Agency Pvt Ltd	At-Unchabali, Barnebari, Joda -758034	Orissa@ thriveni.com	9937091660

(e)Details of prospecting / exploration already carried out

(i) Number of pits and trenches indicating dimensions, spacing etc. along and across the strike/ foliations with reference to geological plan

About 11 nos of pits have been formed due to earlier mining activities. The details of pits are furnished below. On the basis of recent exploration done by 23 numbers of boreholes and existing pits, mineralized zones have been divided in three zones namely – Zone – A, Zone – B and Zone – C. Ore in and around the quarries/BH are considered as proved zone. The dimension of each quarry is as follows:

Zone	NAME OF QUARRY	LENGTH (m)	WIDTH (m)	DEPTH (m)	Existing R.L. (m)	
					Top	Bottom
A	BOTTOM PIT	255	90	40.0	701.00	661.00
	BOTTOM PIT A	25	07	6.0	674.00	668.00
	LUCKY PIT	115	22	13.0	774.00	761.00
	ULIKOCHA PIT	64	26	38.00	662.00	624.00
B	TIGER PIT	214	55	29.0	549.00	520.00
	TIGER PIT A	93	20	2.0	586.00	584.00
	TIGER PIT B	25	12	3.5	536.50	533.00
C	SAGWAN PIT	86	65	38.0	631.00	593.00
	SAGWAN PIT A	38	06	8.0	629.00	621.00
	RURI PIT	350	110	115.0	610.00	495.00
	KADAM KOCHA PIT	95	40	28.0	586.00	558.00

Further, float iron ore is found to be observed at western part of Rudi pit and Tiger pit. However, from quarry face it can be seen that the float ore occurs up to a depth of 5m and below the float ore, massive ore occurs.

(ii)Number of boreholes indicating type (core type/DTH), diameter, spacing, inclination, collar level, depth etc with standard borehole logs duly marking on geological plan/sections.

The mining operation in the area was commenced in 1953. During the period, few pits were opened at different locations by mining activity. These all old pits were within broken area. During the last approved scheme period (2010-11 to 2012-13), A total 21 numbers of core type bore holes were done in the area up to 09.05.2012. Another two core type boreholes were drilled during the month of July 2013. The total meterage of drilled bore hole is 1163.6m with minimum depth is

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15.70 (GBH-10/2) maximum depths is 96.10m (GBH-14/11).The borehole number, their location and depth etc. are given in Table below. The litho log and analysis report has been given in Annexure - XVI. Total eleven numbers of pits have been developed for production of iron ore. The distribution of pits is in such a way that they yielded valuable information on the nature of the deposit. The location, depth of boreholes etc. is given below:

Details of Boreholes given in the area during (2011-12) & (2012-13)

Sl. No.	B. H. No.	Collar RL	Location	Depth in Meters	Date of exploration	Type of bore hole
1	GBH-05/1	597	N-2449414.00 - E-328481.00	55.80	01.03.12 to 06.03.12	Core type
2	GBH-10/2	505	N-2448900.00 - E-328455.39	15.70	02.03.12 to 04.03.12	
3	GBH-14/11	584	N-2448500.00 - E-328400.00	96.10	02.03.12 to 04.03.12	
4	GBH-09/1	512	N-2449000.00 - E-328460.00	25.80	03.03.12 to 05.03.12	
5	GBH-06/1	608	N-2449300.00 - E-328500.00	72.00	07.03.12 to 20.03.12	
6	GBH-13/11	553	N-2448600.00 - E-328400.00	77.90	07.03.12 to 17.03.12	
7	GBH-13/11A	554	N-2448562.25 - E-328405.00	92.20	19.03.12 to 30.03.12	
8	GBH-18/5	673	N-2448300.00 - E-327700.00	74.10	22.03.12 to 31.03.12	
9	GBH-15/7	676	N-2448400.00 - E-327900.00	59.70	24.03.12 to 05.04.12	
10	GBH-15/11	587	N-2448400.00 - E-328300.00	76.80	01.04.12 to 12.04.12	
11	GBH-16/6	679	N-2448300.00 - E-328300.00	83.10	04.04.12 to 12.04.12	
12	GBH-15/6	686	N-2448400.00 - E-327800.00	62.00	07.04.12 to 13.04.12	
13	GBH-17/6	636	N-2448200.00 - E-327800.00	31.10	14.04.12 to 18.04.12	
14	GBH-17/8	584	N-2448200.00 - E-328000.00	20.70	14.04.12 to 18.04.12	
15	GBH-15/10	608	N-2448400.00 - E-328200.00	30.30	14.04.12 to 19.04.12	
16	GBH-16/8	600	N-2448286.00 - E-327983.00	16.00	19.04.12 to 21.04.12	
17	GBH-17/7	610	N-2448200.00 - E-327900.00	19.60	22.04.12 to 24.04.12	
18	GBH-18/8	564	N-2448100.00 - E-328000.00	28.50	27.04.12 to 01.05.12	
19	GBH-19/1	547	N-2448000.00 - E-328100.00	27.50	02.05.12 to 04.05.12	
20	GBH-14/7	565	N-2448500.00 - E-328000.00	38.50	05.05.12 to 08.05.12	
21	GBH-13/7	662	N-2448592.00 - E-328044.00	30.00	09.05.12 to 12.05.12	
22	GBH-17/4	672	N-2448500.00 -E- 327832.00	65.40	10.07.13 to 14.07.13	
23	GBH-17/11	564	N-2448240.00 - E-328328.00	64.80	15.07.13 to 19.07.13	

(iii) Details of sample analysis indicating type of sample (surface, sub-surface from pits/ trenches/bore holes etc.) complete chemical analysis for entire strata for all radicals may be undertaken for selected samples from a NABL accredited Lab or Government Laboratory or equivalent.

Meter wise analysis has been carried out of all the 23 boreholes. Further, a total of 17 nos of random sampling were carried out from the exposed out crops and analysed by NABL accredited lab i.e. SGS Lab. The locations of surface samples are marked in the geological plan. The copy of the core sample analysis report and surface sample analysis report is attached as Annexure- XVI (A)

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(iv) Expenditure incurred in various prospecting operation.

Total meterage of drilling is 1163.60m. The rate of drilling per meter was Rs 4500.00. Total expenditure incurred for exploration of 23 bore holes with analysis was Rs.9306400.

(f) The surface plan of the lease area may be prepared on a scale of 1 : 1000 or 1 : 2000 with contour interval of maximum 10m depending upon the topography and size of the area duly marked by grid lines showing all features indicated under Rule 28(1)(a) of MCDR 1988

Based on the recent survey of the entire lease area, the surface plan has been prepared on a scale of 1:2000 with contour interval of 4m. The existing features and borehole locations have been marked.

(g) Geological Plan

Based on the recent survey of the entire lease area, a fresh geological mapping was carried out and Surface Geological plan has been prepared on a scale of 1:2000 with contour interval of 4m. The existing features and borehole locations have been marked. Based on the exposures, opened working quarries, exploration carried out in the area, attempts has been taken to mark the mineralized zones in the Surface Geological Plan.

(h) Geological Sections

Considering the geological plan, eight numbers of cross sections are prepared in 1:2000 scale covering the total area and from lease boundary to boundary. Position of holes are well shown on the cross sections and the lithology as encountered in each of the bore holes were plotted indicating the run wise grade of ore encountered in the hole. The ore zones are plotted in each of the bore holes of respective cross sections and are connected to arriving sectional area of different grade of the ore zone for that section.

(i) Broadly indicate the future programme of exploration with due justification (duly marking on Geological plan year wise location in different colors) taking into consideration the future tentative excavation programme planned in next five years:

In order to (a) Define the ore zone boundary very clearly

(b) To obtain more information in virgin area on different parameters of the ore zone like – thickness, grade, recovery etc.

(c) To have a more comprehensive idea about +45% Fe ore zone.

(d) To achieve higher reliability in the estimated reserves, that is, to convert the probable reserves into proved category etc.

It is proposed that exploration in the lease area shall be carried out as per the rule 27 (3) and CCOM circular no. 3/2010 vide letter no. M-11012/1/2009-CCOM Nagpur, dated, 14/07/2010 by putting 36 numbers of boreholes to cover the entire lease area, which will commence after obtaining forest clearance. The lessee has drilled 23 boreholes for a total meterage of 1163.6m where in the

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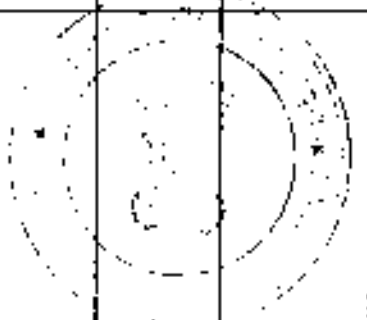
maximum depth of bore hole works out to 96.10m. Hence it is proposed to drill up to a depth of average 100m or up to the bottom most shale. The detail of proposed exploration programme during this plan period is given below and location of these boreholes is shown in Geological Plan.

Exploration proposed to be carried out during plan period

Year	Name of the Bore Holes	Location				Depth of the Hole	Type of hole/Size of core	Details of analysis
		Easting	Northing	Longitude	Latitude			
2018-19	PBH – 01	328200	2448000	85° 20' 3.3748" E	22° 07' 42.6892" N	100m each bore hole Total depth=3500m	Core type (vertical) NQ/HQ	The analysis will be done at every one meter interval. Further, if there is any change in lithology within the sampled interval of 1metre then based on lithology additional sampling will be carried out. The BH samples will be analysed from NABL Accredited Lab
	PBH – 02	328300	2448100	85° 20' 6.8260" E	22° 07' 46.1758" N			
	PBH – 03	327800	2448100	85° 19' 49.3792" E	22° 07' 45.9976" N			
	PBH – 04	328400	2448200	85° 20' 10.2772" E	22° 07' 49.4624" N			
	PBH – 05	328200	2448200	85° 20' 3.2864" E	22° 07' 49.3912" N			
	PBH – 06	327700	2448200	85° 19' 45.6515" E	22° 07' 49.2129" N			
	PBH – 07	327500	2448200	85° 19' 38.8727" E	22° 07' 49.1414" N			
	PBH – 08	328500	2448300	85° 20' 13.7284" E	22° 07' 52.7490" N			
	PBH – 09	328300	2448300	85° 20' 6.7496" E	22° 07' 52.6776" N			
	PBH – 10	328100	2448300	85° 19' 59.7708" E	22° 07' 52.6066" N			
	PBH – 11	327900	2448300	85° 19' 52.7919" E	22° 07' 52.5353" N			
	PBH – 12	327500	2448300	85° 19' 38.8344" E	22° 07' 52.3924" N			
	PBH – 13	328500	2448400	85° 20' 13.8902" E	22° 07' 56.0000" N			
	PBH – 14	328000	2448400	85° 19' 56.2431" E	22° 07' 55.8220" N			
	PBH – 15	327600	2448400	85° 19' 42.2654" E	22° 07' 55.6792" N			
	PBH – 16	328200	2448600	85° 20' 3.1455" E	22° 08' 2.3963" N			
	PBH – 17	328500	2448700	85° 20' 13.5757" E	22° 08' 5.7531" N			
	PBH – 18	328300	2448700	85° 20' 6.5967" E	22° 08' 5.6819" N			
	PBH – 19	328100	2448700	85° 19' 59.6177" E	22° 08' 5.6108" N			
	PBH – 20	327900	2448700	85° 19' 52.6387" E	22° 08' 5.5393" N			
	PBH – 21	328500	2448800	85° 20' 13.5376" E	22° 08' 9.0041" N			
	PBH – 22	328300	2448800	85° 20' 6.5585" E	22° 08' 8.9329" N			
	PBH – 23	328100	2448800	85° 19' 59.5795" E	22° 08' 8.8617" N			
	PBH – 24	327900	2448800	85° 19' 52.6004" E	22° 08' 8.7903" N			
	PBH – 25	328500	2449100	85° 20' 13.4230" E	22° 08' 18.7571" N			
	PBH – 26	328500	2449200	85° 20' 13.3845" E	22° 08' 22.0081" N			
	PBH – 27	328600	2449400	85° 20' 16.7981" E	22° 08' 28.5457" N			
	PBH – 28	328500	2449500	85° 20' 13.2703" E	22° 08' 31.7612" N			
	PBH – 29	328700	2449500	85° 20' 20.2497" E	22° 08' 31.8323" N			
	PBH – 30	328900	2449500	85° 20' 27.2290" E	22° 08' 31.9033" N			
	PBH – 31	329200	2449400	85° 20' 37.7361" E	22° 08' 28.7586" N			
	PBH – 32	329400	2449400	85° 20' 44.7155" E	22° 08' 28.8295" N			
	PBH – 33	329300	2449500	85° 20' 41.1878" E	22° 08' 32.0451" N			
	PBH – 34	329200	2449600	85° 20' 37.6601" E	22° 08' 35.2607" N			
	PBH – 35	329400	2449600	85° 20' 44.6395" E	22° 08' 35.3315" N			
	PBH – 36	329300	2449700	85° 20' 41.1118" E	22° 08' 38.6471" N			



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Year	No of bore hole (CORE / RC/DTH)	Grid interval	Total Meterage (m)	No. of Pits, dimensions and volume	No. of Trenches, dimensions and volume
2018-19	36 core type bore hole	200 x 200m	3600m	Nil	Nil

(j) Reserve and Resources as per UNFC with respect to threshold value notified by IBM may be furnished in a tabular form:

In the last approved Mining Plan, the resource was estimated under measured, indicated and inferred categories. Following points were taken into consideration for resource estimation.

- The resources/reserves were estimated on the basis of the data observed directly from quarry exposures as well as boreholes done.
- The existing quarries within the lease also provide sufficient data of mineralization within the lease area.
- A detail geological mapping was carried out in a scale of 1:2000. During geological mapping both structural as well as lithological study has been done. The outcrops in the un-diverted forest land have shown the occurrence of ore. The lessee has carried out analysis of samples from these out crops through a NABL accredited laboratory. The analysis report is enclosed as Annexure- XII
- Further a report on the adjacent mines has been prepared, by which geological interpretation can be made for the existence of iron ore in this mine.
- The Regional geology has also proved the occurrence of ore.
- On the basis of exploration done by 23 numbers of boreholes and existing pits, mineralized zones have been divided in three zones namely – Zone – A, Zone – B and Zone – C. Ore in and around the quarries/BH are considered as proved zone. The dimension of each quarry is given below:

Zone	Name of Quarry	Length (m)	Width (m)	Depth (m)	Existing R.L. (m)	
					Top	Bottom
A	Bottom Pit	255	90	40.0	701.00	661.00
	Bottom Pit A	25	07	6.0	674.00	668.00
	Lucky Pit	115	22	13.0	774.00	761.00
	Ullkocha Pit	64	26	38.00	662.00	624.00
B	Tiger Pit	214	55	29.0	549.00	520.00
	Tiger Pit A	93	20	2.0	566.00	564.00
	Tiger Pit B	25	12	3.5	536.50	533.00
C	Sagwan Pit	85	65	38.0	631.00	593.00
	Sagwan Pit A	38	06	8.0	629.00	621.00
	Ruri Pit	350	110	115.0	610.00	495.00
	Kadam Kocha Pit	95	40	28.0	586.00	556.00

Further, float iron ore is found to be observed at western part of Rudi pit and Tiger pit. However, from quarry face it can be seen that the float ore occurs up to a depth of 5m and below the float ore, massive ore occurs.

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The parameters and basis of reserve estimation in the approved review of mining plan were as follows:

Method of Estimation: Cross-sectional method was adopted for calculation of reserve of lateritic iron ore zone. Cross-sectional area was calculated which multiplied by the length of influence of ore body considered for each category giving the volume of ROM. The volume (cum) so calculated for ROM is then converted into MT. In case of float ore, surface area method was adopted to estimate the iron ore resource.

Thickness of the ore body for Measured, Indicated & Inferred category:

Measured Resource (331):

In-situ iron ore

Based on 23 drilled borehole data and the data of 11 existing pits, measured resource was estimated. The depth of quarry floor and base of the bore hole where the mineralization ends was considered as the depth of measured ore zone (331). However, the thickness of the ore body is variable from section to section. Further, a lateral influence of 25m in both side from the quarry edge or bore hole was considered for estimation of the resource/reserve.

Float ore zone:

Within the face of the existing pits tiger pit it can be observed that the float ore occurs upto an average thickness of 5m. Hence, Measured resource within part of the float ore zone was considered by taking 5m depth from surface with a recovery of 60%.

Indicated Resource (332):

In-situ iron ore

Based on 21 drilled borehole data and the data of 11 existing pits, measured zone was earmarked. A lateral influence of 25m from the measured zone was considered for the estimation of Indicated category. The depth of indicated category is matching with depth of measured zone.

Float ore

Within the 25m lateral influence from the measured zone, where float ore occurs, that part was considered for estimation of float ore under indicated category(332). Total percentage of recovery of float ore was considered as 60%.

Inferred Resource (333):

From the lithology of the area, it can be seen that there are exposures of lateritic iron ore beyond the Indicated resource which indicate the presence of iron ore but no exploration was carried out due to

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non-availability of forest clearance. As such, these zones were considered under Inferred category. The limit of 333 categories was taken by considering the geological interpretation of bore hole, existing pit, exposure of the ore body, dip and strike of the ore body etc. A detail Random sampling of iron ore from the exposures/out crops was carried out to justify the resource estimation under inferred category. About 17 nos of samples has been collected from the out crops and analysed from SGS Lab. The float ore within Inferred zone considered for the resource estimation under 333 categories.

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(iii) Threshold value considered

Type of ore	Threshold value
Insitu iron ore	+45%Fe
Float iron ore	+45%Fe

iv) Cut-off grade:

The cut-off grade has been considered at +55%Fe which is based on the minimum marketable grade as well as blendable grade of iron ore.

v) Recovery:

In Ghatkuri Iron ore Mine, average grade of ROM is (+55%Fe). As such, entire excavation (ROM) is considered under production and hence resources and reserve for the ROM has been estimated. However, the entire excavation (ROM) is treated in the crushing/screening unit within the lease from where, the finished product (10-30)mm, (5-18)mm & (0-5)mm of +58%Fe grade and iron ore fines (0-10)mm of (+45 to -55%Fe) shall be produced. Besides, there will be a generation of fines (0-10) mm (6% of ROM) waste (-45%Fe). The recovery of above said product from the quarries is given below.

Table showing recovery of different finished product by volume and grade from the ROM

Finished product after screening	Economic viability	Recovery by Volume (%)	Average Grade Fe
10 – 30mm (sized ore)	Saleable	35	+55%
5 – 18mm (sized ore)	Saleable	15	+55%
0– 5mm (fines)	Saleable	10	+55%
0 – 10mm (fines)	Saleable	34	+45 to - 55%
0 – 10mm (fines) - Waste	Non-saleable	06	<45%
Total		**100**	

v) Bulk density:

The Bulk density for ROM as observed from the data of working mines has been considered at **1 cum = 3.0 MT.**

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(vi) **Mineable reserve** was estimated by considering blockages under safety zone and ultimate pit slope. The safety zone area was calculated by considering following statutory barrier:

- 50m on the both side of the HT electric line passing through the lease area.
- 50m on the both side of State High way passing through the lease area
- 7.5m along the ML boundary.

Category wise reserves/resources reported in last approved Mining Plan as on 01.04.2017

Total Resources	Category	Code	Quantity(MT)	Quantity in million tones		Grade %
			Entire Area		Broken up area	
	(A + B)	-	171174858	171.174	18.183	-
A. Reserved	Proved	(111)	17207985	17.209	3.269	+ 55% Fe
	Probable	(121)	–	--	--	
		(122)	6779801	6.780	0.137	
		TOTAL	23987853	23.988		
B. Remaining Resources	Feasibility Mineral Resources	(211)	10653960	10.654		+ 55% Fe
	Pre-feasibility Mineral Resources	(221)	–		8.337	
		(222)	8701620	8.702	3.057	
	Measured Mineral Resources	(331)	--			
	Indicated Mineral Resources	(332)	–			
	Inferred Mineral Resources	(333)	127831735	127.831	3.383	
	Reconnaissance Mineral Resources	(334)	–			
	Total (B)		147187305	147.187	14.777	

Depletion: Nil

- **Category wise remaining reserves/resources (in Million Tonnes) as on 01.04.2017 as per last approved Mining Plan.**

Total Resources	Category	Code	Quantity(MT)	Quantity in million tones		Grade %
			Entire Area		Broken up area	
	(A + B)	-	171174858	171.174	18.183	-
A. Reserved	Proved	(111)	17207985	17.209	3.269	+ 55% Fe
	Probable	(121)	–	--	--	
		(122)	6779801	6.780	0.137	
		TOTAL	23987853	23.988		
B. Remaining Resources	Feasibility Mineral Resources	(211)	10653960	10.654		+ 55% Fe
	Pre-feasibility Mineral Resources	(221)	–		8.337	
		(222)	8701620	8.702	3.057	
	Measured Mineral Resources	(331)	–			
	Indicated Mineral Resources	(332)	–			
	Inferred Mineral Resources	(333)	127831735	127.831	3.383	
	Reconnaissance Mineral Resources	(334)	–			
	Total (B)		147187305	147.187	14.777	

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- **Updated reserves established category-wise**

During last financial year the lessee has not undertaken any exploration (drilling), the earlier resources/reserves have not been updated in this scheme of mining. Further, the basis of parameter has been kept same as in the earlier approved review of Mining plan. Hence, reserve/resources has not been updated in this Mining plan period. However, the resource of entire area has been considered under 121 category since there is no forest clearance over entire area. The section wise calculations have been furnished in the following tables:

(I) MINERAL RESOURCES FOR THE ENTIRE AREA

Zone-A

Category of Resources	Section line	Sectional area in (m2)	Length of influence in (m)	Total volume Cum	Total Mineral Resources (MT)
Measured (331)	2448100	1219	35	42665	
	2448150	5251	50	242150	
	2448200	11987	45	539415	
	2448240	10458	50	522900	
	2448300	13470	55	740850	
	2448350	11916	50	595800	
	2448400	10565	50	528250	
	2448450	11241	50	562050	
	2448500	1581	50	79050	
	2448550	787	50	39350	
	2448600	187	55	10285	
Total				3923165	11769495
Indicated (332)	2448100	1127	35	39445	
	2448150	1040	50	52000	
	2448200	3823	45	172035	
	2448240	3184	50	159200	
	2448300	4002	55	220110	
	2448350	1727	50	86350	
	2448400	3326	50	166300	
	2448450	3380	50	169000	
	2448500	1690	50	84500	
	2448550	389	50	19450	
	2448600	249	55	13695	
Total				1182085	3546255

Zone-B

Category of Resources	Section line	Sectional area in (m2)	Length of influence in (m)	Total volume Cum	Total Mineral Resources (MT)
	2448000	1052	80	84160	
Measured (331)	2448100	1802	75	135150	
	2448150	1532	50	76600	
	2448200	0	45	0	
	2448240	2840	50	142000	
	2448300	2882	45	129690	

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	2448350	3800	50	190000	
	2448400	3877	50	193850	
	2448450	4086	50	204300	
	2448500	2805	50	140250	
	2448550	3555	50	177750	
	2448600	4150	100	415000	
Total				1888750	5666250
	2448000	1301	80	104080	
Indicated (332)	2448100	998	75	74850	
	2448150	861	50	43050	
	2448200	2918	45	131310	
	2448240	4110	50	205500	
	2448300	2906	45	130770	
	2448350	4141	50	207050	
	2448400	3841	50	192050	
	2448450	3920	50	196000	
	2448500	2839	50	141950	
	2448550	3615	50	180750	
	2448600	3426	100	342600	
Total				1949960	5849880

ZONE-C

Category of Resources	Section line	Sectional area in (m2)	Length of influence in (m)	Total volume Cum	Total Mineral Resources (MT)
Measured (331)	2448900	5240	120	628800	
	2449000	7300	100	730000	
	2449100	2314	100	231400	
	2449200	4527	100	452700	
	2449300	3832	100	383200	
	2449400	3082	100	308200	
	2449450	3526	100	352600	
	2449500	3350	100	335000	
Total				3421900	10265700
Indicated (332)	2448900	2810	120	337200	
	2449000	3470	100	347000	
	2449100	1131	100	113100	
	2449200	485	100	48500	
	2449300	4313	100	431300	
	2449400	2647	100	264700	
	2449450	2605	100	260500	
	2449500	1508	100	150800	
Total				1953100	5859300

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Float Iron Ore Zone
Measured (331)
ZONE B

Category of Resources	Section line	Sectional area in (m2)	Length of influence in (m)	Total volume Cum	Recovery @60%	Total Mineral Resources (MT)
Measured (331)	2448100	137	75	10275	6165	
	2448150	138	50	6900	4140	
	2448200	0	45	0	0	
	2448240	271	50	13550	8130	
	2448300	244	45	10980	6588	
	2448350	0	50	0	0	
	2448400	0	50	0	0	
	2448450	0	50	0	0	
	2448500	0	50	0	0	
	2448550	0	50	0	0	
	2448600	0	100	0	0	
Total				**41705**	**25023**	**75069**

Category of Resources	Section line	Sectional area in (m2)	Length of influence in (m)	Total volume Cum	Recovery @60%	Total Mineral Resources (MT)
Indicated (332)	2448100	129	75	9675	5805	
	2448150	131	50	6550	3930	
	2448200	896	45	40320	24192	
	2448240	489	50	24450	14670	
	2448300	129	45	5805	3483	
	2448350	0	50	0	0	
	2448400	0	50	0	0	
	2448450	0	50	0	0	
	2448500	0	50	0	0	
	2448550	0	50	0	0	
	2448600	0	100	0	0	
Total				**86600**	**52080**	**156240**

Zone-C

Category of Resources	Section line	Sectional area in (m2)	Length of influence in (m)	Total volume Cum	Recovery @60%	Total Mineral Resources (MT)
Measured (331)	2448900	155	120	18600	11160	
	2449000	147	100	14700	8820	
	2449100	141	100	14100	8460	
	2449200	0	100	0	0	
	2449300	0	100	0	0	
	2449400	0	100	0	0	
	2449450	0	100	0	0	
	2449500	0	100	0	0	
Total				**47400**	**28440**	**85320**
Indicated	2448900	2810	134	16080	9648	

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(332)	2449000	3470	136	13600	8160	
	2449100	1131	90	9000	5400	
	2449200	0	100	0	0	अनुमोदित APPROVED
	2449300	0	100	0	0	
	2449400	0	100	0	0	
	2449450	0	100	0	0	
	2449500	0	100	0	0	
Total				**38880**	**23208**	**69624**

Table showing estimation of Inferred Mineral Resources for entire area

Category of Resources	Section line	Sectional area in (m2)	Length of influence (m)	Total volume Cum	Total Mineral Resources (MT)
	2448000	2917	100	291700	
	2448100	30481	75	2286075	
	2448150	43438	50	2171900	
	2448200	30787	45	1384515	
	2448240	25492	50	1274600	
	2448300	37193	55	2045615	
	2448350	38578	75	2893350	
	2448400	45516	50	2275800	
	2448450	39905	50	1995250	
	2448500	54314	50	2715700	
	2448550	25827	50	1291350	
Inferred (333)	2448600	38335	75	2875125	
	2448700	43732	100	4373200	
	2448800	45377	100	4537700	
	2448900	30851	100	3085100	
	2449000	5551	100	555100	
	2449100	2970	100	297000	
	2449200	4042	100	404200	
	2449300	11950	100	1195000	
	2449400	16009	75	1200675	
	2449450	29963	50	1498150	
	2449500	31085	75	2331375	
	2449600	7380	100	738000	
	2449700	3068	100	306800	
Total				**43731580**	**127831725**

Gist of Mineral Resources for entire area

Ore Zone	Resources	Zone-A	Zone-B	Zone-C	Total
In-situ Ore	Measured(331)	11769495	5666250	10265700	27701445
	Indicated(332)	3546255	5849880	5859300	15255435
	Total in MT	**15315750**	**11516130**	**16125000**	**42956880**
Float Ore	Measured(331)	0	75069	85320	160389
	Indicated(332)	0	156240	69624	225864

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Total in MT	15315750	231309	154944	386253
G total				43343133
Inferred in million ton(333)	-	-	-	127831725.00
G. Total				171174858

Production during last scheme period = 244574MT(0.244million tons)

Remaining resource for entire area = 171.117-0.224 = 170.873million tons

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a. **MINERAL RESOURCES IN BROKEN UP AREA**

Insitu Iron Ore Zone

Category of Resources	Section line	Sectional area in (m^2)	Length of influence(m)	Total volume cum	Total Mineral Resources (MT)
SAGWAN PIT					
Measured (331)	2449400	2618	40	104720	
	2449450	5418	50	270900	
	2449500	0	40	0	
Total				**375620**	**1126860**
Indicated (332)	2449400	0	40	0	
	2449450	0	50	0	
	2449500	0	40	0	
Total				**0**	**0**
Inferred (333)	2449400	390	40	15600	
	2449450	922	50	46100	
	2449500	3163	40	126520	
Total				**188220**	**564660**
LUCKY PIT					
Measured (331)	2448150	963	38	36594	
	2448200	178	45	8010	
	2448240	148	30	4440	
Total				**49044**	**147132**
Indicated (332)	2448150	56	38	2128	
	2448200	1656	45	74520	
	2448240	1234	30	37020	
Total				**113668**	**341004**
Inferred (333)	2448150	2075	38	78850	
	2448200	1021	45	45945	
	2448240	1376	30	41280	
Total				166075	498225
BOTTOM PIT – A					
Measured(331)	2448300	3911	50	195550	
Total				**195550**	**586650**
Indicated(332)	2448300	45	50	2250	
Total				**2250**	**6750**
BOTTOM PIT					
Measured(331)	2448150	1337	32	42784	
	2448200	5024	50	251200	
	2448240	7412	50	370600	

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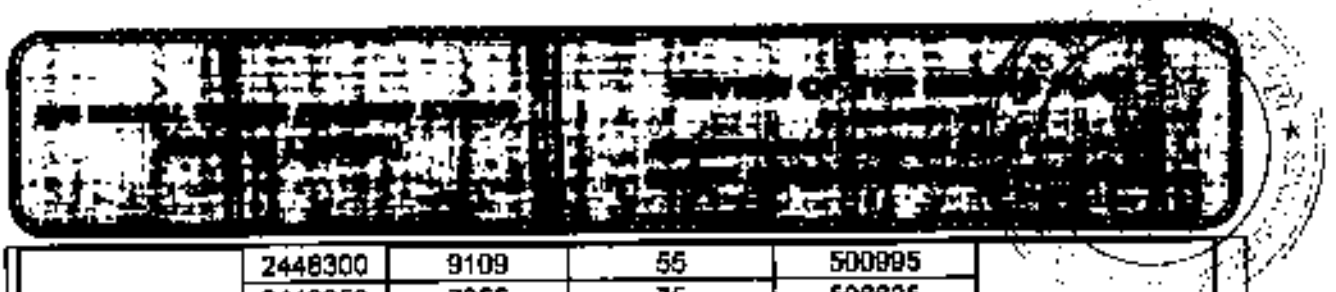

	2448300	9109	55	500995	
	2448350	7955	75	596625	
	2448500	176	100	17600	
Total				**1779804**	**5339412**
Indicated(332)	2448150	0	32	0	
	2448200	14	50	700	
	2448240	19	50	950	
	2448300	0	55	0	
	2448350	0	75	0	
	2448500	1209	100	120900	
Total				**122550**	**367650**
Inferred(333)	2448150	1390	32	44480	
	2448200	21	50	1050	
	2448240	51	50	2550	
	2448300	0	55	0	
	2448350	0	75	0	
	2448500	503	100	50300	
Total				**98380**	**295140**
RURI PIT					
Measured(331)	2448900	2934	80	234720	
	2449000	4903	100	490300	
	2449100	995	100	99500	
	2449200	2750	70	192500	
Total				**1017020**	**3051060**
Indicated(332)	2448900	232	80	18560	
	2449000	149	100	14900	
	2449100	0	100	0	
	2449200	1051	70	73570	
Total				**107030**	**321090**
Inferred(333)	2448900	1533	80	122640	
	2449000	1210	100	121000	
	2449100	1033	100	103300	
	2449200	543	70	38010	
Total				**384950**	**1154850**
KADAMKOCHA PIT					
Measured(331)	2449200	1133	100	113300	
Total				**113300**	**339900**
Inferred(333)	2449200	404	100	40400	
Total				**40400**	**121200**
TIGER PIT					
	2448100	472	100	47200	
Measured(331)	2448150	348	60	20880	
Total				**68080**	**204240**
	2448100	1131	100	113100	
Indicated(332)	2448150	1169	60	70140	
Total				**183240**	**549720**

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Tiger PIT – A					
Indicated(332)	2448240	956	90	86040	
Total				**86040**	**258120**
Inferred(333)	2448240	109	90	9810	
Total				**9810**	**29430**
TIGER PIT – B					
Indicated(332)	2448240	619	30	18570	
Total				**18570**	**55710**
Inferred(333)	2448240	137	30	4110	
Total				**4110**	**12330**
SAGWAN PIT - A					
Measured(331)	2449300	404	120	48480	
Total				**48480**	**145440**
Indicated(332)	2449300	3593	120	431160	
Total				**431160**	**1293480**
Inferred(333)	2449300	434	120	52080	
Total				**52080**	**156240**
ULIKOCHA PIT					
Measured(331)	2448100	424	35	14840	
	2448150	2817	70	197190	
Total				**212030**	**636090**
Inferred(333)	2448100	514	35	17990	
	2448150	2370	70	165900	
Total				**183890**	**551670**

Float Iron Ore Zone

category	Zone	Surface area (m^2)	Thicknass (m)	Volume (m3)	Recovery %	Total Mineral Resources (MT)
Measured (331)	Zone B	3239	5	16195	9717	29151
	Zone C	—	—	—	—	—
	Total	3239		16195	9717	29151

Gist of Mineral Rasources within Broken up Area.

Name of Ore Zone	Category of Resources	Total Mineral Resources		
		Cum	MT	million tones
Insitu Ore Zone	Measured (331)	3858928	11576784	11.5768
	Indicated (332)	1064508	3193524	3.19352
	Inferred (333)	1127915	3383745	3.38375
Float Ore Zone	Measured (331)	16195	29151	0.02915
	Total	6061068	18183204	**18.18320**

(B) MINERAL RESERVES:

Mineral reserve is that part of reserve which can be calculated based on taking ultimate pit slope of the working leaving 7.5m from the lease boundary. While assessing the mineral reserves of the deposit measured and indicated categories of mineral resources have been considered and accordingly the mineral reserves are calculated assuming loss due to pit slope and its proximity with the lease boundary

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The ore blocked under 331 category has been considered as the resource under 221 category and the remaining reserve are under the 121 category as per UNFC .Similarly the ore blocked under 332 category has been considered under the resource of 222 and the remaining reserves are under 122 category.

(I) ESTIMATION OF MINERAL RESERVE IN ENTIRE AREA

In situ iron ore zone

Zone-A

Category of Resources	Section line	Sectional area in m^2	Length of influence in m	Total volume Cum	Total Mineral Resources (MT)
121	2448100	585	35	20475	
	2448150	4314	50	215700	
	2448200	11121	45	500445	
	2448240	8523	50	426150	
	2448300	6944	55	381920	
	2448350	4714	50	235700	
	2448400	0	50	0	
	2448450	0	50	0	
	2448500	0	50	0	
	2448550	787	50	39350	
	2448600	187	55	10285	
Total				**1830025**	**5490075**
122	2448100	148	35	5180	
	2448150	584	50	29200	
	2448200	2150	45	96750	
	2448240	1174	50	58700	
	2448300	1838	55	101090	
	2448350	789	50	39450	
	2448400	0	50	0	
	2448450	0	50	0	
	2448500	0	50	0	
	2448550	297	50	14850	
	2448600	197	55	10835	
Total				**356055**	**1068165**

ZONE-B

Category of Resources	Section line	Sectional area in m^2	Length of influence(m)	Total volume Cum	Total Mineral Resources (MT)
	2448000	819	80	65520	
121	2448100	1610	75	120750	
	2448150	1379	50	68950	
	2448200	0	45	0	
	2448240	2840	50	142000	
	2448300	2882	45	129690	
	2448350	3800	50	190000	
	2448400	382	50	19100	
	2448450	0	50	0	
	2448500	0	50	0	

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	2448550	0	50	0	
	2448600	3920	100	392000	
Total				1126010	[illegible]
	2448000	378	80	30240	
122	2448100	998	75	74850	
	2448150	861	50	43050	
	2448200	2618	45	131310	
	2448240	4110	50	205500	
	2448300	2906	45	130770	
	2448350	2605	50	130250	
	2448400	0	50	0	
	2448450	0	50	0	
	2448500	0	50	0	
	2448550	0	50	0	
	2448600	2113	100	211300	
Total				957270	2871810

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ZONE-C

Category of Resources	Section line	Sectional area in m^2	Length of influence(m)	Total volume Cum	Total Mineral Resources (MT)
121	2448900	5058	120	606960	
	2449000	5517	100	551700	
	2449100	1951	100	195100	
	2449200	3950	100	395000	
	2449300	3765	100	376500	
	2449400	2733	100	273300	
	2449450	2387	100	238700	
	2449500	872	100	87200	
				2724460	8173380
122	2448900	1264	120	151680	
	2449000	353	100	35300	
	2449100	74	100	7400	
	2449200	0	100	0	
	2449300	3312	100	331200	
	2449400	1514	100	151400	
	2449450	1413	100	141300	
		554	100	55400	
Total				873680	2621040

Mineral Reserve of Float iron Ore Zone

Category of Resources	Section line	Sectional area in (m2)	Length of influence in (m)	Total volume Cum	Recovery @60%	Total Mineral Resources (MT)
Proved (111)	2448100	137	75	10275	6165	
	2448150	138	50	6900	4140	
	2448200	0	45	0	0	
	2448240	271	50	13550	8130	
	2448300	244	45	10980	6588	

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	2448350	0	50	0	0	
	2448400	0	50	0	0	
	2448450	0	50	0	0	
	2448500	0	50	0	0	
	2448550	0	50	0	0	
	2448600	0	100	0	0	
Total				**41705**	**25023**	**75069**

Category of Resources	Section line	Sectional area in (m2)	Length of influence in (m)	Total volume Cum	Recovery @60%	Total Mineral Resources (MT
Probable (122)	2448100	129	75	9675	5805	
	2448150	131	50	6550	3930	
	2448200	896	45	40320	24192	
	2448240	489	50	24450	14670	
	2448300	129	45	5805	3483	
	2448350	0	50	0	0	
	2448400	0	50	0	0	
	2448450	0	50	0	0	
	2448500	0	50	0	0	
	2448550	0	50	0	0	
	2448600	0	100	0	0	
Total				**86800**	**52080**	**156240**

ZONE-C

Category of Resources	Section line	Sectional area in (m2)	Length of influence in (m)	Total volume Cum	Recovery @60%	Total Mineral Resources (MT
Measured (331)	2448900	155	120	18600	11160	
	2449000	147	100	14700	8820	
	2449100	141	100	14100	8460	
	2449200	0	100	0	0	
	2449300	0	100	0	0	
	2449400	0	100	0	0	
	2449450	0	100	0	0	
	2449500	0	100	0	0	
Total				**47400**	**28440**	**85320**
Indicated (332)	2448900	2810	134	16080	9648	
	2449000	3470	136	13600	8160	
	2449100	1131	90	9000	5400	
	2449200	0	100	0	0	
	2449300	0	100	0	0	
	2449400	0	100	0	0	
	2449450	0	100	0	0	
	2449500	0	100	0	0	
Total				**38680**	**23208**	**69624**

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ZONEWISE SUMMARY OF RESERVE WITHIN THE ENTIRE AREA

Name of the ore zone	Zone	111	122	Total
Insitu Ore Zone	Zone - A	5490075	1088185	[illegible]
	Zone - B	3384030	2871810	[illegible]
	Zone - C	8173380	2621040	10794420
Float ore zone	Zone - B	75069	156240	231309
	Zone - C	85320	62424	147744
	Grand Total	**17207985**	**6779801**	**23987553**

Production during last acheme period = 244574 MT= 0.244 million tons
Remaining reserve within entire area : 23.987-0.244= 23.743 million tons

(II) **RESERVE WITHIN BROKEN UP AREA**

Category of Resources	Section line	Sectional area in (m^2)	Length of influence(m)	Total volume cum	Total Mineral Resources (MT)
		SAGWAN PIT			
111	2449400	140	40	5600	
	2449450	1248	50	62400	
	2449500	800	40	32000	
Total				**100000**	**300000**
122	2449400	0	40	0	
	2449450	0	50	0	
	2449500	0	40	0	
Total				0	0
		LUCKY PIT			
111	2448150	482	38	18316	
	2448200	130	45	5850	
	2448240	63	30	1890	
Total				**26056**	**78168**
122	2448150	0	38	0	
	2448200	0	45	0	
	2448240	0	30	0	
Total				0	0
		BOTTOM PIT – A			
111	2448300	508	50	25400	
Total				**25400**	**76200**
122	2448300	0	50	0	
Total				0	0
		BOTTOM PIT			
111	2448150	148	32	4736	
	2448200	2300	50	115000	
	2448240	3799	50	189950	
	2448300	2008	55	110440	
	2448350	1305	75	97875	
	2448500	0	100	0	
Total				**518001**	**1554003**
122	2448150	0	32	0	
	2448200	0	50	0	
	2448240	0	50	0	

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	2448300	0	56	0	
	2448350	0	75	0	
	2448500	0	100	0	
Total				**0**	**0**
			RUBI PIT		
111	2448900	875	80	70000	
	2449000	689	100	68900	
	2449100	99	100	9900	
	2449200	1580	70	110600	
Total				**259400**	**778200**
122	2448900	0	80	0	
	2449000	0	100	0	
	2449100	0	100	0	
	2449200	17	70	1190	
Total				**1190**	**3570**
			KADAMKOCHA PIT		
111	2449200	734	100	73400	
Total				**73400**	**220200**
			TIGER PIT		
122	2448100	161	100	16100	
	2448150	79	60	4740	
Total				**20840**	**62520**
122	2448100	0	100	0	
	2448150	0	60	0	
Total				**0**	**0**
			TIGER PIT – A		
122	2448240	62	90	5580	
Total				**5580**	**16740**
			TIGER PIT – B		
122	2448240	196	30	5880	
Total				**5880**	**17640**
			SAGWAN PIT - A		
111	2449300	50	120	6000	
Total				**6000**	**18000**
122	2449300	275	120	33000	
Total				**33000**	**99000**
			ULIKOCHA PIT		
111	2448100	146	35	5110	
	2448150	656	70	45920	
Total				**51030**	**153090**

Float Iron Ore Zone

category	Zone	Surface area (m^2)	Thickness (m)	Volume (m3)	Recovery %	Total Mineral Resources (MT)
111	Zone B	3239	5	16195	9717	29151
	Zone C	---	—	—	---	—
	TOTAL	3239		16195	9717	29151

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GIST OF THE MINERAL RESERVE WITHIN BROKEN-UP AREA

Name of Ore Zone	Category of Resources	Total Mineral Resources		million tones
		Cum	MT	
Insitu Ore Zone	Proved (111)	1080127	3240381	3.2403
	Probable (122)	45650	136950	0.1369
Float Ore Zone	Proved (111)	16195	29151	0.0291
	Total	**1141972**	**3406482**	**3.4064**

Production during last scheme period = 244574 MT

Remaining reserve within entire area: 3406482- 244574 =3161908 MT

FEASIBILITY / PRE-FEASIBILITY MINERAL RESOURCES:

(I) Due to Road barrier:

ZONE-A

Category of Resources	Section line	Sectional area in m^2	Length of influence in m	Total volume Cum	Total Mineral Resources (MT)
	2448100	634	35	22190	
221	2448150	937	50	46850	
	2448200	866	45	38970	
	2448240	1935	50	96750	
	2448300	6526	55	358930	
Total				**563690**	**1691070**
222	2448100	979	35	34265	
	2448150	456	50	22800	
	2448200	1673	45	75285	
	2448240	2010	50	100500	
	2448300	2164	55	119020	
Total				**351870**	**1055610**

GIST OF BLOCKAGE OF ORE DUE TO ROAD BARRIER

Zone	Pre-feasibility (221)	Pre-feasibility (222)	Total
Zone - A	1691070	1055610	2746680

(II) DUE TO H.T LINE

ZONE-A

Category of Resources	Section line	Sectional area in m^2	Length of influence in m	Total volume Cum	Total Mineral Resources (MT)
	2448450	10565	50	528250	
221	2448500	11241	50	562050	
	2428550	1581	50	79050	
Total				**1169350**	**3508050**
222	2448400	3326	50	166300	
	2448450	3380	50	169000	
	2448500	1690	50	84500	
Total				**419800**	**1259400**

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ZONE-B

Category of Resources	Section line	Sectional area in m^2	Length of influence in m	Total volume Cum	Total Mineral Resources (MT)
	2448450	4086	50	204300	
221	2448500	2805	50	140250	
	2428550	3555	50	177750	
Total				522300	1566900
	2448400	3920	50	196000	
222	2448450	2839	50	141950	
	2448500	3615	50	180750	
Total				518700	1556100

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GIST OF BLOCKAGE OF ORE DUE TO H.T LINE

Zone	Pre-feasibility (221)	Pre-feasibility (222)	Total
Zone - A	3508050	1259400	4767450
Zone - B	1566900	1556100	3123000
Grand Total			7890450

(III) Due to Ultimate Pit Slope

Zone-A

Category of Resources	Section line	Sectional area in m^2	Length of influence in m	Total volume Cum	Total Mineral Resources (MT)
	2448350	7202	50	360100	
221	2448550	0	50	0	
	2448600	0	55	0	
Total				360100	1080300
	2448350	938	50	46900	
222	2448550	92	50	4600	
	2448600	52	55	2860	
Total				54360	163080

Zone-B

Category of Resources	Section line	Sectional area in m^2	Length of influence in m	Total volume Cum	Total Mineral Resources (MT)
	2448350	0	50	0	
221	2448400	3495	50	174750	
	2448600	230	55	23000	
Total				197750	593250
	2448350	1536	50	76800	
222	2448400	3841	50	192050	
	2448600	1313	100	131300	
Total				400150	1200450

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GIST OF BLOCKAGE OF ORE DUE TO ULTIMATE PIT SLOPE

Zone	Pre-feasibility (221)	Pre-feasibility (222)	Total
Zone - A	1080300	163080	1243380
Zone - B	593250	1200450	1793700
Grand Total			3037080

(II) Due to 7.5 m safety zone

ZONE -B

Category of Resources	Section line	Sectional area in m^2	Length of influence(m)	Total volume Cum	Total Mineral Resources (MT)
	2448000	233	80	18640	
221	2448100	192	75	14400	
	2448150	153	50	7650	
	2448200	0	45	0	
	2448240	0	50	0	
	2448300	0	45	0	
Total				40690	122070
	2448000	923	80	73840	
222	2448100	0	75	0	
	2448150	0	50	0	
	2448200	0	45	0	
	2448240	0	50	0	
	2448300	0	45	0	
Total				73840	221520

ZONE -C

Category of Resources	Section line	Sectional area in (m2)	Length of influence in (m)	Total volume Cum	Total Mineral Resources (MT)
221	2448900	182	120	21840	
	2449000	1783	100	178300	
	2449100	363	100	36300	
	2449200	577	100	57700	
	2449300	67	100	6700	
	2449400	349	100	34900	
	2449450	1139	100	113900	
	2449500	2478	100	247800	
Total				697440	2092320
222	2448900	1546	120	185520	
	2449000	3117	100	311700	
	2449100	1057	100	105700	
	2449200	485	100	48500	
	2449300	1001	100	100100	
	2449400	1133	100	113300	
	2449450	1192	100	119200	
	2449500	954	100	95400	
Total				1079420	3238260

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Float Iron ore

Category of Resources	Section line	Sectional area in (m2)	Length of influence in (m)	Total volume Cum	Recovery@60%	Total Mineral Resources (MT)
222	2449100	40	100	4000	2400	7200

GIST OF BLOCKAGE OF ORE DUE TO 7.5 M SAFETY ZONE

Zone	Pre-feasibility(221)	Pre-feasibility (222)	Total
Zone – A	0	0	0
Zone – B	122070	221520	60960
Zone – C	2092320	3238260	1637490
Grand Total	2214390	3459780	5674170

SUMMARY OF BLOCKAGES UNDER DIFFERENT CATEGORY

Name of the Zone	Blockage as per UNFC	Due to Safety Zone	Due to road	H.T Line	Due to Ultimate Pit Slope	Total
A	221	0	1691070	3508050	1080300	6279420
	222	0	1055610	1259400	163080	2478090
	Sub total	**0**	**2746680**	**4767450**	**1243380**	**8757510**
B	221	122070	0	1568900	583250	2282220
	222	221520	0	1556100	1200450	2978070
	Sub total	**343590**	**0**	**3123000**	**1793700**	**5260290**
C	221	2092320	0	0	0	2092320
	222	3238260	0	0	0	3238260
	Sub total		**0**	**0**	**0**	
Float (Zone-C)	222	7200	0	0	0	7200
Total		**5337780**	0		0	**5337780**
Grand total		**5681370**	**2746680**	**7890450**		19356580

Zone wise blockages

Name of the ore zone	Zone	221	222	Total
In situ	A	6279420	2478090	8757510
	B	2282220	2978070	5260290
	C	2092320	3238260	5330580
Float	C	–	7200	7200
Total		10653960	8701620	19356580

Gist of Resource of In situ and Float Iron ore within entire area

Type of resources	Resource within in situ ore zone (MT)	Resource within float ore zone (MT)	Total resource (MT)	Grade
Measured resources (331)	27701445	160389	27861834	+45%Fe
Indicated resources (332)	15255435	225864	15481299	
Inferred Resources (333)	127831725	0	127831725	
Total	170788605	386253	171174858	

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Production during last scheme period = 244574 MT= 0.244 million tons
Remaining reserve within entire area : 171.174 - 0.244= 170.93 million tons

Gist of Reserve of In situ and Float Iron ore within entire area

Type of resources	Reserve within in situ ore zone (MT)	Reserve within float ore zone (MT)	Total resource (MT)	Grade
Proved reserve (111)	–	–	–	+45%Fe
Probable reserve(121)	17047485	160389	17207874	
Probable reserve(122)	6561015	218664	6779679	
Total	**23608500**	**379053**	**23987553**	

Production during last scheme period = 244574 MT= 0.244 million tons
Remaining reserve within entire area : 23.987-0.244= 23.743 million tons

(L) Mineral Reserves/ Resources:

Mineral Resources: (Mineral resources has been estimated purely based on level of exploration, with reference to the threshold value of minerals declared by IBM)

Level of Exploration	Area covered under exploration (Ha)	Mineral resource assessed (In Million tons)	Grade
G1-Detail Exploration	25.267	27.861	+45%Fe
G2-General Exploration	11.478	15.481	
G3 - Prospecting	89.25	127.831	
G4- Reconnaissance	-	–	
Total	**125.995**	**171.174**	

Summary of lease area explored as per UNFC norms

Name of the Lease and owner	Total Lease area (Ha)	Lease area explored as per UNFC norms (in Ha) B = C + D + E + F				Remarks/comments including reasons for not carrying out the exploration as per UNFC norms
		G1 level	G2 Level	G3 Level	Other lease area/ unexplored area	
A	B	C	D	E	F	G
Ghatkuri Iron Mines	149.7343	25.267	11.478	89.25	23.7393	For want of forest clearances exploration could not be under taken.

Resources and Reserves within the lease have been arrived after applying results feasibility/pre-feasibility study and economic evaluation of deposit based on various factors such as:

Mining Method

In this plan period, same method of mining i.e. fully mechanized opencast mining method will be adopted by engaging HEMM like Excavator, Pay Loader, Air Compressor, Wagon drill, Hydraulic drill, dumpers etc. for the excavation and production of ROM.

Recovery factor:

In Ghatkuri iron ore Mine, average grade of ROM is (+55%Fe). As such, entire excavation (ROM) is considered under production and hence resources and reserve for the ROM has been estimated. However, the entire excavation (ROM) is treated in the crushing/screening unit within the lease from where, the finished product (10-30)mm, (5-18)mm & (0-5)mm of +55%Fe grade and iron ore fines (0-

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10)mm of (+45 to -55%Fe) shall be produced. Besides, there will be a generation of fines (0-10) mm (6% of ROM) waste (-45%Fe). The recovery of above said product from the quarries is given below:

Table showing recovery of different finished product by volume and grade from the ROM

Finished product after screening	Economic viability	Recovery by Volume (%)	Average Grade (%) Fe
10 – 30mm (sized ore)	Saleable	35	+55%
5 – 18mm (sized ore)	Saleable	15	+55%
0– 5mm (fines)	Saleable	10	+55%
0– 10mm (fines)	Saleable	34	+45 to -55%
0 – 10mm (fines) - waste	Non-saleable	06	<45%
Total		100	

Tonnage Factor

The conversion factor for ROM as observed from the data of working mines is considered at 1 cum = 3.0 MT.

Cutoff grade

As per guidelines of IBM threshold value of iron ore is considered as 45% Fe. While above 55 % Fe ore is termed as saleable iron ore, below that up to 45% Fe is termed as sub grade iron ore. Ore containing less than 45% Fe is considered as mineral waste.

Ultimate pit depth proposed.

As the lessee has applied for diversion of fresh forest land and if the same shall be granted by the forest authority, then ultimate pit limit shall be based on mineralized area marked. It has been calculated that in this case, 105.565 ha shall be degraded due to mining and allied activities and 44.1693 ha shall come under safety zones. So, entire lease area shall be utilized at conceptual stage.

The maximum depth up to which the quarry can be developed economically is considered as the ultimate or conceptual extent of the quarry. Based on the present geological information, exploration data and mine ability of ore the ultimate pit limit has been marked. The depth of ultimate pit limit has been shown up to the probable limit in the iron ore zono. The bottom most RL has been proposed is given below:

Zone	Ultimate size of Pits (m)		Top RLs (m)	Bottom RLs (m)
	Average length	Average width		
Zone-A	430	280	775	649
Zone-B	412	220	604	504
Zone-C	638	225	635	490

Mineral/ ore blocked dues to benches:

During mining operation certain resources have been blocked under UPL, lease boundary safety zone, and blocked area within bench slope. The ore in these blocked areas are non-mineable. Although feasibility study has been carried out and the quantity is established, because of the above mentioned blockages the quantity falls under F-2 category. By considering these blockages, due to above mention various factors, the mineable resource has been estimated.

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Resource, Reserve & Grade as per United Nations Framework Classification (As on 1.04.2017)

Total Resources	Category	Code	Quantity(MT) Broken up area		Grade	Quantity(MT) Remaining area		Grade
	(A + B)		In situ	Float		In situ	Float	
A. Reserve	Proved	(111)	3240381	29151	+45%Fe	–	–	+45%Fe
	Probable	(121)	–	–		17047485	160389	
		(122)	136950	–		6561015	218664	
		Total	3377331	29151		23608500	379053	
B. Remaining Resources	Feasibility Mineral Resources	(211)	–	–	+45%Fe		–	+45%Fe
	Pre-feasibility Mineral Resources	(221)	8336403			10653960	–	
		(222)	3068574	–		8694420	7200	
	Measured Mineral Resources	(331)	–	–			–	
	Indicated Mineral Resources	(332)	–	–			–	
	Inferred Mineral Resources	(333)	3383745	–		127831725	–	
	Reconnaissance Mineral Resources	(334)	–	–			–	
	Total(B)		14776772	–		147180106	–	
GRAND TOTAL			18164053	29151		170788606		

CLASSIFICATION OF RESERVE AS PER UNFC SYSTEM:

UNFC system has been adopted to categorize the mineral Resources and reserves. Although mineral reserves are proved by bore holes drilling with the lease area, since et present the forest clearance for the entire area is applied the reserves are placed under 121 category. For the estimation of different mineral reserves, Occurrences of mineral of intrinsic economic interest, location, grade, quantity, geological characteristic etc. has been studied in detailed and are given hereunder:

For (111) category of Mineral Reserve (for broken up area)

UNFC axis and code	Guideline	Studies Done
G1 (Detailed Exploration)	1 **Geological survey:** i) Mapping for coal, mapping 1:5000; for other minerals 1:1000 ii) Preparation of detailed topographical-cum-geological map including all surface geological features, extent of deposit, structure, location of boreholes, assay plan and sections of exploratory mine development and borehole data.	Detailed exploration was carried out. The mineralization zone has been divided into three zones. Zone (A) – covering 4 pits with max depth of ore body is 40m and 7 no. of BH with max depth of 83m. Total number of samples were collected & analyzed. The grade of iron ore ranges from 36.58 to 59.50%Fe. Zone (B) – covering 3 pits with max depth

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		ii) Topo-grid/triangulation stations/ identified fiducially linking in the maps.	of ore body is 29m and 9 no. of BH with max depth of 96.10m.Total number of samples were collected & analyzed. The grade of iron ore ranges from 36.58% to 62.17%Fe. Zone(C) – covering 4 pits with max depth of ore body is 115m and 4 no. of BH with max depth of 72.0m.Total number of samples were collected & analyzed. The grade of iron ore ranges from 52.96 to 63.52%Fe Detailed geological survey has been done. Mapping has bean done on 1:1000. Detailed topographical cum geological map including all required features has been prepared. Triangulation stations have been linked with spherical co-ordinates.
	2	**Geochemical survey**: Detailed grid pattern sampling and analysis.	Not done
	3	**Geophysical survey** : Detailed and specific borehole geophysical survey	As the geological study was carried out by study the open pits and exploration done, Geophysical survey is not necessary.
	4	**Technological** 1. Pitting-2.5 per Sq. KM. For sample deposit 2. Trenching- At spacing of 200-300m 3. Drilling – Closer spaced (with definite grid pattern) than that for G2 category); a) For coal density of boreholes to be 12 to 15 per sq.KM depending on the complexities for geo-structural proving. b) For opencast project grid spacing may be 100x50m depending on the geology, weather mantle cover, burning nature of coal seams. 4. Exploratory mining and check drilling results if possible;	It is a working mine and number of pits are opened for the production of iron ore. Surface exposures have been found, exploration by putting boreholes was carried out. number of pits were opened which later on converted into quarries. These workings show presence of iron ore on its faces. Also, the mineralized zone has been demarcated based on the surface exposures as well as boreholes drilled.
	5	**Sampling** – systematic pit and trench sampling core and sludge sampling for laboratory scale and bulk sample for the pilot plant scale beneficiation studies	Total number of samplings has been done which were analyzed. The iron ore is ranges from 36.58% to 63.52%Fe Laboratory scale sampling has been done.
	6	**Petrographic and mineragraphic study:** Refining of data on the petrographic character of rocks of the deposit and its surroundings, alternations (if any), including study of grain size texture gangue and its liberation characteristics for further refining of data.	It is not done

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	7.	Geo statistical analysis of borehole data, thickness of ore, waste encountered in holes, assays values of samples if considered necessary.	Not done
F1 (Feasibility study)	1.	Geology: Geology of area and project, detailed exploration, closed spaced drilling; ore body modeling, bulk samples for beneficiation, geotechnical and ground water & surface water studies to be carried out depending upon coal qualities.	Detailed geological studies have been carried out on the basis of quarries and exploration. There is no surface water body in the area. Only during the rainy season rain water flows from higher level to lower level in the area.
	2.	**Mining:** Mining plan, mine recoveries and efficiencies, equipment selection, manpower requirement.	It is a working mine and number of pits are opened for the production of iron ore. Mining will be done by fully mechanized mining method with the use of HEMM as per approved mining plan.
	3.	**Environment:** EIA studies and EMP including socio-economic impact, rehabilitation of project affected persons, waste disposal/ reclamation, detailed land use data.	EIA/EMP studies and EMP study of the mine is carried out and on that basis EIA/EMP report was submitted to MOEF for EC. Lessee has got EC from MOEF for the production capacity of 0.403mtpa. NOC from State Pollution Control Board has also been obtained. For 10MTPA production capacity the EC is under process at MoEF, GOI.
	4.	**Forest Clearance**	Forest Clearance for broken up area is obtained.
	5.	**Processing :** Pilot scale/industrial scale investigation data, list of equipment, manpower and environmental considerations like waste disposal of tailing etc.	It is planned to process the entire ROM in the Mobile crushing & screening unit to make the final finished product. As per requirement of the consuming industries, it has been planned to make finished product of sized iron ore of 10-30mm, 5-18mm and 0–5mm. After processing about 6% fines of less than 45%Fe will be generated. This material is considered as waste and shall be dumped separately. Rest finished product is saleable. So, 94% recovery is envisaged from ROM.
	6.	**Infrastructure and services, construction activities:** Full details	Full details have been incorporated in Chapter – 9.0 of the mining plan.
	7.	**Costing :** Detailed break-up of capital cost, operating cost, details of working capital	Detailed break-up of capital cost, operating cost, working capital etc. are regularly done by the Chartered Accountant.
	8.	**Marketing :** Overview, specific market aspects	The finished product will be sold to consuming parties.

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	9.	**Economic Viability :** Cash flow forecast, inflation affects sensitivity studies.	It is done by the chartered accountant.
	10	**Other factors :** Statutory provisions relating to labour, land, mining, taxation etc.	Supplementary lease deed executed in favor of the lessee. All statutory provisions have been taken care of in the mining plan and will be regularly complied with.
E1 (Economic)	1.	**Detailed exploration.**	Detailed exploration was carried out in the broken up area. Further, exploration is proposed in un-diverted forest area which shall be done after getting the forest land.
	2	**Mining report / mining plan / working mines**	Mining plan and Scheme of mining for this mine were prepared and approved from time to time. This mining plan is prepared for the renewal purpose and submitted to IBM for its approval.
	3.	**Specific end-use grades of reserves (above economic cut-off grade).**	In the present case, ROM produced from the mine will be treated in the crushing & screening unit from where different sizes of finished product shall be produced. The grade of these finished product will be +52% and +58% Fe. These end products are saleable in the present market scenario.
	4.	**Specific knowledge of forest/non-forest and other land use data.**	The entire area falls within the Reserved forest and lessee has obtained forest clearance over 13.960 ha of forest land. Further, lessee has applied for forest clearance for the rest of the area which is under process. Land use of the area and land likely to be degraded at the end of this plan period and at conceptual period has been calculated and given in Chapter – 4.

For (121) category of Mineral Reserve (for entire area)

UNFC axis and code		Guideline	Studies Done
G1 (Detailed Exploration)	1	**Geological survey:** iii) Mapping for coal, mapping 1:5000; for other minerals 1:1000 ii) Preparation of detailed topographical-cum-geological map including all surface geological features, extent of deposit, structure, location of boreholes, assay plan and sections of exploratory mine development and borehole data. iv) Topo-grid/triangulation stations/	Detailed exploration was carried out. The mineralization zone has been divided into three zones. Zone (A) – covering 4 pits with max depth of ore body is 40m and 7 no. of BH with max depth of 83m. Total number of samples were collected & analyzed. The grade of iron ore ranges from 36.58 to 59.50%Fe. Zone (B) – covering 3 pits with max depth of ore body is 29m and 5 no. of BH with

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		identified fiducially linking in the maps.	max depth of 96.10m.Total number of samples were collected & analyzed. The grade of iron ore ranges from 40.16 to 62.17%Fe. Zone(C) – covering 4 pits with max depth of ore body is 115m and 4 no; of BH with max depth of 72.0m.Total number of samples were collected & analyzed. The grade of iron ore ranges from 52.86 to 63.52%Fe. Detailed geological survey has been done. Mapping has been done on 1:1000. Detailed topographical cum geological map including all required features has been prepared. Triangulation stations have been linked with spherical co-ordinates.
	2.	**Geochemical survey**: Detailed grid pattern sampling and analysis.	Not done
	3.	**Geophysical survey** : Detailed and specific borehole geophysical survey	As the geological study was carried out by study the open pits and exploration done. Geophysical survey is not necessary.
	4.	**Technological** 1. Pitting-2.5 per Sq.km. For sample deposit 2. Trenching- At spacing of 200-300m 3. Drilling – Closer spaced (with definite grid pattern) than that for G2 category): a) For coal density of boreholes to be 12 to 15 per sq.KM depending on the complexities for geo-structural proving. b) For opencast project grid spacing may be 100x50m depending on the geology, weather mantle cover, burning nature of coal seams. 4. Exploratory mining and check drilling results if possible;	It is a working mine and number of pits are opened for the production of iron ore. Surface exposures have been found, exploration by putting boreholes was carried out, number of pits were opened which later on converted into quarries. These workings show presence of iron ore on its faces. Also, the mineralized zone has been demarcated based on the surface exposures as well as boreholes drilled.
	5.	**Sampling** – systematic pit and trench sampling core and sludge sampling for laboratory scale and bulk sample for the pilot plant scale beneficiation studies	Total number of samplings has been done which were analyzed. The iron ore is ranges from 36.58% to 63.52%Fe. Laboratory scale sampling has been done.
	6.	**Petrographic and mineragraphic study:** Refining of data on the petrographic character of rocks of the deposit and its surroundings, alternations (if any). Including study of grain size texture gangue and its liberation characteristics for further refining of data.	It is not done

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	7.	Geo statistical analysis of borehole data, thickness of ore, waste encountered in holes, assays values of samples if considered necessary.	Not done
F2 (Feasibility study)	1.	Geology: Geology of area and project, detailed exploration, closed spaced drilling; ore body modeling, bulk samples for beneficiation, geotechnical and ground water & surface water studies to be carried out depending upon iron qualities.	Detailed geological studies have been carried out on the basis of quadrid grid exploration. There is no surface water body in the area. Only during the rainy season rain water flows from higher level to lower level in the area.
	2.	**Mining:** Mining plan, mine recoveries and efficiencies, equipment selection, manpower requirement,	It is a working mine and number of pits are opened for the production of iron ore. Mining will be done by fully mechanized mining method with the use of HEMM as per approved mining plan.
	3.	**Environment:** EIA studies and EMP including socio-economic impact, rehabilitation of project affected persons, waste disposal/ reclamation, detailed land use data.	EIA/EMP studies and EMP study of the mine is carried out and on that basis EIA/EMP report was submitted to MOEF for EC. Lessee has got EC from MOEF for the production capacity of 0.403mtpa. NOC from State Pollution Control Board has also been obtained. For 10MTPA production capacity along with 4.5 MTPA beneficiation plant the EC is under process at MoEF, GOI.
	4.	**Forest Clearance**	Forest Clearance for entire area is under process.Stage-1 forest clearance is at final stage.
	5.	**Processing :** Pilot scale/industrial scale investigation data, list of equipment, manpower and environmental considerations like waste disposal of tailing etc.	It is planned to process the entire ROM in the Mobile crushing & screening unit to make the final finished product. As per requirement of the consuming industries, it has been planned to make finished product of sized iron ore of 10-30mm, 5-10mm and 0–5mm. After processing about 6% fines of less than 45%Fe will be generated. This material is considered as waste and shall be dumped separately. Rest finished product is saleable. So, 94% recovery is envisaged from ROM.
	6.	**Infrastructure and services, construction activities:** Full details	Full details have been incorporated in Chapter – 9.0 of the mining plan.
	7.	**Costing :** Detailed break-up of capital cost, operating cost, details of working capital	Detailed break-up of capital cost, operating cost, working capital etc. are regularly done by the Chartered Accountant.
	8.	**Marketing :** Overview, specific market aspects	The finished product will be sold to consuming parties.

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	9.	**Economic Viability :** Cash flow forecast, inflation affects sensitivity studies.	It is done by the chartered accountant.
	10	**Other factors :** Statutory provisions relating to labour, land, mining, taxation etc.	All statutory provisions have been taken care of in the mining plan and will be regularly complied with.
E1 (Economic)	1.	**Detailed exploration.**	Detailed exploration was carried out in the broken up area. Further, exploration is proposed in un-diverted forest area which shall be done after getting the forest land.
	2	**Mining report / mining plan / working mines**	Mining plan and Scheme of mining for this mine were prepared and approved from time to time. This mining plan is prepared for the renewal purpose and submitted to IBM for its approval.
	3.	**Specific end-use grades of reserves (above economic cut-off grade).**	In the present case, ROM produced from the mine will be treated in the crushing & screening unit from where different sizes of finished product shall be produced. The grade of these finished product will be +52% and +58% Fe. These end products are saleable in the present market scenario.
	4.	**Specific knowledge of forest/non-forest and other land use data.**	The entire area falls within the Reserved forest and lessee has obtained forest clearance over 13.960 ha of forest land. Further, lessee has applied for forest clearance for the rest of the area which is under process. Land use of the area and land likely to be degraded at the end of this plan period and at conceptual period has been calculated and given in Chapter – 4.
Though there is no forest clearance for entire area, as per UNFC guide line it is coming under the Exceptional Economic (conditional Economic) i.e. E1 Code.			

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For (122) category of Mineral Reserve:

UNFC axis and code		Guideline	Studies Done
G2 (Detailed Exploration)	1.	**Geological survey:** v) Mapping for coal, mapping 1:5000; for other minerals 1:1000 ii) Preparation of detailed topographical-cum-geological map including all surface geological features, extent of deposit, structure, location of boreholes, assay plan and sections of exploratory mine development and borehole data. vi) Topo-grid/triangulation stations/ identified fiducially linking in the maps.	From the study of the surrounding mines of this region, it observed that the iron ore body continues further in this region. Thus, based on that, the lateral influence of 50 mtr has been taken from the proved limit matching with the depth of the proved mineralization of bore hole and existing quarry.
	2.	**Geochemical survey**: Detailed grid pattern sampling and analysis.	Not done
	3.	**Geophysical survey** : Detailed and specific borehole geophysical survey	As the geological study was carried out by study the open pits and exploration done, Geophysical survey is not necessary.
	4.	**Technological** 1. Pitting-2.5 per Sq.KM For sample deposit 2. Trenching- At spacing of 200-300m 3. Drilling – Closer spaced (with definite grid pattern) than that for G2 category); a) For coal density of boreholes to be 12 to 15 per sq.KM depending on the complexities for geo-structural proving. b) For opencast project grid spacing may be 100xx50m depending on the geology, weather mantle cover, burning nature of coal seams. 4. Exploratory mining and check drilling results if possible;	The mineralized zone has been demarcated based on the surface exposures as well as boreholes drilled. It has been observed that ore body is continuing even at the closure of the boreholes. Keeping in view the exploration data and the behavior of the ore body, further 50 mtr has been taken from the proved limit matching with the depth of the proved mineralization of bore hole and existing quarry.
	5.	Sampling – systematic pit and trench sampling core and sludge sampling for laboratory scale and bulk sample for the pilot plant scale beneficiation studies	Samples from the working quarries & virgin area were collected and analyzed from time to time.
	6.	Petrographic and mineragraphic study: Refining of data on the petro graphic character of rocks of the deposit and its surroundings, alterations (if any), including study of grain size texture gangue and its liberation characteristics for further refining of data.	It is not done

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	7.	Geo-statistical analysis of borehole data, thickness of ore, waste encountered in holes, assays values of samples if considered necessary.	Not done

The lessee has drilled 23 bore holes during 2010-13. Due to earlier mining operation there are 11 numbers of quarries/pits existing within the ML area. Based on these drilled borehole data and the data of existing pits, measured resource has been estimated. The depth of quarry floor and base of the bore hole where the mineralization ends has been considered as the depth of measured ore zone (331). However, the thickness of the ore body is variable from section to section. Further, a lateral influence of 25m in both side from the quarry edge or borehole has been considered for estimation of the resource/reserve under G1 code.

F2 (Pre-Feasibility study)	1.	**Geology:** Geology of area and project, detailed exploration, closed spaced drilling, ore body modeling, bulk samples for beneficiation, geotechnical and ground water & surface water studies to be carried out depending upon coal qualities	The thickness of the ore body is considered keeping in view that it may continue further at depth. There is no surface water body in the area. Only during the rainy season rain water flows from higher level to lower level in the area.
	2.	**Mining:** Mining plan, mine recoveries and efficiencies, equipment selection, manpower requirement.	Mining will be done by fully mechanized mining method with the use of HEMM as per approved mining plan.
	3.	**Environment:** EIA studies and EMP including socio-economic impact, rehabilitation of project affected persons, waste disposal / reclamation, detailed land use data.	Lessee has got EC from MOEF for the production capacity of 0.403MTPA. NOC from State Pollution Control Board has also been obtained.
	4.	**Processing:** Pilot scale/industrial scale investigation data, list of equipment, manpower and environmental considerations like waste disposal of tailing etc.	It is planned to process the entire ROM in the Mobile crushing & screening unit to make the final finished product.
	5	**Infrastructure and services, construction activities:** Full details	Full details have been incorporated in Chapter – 9.0 of the mining plan.
	6.	**Costing :** Detailed break-up of capital cost, operating cost, details of working capital	Detailed break-up of capital cost, operating cost, working capital etc. are regularly done by the Chartered Accountant
	7.	**Marketing :** Overview, specific market aspects	The finished product will be sold to consuming parties.
	8.	**Economic Viability :** Cash flow forecast, inflation affects sensitivity studies.	It is done by the chartered accountant.

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	9.	**Other factors :** Statutory provisions relating to labour, land, mining, taxation etc.	All statutory provisions have been taken care of in the mining plan and will be regularly complied with.
As the supplementary lease deed has been executed in favor of lessee and the govt has granted permission to work within broken up area the feasibility study axis within the broken up area has been kept under F1 category. However, to work beyond the broken up area, the lessee will have to obtain forest clearance over the said area. As the lessee cannot work outside the broken up area; therefore, the reserve under this category has been kept under the code F2.			
E1 (Economic)	1.	**Detailed exploration.**	Detailed exploration was carried out in the granted forest area only.
	3.	**Specific end-use grades of reserves (above economic cut-off grade).**	In the present case, ROM produced from the mine will be treated in the crushing & screening unit from where different sizes of finished product shall be produced. Based on previous extraction of Iron ore in the area, the grade of iron ore is assumed to be the same.
	4.	**Specific knowledge of forest/non-forest and other land use data.**	The entire area falls within the Reserved forest and lessee has obtained forest clearance over 13.960 ha of forest land. Further, lessee has applied for forest clearance for the rest of the area which is under process. Land use of the area and land likely to be degraded at the end of this plan period and at conceptual period has been calculated and given in Chapter – 4.
Though there is no forest clearance for entire area, as per UNFC guide line it is coming under the Exceptional Economic (conditional Economic) category. Therefore, E1 Code has been given for the resource.			

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CHAPTER-II

2.0 MINING

Opencast Mining

2.1 Briefly describe the existing as well as proposed method for excavation with all design parameters indicating on plans /sections.

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The Mining plan has been approved up to 31.03.2018. As per the MMDR (Amendment) Act 2015, the supplementary lease deed has been executed and the lease period has been extended upto 31.03.2020. At present the lessee is having permission to work within broken up area of 13.960Ha for a capacity of 0.403million ton of iron ore per annum. Based on the permission, the lessee has now started operation within 13.960Ha. Further, the lessee has obtained TOR for the enhanced production capacity of 10.0MTPA of iron ore.

Existing Quarries:

Mining operation in this lease area is going on after the lease was executed. Continuation of mining operation in the area has opened up 11 numbers of quarries. During the last approved scheme period, production of iron ore was proposed maximum @ 0.403 mtpa ROM and on that basis, lessee has applied for EC. MOEF has granted EC for the said production.

The area is potential for iron ore which is proved by existing open pits. There are total eleven numbers of pits. At present, total 13.960 ha area has been broken due to mining and allied activities, out of which, 12.581 ha comes under excavation due to pits. During the preparation of plans, it was found that the topography and contour value within the lease area was not matching. There is about 30m difference in the contour value. Thus, the entire lease area is freshly surveyed and then based on the up-dated features and contour value, final maps have been prepared. The dimensions of these pits are given below:

DIMENSION OF EXISTING QUARRY OF GHATKURI IRON ORE MINE

NAME OF QUARRY	LENGTH (M)	WIDTH (M)	TOP R.L (M)	BOTTOM R.L (M)
SAGWAN PIT	85	65	631.00	593.00
SAGWAN PIT A	38	06	629.00	621.00
BOTTOM PIT	265	90	701.00	652.00
BOTTOM PIT A	26	07	674.00	668.00
TIGER PIT	214	55	549.00	520.00
TIGER PIT A	93	20	566.00	564.00
TIGER PIT B	25	12	536.50	533.00
RURI PIT	350	110	610.00	495.00
KADAM KOCHA PIT	95	40	588.00	556.00
LUCKY PIT	115	22	774.00	761.00
ULIKOCHA PIT	64	28	662.00	624.00

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Existing method of mining:

The mining operation in this area was initially carried out by open cast manual mining method which later on converted by adopting the mechanized opencast mining method with the use of Excavator, Pay Loader, Air Compressor, Jackhammer, dumpers etc. Later on, this mine was categorized under Category – A (OTFM) but after getting the EC and consent to operate from JSPCB, the mining operation in the area was resumed from 20.01.2013 and the work was carried out by fully mechanized method by deploying HEMM, deep hole drilling by wagon drill, screening & crushing unit etc. As such, during this plan period, the same method of mining is proposed and thus the mine has been categorized under Category – A (fully mechanized). Due to restriction of granted forest area, total five quarries were worked during the approved scheme period for the production of ROM @ 0.403 mtpa.

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Bench Parameters:

Keeping in view the production target within the broken area in the year 2017-18, it is proposed to keep the bench height at 6.0m with width 10m.However, outside the broken up area during 2018-19 onwards, the bench height will be kept at 10m with width 15m. The individual slope will be kept at 80^0. It has been planned to produce 0.403mt of iron ore from broken up area. After obtaining Forest Clearance over additional area and environment clearance for 10MTPA, production of 10MTPA capacity will be achieved during 2019-20. The haulage roads of 10m width and 1 in 16 gradient and ramp of 12m width and 1 in 10 gradients have been made and maintained to reach the quarry floor. The benches of the proposed quarry will serve the purpose of haul road for plying the machines.

Proposed Method of Mining:

In this plan period, Fully Mechanized opencast Method will be adopted by engaging HEMM like Excavator, Pay Loader, Air Compressor, Wagon drill, Hydraulic drill, dumpers etc for the excavation and production of ROM. Production planning has been envisaged for the financial year 2018-19 to 2019-20.

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From 2018-19 onwards, production target shall be enhanced gradually from 5.0 MTPA (2018-19) to max 10.0 MTPA (2019-20) which can be achieved by extending the existing quarries laterally as well as in depth. This enhanced production target can only be achieved after getting the forest clearance over total area as well as the environment clearance for the said production. Drilling and blasting shall be used only in hard patches which account only 70% of the total excavation.

A mobile crusher of 1x200TPH and screen plant of 2x250 TPH exists in the lease area to process the ROM produced from the mine. Lessee has obtained the "Consent to Operate" from JSPCB for 1x250TPH crusher and 2x250 TPH mobile screen plant. Presently, this mobile crusher & screening unit is located at Tiger pit which shall be shifted to different quarries as per the requirement.

The selection of quarries during this mining plan period is based on the data of recent exploration carried out in the area which gives a promising result and thus selected for future development. It can be seen from the analysis result of boreholes that the average grade of ROM is +55%Fe. As such, total excavation (ROM) shall be considered under production and thus there will be no generation of overburden waste.

Due to demand of size iron ore by consuming industries, it is proposed that total excavated ROM of +55% Fe grade shall be treated into the mobile crushing/screening unit within the lease area from where the finished product of 10-30mm, 5-18mm and fines shall be produced. The recovery of the saleable finished product is considered @ 94%.

The detail of development schedule and the parameters considered pertaining to recovery and conversion factor is given below.

Parameters considered:

a) ROM (+55% Fe) = 100% of excavation.

b) Tonnage factor = 1 cum = 3.0 MT.

c) The ROM produced from the mines shall be treated in the crushing/screening unit to get the sized iron ore. The recovery of finished product is 94% of the total ROM. Rest 06% is waste with -45%Fe grade. The recovery by volume and grade from the ROM is given below

Finished product after screening	Economic viability	Recovery by volume (%)	Average Grade Fe
10 – 30mm (sized ore)	Saleable	35	+55%
5 – 18mm (sized ore)	Saleable	15	+55%

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0– 5mm (fines)	Saleable	10	+55%
0– 5mm (fines)	Saleable	34	+45 to -55%
0 – 5mm (fines) - waste	Non-saleable	06	<45%
Total		100	

d) Conversion factor for waste considered = 1 cum = 2.6 MT.

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The details of operating system of the mines will be as follows:

- **Drilling & Blasting**

Loosening of rock mass was done by drilling & blasting. For this purpose wagon drill of 100mm dia is being used with burden and spacing of 3.0m and 3.5m respectively. Rock breaker will be used for breaking the boulder size material.

The area contains lateritic ore which requires drilling & blasting. As the strata is hard, ore and O.B. benches will be made and maintained at 10.0m height and width more than the height of bench. Seperate benches for O.B. and ore shall be maintained wherever possible. The hard, ore body will be drilled by LM 100mm drill machine and then blasted.

- **Excavation and loading**

Heavy Earth moving Machinery has been deployed, within the mines to produce required production of ore and its transportation. For excavation and loading 2.1 Cu.m to 4.3 cum capacities excavator will be used within the mine site.

- **Pit Road Layout**

The layout of roads for haulage of ore/ waste will be developed complying with the statutory regulations stipulated in the Metalliferrous Mines Regulations, 1961. The main haul roads shall generally be of 15m width. the width of 30-60 ton dumper envisaged for haulage of material being about 10m. Road gradient shall generally be maintained at 1 in 16, except in cases of ramps, where gradient of up to 1 in 12 may have to be provided, due to space constraints.

- **Transportation: (For Ore & Waste):**

Transportation of ore is carried out by the 30-60t capacity dumper. The, total production of ore shall be directly transported to the stock yard for sorting & sizing

- **Working Schedule**

After allowing for 52 Sundays and 3 National holidays and 4 major holidays, the available working days in a year workout to be 306. However, the effective working days have been kept as 300 days.

- **Man power detail**

The lessee has employed 111 numbers of manpower under this project for smooth functioning of mining operation.

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(C) Enclose individual year wise development plans and sections showing pit layouts, dumps, stacks of mineral reject, if any, etc. in case of 'A' category mines. Composite development plans showing pit layouts, dumps, stacks of mineral reject, if any, etc.

Separate Year wise development plan has been attached.

Development during (2018-19):

In this year of plan period, it has been planned to work in the above three zones simultaneously by pushing the benches so formed after the excavation of 2017-18 in depth and to some extent laterally. Iron ore will be produced from both in-situ and float ore zone.

The height and width of benches will be maintained at 10m and 15m respectively. The production quantity can be obtained after getting the final stage forest clearance and environment clearance. The generation of overburden will be nil.

During this year, 15m haul road is proposed to be developed for transportation of ore & waste. The gradient of haul road will be maintained at 1:16m. The hard patches are approx 70% of the total excavation which requires drilling & blasting. The ROM will be excavated by hydraulic excavator and wherever hard patches encountered, it will be drilled by hydraulic drill and then blasted.

The details of zone wise development will be as follows:

Particulars			Description
Bench Geometry	Height		10m
	Width		15m,
	Individual Angle		80°
Quarry development	Zone Wise production	A	2017065MT
		B	1145940MT
		C	1836240MT
	Total Excavation		4999245MT
	Name of the section along which Zone wise development will be done	A	2448150,2448200,2448240,2448300 & 2448350 N
		B	2448100,2448150,2448200,2448240 & 2448300N
		C	2449200,2449300,2449400 7 2449450 N
	Direction of advancement		Both laterally and depth-ward
	Top RL(Zone wise)	A	740 m
		B	576.22 m
		C	636.60 m
	Bottom RL (Zone wise)	A	682 m
		B	530 m
		C	570 m
	Overall quarry slope angle		45°

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The detail of bench-wise excavation is given below and shown in development plan

Table showing Excavation during 2018-19 of plan period (ZONE-A)

Section	Bottom R.L.	Cross-sectional Area (m2)	Length of influence (m)	Total excavation (m^3)	Total excavation MT
2448150	767	130	50	6500	
	760	250	50	12500	
	672	185	55	10175	
	662	260	60	15600	
	652	250	65	16250	
	642	230	70	16100	
	632	225	90	20250	
	622	225	85	19125	
	612	225	80	18000	
	602	312	65	20280	
2448200	767	40	45	1800	
	760	80	45	3600	
	702	110	45	4950	
	692	140	45	6300	
	682	140	45	6300	
	672	130	45	5850	
	662	80	45	3600	
	652	120	45	5400	
	642	950	45	42750	
	632	1020	45	45900	
2448240	767	40	50	2000	
	760	90	50	4500	
	712	120	50	6000	
	702	220	50	11000	
	692	270	50	13500	
	682	265	50	13250	
	672	230	50	11500	
	662	460	50	23000	
	652	660	50	33000	
	642	885	50	44250	
2448300	712	60	55	3300	
	702	95	55	5225	
	692	125	55	6875	
	682	80	55	4400	
	672	115	55	6325	
	662	390	55	21450	
	652	650	55	35750	
	642	640	55	35200	
2448350	712	40	50	2000	
	702	115	50	5750	
	692	110	50	5500	
	682	120	50	6000	
	672	180	50	9000	
	662	460	50	23000	
	652	530	50	26500	
2448400	702	96	75	7200	
	692	62	75	4650	
	682	280	75	21000	
Total				672355	2017065

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Table showing Excavation during 2018-19 of plan period (ZONE-B)

Section	Bottom R.L.	Cross-sectional Area (m2)	Length of influence (m)	Total excavation (m^3)	Total excavation MT
2448100	550	100	75	7500	
	540	360	75	27000	
	530	310	75	23250	
	520	250	75	18750	
2448150	550	60	50	3000	
	540	300	50	15000	
	530	300	50	15000	
	520	360	50	18000	
2448200	560	40	45	1800	
	550	250	45	11250	
	540	400	45	18000	
	530	670	45	30150	
	520	940	45	42300	
2448240	560	40	50	2000	
	550	180	50	9000	
	540	390	50	19500	
	530	640	50	32000	
2448300	570	50	60	3000	
	560	80	50	4800	
	550	310	40	12400	
Total				313700	941100

FLOAT ORE							
Development 2018-19 (Zone-B)							
Section	Bottom R.L.	Cross-sectional Area (m2)	Length of influence (m)	Volume of Excavation (m3)	Production of ore (m^3) @ 60% Recovery	Production of ore (MT) @ 3.0TCF	Generation of waste in m3 @ 40% of total excavation
2448100	550	210	75	15750	9450	28350	6300
	540	40	75	3000	1800	5400	1200
2448150	550	160	50	8000	4800	14400	3200
	540	110	50	5500	3300	9900	2200
2448200	560	130	45	5850	3510	10530	2340
	550	180	45	7200	4320	12960	2880
	540	170	45	7650	4590	13770	3060
	530	240	45	10800	6480	19440	4320
	620	180	45	8100	4860	14580	3240
2448240	560	130	50	6500	3900	11700	2600
	550	180	50	8000	4800	14400	3200
	540	180	50	9000	5400	16200	3600
	530	65	50	3250	1950	5850	1300
2448300	560	160	60	9600	5760	17280	3840
	550	140	40	5600	3360	10080	2240
Total						204840	45520

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Development 2018-19 (Zone-C)

Section	Bottom R.L.	Cross-sectional Area (m2)	Length of influence (m)	Total excavation (m^3)	Total excavation MT
2448900	570	20	80	1600	
	560	160	80	12800	
	550	310	80	24800	
	540	340	80	27200	
	530	310	80	24800	
2449000	580	30	80	2400	
	570	90	100	9000	
	560	245	100	24500	
	550	175	100	17500	
	540	110	100	11000	
	530	80	100	8000	
2449100	580	175	100	17500	
	570	235	100	23500	
	560	195	100	19500	
	550	105	100	10500	
	540	120	100	12000	
2449200	610	90	80	7200	
	600	110	80	8800	
	590	230	80	18400	
	580	640	100	64000	
	570	795	100	79500	
2449300	630	50	80	4000	
	620	315	80	25200	
	610	550	100	55000	
	600	570	100	57000	
Total				565700	1697100

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Development 2018-19 (Zone-C)

FLOAT ORE

Section	Bottom R.L.	Cross-sectional Area (m2)	Length of influence (m)	Volume of Excavation (m3)	Production of ore (m^3) @ 60% Recovery	Production of ore (MT) @ 3.0TCF	Generation of waste in m3 @ 40% of total excavation
2448900	570	145	80	11600	6960	20880	4640
	560	145	80	11600	6960	20880	4640
	550	70	80	5600	3360	10080	2240
2449000	580	125	80	10000	6000	18000	4000
	570	170	100	17000	10200	30600	6800
	560	35	100	3500	2100	6300	1400
2449100	580	180	100	18000	10800	32400	7200
Total						139140	30920

SUMMARISED STATEMENT OF ROM PRODUCTION

Year	Zone A	ZONE-B	ZONE-C	Total Excavation (MT)
2018-19	2017085	1145940	1836240	4999245

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SUMMARISED STATEMENT OF ZONEWISE GENERATION OF WASTE (INCLUDING FLOAT ORE ZONE)

Year	Zone A	ZONE-B	ZONE-C	Total
2018-19	121024	114276	141094	376394

Table showing production of finished product & Generation of waste (2018-19)

Year	Total excavation MT (+45% Fe) (A)	Saleable Iron Ore in MT			Sub-grade/ Mineral rejects	Waste (0-10)mm @ 6%
		Sized (10-30) mm (+65%Fe) 35% of A	Sized (5-15) mm (+65% Fe) 15% of A	Fines (0-5) mm (+65% Fe) 10% of A	Fines (0-10) mm (+45 to -65% Fe) 34% of A	
2018 -19	4999245	1749736	749886.75	499924.5	1699743.3	299954.7

Note: "The waste generation after processing of ROM will be @ 6% i.e. 299954.7MT. Waste generation from float ore zone from Zone-B and C will be @ 40% i.e. 76440MT. Hence total waste generation during 2018-19 will be 376394.7 MT.

Table showing quarry position at the end of 2018-19

Name of the Zone/ Quarry		Existing dimension					Dimension at the end of 2018-19				
		Length (m)	Width (m)	Height (m)	Top R.L. (m)	Bottom R.L. (m)	Length (m)	Width (m)	Height (m)	Top R.L. (m)	Bottom RL (m)
Zone-A		336	167	80	712	852	370	160	120	722	602
Zone-B		283	106	23	543	520	288	130	60	580	520
Zone - C	Rudi Pit	355	250	116	611	495	535	180	135	630	495
	Sagwan Pit	116	76	43	630	587					
	Sagwan Pit-A	77	16	9	629	620					
	Kadam Kocha	128	55	32	588	556	All the four quarries will be merged during this year				

Development during 2019 – 20:

In this year of plan period, it has been planned to work in the above three zones simultaneously by pushing the benches so formed after excavation during 2018-19 in depth and to some extent laterally. Iron ore will be produced from all the three zones.

The height and width of benches will be maintained at 10m and 15m respectively. However, after two alternative benches the width of each bench will be kept at 20m to maintain the slope. The targeted production can be obtained after getting the final stage forest clearance. The generation of overburden will be nil.

During this year, 15 and 20m haul road is proposed to be developed for transportation of ore & waste. The gradient of haul road will be maintained at 1:12m. The hard patches are approx 70% of the total excavation which requires drilling & blasting. The ROM will be excavated by hydraulic excavator and wherever hard patches encountered, it will be drilled by hydraulic drill and then blasted.

Particulars		Description
Bench Geometry	Height	10m
	Width	15m, However, after two benches 3rd bench will be 20m to maintain the gradient of the quarry.
	Individual Angle	60°

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Quarry development	Zone Wise production	A	4126260MT
		B	2003800MT
		C	3869940MT
	Total excavation		10000000 MT
	Name of the section along which Zone wise development will be done	A	2448150,2448200,2448240,2448300,2448350 & 2448400N
		B	2448100,2448150,2448200,2448240,2448300& 2448350 N
		C	2448900,2449000,2449100,2449200,2449300,2449400 & 2449450 N
	Direction of advancement		Both laterally and depth-ward
	Top RL(Zone wise)	A	742 m
		B	600 m
		C	617 m
	Bottom RL (Zone wise)	A	602 m
		B	520 m
		C	490 m
	Overall quarry slope angle		45°

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Table showing Excavation during 2019 -20 of plan period (ZONE A)

Section	Bottom R.L.	Cross-sectional Area (m2)	Length of influence (m)	Total excavation (m³)	Total excavation MT
2448150	692	98	80	7840	
	682	202	80	16160	
	672	282	80	22560	
	662	290	80	23200	
	652	290	80	23200	
	642	240	80	19200	
	632	240	80	19200	
	622	240	80	19200	
	612	190	80	15200	
	602	190	80	15200	
2448200	732	80	50	4000	
	722	145	50	7250	
	712	195	50	9750	
	702	100	50	5000	
	692	100	50	5000	
	682	100	50	5000	
	672	50	50	2500	
	662	50	50	2500	
	652	50	50	2500	
	632	50	50	2500	
	622	700	50	35000	
2448240	732	98	70	6860	
	722	180	70	12600	
	712	162	70	11340	
	702	112	70	7840	
	692	112	70	7840	
	682	112	70	7840	
	672	62	70	4340	
	662	62	70	4340	

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	662	82	70	4340	
	652	82	70	4340	
	642	32	70	2240	
	632	844	70	59080	
	622	644	70	38080	
	722	186	70	13020	
	712	390	70	27300	
	702	380	70	26600	
	692	380	70	26600	
	682	380	70	26600	
2448300	672	330	70	23100	
	662	330	70	23100	
	652	590	70	41300	
	642	890	70	62300	
	632	1500	70	105000	
	622	1200	70	84000	
	712	476	90	42840	
	702	452	90	40680	
	692	452	90	40680	
	682	452	90	40680	
2448350	672	402	90	36180	
	662	402	90	36180	
	652	402	80	32160	
	642	1210	80	96800	
	632	910	80	72800	
	622	610	80	48800	
Total				1375420	4126260

Table showing Excavation during 2019 - 20 of plan period (ZONE-B)

Section	Bottom R.L.	Cross-sectional Area (m2)	Length of influence (m)	Total excavation (m^3)	Total excavation MT
	650	100	120	12000	
2448100	640	165	120	19800	
	630	175	120	21000	
	620	115	120	13800	
	570	90	80	7200	
	560	245	80	19600	
2448240	550	240	80	19200	
	540	240	80	19200	
	530	410	80	32800	
	520	1182	80	94560	
	570	305	80	24400	
	560	338	80	27040	
2448300	550	320	60	19200	
	540	820	60	49200	
	530	830	60	49800	
	520	470	50	23500	
	590	413.89	60	24833.4	
	580	610	60	36600	
2448350	570	890	60	53400	
	560	1020	60	61200	
	550	660	60	39600	
Total				667933	2003800

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Development 2019-20 (Zone-C)					
Section	Bottom R.L	Cross-sectional Area (m2)	Length of influence (m)	Total excavation (m^3)	Total excavation MT
2448900	520	270	110	29700	
	510	810	110	89100	
	500	765	90	68850	
	490	922	90	82980	
2449000	520	722	100	72200	
	510	785	100	78500	
	500	812	100	81200	
	490	510	100	51000	
2449100	550	180	100	18000	
	540	590	100	59000	
2449200	560	970	100	97000	
2449300	600	200	100	20000	
	590	905	100	90500	
	580	722	100	72200	
	570	420	100	42000	
2449400	610	80	75	6000	
	600	470	75	35250	
	590	1000	75	75000	
	580	720	75	54000	
	570	420	75	31500	
2449450	610	65	80	5200	
	600	75	80	6000	
	590	280	80	22400	
	580	720	80	57600	
	570	560	80	44800	
Total				1289980	3869940

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Summarized statement of production

Year	Zone A	ZONE-B	ZONE-C	Total Excavation
	In-situ ore	In-situ ore zone	In situ ore zone	
2019 -20	4126260	2003800	3869940	10000000

SUMMARISED STATEMENT OF ZONEWISE GENERATION OF WASTE

Year	Zone A	ZONE-B	ZONE-C	Total
	In-situ ore	In-situ ore zone	In situ ore zone	
2019 -20	247575.6	120228	232196.4	600000

Table showing production of finished product & Generation of waste (2019 -20)

Year	Total Excavation MT (+45% Fe) (A)	Saleable Iron Ore in MT			Sub-grade/ Mineral rejects	Waste (0-10) mm (rejects) (- 45%Fe) @ 6%
		Sized (10-30) mm (+58% Fe) 35% of A	Sized (5-18)mm (+58% Fe) 15% of A	Fines (0-5) mm (+58% Fe) 10% of A	Fines (0-10) mm (+45 to - 58% Fe) 34% of A	
2019-20	10000000	3500000	1500000	1000000	3400000	600000

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Table showing quarry position at the end of 2019-20

Name of the Quarry	Existing dimension					Dimension at the end of 2019-20				
	Length (m)	Width (m)	Height (m)	Top R.L. (m)	Bottom R.L. (m)	Length (m)	Width (m)	Height (m)	Top R.L. (m)	Bottom R.L. (m)
Zone-A (Lucky pit, ulikocha, bottom pit, bottom pit-A)	370	180	180	775	602	458	299	140	742	602
Zone-B (Tiger pit, tiger pit, -A, tiger pit-B)	288	130	80	580	520	357	210	80	600	520
Zone-C (Rudi pit, sagwan pit, sagwan pit-A Kadam kocha pit)	535	180	135	630	495	670	252	127	617	490

b) Indicate year-wise tentative Excavation in Cubic Meters indicating development, ROM, pit wise as in table below.

I. (1) In-situ Tentative Excavation

Year	Pit no.	Total tentative Excavation (Cum)	Top Soil (Cu m)	OB/SB/IB (Cum)	ROM (Cu m)		Mineral reject	ROM/Waste Ratio
					Ore (Cum)*	Mineral reject (Cum)		
1	2	3	4	5	6	7	8	8
2018-19	Zone-A	1659777	Nil	116367.2	937358.4	607051.2	Nil	1:0.070
2019-20	(Lucky pit, ulikocha, bottom pit, bottom pit-A) Zone-B (Tiger pit, tiger pit, -A, tiger pit-B) Zone-C (Rudi pit, sagwan pit, sagwan pit-A Kadam kocha pit)	3320056	Nil	230769.2	1875000	1214286	Nil	1:0.074
Total		4979832		346136.4	2812358	1821337		

Tentative tonnage and recovery factor

(a) Based on the earlier experience of mining operation, the recovery of marketable ore and their sub-grade & mineral rejects is given below:

Mineral	Marketable ore	Sub-grade	Mineral rejects
Iron ore	@ 60% of ROM (+55% Fe)	@ 34% of ROM (+45-55% Fe)	@ 6%of ROM < 45%Fe

(b) Tonnage factor for iron ore considered - 1Cum = 3.2 MT for saleable and 1 cum = 2.8 MT for S/G mineral. The tonnage factor of intercalated waste from iron ore zone 1Cu.m = 2.6 MT

In-situ Tentative Excavation

I-(2) In-situ Tentative Excavation (MT)

Year	Pit no.	Total tentative Excavation (MT)	Top Soil (MT)	IB/SB/OB Waste (MT)	ROM (MT)		Mineral reject	ROM/Waste Ratio (MT/MT)
					Ore(MT)*	Mineral reject / sub grade (MT)		
1	2	3	4	5	6	7	8	9
2018-19	Zone-A (Lucky pit, ulikocha, bottom pit, bottom pit-A) Zone-B (Tiger pit, tiger pit, -A, tiger pit-B) Zone-C (Rudi pit, sagwan pit, sagwan pit-A Kadam Kocha pit)	4999245	Nil	299954.7	2999547	1699743	Nil	1:0.079
2019-20		10000000	Nil	600000	6000000	3400000	Nil	1:0.063
Total		14999245		899954.7	8999547	5099743		

18/12/2017

क्षेत्रीय खान नियंत्रक
Regional Controller of Mines
भारतीय खान ब्यूरो
Indian Bureau of Mines

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II. Dump re-handling

During ensuing Scheme period, there is no proposal of dump re-handling.

Extent of Mechanization:

Drilling & Blasting

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a) <u>Broad blasting parameters like charge per hole, blasting pattern, charge [illegible] maximum number of holes blasted in a round, manner and sequence of firing, etc.</u>

It has been explained in chapter – I that the area contains float, soft laminated ore as well as hard massive iron ore in patches. In Ghatkuri mine, the hard patches are approx 70% of the total excavation which requires drilling & blasting. The ROM will be excavated by hydraulic excavator and wherever hard patches encountered, it will be drilled by hydraulic drill and then blasted.

<u>Requirement of Machineries during 2018-19 of plan period</u>

During 2018-19, it has been planned to produce 5.0 million tons of iron ore. The bench height and width will be maintained at 10m and 15m respectively. The same production can be achieved after getting final stage forest clearance and environmental clearance for the enhanced production. During this period, two shift operations have been envisaged to achieve the targeted production.

(a) <u>Requirement of Pneumatic Drill Machine</u>

Drilling Pattern:

Hole dia	110 mm
Bench height :	10.00 m
Avg. Burden	3.0 m
Avg. Spacing	3.50 m
Hole depth	11.0 m (sub grade drilling of 10%)
Drilling pattern	Staggered pattern

<u>Drilling parameter</u>

Diameter of the blast hole (D)	:	110 mm
Height of the bench(h)	:	10 m
Sub-grade drilling(S) (10% of the height of the bench)	:	1.0 m
Depth of the hole (d)	:	11 m
Burden (b)	:	3.0 m
Spacing (s)	:	3.5 m
Volume of earth to be broken/loosen per hole. (V), V = b x s x h	:	3.0 x 3.5 x 10 = 105 Cum

Meterage of drilling per year

The maximum volume of excavation (ROM) is estimated in the year 2018-19, out of which 80% of the hard materials need drilling and blasting and rest of the iron ore can be excavated directly by using excavator.

Max. Volume of excavation in a year 2018-19	:	1659777Cum
Volume of materials that require blasting (80% of total excavation)	:	1327822cum
Number of holes to be drilled in a year	:	1327822/105 = 12645.92Nos
Meter-age of drilling required in a year	:	12645 x 11 = 139106m

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Meter-age of drilling per drill

Hydraulic Drill		
Speed of the drill (s)	:	30 m per hour
No of working days in a year (w)	:	300
Efficiency (e)	:	80%
Number of shifts/day (n)	:	2
Effective hour per shift (h)		6.5
Meter-age of drilling to be effected/year (M) M = s x w x n x h x e	:	30 x 300 x 2 x 6.5 x 0.8 = 93600

Required drills

Total meter-age drilling per year : 139106m

Meter-age drilling per year by Hydraulic drill : 93600

Required No. of drills : 139106/93600 = 1.48(Say 2)

Hence two Hydraulic drills are sufficient to take care of the drilling requirement. However as a contingency measure one Pneumatic drill will be kept as a standby.

The ROM production during year will be 1659777cum; the bench height will be 10m and there will be used of 4.3 cum capacity of excavator and 60 Tonner capacity of dumper excluding the existence capacity.

(b) Excavation and loading

Specification of excavators		
Bucket capacity (c)	:	4.3 Cum
Bucket fill factor (f)	:	0.85
Time cycle pass at 90O swing (T1 and T2)	:	30 sec
Swell factor (s)	:	0.80
Production efficiency factor (e)	:	0.85
Job management factor (j)	:	0.85
Time scheduling		
Working days per year (w)	:	300
Number of working shifts per day	:	3
Working hours per shift	:	8
Effective working hours per day (h)	:	6.5 x 3 = 19.5
Seconds in hour (t)	:	3600
Output /4.3 Cum shovel/annum (O) O = {c x f x s x e x j x w x h x t} ÷ T1	:	(4.3 x 0.85 x 0.8 x 0.85 x 0.85 x 300 x 19.5 x 3600) / 30 = 1483038.18 say 1483038 Cum
Number of excavators required		
Maximum excavation in a year	:	1659777 Cum
Total excavation by one 4.3 Cum capacity excavator per annum	:	1483038 Cum
Requirement of excavator (For ROM)	:	1659777 /1483038 = 1.11 say 2
Total excavator required (4.3 Cum) Excavator required for feeding to screen and crusher plant	:	2 + 1(Stand by) = 3 Nos. 5.0 Nos of 1.8 Cum. capacity

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Total excavator required (4.3 Cum) Excavator required for feeding to screen and crusher plant	:	2 + 1(Stand by) = 3 Nos. 5.0 Nos of 1.8 Cum. capacity

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(C) Transportation

During the second and third year of plan period, it is calculated that 126468.90cum waste shall be generated from the processing unit. Sufficient hauling equipment will be provided to handle the entire quantity. Crushing & Screen plant area is within the lease hold area and the to & fro distance is 3.0 km from mine faces. Accordingly calculation for tipper/dumper requirement is furnished.

Loading time		
Capacity of the dumper 60 toners Volvo dumper	:	32 Cum
Rate of production of 4.3 Cum shovel per day	:	1483038/300= 4943.46 say 4944 Cum
Number of passes required for one dumper attached to 4.3 Cum shovel Dumper capacity ÷ [c x f x s]	:	32/(4.3 x 0.85 x 0.8)= 10.94 say 11 passes
To & Fro Hauling time with loading & unloading (Average hauls distance covered for to & fro 3.0 km) Average speed of the dumper taken as 15 Km/hour	:	20 minutes
Working time per dumper per day	:	19.5
Number of trips per dumper per day (0.85 is efficiency and 0.85 is Availability)	:	(19.5 x 60 x 0.85 x 0.85) / 20 = 42 trips
Total Cum per day per dumper (0.8 is the fill factor)	:	42 x 32 x 0.8 = 1075 Cum
Dumper requirement (attached to 4.3 Cum shovel)	:	4944/1075 = 4.59say 5 Nos
Total dumper required for four 4.3 Cum. shovel Dumper required for handling screen & crusher output to temporary stack yard. Loader required for handling the crusher & screen output Volvo Tipper for transporting waste outside the leese (To & fro 2.0 km)		5 plus 1 stand by. Total 6 Nos 5 Nos of 30 Ton capacity 3 Nos of 2.2 Cum Capacity 2 No of 30 Ton capecity

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Sl. No.	Plant & Machinery	Capacity	Make	Quantity in No's
1	Mobile Crushing Plant (60% of materials will be crushed)	250 TPH	Metso	03
2	Mobile Screen plant	250 TPH	Reclaimer	04
3	Drill Machine	30m/Hr	DP 1100	02
4	Drill Machine	10m/hr		01
5	Excavator	2.1 Cu M		02
6	Excavator	4.3 CuM		03
7	Excavator (for feeding to screen and crusher plant)	1.8 CuM.		07
8	Rock Breaker			01
9	Dumper-ROM Handling	60	Volvo	08
10	Dumper product handling	30 Ton		05
11	Volvo – Waste Handling	30 Ton		03
12	Wheel Loader	2.2 CuM	ZL 50/ SDLG	02 + 1 = 03 Nos
13	Diesel Tankers			02
14	Dozer		bemi	01+ 01 = 2Nos
15	Mobile Service van			01
16	Diesel Bowser (12 KL)			02
17	Water sprinkler 12 K			05
18	Water Tanker			02
19	Ambulance			01
20	DG 125 kVA			02
21	DG 380 KV			01
22	Mobile Lighting Tower			06
23	Explosive Van			01
24	Portable Weigh Bridge	60 Ton	AVERY	02
25	Light Vehicles - Jeep			15 No

Requirement of Machinery during the Fifth year (2019-20) of plan period

During 2019-20, it has been planned to produce 10.0 million tons of iron ore. The bench height and width will be maintained at 10m and 15m respectively. The same production can be achieved after getting final stage forest clearance and environmental clearance for the enhanced production. During this three shift operation has been envisaged to achieve the targeted production.

Drilling Pattern:

Hole dia.	110 mm
Bench height :	10.00 m
Avg. Burden	3.0 m
Avg. Spacing	3.50 m
Hole depth	11.0 m (sub grade drilling of 10%)
Drilling pattern	Staggered pattern

Drilling parameter

Diameter of the blast hole (D)	:	110 mm
Height of the bench(h)	:	10 m
Sub-grade drilling(S) (10% of the height of the bench)	:	1.0 m
Depth of the hole(d)	:	11 m

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Burden (b)	:	3.0 m
Spacing (s)	:	3.5 m
Volume of earth to be broken/loosen per hole. (V), V = b x s x h	:	3.0 x 3.5 x 10 = 105 Cum

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Meter-age of drilling per year

The maximum volume of excavation (ROM) is estimated in the year 2019 -20, out of which 80% of the hard materials need drilling and blasting and rest of the Iron ore can be excavated directly by using excavator.

Max. Volume of excavation in a year 2019-20	:	3320055Cum
Volume of materials that require blasting (80% of total excavation)	:	2656044 Cum
Number of holes to be drilled in a year	:	2656044/105 = 25295Nos
Meter-age of drilling required in a year	:	25295 x 11 = 278245 m

Hydraulic Drill		
Speed of the drill (s)	:	30 m per hour
No of working days in a year (w)	:	300
Efficiency (e)	:	80%
Number of shifts/day (n)	:	3
Effective hour per shift (h)		6.5
Meter-age of drilling to be effected/year (M) M = s x w x n x h x e	:	30 x 300 x 3 x 6.5 x 0.8 = 140400

Meter-age of drilling per drill

Required drills

Total meter-age drilling per year : 278245 m

Meter-age drilling per year by Hydraulic drill : 140400

Required No. of drills : 278245 /140400 = 1.98 (Say 2)

Hence two Hydraulic drills are sufficient to take care of the drilling requirement. However as a contingency measure one Pneumatic drill will be kept as a standby.

In addition, one or two Rock drills shall be kept, if required for breaking of big boulder encounter during mining operation.

The ROM production during 5th year will be 10.0 million tonne. During the year the bench height will be 10mtrs and there will be used of 4.3 cum capacity of excavator and 85 ton capacity of dumper excluding the existence capacity 4th year capacity.

(a) Excavation and loading

Specification of excavators		
Bucket capacity (c)	:	4.3 Cum
Bucket fill factor (f)	:	0.85
Time cycle pass at 90O swing (T1 and T2)	:	30sec
Swell factor (s)	:	0.8
Production efficiency factor (e)	:	0.85
Job management factor (j)	:	0.85
Time scheduling		
Working days per year (w)	:	300
Number of working shifts per day	:	3
Working hours per shift	:	8

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Effective working hours per day (h)	:	6.5 x 3 = 19.5
Seconds in hour (t)	:	3600
Output /4.3 cum shovel/annum (O) O = [c x f x s x e x j x w x h x t] + T1	:	(4.3 x 0.85 x 0.80 x 0.85 x 0.85 x 300 x 19.5 x 3600) / 30 = 1483038 Cum
Number of excavators required		
Maximum excavation in a year	:	3320055 cum
Total excavation by one 4.3 cum capacity excavator per annum	:	1483038 cum
Requirement of excavator of capacity of 4.3 cum (For RoM)	:	3320055/1483038 = 2.23 say 3 Nos
Total excavator required of capacity 4.3 cum. Excavator required for feeding to screen plant	:	3.0 (2 Nos of 2.1 cum excavator and 2 No of 4.3 Cum. excavator already exist and 1 no of 4.3 Cum excavator extra for 5th year) 5 Nos of 0.9 cum. capacity

(b) Transportation

During the fifth year of plan period, it is calculated that 230770cum waste shall be generated from the processing unit. Sufficient hauling equipment will be provided to handle the entire quantity. Crushing & Screen plant area is within the lease hold area and the to & fro distance is 3.0 km from mine faces. Accordingly calculation for tipper/dumper requirement is furnished.

Loading time		
Capacity of the dumper	:	42 cum
Rate of production of 4.3 cum shovel per day	:	1483038/300 = 4943.46 say 4944 cum
Number of passes required for one dumper attached to 4.3 cum shovel Dumper capacity ÷ [c x f x s]	:	42/4.3 x 0.85 x 0.8 = 14.3 say 14 passes
To & Fro Hauling time (Average hauls distance covered for to & fro 3.0 km) Average speed of the dumper taken as 15 Km/hour	:	20 minutes
Working time per dumper per day	:	19.5 Hours
Number of trips per dumper per day (0.85 is efficiency and 0.85 is Availability)	:	=(19.5 x 0.85 x0.85 x60) / 20 =42 trips
cum per day per dumper (0.8 is the fill factor)	:	42 x 42 x 0.8= 1411 cum
Dumper requirement (attached to 4.3 cum shovel)	:	4944 /1411 = 3.50 say 4 Nos
Total dumper required for three nos of 4.3 cum. Shovel. Dumper required for handling screen & crusher output to temporary stack yard. Loader required for handling the crusher & screen output Volvo Tipper for transporting waste outside the lease (To & fro 2.0 km)		4 of 42 cum dumpers (8 Nos of 32 cum dumper and 5 No of 17 cum. dumpers already exist and 4 Nos of 42 cum dumpers extra required for 5th year) 5 Nos of 30 ton capacity 5 Nos of 2.2 cum. Capacity 6 No of 30 Ton capacity

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(d) List of Requirement of Mining Machinery for fifth year

Sl. No.	Plant & Machinery	Capacity	Make	Quantity in No's
1	Mobile Screening and Crushing Plant	1500 TPH		3 (500TPH)
2	Mobile Crushing Plant (60% of materials will be crushed)	250 TPH	Metso	02
4	Mobile Screen plant	250 TPH	Recamier	03
5	Drill Machine	30m/Hr	DP 1100	02
6	Drill Machine	10m/hr		01
	Excavator	2.1 cum		02
7	Excavator	4.3 cum		03
8	Excavator (for feeding to screen and crusher plant)	0.9 cum.		06
9	Rock Breaker			02
	Dumper-ROM Handling	86 Ton		04
10	Dumper-ROM Handling	50	Volvo	08
11	Dumper product handling	30 Ton		10
12	Volvo – Waste Handling	30 Ton		06
13	Wheel Loader	2.2 cum	ZL 50/SDLG	05
14	Water & Diesel Tankers			06
15	Dozer		BEML	02
16	Mobile Service van			02
17	Diesel Bowser (12 KL)			03
18	Water sprinkler 12 K			06
19	Water Tanker			04
20	Ambulance			01
21	DG 125 kVA			02
22	DG 380 KV			01
	DG 500 KV			01
23	Mobile Lighting Tower			09
24	Explosive Van			01
25	Portable Weigh Bridge	60 Ton	AVERY	04
26	Light Vehicles - Jeep			15

Blasting

Type of explosive used/to be used:

To carry out blasting operation, Nitro compound explosive, Detonator (Ordinary & Electric) and safety fuse shall be used in the mine. Lessee has own Magazine within the lease area. But at present lessee has engaged M/s D. K. Ghosh of Barajamda to carry out blasting. A copy of an agreement for carry out blasting operation in the mine is enclosed as **Annexure – XXIV.**

Whether secondary blasting is needed, If so describe in brief:

Not applicable.

Storage of explosives (like capacity and type of explosive magazine):

A licensed magazine at plot no N/A, Village Tatiba has been established as per license No: E/EC/JH/22/445 (E13319) valid up to 31.03.2016. A copy of explosive license is enclosed as **Annexure – XXIV.**

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Blasting Procedure

High explosives will be loaded by deck charging. The stemming length will be one third of the depth of the blast hole. The ratio of base charge & column charge will be kept at 0.2:1. The explosive column is blasted in a 'V' type blasting pattern initiated by OD/ NONEL/ safety fuse/Detonating cord.

Hydraulic operated rock breakers fitted with hydraulic excavators are deployed for breaking of oversize boulders generated from the deep hole (large diameter) blasting. Therefore, secondary blasting is not necessitated.

Ground Vibration & Fly rock Problems & Precautions:

The following precautionary measures will be adopted for controlling fly rock movement & ground vibration.

Blasting pattern will be properly designed to reduce ground vibrations/ fly rock.

Controlled blasting technique/muffle blasting will be adopted by varying burden, spacing and charge/hole depending upon the hardness of the formations.

Loose materials will be removed from the bench floors and bench slopes before blasting.

a) Stemming length and stemming material will be optimum i.e. 1/3 of hole length and will be suitably chosen.
b) Safe ratio (stemming length to burden of hole) shall be kept at more than 0.6.
c) Stemming material will be compacted properly before blasting.

Ground Vibration & Fly rock Problems & Precautions:

- Blasting will be carried out by a person with Blaster's Certificate of Competency issued by DGMS, Dhanbad.
- Safety tools and implements that are required will be kept adequately near blasting site at the time of charging.
- Portable blasting shelters will be provided near the blasting site.
- Blasting will be preferably done during 5.00 PM to 6.00 PM depending on seasonal variation of break hours or the end of the day in order to ensure that no person or animals are within the blasting danger zone.
- Misfires will be handled carefully as per stipulated procedures.
- Proper warning system before blasting will be adopted and clearance of the area before blasting will be ensured.
- Precautionary measures as stipulated under MMR, 1961 shall be strictly followed.

Safety Aspect

The major risks associated with the project are as follows:

1. Disaster due to Slope failure.
2. Disaster due to failure of waste dump.
3. Disaster due to surface fire.

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4. Dangers due to storage of Magazine.
5. Accident due to Machineries (transportation, excavation etc.)
6. Disaster due to blasting.

The safety measures will be undertaken as per the DGMS Rule and guide line.

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d) Describe briefly giving salient features of the proposed method of working indicating category of mine.

Opencast Fully mechanized method will be adopted during ensuing scheme period. The height of the bench will be 10m and the width will be 15m or more than the bench height. The deposit will be exploited in the manner as has been proposed in the scheme of mining. Wagon drill and Pneumatic Drill will be used for drill hole for blasting. Hydraulic excavator of 2.1 Cu.m to 4.3 Cu.m bucket capacity for excavation, truck of capacity 30 and 60 tons will be used for transport of ore and overburden.

e) Describe briefly the Layout of Mine Workings, Pit road layout, the layout of faces and sites for disposal of overburden/waste along with ground preparation prior to disposal of waste, reject etc. A reference to the plans and sections may be given. UPL or ultimate size of the pit is to be shown for identification of the suitable dumping site.

• Layout of Mine Workings

It has been proposed to obtain a production of 10.0 Million Tons of iron ore per annum. At the end of the scheme period the layout of the three Zone i.e. A, B and C will be as follows:

zone	Dimension of zones at the end of 2017-18				
	Length (m)	Width (m)	Height (m)	Top R.L. (m)	Bottom R.L. (m)
Zone-A	458	299	140	742	602
Zone-B	357	210	80	600	520
Zone-C	670	252	127	617	490

• Pit Road Layout

The layout of roads for haulage of ore/ waste will be developed complying with the statutory regulations stipulated in the Metalliferrous Mines Regulations, 1961. The main haul roads shall generally be of 15m width, the width of 30-60 ton dumper envisaged for haulage of material being about 5m. Road gradient shall generally be maintained at 1 in 16, except in cases of ramps, where gradient of up to 1 in 12 may have to be provided, due to space constraints.

Sites for disposal of overburden/waste along with ground preparation prior to disposal of waste/ reject etc.

Disposal of Waste

The waste materials generated from the mine working comprises laterite, shale, clay materials in form of intercalated waste having -45% Fe occurring within the ore zone. A total of 6% waste will be generated as mineral rejects out of the volume of ore zone. Further, during excavation within float

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ore zone about 40% waste likely to be generated during plan period. Hence, total waste generation will be 980083.6MT.

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In the plan period neither any pit nor part thereof is going to be exhausted, so backfilling is not possible. A total of 376394.7 Cu.m of waste will be generated during planned period. Out of which about 40% i.e. 150557.8 cum will be utilized for road maintenance and balance 60% i.e. 225836.8 cum will be disposed of as on the proposed waste dump at the earmarked site.

Disposal of mineral reject

Four Old dumps exist within the lease area namely - ED-1, ED-2, ED-3 and ED-4 which are shown in Surface plan. The maximum height of these dumps ranges from 3m-5.85m. The analysis report of existing dumps is enclosed as Annexure-XI. From the analysis, it is clear that these four dumps comes under sub-grade and not waste. However, the quantity as well as the tonnage factor of these dumps shall be reassessed from the State Government authority and the report will be submitted to the IBM authority for its confirmation.

During this plan period, about 34% of total excavation shall be generated with average grade of (+45 to -58% Fe). Since this material is also marketable, no separate stacking of sub-grade material is proposed.

Further, there are four old dumps exist within the lease area namely - ED-1, ED-2, ED-3 and ED-4 which are shown in Surface plan. The maximum height of these dumps ranges from 3m-5.85m. From the analysis, it is clear that these four dumps come under sub-grade. The location of these dumps is shown in surface plan.

Lessee wants to dispatch this old S/G material as it is without any processing. As such, question of re-handling of material for any treatment and recovery from this material does not arise. It is proposed to despatch this material from the third year onwards i.e; in Financial years 2018-19 and 2019-20. The details of despatch schedule of existing S/G material are given below.

Table showing year-wise despatch schedule of available S/G material from old dump

Years	Quantity to be despatch (MT)
(2018-19)	55000
(2019-20)	55000
Total	**110000**

f) Conceptual Mine planning up to the end of lease period taking into consideration the present available reserves and resources describing the excavation, recovery of ROM, Disposal of waste, backfilling of voids, reclamation and rehabilitation showing on a plan with few relevant sections.

If fresh forest land shall be granted to lessee, all the resources estimated in un-diverted forest land will become a mineral reserve. The proposed production during the scheme period is 15.06 Million Tons of ROM. So, at the end of plan period, the reserve of ROM will be (23.988 – 15.06) = 8.988

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million tons. After plan period the production target will be continue @ of 10.0 million tons. As such, life of remaining reserve will be 8.988/10=0.898 years. So the total life of the mine is (2 + 1) = 3.0 years.

After obtaining the forest clearance, all the resources estimated in the ML area will be converted to mineral reserve. The proposed five years production during the Scheme period is 15.00 million tons of ROM. So, at the end of plan period, the reserve of ROM will be (171.175 – 15.00) = 156.175 million tons. After plan period the production target will be continue @ of 10.0 million tons. As such, life of remaining reserve will be 156.175/10=15.61 years say 16 years. So the total life of the mine is (2 + 16) = 18years.

However, it has been proposed to drill around 36 numbers of holes at a grid interval of 200m X 100m during plan period. Therefore the life of mines may change depending upon outcomes of proposed exploratory drill holes, cut-off grade, method of working and market demand.

The Ultimate Extent and Size of the Pit

As the lessee has applied for diversion of fresh forest land and if the same shall be granted by the forest authority, then ultimate pit limit shall be based on mineralized area marked. It has been calculated that in this case, 105.565 ha shall be degraded due to mining and allied activities and 44.1693 ha shall come under safety zones. So, entire lease area shall be utilized at conceptual stage.

Ultimate capacity of dump:

There is no (waste) dump in the area. All the reject (waste) generated after processing shall be dumped in the area earmarked within the ML area for the purpose. The waste materials generated from the mine working comprises laterite, shale, clay materials in form of intercalated waste having < 45% Fe occurring within the ore zone. A total of 6% waste will be generated as mineral rejects out of the volume of ore zone. Further, during excavation within float ore zone about 40% waste likely to be generated during plan period. Hence, total waste generation will be 980083.6MT or 376955.2cum.

Waste Generation during planned period and its disposal

Total generation of waste during planned period will be as follows :

Year	Waste (MT)			Waste in cum
	Fines (0-10) (-45%Fe) reject	Waste from float zone	Total waste	
2018 - 19	299854.7	76440	376394.7	144767.2
2019 - 20	600000.0	—	600000	230769.2
Total	899854.7	76440	976394.7	375536.4

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Disposal of waste

Year	Total waste in cum	Utilization for road maintenance	Remaining 60% will be utilized for dumping
2018 - 19	144767.2	57906.88	86860.32
2019 - 20	230769.2	92307.69	138461.5
Total	375536.4	150214.6	225321.9

Out of the total waste, about 40% i.e.150214.6cum will be utilized for road maintenance and balance 60% i.e. 225321.9 cum will be disposed of as waste at the earmarked site.

Waste Generation Beyond planned period

After processing

Total Mineable Resource (In-situ Iron ore zone) = 23987553MT
Total Excavation during Planned period = 14999245MT
Remaining Resource for conceptual period = 8988308 MT
Waste generation during conceptual period = 8988308 MT x 6%
= 539298 MT

Float Iron ore zone

Total volume of Float Iron ore zone = 471685Cum
Waste generation @ of 40% = 471685 x 40%
= 188674cum or 490552MT
Total waste generation = 539298 + 490552=1029850MT

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Waste management:

Out of the total mine waste of 1029850MT a total of 40% i.e. 411940 MT will be utilized for road construction and maintenance. The remaining waste of the mine i.e. 617910MT will be utilized for back filling over an area of 1.02 ha during conceptual period.

Sub grade stack yard

During plan period:

Above 45 % Fe to -58% Fe iron ore, which do not have the market at present, is considered as sub - grade iron ore. The sub – grade Iron ore generation in the area is estimated in the proposed Mining plan period would be 2060653MT. The details of the year-wise generation of Sub-grade are given below:

Year	Generation of Sub-grade Ore (cum)	Generation of Sub-grade Ore (MT)
2018-19	607051.2	1699743
2019-20	1214286	3400000
Total	**1821337**	**5099743**

However based on the marketability of ore the sub-grade will be blended with high grade to make it saleable grade and sold it various consuming agencies as far as practicable.

During Conceptual period:

Total Mineable Resource (In-situ Iron ore zone) = 23987553MT
Total Excavation during Planned period = 14999245MT
Remaining Resource for conceptual period = 8988308 MT
Waste generation during conceptual period = 8988308 MT x 34%
= 3056025 MT

These sub grades shall be stacked separately within the lease area. However based on the marketability of ore the sub-grade will be blended with high grade to make it saleable grade and

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sold to various consuming agencies as far as practicable. At the end of the conceptual period, there will be no sub-grade stack within the lease area.

Conceptual Exploration

The total area will be explored within scheme period. Therefore, no proposal of exploration has been envisaged during conceptual period.

Manpower:

As it is an existing mine a total of 15 numbers of managers and supervisory personnel and 96 numbers of skilled and semi-skilled persons already exist within the mines to obtained existing production capacity.

The proposed production of 10 million tons of iron ore per annum will be obtained by the employment of additional 138 personal after resumption of mining operation. About 70% of manpower will be from local area.

Machinery

For production during conceptual period same machineries/equipment of plan period will be deployed.

Afforestation

Afforestation Scheme period:

The main objective of the green belt is to provide a barrier between the source of pollution (Impact zone) and the surrounding environment. The green belt helps to capture the fugitive emissions and to attenuate the noise generated apart from improving the aesthetics. Development of green belt and other forms of greenery shall also prevent soil erosion and washing away of top soil besides helping in stabilizing the functional ecosystem, make the climate more conducive and restore water balance. Plantation along the boundary will be done as planned in the scheme of mining. Plant species will be selected in consultation with the local DFO. Local Gardner, (Mali) will be engaged for this purpose. Improvements in the green belt and green cover will be done to the best extent possible.

It is worthy to be mentioned here that the total area is coming under Reserve forest category. So in the safety zone gap plantation can be possible under the guidance of the local forest authorities Therefore, during planned period gap filling plantation has been envisaged over an area 0.50Ha.A year-wise plantation is envisaged for the five years of the mining plan period. Plantation proposed to be carried out during the five years mining plan period is given below.

Year	Location	No. of Plants	Area to be Covered (Ha)	Species of plant.	Expected Survival Rate (%)
2018-2019	In 7.5m safety zone boundary	4687	2.5	Jamun, babul, gulmohar, Teak, gamhar, siris etc	85%
2019-2020	-do-	4687	2.5	-do-	
Total		**9374**	**5.00**		

In addition to above, the lessee will maintain the safety zone over 31.638Ha.

Afforestation during conceptual period

During conceptual period it has been planned to do the plantation over the safety zone area of 31.638Ha Ha.

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Type of species to be planted:

The scheme and selection of plant species will be mainly based on the local soil conditions and social accept abilities. The plant species which preferably will be nitrogen fixers, pollution abaters, fruit bearing shall be taken up for plantation. The species recommended are Diospyros melanoxylon (Kendu), Aegle marmelos (Bel) Gmelina arborea (Gambhari), Albizzia lebek (Siris), Mangifera indica (Mango) Madhuca indica (Mahul), Syzigium cumini (Jamu).

Environmental aspects.

The afforestation programme and the reclamation proposal as a part of maintaining balance in the ecosystem. Disposal of waste has been planned with due regard to environmental implications. In order to avoid air pollution arising out of generation of dust, water spraying will be done on roads and other points where dust is likely to be generated. Dust due to blasting, however, will not be of any significance to cause set back to the air regime. The average wind speed of the area will be able to diffuse the dust quickly in the air and render it proper for inhalation.

Pollution of water regime will be caused by the run off rainwater from dumps mainly. This has been taken care of by planning a suitable settling pond in close vicinity of the dump. Similarly the ore may contaminate the ground water and surface water accumulated in the quarry floor. This contamination is expected to be so negligible that treatment of the same may not be required. Though the mines will be worked mechanically there will be use of modern machinery. So the noise pollution will not be a problem at all. The workers in the close vicinity of sources of noise like machinery, diesel pumps compressors etc. will be provided with ear protective devices.

Degradation of land is unevoidable in a surface mining operation. This has been kept into a minimum level by planning more of depth-wise extension of the quarry. Lateral extension has been kept at bare minimum necessary level.

Land Degradation

Existing Land use:

Total mining lease area 149.7343 ha. Out of which, an area of 13.960 ha was broken prior to 1980 due to different mining and allied activities. The lessee has applied for diversion over total aree.

Land use at the end of plan period:

At present land degradation due to mining activities is 13.960 hectares. Further, steps have already been taken for the diversion of total area and expected that the same shall be obtained within this year. It is anticipated that about 47.364 ha of forest land shall be degraded due to mining and allied activities by the end of this plan period. The details of land use at the end of the plan period will be as follows:

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Sl. No.	Pattern of Utilization	Existing	At the end of plan period
1	Mining	12.581	35.589
2	Dump area	0.364	3.703
3	Mine Road	0.915	0.143
4	Sub-grade stack	0	4.322
5	Camp Site, Magazine	0.100	0.100
6	Mineral processing unit	0	7.314
7	Weigh Bridge, Work shop	0	0.510
8	Exploration	0	0.005
Total		13.960	47.364

Hence, additionally 33.404 Ha is required for proposed mining and allied activities during 2018-19 and 2019-20. For the proposed land requirement the lessee has already applied for diversion of forest land over total area. The details correspondence with forest department is attached as Annexure IX. After obtaining the forest clearance, the proposed development will be carried out.

Land use at conceptual stage:

In the present case, the ultimate pit limit is same as that of existing one. But as the lessee has applied for diversion over total area and if the same shall be granted by the forest authority, then ultimate pit limit shall be based on mineralized area marked. It has been calculated that in this case, 105.565 ha shall be degraded due to mining and allied activities and 44.1693 ha shall come under safety zones. So, entire lease area shall be utilized at conceptual stage. The land use details are follows:

Sl. No.	Pattern of Utilization	Existing	During Plan period	End of Conceptual period
1	Mining & Allied activities (including processing)	12.581	42.903	98.950
2	Dump area	0.364	3.703	0.00
3	Road	0.915	0.143	1.683
4	Sub-grade stack	0.00	0.00	4.322
5	Site office & Magazine	0.100	0.100	0.100
6	Weigh Bridge, Work shop etc.	0.010	0.510	0.510
	Exploration	-	0.005	-
Sub total		**13.960**	**47.3640**	**105.565**
8	Safety zone	44.1693	44.1693	44.1693
9	Area for future mining and allied activities	91.605	58.2010	0.00
Total		149.7343	149.7343	149.7343

During planned period gap filling plantation will be done over an area of 5.00Ha within safety zone. (Ref: Environment Management Plan).

Reclamation / Afforestation

Reclamation of Mined out land

Out of the total ML area of 149.7343Ha the area of degradation under mining will be 98.950 Ha.

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Considering the present exploration data and estimated mineable reserve within the ML area, it can be observed that, none of the quarries are going to be exhausted during ensuing plan period. The ultimate quarry limit has been delineated considering the present exploration data.

The reclamation procedure will start after complete exhaust of minerals in the Pit area. Based on the present exploration data it can be observed that the tiger pit will be exhausted first during conceptual period. Therefore the reclamation will be started from the tiger quarry by means of bench plantation and back filling plantation.

During conceptual period it has been planned to reclaim the mined out land, both by means of back filling & plantation and bench plantation. Back- filling will be done at lower elevated area where as the dead benches in the hilly terrain where back filling cannot be possible will be reclaimed by means of plantation.

Out of the total mined out land of 98.950 hects an area of 6.02 Ha can be reclaimed by means of back filling and plantation and balance 92.93 Ha will be reclaimed by means of bench plantation.

Reclamation of dump

As on date, there is no waste dump within in the lease. During ensuing scheme period it has been plan to dispose of the waste material within the lease area after the exhaust of mined out land this waste dump re-handled for back filling purpose. Therefore at the end of conceptual period practically there will be no waste dump within the lease area. Hence no propose for reclamation of dump has been envisaged. However the degraded dump area will be covered under plantation.

Reclamation of other areas

The other areas like ore stack yard, road, site services, sub-grade stack etc will be reclaimed during conceptual period as under:

Pattern of Utilization	Total area at the end of Conceptual period (Ha)	Method of Reclamation
Infrastructure	0.60	Plantation
Roads	1.693	
Sub Grade Dump	4.322	
Green Belt	44.163	
Total	**50.7843**	

Post mining land use

After obtaining forest clearance 91.636 ha area shall come under excavation and entire lease area shall be utilized. Reclamation and rehabilitation by plantation of entire degraded area shall be done at that stage.

At the ultimate stage, reclamation and post mining land use pattern of the area shall emerge as follows:

i) Total 91.636 ha area shall be degraded due to excavation at ultimate stage.

ii) About 26.29Ha of area will be refilled and 65.346 Ha of the excavated area shall be rehabilitated by way of plantation at this stage on dead bench.

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iii) All the S/G material from the dumps shall be sold and there will be no surface dump at this stage.

iv) Mine roads shall be kept and handed over to the local authority for their use.

v) The entire degraded area shall be reclaimed and rehabilitated by plantation at 3 stage and handed over to the forest authority.

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vi) There will be no external surface dump at ultimate stage.

The post mining land use pattern is given below:

ENVIRONMENTAL MANAGEMENT Post Mining (conceptual) land Use Pattern of ML Area (Ha)						
POST MINING LAND USE OF CORE ZONE WITH ENV. MANAGEMENT						
S. No	Description	Land use (Ha.)				
		Plantation	Water body	Public use	Undisturbed	Total
01	Mining & Allied activities (including processing)	98.950	-	-	-	98.950
02	Dumps	-	-	-	-	-
03	Infrastructure	0.600	-	-	-	0.600
04	Roads			1.693		1.693
05	Railway Siding	-	-	-	-	-
06	Sub grade / Mineral storage	4.322	-	-		4.322
07	Green Belt/Plantation/ safety zone	44.1693	-	-	-	44.1693
08	Other Undisturbed area	-	-	-	-	-
	Total	148.0413	-	1.693	-	149.7343

Beneficiation plant will be within the mine area which will be dismantled and the area will be afforested in the post mining stage

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CHAPTER-III

3.0 MINE DRAINAGE

a) Likely depth of water table based on observations from nearby wells and water bodies.

Topographically, Ghatkuri iron ore Mine represents a hilly terrain. For this reason, ground water body is far below the ground surface of the area. The highest relief of the area is 636mRL near forest pillar -1158 in the south-western part of the lease boundary whereas lowest relief is 452mRL near forest pillar – 1107 in the north-eastern part of the lease boundary area.

There is no perennial nala within the lease hold. Nearest surface water body is the perennial Karo River, flowing from south to northeast at about 2.75 km, east of the lease hold area. Other river is the Koina River at a distance of 7.5 km NW of lease area flowing from NW to N.

The entire study area in and around the proposed project site is occupied by compact and hard rock belonging to Archaean period which are devoid of any primary porosity. The ground water in such formation occurs within the secondary porosity such as joints, fractures and bedding plains. Groundwater occurs in the weathered residuum under unconfined condition and circulates through fractures and fissures below. The weathering has lead to the formation of laterite, which is highly erratic in nature, hence irregular/discontinuous pockets of laterite is a common feature in the Iron Ore deposits. Predominantly Laterites are found as capping rock in the leasehold. Hydrogeologically, the laterites are good for holding and transmitting ground water due to its porosity and permeability.

It has been observed from the nearby wells and tube wells that the water touches at about 418mRL as such, there is no intersection of water table during mining and as such there will not be any impact on the water regime. During the recent exploration, boreholes have been sunk up to a maximum depth of 96m and nowhere water body is encountered upto 470.90mRL.

b) Workings expected to be.....m above/reach below water table by the year.....

There are total 11quarries in the lease area. The expected working depth of these quarries by the end of this plan period is given below:

Table showing depth of quarries – Existing, at the end of plan period & at the end of Conceptual period

	NAME OF QUARRY	EXISTING DEPTH (mRL)		AT THE END OF PLAN PERIOD (mRL)		AT THE END OF CONCEPTUAL PERIOD (mRL)	
		TOP	BOTTOM	TOP	BOTTOM	TOP	BOTTOM
ZONE-A	BOTTOM PIT	701.00	661.00	742 00	602.00	775.00	599.00
	BOTTOM PIT A	674.00	668.00				
	LUCKY PIT	774.00	761.00				
	ULIKOCHA PIT	662.00	624.00				
ZONE-B	TIGER PIT	549.00	520.00	60000	520.00	600.00	503.00
	TIGER PIT A	568.00	560.00				

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	TIGER PIT B	536.50	533.00				
ZONE-C	SAGWAN PIT	631.00	593.00	610.00	490.00	617.00	490.00
	SAGWAN PIT A	629.00	621.00				
	RURI PIT	610.00	495.00				
	KADAM KOCHA PIT	588.00	556.00				

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From the Table given above, it is clear that the maximum depth to be attained at [illegible] will be at 490 mRL in zone - C. As such, there is no chance of seepage of water and the quarry depth will not touch the water table within the lease.

c) **Quantity and quality of water likely to be encountered, the pumping**

As almost all the pits are located at slopes of the hill, there is no chance of inundation of pits. As stated above, the proposed working depth of quarries during the plan period excavation will not touch the water table. As such, question of encountered of water due to seepage does not arise.

(d) Describe regional and local drainage pattern. Also indicate annual rainfall, catchment area and likely quantity of Rainwater to flow through the lease area, arrangement for arresting solid wash:

Regional Drainage Pattern

There is no river or perennial stream in the area. The general drainage is through small seasonal nalas originating from the margins of the area and flows in the northern side of the area and ultimately joins Karo River. The perennial water source Karo river flows at a distance of 2.75km in the east of the project area and Koina river about 7.5 km NW of the lease boundary. The Karo River enters the buffer zone in the southern sector and flows in a SW-NE direction in jig-jag course seem to be controlled by structural discontinuities. The Karo River flows at a distance of 2.75km in the east of the project area. The Koina River originates in the western sector of the buffer zone flows in SW-NE direction (7.5 km away from the lease boundary) and leaves the buffer zone south of the Bainatu village in the northern sector of the buffer zone.

Annual Rainfall

The rain fall data has been obtained from IMD for the financial year 2009-2013. Based on the data the rain minimum Annual rainfall is 971mm during 2010 and the maximum rain fall is 1820mm during 2013. However, the average rain fall date is calculated to be 1353 mm.

Catchment area and likely quantity of Rainwater to flow through the lease area:

The total area is 149.7343Ha. However, the catchment area is coming around 70.358Ha or 7035800sqm. An average rainfall of 1353 mm has been taken into consideration for the calculation of run-off. The details of runoff per annum and the quantity of Rainwater to flow through the lease area are as follows:

- Run off co-efficient considered = 0.13
- Average annual rainfall = 1.35 m/yr
- Runoff = catchment area × Runoff coefficient × Annual rainfall
  = 7035800 Sq. m × 0.13 × 1.53 m/ year = 1398420 cu.m/yr

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The area experiences high rainfall, the site will generate above volume of run offs during such rainy periods. The surface run off from the uncovered site would contain high concentration of suspended matter and eroded matter. This may result potential impact to surface water body.

Keeping in view the evapo-transpiration and seepage into sub-surface at 40%, water flow within lease area will be 1399420 x 60% = 839652m^3 which will be allow to flow within proposed drainage system to be constructed during plan period.

The area experiences high rainfall, the site will generate above volume of run offs during such rainy periods. The surface run off from the uncovered site would contain high concentration of suspended matter and eroded matter. This may result potential impact to surface water body.

Arrangement for arresting solid wash:

Surface run off from pits if directly discharged into the river may cause siltation problem. However, protective measures like retaining wall, garland drain settling pond etc. have been proposed to be constructed in and around the proposed dump and at strategic point of quarries.

Surface Run off Management:

Details of protective measures to be constructed for the surface management has been explained in ch-IV

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CHAPTER-IV

4.0 STACKING OF MINERAL REJECT /SUB GRADE MATERIAL AND DISPOSAL OF WASTE

a) <u>Indicate briefly the nature and quantity of top soil, overburden / waste and Mineral Reject to be disposed of.</u>

In Gharkuri iron ore mine, mainly two types of waste is being generated. The waste encountered during the mining operation is as follows:

Top soil: : The area targeted for development during the plan period does not contain any topsoil. The work is concentrated within the broken area in the first year where top slice has already been removed and from 4th year onwards lateral development will be carried out after getting the additional forest land. Since, ROM (total excavation) is considered as production, there will be no generation of any topsoil during this period.

(ii) **Overburden waste-** containing laterites, shale and BHJ/BHQ.

(iii) **Intercalated waste-** It has been explained in Chapter–I that the analysis of recent exploration data shows that average grade of ROM is +55%Fe. As such, future planning is based on ROM (Total excavation). As such, during the next two years plan period, there is no generation of waste during the course of mining operation. However, it has been also mentioned in chapter-II that the ROM so produced will be treated in the mobile crushing and screening unit to make the finished product as per requirement of the consuming industries. It has been mentioned that about 60% of the finished product of +55% Fe, 34% of the finished product of +45 to -55% Fe shall be produced. Also, there will be generation of fines (0 - 10mm) with -45%Fe which is 6% of ROM. found in between the ore zone having no or negligible mineral content less than the threshold value of iron ore (i.e. below 45% Fe).

(iii) **Mineral Rejects/ Sub-grade ore**:
About 60% recovery of +58% Fe ore and 34% recovery of S/G ore (+45% to 58%Fe) is expected to be produced. The remaining 6% will be generated as waste.

The year wise generation of waste and sub-grade

Year	Top Soil (cum)		Mineral Rejects/sub-grade (cum)				Waste	
	Reuse/ spreading	Storage	Backfilling	Storage	Blending	Beneficiation	Dumping	Road maintenance
2018 -19	Nil	Nil	Nil	60705.12	546346.1	Nil	86860.3	57906.9
2019 -20	Nil	Nil	Nil	121428.6	1092857	Nil	138462	92307.7
TOTAL				182133.7	1639203		225322	150215

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b) **The proposed dumping ground within the lease area be proved for presence or absence of mineral and be outside the UPL unless simultaneous backfilling is proposed or purely temporary dumping for a short period is proposed in mineralized area with technical constraints & justification.**

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Details of existing waste dump

Four Old waste dumps exist within the lease area namely - ED-1, ED-2, ED-3 and ED-4 which are shown in Surface plan. The analysis report of existing dumps from the NABL accredited Lab is enclosed as Annexure-XI. From the analysis, it is clear that these four dumps comes under sub-grade and not waste. As such, as on date, there is no waste dump within the lease area.

Waste Generation during planned period and its disposal

Total generation of waste during planned period will be as follows :

Year	Waste (MT)			Total waste cum
	Fines (0-10) (-45%Fe) reject	Waste from float zone	Total waste	
2018 - 19	299954.7	76440	376394.7	144767
2019 - 20	600001.2		600001.0	230769
Total	**899954.7**	**76440**	**976394.7**	**375536**

Disposal of waste

Year	Total waste in cum	Waste Utilization for road maintenance (cum)	Remaining 60% will be utilized for dumping (cum)
2018 - 19	144767	57906.88	86860.32
2019 - 20	230769	92307.69	138461.5
Total	**375536**	**150214.6**	**225321.9**

Out of the total waste, about 40% i.e. 150214.6 will be utilized for road maintenance and balance 60% i.e. 225321.9 cum will be disposed of within the co-ordinate 2448080 to 2448420 and 327880 to 328120.

Location of proposed waste dump:

The waste so generated during this plan period is proposed to dump in the western part of the Tiger pit over an area of 3.58 ha which has been proved as non-mineralized zone. This proposed dump will be temporary in nature and re-handled for back filling during the conceptual period.

a) **Attach a note indicating the manner of disposal of waste, configuration and sequence of year wise buildup of dumps along with the proposals for protective measures.**

Manner of disposal of waste.

The dumping will be carried out in the re-treating fashion. After attaining the designed height, terracing and immediate plantation of the dead dump slopes shall be done. The positions of proposed dumps so formed in a year wise manner are illustrated in Dump Plan and Section, Plate No. VIII showing proposed R.L. Necessary haul roads has been made and maintained for transportation of waste material. In order to minimize the surface wash off, the maximum stable slope angle for the proposed waste dump shall be made and maintained at 28°.

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Configuration and sequence of year wise buildup of dumps

The details of utilization of waste during the plan period are as follows;

Year	Quantity of waste to be dumped (cum)	Area to be covered (m2)	Average Height (m)	Bottom R.L (m)	Top R.L (m)
2018-19	86860.32	14000	10	556.0	582.0
2019-20	138461.5	21839	10	582.0	642.0
Total	**225321.9**	**35839.60**			

Precaution for confinement of dump to prevent pollution of surface water bodies/ courses:

Proposed Precaution of Waste Dump

Retaining wall of 540 m long all around the bottom periphery of waste dumps followed by garland drains of 540m shall be constructed during the plan period of 2015-16. 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, a settling pond 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)
2018 -19	540	1.0	2.0	540	1.0	1.5	12	10	4
2019 -20	Maintenance								
Total	540	1.0	2.0	540	1.0	1.5	12	10	4

Engineering details of retaining walls & Garland drains

The average rain fall in west Singhbum district is considered as 1600mm with rainy seasons during June to September months. 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

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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, 10m 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 Dump Plan.

f) Sub grade Stacking

During this plan period, about 34% of total excavation shall be generated with average grade of (+45 to -58% Fe). Since this material is also marketable, no separate stacking of sub-grade material is proposed

The sub–grade iron ore generation in the area is estimated in the proposed Mining plan period would be 5084203.26 MT. the details of the year-wise generation of Sub-grade is given below;

Year	Generation of Sub-grade Ore	
	MT	Cum
2016-17	1699743	607051.2
2017-18	3400000	1214286
Total	5099743	1821337

Location of proposed sub-grade stack:

These sub grades shall be stacked separately within the quarry floor. However besed on the marketability of ore the sub-grade will be blended with high grade to make it saleable grade and sold il various consuming agencies as fer as practicable. Further it has been planned to establish a beneficiation plant within the lease area during 2017-18.In which low grade and subgrade material will be beneficiated to obtained marketable iron ore. The details of beneficiation plant given in chapter-VI.

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Utilization of sub-grade

The total sub-grade ore during plan period will be 1815786.88 cum. The details of utilization of this sub-grade will be as follows:

Year	Proposed Generation (Cu.m)	Blending @ 90% (Cu.m)	Storing (Cu.m)
2018 -19	48962.91	546346.1	60705.12
2019-20	552535.82	1092857	121428.6
TOTAL	**1815786.88**	**1639203**	**182133.7**

Precaution for confinement of Sub Grade to prevent pollution of surface water bodies/ courses:

As the sub grade ore will be stored within quarry floor no preventive measures has been envisaged during plan period.

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CHAPTER-V

5.0 USE OF MINERAL AND MINERAL REJECT

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A mobile crusher of 1x200TPH and screen plant of 2x250 TPH exists in the leasp area to process the ROM produced from the mine. Lessee has obtained the "Consent to Operate" from JSPCB for 1x250 TPH crusher and 2x250 TPH mobile screen plant vide consent no. PC/JSR/AIR/97/12-1G-230 dated 12.01.2013. Presently, this mobile crusher & screening unit is located at Tiger pit which shall be shifted to different quarries as per the requirement.

During this plan period, it is proposed that all the ROM (total excavation with +55% Fe) produced from the pits shall be treated in the mobile crushing/screening unit within the lease area, to produce the finished sized product. Iron ore produced (finished product), after processing in mobile crushing/screening unit shall be sold to various consuming industries like Steel Plant, Sponge Plant and Blast Furnace. The average grade of finished product produced from this mine is as follows:

Sl. No.	Product	Average grade	Purpose
1	(10-30)mm sized iron ore	+ 55% Fe	Saleable
2	(5-20)mm sized iron ore	+ 55% Fe	
3	(0-5)mm fines iron ore	+ 55% Fe	
4	(0-10)mm fines iron ore	+ 45 to -55% Fe	
5	(0-5)mm fines iron ore	- 45% Fe	Waste

The saleable ore accounts about 94% of the total ROM whereas only 6% material comes below 45% Fe which is treated under mineral rejects (waste).

b) Indicate physical and chemical specifications stipulated by buyers:

The iron ore so produced after processing in crushing & screening unit will meet the specifications of the consuming industries for Steel Plant, Sponge Plant and Blast Furnace. The specification of these plants is given below:

SPECIFICATION OF IRON ORE WITH RESPECT TO CONSUMING INDUSTRIES

Parameter	Blast Furnace	Steel Plant	Sponge Iron Grade	Pellet Industry
Fe	+58%	+58%	+58%	+52%Fe
Si02	2 – 3%	2 – 3%	2% max	
Al203	3 – 6%	2 – 3%	3% max	
Si02 + Al203	Nil	Nil	5% max	
Al203 / Si02	1 ; 6 max	Nil	1.6 max	
P	0.15% max	0.03 – 0.1	0.05% max	

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S	0.03% max	Nil	0.02% max
Cu	0.03% max	Nil	0.04% max
Pb & Others	Nil	Nil	Traces
Size	10mm to 15mm	50 – 150mm	5 to 18mm

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The recent exploration carried out in the area also gives a promising result. The finished products of iron ore produced after crushing/screening unit shall be sold to mainly to the above mentioned consuming industries.

c) Give details in case blending of different grades of ores is being practiced or is to be practiced at the mine to meet specifications stipulated by buyers:

No blending of different grades of ore is being taken up to meet the specification of the consuming industries. As stated earlier, ROM of this area is of average +55%Fe grade. All the ROM produced from the area shall be treated in the mobile crushing/screening unit situated within the lease area to make the different sized ore as required by the consuming industries. The finished product will be of sizes 10-30mm, 5-18mm, fines 0-5mm of average grade (+55%Fe), (0-10mm) material of +45 to -55% Fe and (0-10mm) material of -45% Fe. The fines (0-10mm) material of -45% Fe is treated under waste which has no market. Rest all the finished product shall be saleable. The year-wise production of finished product after crushing & screening unit is given below.

Year	Proposed production ROM in MT	Production of Finished iron ore in MT after Processing				Waste(MT)		
		(10-30)mm (+55% Fe)	(5-18)mm (+55%Fe)	Fines (0-5)mm (+55%Fe)	(0-10)mm (+45 to -55% Fe)	Fines (0-10) (- 45% Fe) reject	waste from float zone	Total waste
2018-19	4999245	1749736	749886.6	499924.5	1699743	299954.7	76440.0	376394.7
2019 -20	10000000	3500000.00	1500000	1000000	3400000	600000.0	"	600000.0
Total	14999245	5249736	2249886.6	1499924.5	5099743	899954.7	76440	976394.7

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CHAPTER-VI

6.0 PROCESSING OF ROM AND MINERAL REJECT

a) If processing / beneficiation of the ROM or Mineral Reject is planned to be conducted, briefly describe nature of processing / beneficiation. This may indicate size and grade of feed material and concentrate (finished marketable product), recovery etc. अनुमोदित

It has been seen that the average analysis of ROM comes to +55% Fe. So, during this plan period, it is planned to process the entire ROM in the Mobile crushing & screening unit to make the final finished product. As per requirement of the consuming industries, it has been planned to make finished product of sized iron ore of 10-30mm, 5-18mm and 0–5mm. After processing about 6% fines of less than 45%Fe will be generated. This material is considered as waste and shall be dumped separately. Rest finished product is saleable. So, 94% recovery is envisaged from ROM.

A mobile crusher of 1x200TPH and screen plant of 2x250 TPH exists in the lease area to process the ROM produced from the mine. Lessee has obtained the "Consent to Operate" from JSPCB for 1x250 TPH crusher and 2x250 TPH mobile screen plant vide consent no. PC/JSR/AIR/97/12-1G-230 dated 12.01.2013. Presently, this mobile crusher & screening unit is located at Tiger pit which shall be shifted to different quarries as per the requirement.

CRUSHING AND SCREENING:

The ROM (+55%Fe grade) material shall be brought by tippers and dumped in a feed Hooper of Mobile screen plant of 2 x 250 TPH capacity. From this screening plant, three types of products shall be produced namely – (a) sized ore of +30mm having 55%Fe (b) 10 – 30mm material with 58%Fe and (c) 0-10mm material with <58% Fe.

The sized ore of +30mm material so produced from the screen plant shall then be treated in the Mobile Crushing Plant of 1 x 200 TPH capacities. From here, two finished product shall be produced (a) 5 – 18mm material with +55% Fe and (b) 0 – 5mm material with +55% materials. The material of 0-10mm shall again be treated in a screening unit from where about 94% fines (0-10mm) of +55%Fe and 6% fines (0-10mm) of <45%Fe shall be produced. The overall recovery of fines (0-10mm) of +55%Fe will be 34% of the total ROM whereas recovery of fines (0-10mm) of -45%Fe will be about 6% of the total ROM. The 0 -5mm, 0-10mm, 5 – 18 mm, 10-30 mm material shall be stacked separately.

So, fihally, four saleable finished products shall be produced from ROM i.e.

(a) (10 – 30mm) material of +55% Fe - sized ore
(b) (5 – 18mm) material with +55% Fe - sized ore
(c) (0 - 5mm) material of +55%Fe - Fines
(d) (0-10mm) fines of +45 to -58%Fe - Fines
(e) (0-5mm) fines of <45%Fe - Fines

The flow sheet is annexed as Annexure – XIV and material balance chart of mobile crushing & screening unit is given hereunder.

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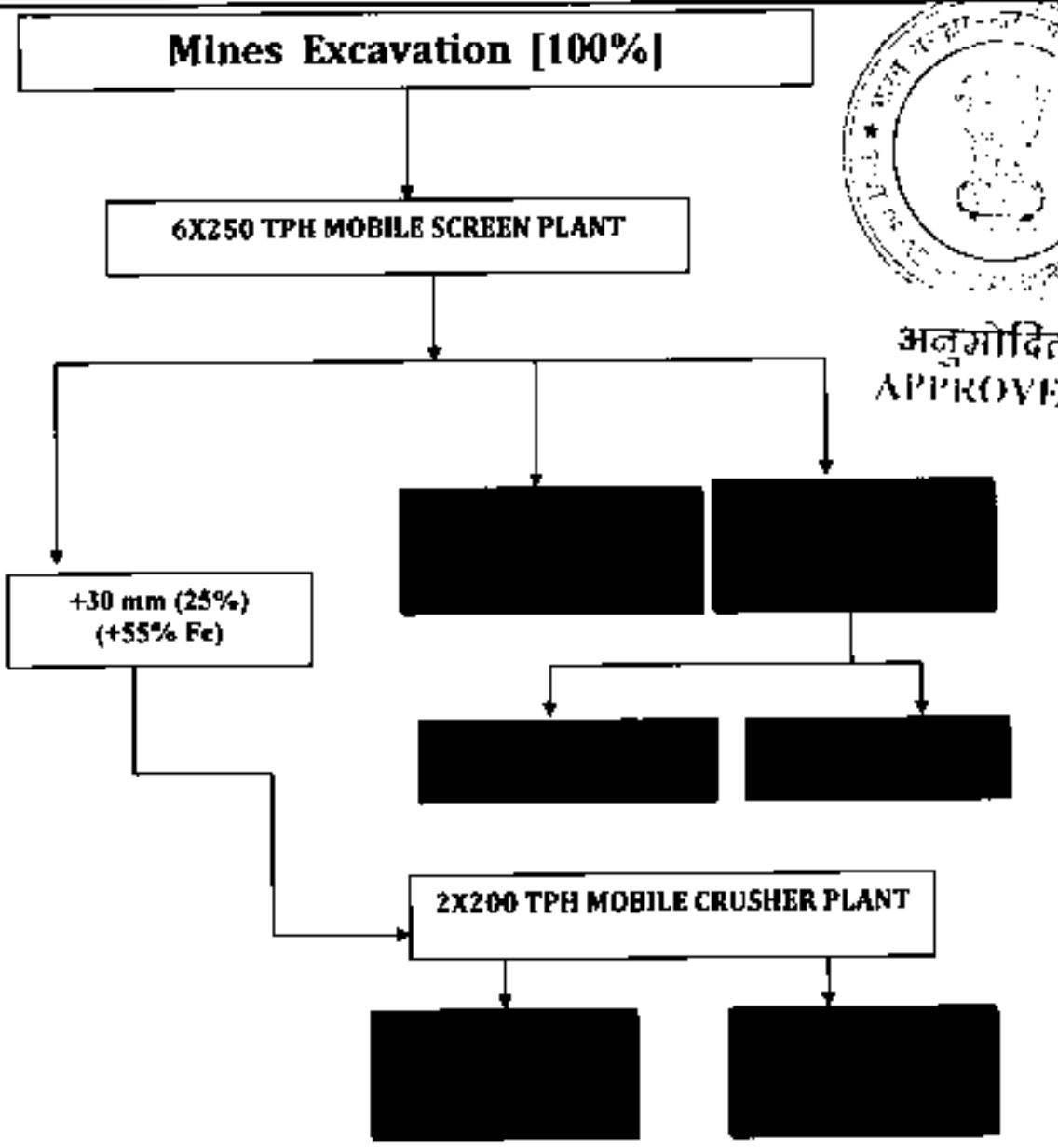

	CRUSHER & SCREEN PLANT	WORKING HOUR/DAY
1	6 X 250 TPH Mobile Screen Plant	The working hour will be according to the above ROM production/Requirement
2	2 X 200 TPH Mobile Crusher Plant	

The ROM produced from the mines shall be treated in the crushing/screening unit to get the sized iron ore. The recovery of finished product is 94% of the total ROM. Rest 06% is waste with -45%Fe grade. The recovery by volume and grade from the ROM is given below.

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Finished product after screening	Economic viability	Recovery by volume (%)	Average Grade Fe
10 – 30mm (sized ore)	Saleable	35	+55%
5 – 18mm (sized ore)	Saleable	15	+55%
0– 5mm (fines)	Saleable	10	+55%
0– 10mm (fines)	Saleable	34	+45 to -55%
0 – 5mm (fines) - Waste	Non-saleable	06	<45%
Total		100	

Lessee had applied for diversion of additional 91.951 ha of forest land. After getting the forest clearance for additional area, the production shall enhance. So, to meet the required enhance finished product, there is a proposal to establish a processing unit of 1500 TPH central screen plant integrated with 600 TPH crushing and screening plant within the lease area to make the finished product as per requirement. The details of proposed 1500 TPH central screen plant integrated with 600 TPH crushing and screening plant is given below:

System Description of proposed 1500 TPH central screen plant integrated with 600 TPH crushing and screening plant:

ROM (– 800 mm) will be fed to the Hopper from mines through 35 tons capacity dumpers. To separate over size boulders, we are having static Grizzly and + 600 mm material will be broken with static rock breaker. All below 600 mm material will be fed to the scalper screen through heavy duty apron feeder. It is double deck screen having #140 mm aperture in the top deck and #80 mm in the bottom deck. In the scalper screen, we will separate + 80 mm and the same will be sent to our 600 TPH three stage Crushing & Screening plant through shuttle conveyor to feed to Primary Jew crusher or stockpile(Optional). All -80 mm material will be conveyed to secondary screen house and equally divided by dividing chute/ hopper with feeder and will be fed to our secondary multi-slope banana configured linear motion screens, where we will separate 0 – 18 mm, 18 – 40 mm and 40 – 80 mm. The 40 – 80 mm product will be conveyed to the bi-directional conveyor and this will feed to secondary crusher through surge hopper whenever there is a short fall from the primary crusher due to low recovery of + 80 mm material and this will feed to stockpile whenever there is excess feed. The 18 – 40 mm product will be fed to another Linear motion single deck screen through a conveyor to separate the under sizes (-18 mm) from the product and the same will go to his stockpile through conveyor. All – 18 mm material will fed to another two single deck Flip-Flop Screen through the conveyor. Here, 0-5 mm and 5-18 mm will be separated out. The 5-18 mm product will be fed to another single deck Flip-Flop screen to separate the under sizes (-5mm) from the product and the same will go to his stockpile through conveyor. All stock piles having a ground capacity of about 4000 Tons.

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All the + 80 mm material will be crushed through jaw it will come to surge hopper where we can control the feed to cone crusher and where we can add the 40-80 mm material to optimize the secondary cone crusher utilization. The material from the surge hopper will be fed to the 2 deck Ripl-Flow primary screen where we separate 0-40 mm and +40 mm. All the +40 mm material will be fed to the Secondary cone crusher and 0-40 mm will be fed to the secondary triple deck screen. The secondary cone crusher output also will be fed to the secondary Screen. The secondary screen will separate 0-5mm, 5-18mm and +18 mm. All the +18 mm will be fed to the tertiary crusher and crushed material will be fed to the same secondary screen, this is a closed circuit. In the secondary screen, we will get 0-5 mm (Crushed fines) and the crushed 5-18(CLO) mm as a product. The 5-18 mm(CLO) will be fed to another screen to separate the any under sizes from the product and the same will go to his stockpile through conveyor.

b) Explain the disposal method for tailings or waste from the processing plant (Quantity and quality of tailings proposed to be discharged, size and capacity of tailing pond, toxic effect of such tailings, if any, with process adopted to neutralize any such effect before their disposal and dealing of excess water from tailing dam).

After processing of the ROM, there will be generation of waste (0-10mm fines having ~45% Fe) accounting about 6% of the total feed.

No proposal has been envisaged for establishment of beneficiation plant during plant period as the validity of ML is up to 31.03.2020. However, it has been envisaged to establish a beneficiation plant of 4.50MTPA capacity in the ML area during conceptual period. Hence, there is no question of tailing disposal during plan period.

c) A flow sheet of schematic diagram of the processing procedure should be attached.

Flow sheet of the schematic diagram of the processing procedure is given as Annexure - XIX.

d) Specify quantity and type of chemicals to be used in the processing plant.

Not applicable.

e) Specify quantity and type of chemicals to be stored on site/plant.

Not applicable as stated above.

f) Indicate quantity (Cum per day) of water required for mining and processing and sources of supply of water. Disposal of waste water and extent of recycling.

The water requirement for this proposal is mainly for green belt, dust suppression, drinking water purpose & in beneficiation plant for makeup purpose. The total water requirement will be 2500 m^3/day

Sl.no	Purpose	Quantity, m^3/day
1.	Green belt, work shop& dust suppression	409
2.	Beneficiation plant Makeup water @ 112m^3/hr x 18 hrs/day During conceptual period	2016
3.	Domestic	75
	Total	**2500**

The entire water requirement of 2500 m^3/day for domestic, mining, dust suppression and beneficiation plant make up water will be met from Surface and Ground water. (Necessary permission letters are made which is under process). The area falls in the **"safe"** category as far as the stage of development is concerned.

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CHAPTER-VII

7.0 OTHER

7.1 Site services

Site services like rest shed, first-aid center and drinking water facilities, mess canteen, tool room of mining equipment etc. exists within the lease area. There is one site office and screening & crushing unit within the lease area. Barajamda and Barbil town is nearer from the mine, as such, no difficulty is experienced to get the services of repair and a commodity, as there is regular communication from mine.

The mining operation shall be carried out by fully mechanized method. Some workers are required for day to day maintenance work. As far as mine infrastructure facilities is concerned, an office is there for smooth functioning of mining operation. After resumption of mining operation it has been planned to construct following infrastructure facilities within the lease hold area:

1. Workshop
2. Canteen
3. Temporary Rest shelter

Further, arrangement of electricity, drinking water facility, telecommunication facility will be made for smooth operation of the mines.

EMPLOYMENT POTENTIAL:

(a) Management and supervisory Personnel:

(i) Existing:

Sl. No.	Description	No.
01	First Class Mines manager	01
02	Second Class Mines manager	02
03	Mining Engineer – B.E (Mining)	01
04	Mechanical Engineer	01
05	Mining Geologist - M.Sc (Geology)	02
06	Mining mate	03
07	Supervisor	02
08	Blaster/Helper	01
09	Accountant	01
10	Clerk	01
11	Dispatch In charge	01
Total		**15**

(ii) Gist of the manpower existing in Ghatkuri Iron Ore Mine(under Contract)

SL	CATOGERY	Nos
1	Skilled	26
2	Semi-skilled	16
3	Unskilled	54
	TOTAL	**96**

(iii) Proposed

Sl. No.	Description	No.
01	Mechanical Engineer	02
02	Foreman	02
03	Mining Mate	04
04	Excavator Operator	15
05	Wheel Loader operator	20

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06	Drill Machine operator	02
07	Dozer operator	01
08	Dumper operator	48
09	Mobile Crushing &Screen operator	09
10	Motor Grader	01
11	Water Tanker operator	03
12	Supervisor	06
13	Operators Helper	25
	Total	**138**

Hence, once the mine will be operated in full capacity total employment will be 15 + 96 + 138= 249nos. Out of the total requirement the about 70% will be from local area.

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CHAPTER-VIII

8.0 PROGRESSIVE MINE CLOSURE PLAN UNDER RULE 23 OF MCDR'2017

8.1 Environment Base line information: Attach a note on the status of the following information with regard to the following.

8.1.1 Existing land use pattern indicating the area already degraded due to mining, roads, processing plant, workshop, township etc in a tabular form.

Sl. No.	Pattern of Utilization	Existing (Ha)
1	Mining	12.581
2	Dump area	0.364
3	Mine Road	0.915
4	Sub-grade stack	-
5	Camp Site, Magazine	0.100
6	Plantation (Safety zone)	-
Total		13.960

8.1.2 - Water regime, Quality of air, Ambient noise level, Flora, Climatic conditions

Water Regime

Topographically, Ghatkuri Iron ore Mine represents a hilly terrain. For this reason, ground water body is far below the ground surface of the area. The highest relief of the area is 836mRL near forest pillar -1158 in the south-western part of the lease boundary whereas lowest relief is 452mRL near forest pillar – 1107 in the north-eastern part of the lease boundary area. There is no perennial nala within the lease hold. Nearest surface water body is the perennial Karo River, flowing from south to northeast at about 2.75 km, east of the lease hold area. Other river is the Koina River at a distance of 7.5 km NW of lease area flowing from NW to N.

It has been observed from the nearby wells and tube wells that the water touches at about 418mRL as such, there is no intersection of water table during mining and as such there will not be any impact on the water regime. During the recent exploration, boreholes have been sunk up to a maximum depth of 96m and nowhere water body is encountered upto 470.90mRL.

Quality of Air/ Ambient noise level/ Flora/ Climatic conditions

Air Quality

The prevailing environmental scenario of this leasehold area may be affected by the mining and transportation. Air pollution is generally ceused due to dust and fumes generated during drilling, blasting, waste dumping etc. As the mining operation is being carried out and shall be carried out by fully mechanized method with the help of hydraulic excavator, deep hole drilling by wagon drill and dumpers of 25/35 tons capacity, as such, it is anticipated that the AAQ of the area may be affected. However, to control the dust particle, water sprinkling on haul roads is being done. Also, AAQ of the area has been analyzed which shows all the parameters are well within the prescribed norms.

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Water quality is not affected due to mining activities. There is no quarry discharge water from the mine. As there is no source of water within the target area, analysis of the same has not been done Noise due to drilling blasting and movements of trucks/dumpers is very negligible. The AAQ, water and noise level in the area are being monitored. The result of the monitoring of AAQ and Noise is enclosed as Annexure – XXI.

Water quality

Water quality of surface water and ground water is not affected due to mining activity of this mine. There is no perennial source within the leasehold. There is no cause of contamination of water, as no industrial effluent is discharged and there is also no quarry discharge water from mine.

In the eastern part, the drainage is also of dendritic type controlled by the Karo River which flows in the west side of the mine area. Possible source of contamination of surface water will be from rainwater runoff during monsoon. Water will be required for greenbelt & Sprinkling purpose. Drinking water will be taken from Ground water. This is a nominal quantity which will be drawn from existing tube wells of Tatiba village. The areas of the stack yard and dumps will be surrounded by garland drains to arrest the wash offs. Since the water will be recharged adequately through infiltration and seepage, no effect is envisaged on the groundwater resource also.

Thus effect on water quality and quantity may be termed as significant in case of surface, while it will be negligible for ground water. Most impact will be during the monsoon period. With measures for arresting silt in rainwater runoff it will be insignificant during the whole period of project in both core and buffer zone. Since ground Water Table is at 418m above MSL, there is no intersection of water table during mining and as such there will not be any impact on the water regime.

Noise level

Running of machines, movement of dumpers within the area and blasting are the source of noise pollution. Since the lease area is mostly surrounded by forest, path of the noise will be interrupted and it will not be felt at distance from the operation site. The noise quality of the area is well within the limit.

There will be some effect on the noise environment as the proposed mining will employ additional HEMM like Excavator, loaders, dumpers, crushing and screening of ore. The effect is anticipated to have some impact in core zone but will be insignificant in buffer zone due to the vegetation around the mine area which will effectively obstruct the transmission of noise to area away from the source. Prediction of anticipated noise levels resulting from the operation is the most critical step in assessment of the impact of alternatives on the noise environment.

The noise level has been regularly monitored and found that in most cases noise levels are within permissible limits of 85 dB(A) for maximum 8 hrs exposure. Copy of Noise monitoring report is

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enclosed as Annexure – XXI. The peaks at times may be marginally higher but this situation does not continue for any appreciable length of time. Considering the norm of reduction of noise level as above for each doubling of distance from the site of measurement, it is anticipated that impact of noise at the site will remain localized although there will be increase in noise level during operation phase. The noise level at boundary of the mine premises will be not more than 70 dB (A) in normal operation. The impact on noise quality within the lease area may be termed marginal which may require mitigative measures. Insignificant impact is envisaged outside the lease area in the buffer zone.

Flora

The area heavily vegetated with natural vegetation. Both flora and fauna comprising the terrestrial ecology of the project site as well as buffer zone area were surveyed to assess the ecological status. Available official reports and published reports were also verified. The forest in the buffer area is deciduous type with high density of trees at certain locations. The vegetation pattern in the study area has been studied in detail.

Flora in the Study Area

Flora consists of Sal, Asan, Dhaura, Putali, Kurchi, Karam, Bija/Piasal, Kendu, Sidha, Harida/Harfa, Champaka, Sonari, Bamboo, Mahul/Mahua, Jamun, Chahar, Gulli, Behra, Imli, Badea etc.

Fauna in the Study Area

Fauna within the core area consists of :

Mammals - Indian palm squirrel, Rat, Rabbit, Jackal.

Birds - Baya, Crow, Parrot, Pigeon, Sparrow, Blue jay.

Reptiles - Russel's Viper.

Amphibians - Toad.

Climatic conditions

The climate of the area is generally cold in winter between November and February and hot in summer between March and June. The monsoon sets in late June and continues up to the end of August. Maximum and minimum Temperature during last 10 years is 43.2°C in May 1995 and 7.2°C in December 1997.

Rain fall:

Annual rainfall as obtained as secondary data from meteorological office at IMD Jamshedpur over a period of 10 years indicates rainfall to be above 1200 mm. Most of the rainfall is received during monsoon season. The monsoon starts in June and continues till September. The maximum amount of rainfall in received in July and also the maximum rainy days occurs in July.

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Temperature & Humidity:

The winter seasons sets in towards end of November and continues till February. The last week of December is the coolest month of the year, with annual minimum temperature falling as low as below 5°C. The temperature gradually rises after February and March to May is the summer season. This is also referred to as Pre-monsoon season. During this time the mean maximum temperature 38.2°C whereas the mean minimum temperature is 24.3°C. The monsoon season starts during June with temperature ranging from 29.1°C to 34.4°C. Last week of August sees the increment of temperature with mean minimum being 22.2°C. From October the mean temperature falls gradually marking the onset of the winter season. The mean minimum temperature is 18.3°C and means maximum temperature is 28.8°C in this month. The fall in temperature continues in November with mean minimum being 12.6°C during this month.

The maximum humidity is observed during the monsoon season with mean value of 85%. The minimum humidity is observed in December as 26%. Generally the weather during the other seasons is more or less dry and in the comfortable zone.

Wind speed & Direction

Wind speed is by and large moderate and varies between slow to medium with maximum speed reaching a value of 10.5 km/h. During early monsoon and during retrieval of monsoon wind speed is very high. As wind direction and speed are most important factors for the transportation of dusts. Seasonal data were collected. The calm condition is generally low. In general strong wind blows from all the directions.

6.1.3 Human Settlements

The area falls under the R.F. The study area is of rural setting. Tribal population is dominant in the study area. The nearest urban area is the Kiriburu town, situated at a distance of about 6 km in the south-east of mine lease area. The study area is not thickly populated. The main occupation is agriculture, followed by workers in iron-ore mines and forest produce. The core area is devoid of any human settlements. Major villages/towns located within a radius of 5 km from mine lease site are:

- Kiriburu
- Baraiburu
- Bolani
- Balagoria
- Chhota Hating
- Paraspoling

Socio-economic and demographic data based on Census Data, Govt. (2001) of India is given below:

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Sex – Age Composition:

The average number of members per household is five. The 0-6 age group is 17.19% of the total population. The total male population is 73544 where as that of the females 67468. This gives a sex ratio of 917 females for every 1000 males. (Ratio male/female is 1:09)

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Caste Composition:

The area has good population of tribal which inhibits the forested regions. The Caste composition is given below:

Schedule Caste : 11.21 %

Schedule Tribe : 38.62 %

General : 50.16 %

Literacy:

Literacy rate as per 2001 Census in the study shows general growth as compared to 1991data. Overall the level of literacy is above 60%. Female literacy is generally lower (37.56%) in comparison to a male literacy (62.44%).

Literate : 51.15 %

Illiterate : 48.85 %

Work participation rate is 31.62 %, with 48.37% male and 13.36% female.

Infrastructura:

Kiriburu is the nearest major human habitation (about 6.0 km from site). The town is provided with all basic civic amenities and has a population of 9554 and 1884 households, as per 2001 census report. SAIL quarters are present near the Kiriburu hill top area. Suitably maintained pitched roads are present in the town. Major source of water in the area is the Karo River. Most of the important locations are provided with water supply and electricity. Other important places in the study area are Barbil, Bolani, Thakurani Colony and Barajamda village. The areas are developed with basic facilities.

Industries in the area:

Major industrial activities close to the site are other Iron Ore Mines in Kiriburu (Karampada), Megahtaburu, etc. Megahtaburu also has copper mines. Bolani Mines are also present in the study area. Gua, with Iron Ore Mines, is situated at about 10 km from site. Sponge Iron factory and iron crushing plants are present around Barajamda and Barbil. Other small scale industries like brick kiln, are also found in the study area.

Medical facilities: Major medicals facilities like hospitals & dispensary are available at Kiriburu. SAIL (TISCO) hospital is present here with all basic facilities. Dispensary, hospitals are other medical facilities are present at Barbil. Other Central Hospital & Dispensary are located within 10km of site.

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Electricity: A main power line passes through north of the lease hold area. Electricity facility is available at Kiriburu, Barbil and most of the other locations of the area.

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Education facility: Schools, namely primary, middle school to high school are available in Barbil, Kiriburu, etc. Overall the condition of education facilities is moderate with 61.26% literates.

8.1.4 Public buildings, Places of worship & Monuments :

The area is devoid of any notable public buildings, National monuments, places of worship etc. There are no Natural Parks of tourist interest or wild life sanctuary near the area.

8.1.5 Indicate any sanctuary is located in the vicinity of leasehold

No sanctuary exists in and around within 5Km radius of the lease holds area.

8.2.0 Impact Assessment: Attach an Environmental Impact Assessment Statement describing the impact of mining and beneficiation on environment on the following:

8.2.1 Land Degradation:

Sl. No.	Pattern of Utilization	Existing	During Plan period	End of Conceptual period
1	Mining & Allied activities (processing unit)	12.581	42.903	98.950
2	Dump area	0.364	3.703	0.00
3	Road	0.915	0.143	1.683
4	Sub-grade stack	0.00	0.00	4.322
5	Site office & Magazine	0.100	0.100	0.100
6	Weigh Bridge, Work shop etc.	-	0.510	0.510
	Exploration	-	0.005	-
	Sub total	**13.960**	**47.3640**	**105.565**
8	Safety zone	44.1693	44.1693	44.1693
9	Area for future mining and allied activities	91.605	58.2010	0.00
	Total	**149.7343**	**149.7343**	**149.7343**

Open cast mining causes various types environmental pollution. It is predicted that the process of mining have little impact on the existing ecological conditions of the project area as the proposed fully mechanized mining activities shall be concentrated in the broken up area and some virgin land shall be degraded in the first five years. The increase in production in mine and other allied activities in the area shall have additional impact on abiotic and biotic environment of the area (although not significant) various environmental safe guards have been proposed to implement in the form of EMP report.

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8.2.2 Ambient Air Quality.

Ambient Air Quality (AAQ) in respect of respirable suspended particulate matter (PM10), Sulphur dioxide (SO_2), oxides of Nitrogen (Nox) and CO was studied and determined quantitatively through planned monitoring. AAQ monitoring was done at six selected locations in the study area, taking into consideration all possible intervening factors and the criteria for selection of sampling stations relating to AAQ monitoring and the Indian Standards and Emissions Regulations published by notified the Ministry of Environmental & Forest, Central Pollution Control Board (CPCB). The monitoring was carried out in all the seasons. There was a very clear trend of record of lowest values in the night sampling hours and highest in the day time (fore noon) hours. This is due to very low activity in the area after evening hours. Nevertheless all the values (throughout year) across all parameters were much below the prescribed limit.

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8.2.3 Noise Characteristics.

The main source of noise in the project area is limited to plying of Dumper & Tipper only. In order to have an idea of the present noise level of the project site, a detailed measurement of noise level was carried out at different locations within the proposed project (core zone) site and buffer zone. One location at core Zone and seven locations in buffer zone were selected for the purpose. The present status of the Noise level around the mines site is within the standard.

8.2.4 Water Quality:

The water surface and ground water sources were monitored for their quality and it is observed that all the water quality parameter is within limit. Additional measures may be regarded to contain the pollution due to enhancement of production.

8.2.5 Impact on Biodiversity.

The forest in and around the lease area is deciduous type with low density of tree. The forest in the buffer zone is undisturbed very thick, dry and deciduous type. The trees shed their leaf during February to march and during the period the forest floor is covered with litter. On the onset of rains new leaves emerge and reach their maximum leaf index by October. The forest is having good regeneration potential in the region.

Soil erosion is taking place due to deforestation, illicit felling of trees followed by podu cultivation. As this region is thick in forest cover, the place is also rich in types and kinds of animal inhabitants.

EIA study has indicated that the deforestation and illegal cutting of trees and podu cultivation may have impact on the area. However, these may not be discernible. Changes in and around leasehold area to impact biodiversity. Thus, existing impact on environment shall largely remain the same.

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8.3.0 ENVIRONMENT MANAGEMENT PLAN

Major sources of pollution and mitigation measures.

8.3.1 Measures for controlling air pollution

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Existing air environment in the mining area is of desired quality i.e., all parameters are within limit. The extended mining activity in the area might add little pollutants to the existing air environment. Control measures have to be considered and implemented. The following preventive measures shall be taken to control the air pollution at different sites present inside the lease area.

a. Regular water spraying on haul roads, waste dumps and maintaining approach roads, to suppress the dust.
b. The volume of dust rising from waste dump areas, quarry site, roads, etc. by action of wind shall be checked by planting grasses and broad leaf trees.
c. Ensuring transporting vehicles not to cross the stipulated speed. A strict instruction should also be given in the board it shall be displayed that no vehicle should run greater than a speed of 30 Km/hour.
d. Over loading on transport vehicles to be prevented in order to stop spillage.
e. Strengthening further the green belt plantation around ML area, quarry and over burden dump as well as crushing plant site.
f. Water spraying in the ore stack yard will be done to check air borne dust.
g. Exhaust fumes in the internal combustion engines used in excavators, ensuring vigorous maintenance and stringent overhaul schedules shall minimize dumpers, dozers and other machinery.
h. Wet drilling method shall be adopted.
i. Water injection system in drill and wearing of PPE by driller to be proposed to control air pollution and minimization of its effect.

8.3.2 Measures for controlling water pollution

The garland drains around quarry and dumps shall be constructed. In addition check dams, two stage settling ponds and afforestation on existing dumps and on vacant land has been proposed. These measures shall be taken to ensure that the surface water quality in the project area is within permissible limit in respect of all the parameters for all four seasons. However, it is anticipated that there may be slight increase in water pollution load due to enhancement of production. The measures being proposed for water treatment and conservation water are as follows :

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a. Extension of garland drain around quarry, waste dump yard etc.
b. Construction of more check dams around the dump site to arrest flow of loose sediments before discharge into the drainage system of the region through settling tanks.
c. Drains to be cleaned up periodically.
d. Strengthen of small stone/ rock barriers across the drains at intervals to check the water current and to arrest the solid particles.
e. Effluent water from the quarry to be pumped regularly and discharged to the adjacent garland drains.
f. All the water of mines has to pass into the settling tanks and after settling, the water shall be used for plantation & dust suppression.
g. Water shall be treated before use for drinking purpose. Before water is supplied for consumption particularly for drinking purpose it has to be ensured that the water is free from any pathogens.

8.3.3 Noise Pollution Control

As general precaution, to reduce the effect of high noise level, the following ameliorating measures have been proposed in addition to the measures being already taken up:-

- Provision of protective devices like acoustic wool, earplugs, ear muffs to workers exposed to noise of more than 80 dB (A) provided.
- Provision of sound proof cabins for the workers deployed on machines producing higher level of sound like Dozers, dumpers, shovels etc.
- Proper maintenance of noise generating machinery including transporting vehicles would be ensured.
- A thick green belt shall be provided around the periphery of mine to screen the noise.
- Reducing the exposure time of workers whenever required.

8.3.4 Vibration levels (due to blasting)

During the time of mining operation ground vibration was not there due to blasting. However, Vibration study has not been carried out within the lease area during blasting. After resumption of mining operation, vibration study will be carried out. Accordingly, the precautionary measures will be adopted.

8.3.5 Water regime

Run off after rain can create pollution problem in the surrounding water regime. The disturbed land and loose overburden is very much susceptibility to erosion and silting may be the result. Therefore, as a precautionary measure following activity will be undertaken:

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a. Extension of garland drain around quarry, waste dump yard etc.
b. Construction of more check dams around the dump site to arrest flow of loose sediments before discharge into the drainage system of the region through settling tanks.
c. Drains to be cleaned up periodically.
d. Strengthen of small stone/ rock barriers across the drains at intervals to check the water current and to arrest the solid particles.
e. Effluent water from the quarry to be pumped regularly and discharged to the adjacent garland drains.
f. All the water of mines has to pass into the settling tanks and after settling, the water shall be used for plantation & dust suppression.

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8.3.6 Acid Mine Drainage

As on date there is no data about the acid Mine drainage within the surrounding water body.

8.3.7 Surface Subsidence

Not Applicable

8.3.8 Socio-Economics

The proposed project, does not involve any displacement of human habitation, hence no habitation package is needed for displacement.

The mining activity envisages the deployment of local laborers. So, it is likely that the general economic condition of the local people will improve. The peripheral development package will also improve their health and sanitation.

Apart from introducing eco-friendly mining (Fully Mechanised), special attention for upliftment of socio economic conditions of the nearby villages by providing following facilities has been proposed. Health and education facilities created in the project shall be extended to villagers also.

1. Roads development in the project shall be utilized by the villagers also which shall connect them to nearby town,
2. Drinking water facilities, Cultural and recreational centers.
3. Afforestation of the village areas, distribution of seedlings and involving people in such programmes.
4. Providing employment to local people will be the one of the major factors for upliftment of the society.

8.3.9 Historical monuments etc.

No public buildings, monuments, places of historical importance exist in and around within 5Km radius of the lease hold area.

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8.3 Progressive reclamation Plan:

To mitigate the impacts and ameliorate the condition, describe year wise steps proposed for phased restoration, reclamation of lands already/to be degraded/disturbed in respect of following items separately for 5 years period.

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8.3.1. Mined-Out Land: Describe the proposals to be implemented for reclamation and rehabilitation of mined-out land including the manner in which the actual site of the pit will be restored for future use. The proposals may be supported with yearly plans and sections depicting yearly progress in the activities for land restoration/ reclamation/rehabilitation, afforestation etc., called "Reclamation Plan".

Out of the total ML area of 66.368Ha the area of degradation under mining will be 27.578 hects. Considering the present exploration data and estimated mineable reserve within the ML area, it can be observed that, none of the quarries are going to be exhausted during ensuing scheme period. The ultimate quarry limit has been delineated considering the present exploration data.

The reclamation procedure will start after complete exhaust of minerals in the Pit area. Based on the present exploration data it can be observed that the Old quarry will be exhausted first during conceptual period. Therefore the reclamation will be started from the Old quarry by means of bench plantation.

During conceptual period it has been planned to reclaim the mined out land, both by means of back filling & plantation and bench plantation. Back- filling will be done at lower elevated area where as the dead benches in the hilly terrain where back filling cannot be possible will be reclaimed by means of plantation.

Out of the total mined out land of 27.578 hects an area of 2.856 Ha can be reclaimed by means of back filling and plantation and balance 24.722 Ha will be reclaimed by means of bench plantation.

8.3.2 Top Soil Management:

The generation of top soil will be nil.

8.3.3 Tailings Dam Management:

Not Applicable

8.3.4 Acid mine drainage, if any and its mitigative measures.

Not Applicable

8.3.5 Surface subsidence mitigation measures through backfilling of mine voids or by any other means and its monitoring mechanism.

Not Applicable

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8.3.6 The information on protective measures for reclamation and rehabilitation works year wise may be provided as per the following table.

Information on protective measures for reclamation and rehabilitation works for 2018-19:

Items	Details	2018-19	अनुमोदित APPROVED
Dump management	Area to be afforested (ha)	Nil	Nil
	No of saplings to be planted	Nil	Nil
	Cumulative no of plants	Nil	Nil
	Cost including watch and care during the year	Nil	Nil
Management of worked out benches	Area available for rehabilitation (ha)	Nil	Nil
	Afforestation to be done(ha)	Nil	Nil
	No of saplings to be planted in the year	Nil	Nil
	Cumulative no of plants	Nil	Nil
	Any other method of rehabilitation (specify)	Nil	Nil
	Cost including watch and care during the year	Nil	Nil
Reclamation and Rehabilitation by backfilling	Void available for Backfilling (L x B x D) pit wise / slope wise	Nil	Nil
	Void filled by waste /tailings	Nil	Nil
	Afforestation on the backfilled area	Nil	Nil
	Rehabilitation by making water reservoir	Nil	Nil
	Any other means (specify)	Nil	Nil
Rehabilitation of waste land within lease	Area available (ha)	2.5Ha	2.5Ha
	Area to be rehabilitated	2.5Ha(4687 no of saplings)	2.5Ha(4687 no of saplings)
	Method of rehabilitation	Plantation	Plantation
Others (specify)	Construction of Retaining wall	540 mx 1mx2m	Maintenance
	Construction of garland drain & settling pit etc.	540m x 1m x1.5m	Maintenance
	Construction of settling pond	1no(12m x 10m x 4m)	Maintenance
	De-silting of garland drain & settling pit	–	0.108 Ha
	(i) Ambient Air Quality	As proposed in the EC condition	
	(ii) Water Quality	As proposed in the EC condition	
	(iii) Noise Level Study	As proposed in the EC condition	
	(iv) Ground Vibration	As proposed in the EC condition	
	(v) Fugitive Dust	As proposed in the EC condition.	
	(vi) Water Level Monitoring	As proposed in the EC condition.	

8.4 Disaster Management and Risk Assessment:

- Geological & climatic hazards such as land slide, subsidence and Inundation are not expected owing to the competence of strata available in the lease hold.
- Though earthquake is felt several times in Odisha, damage to man & materials have not been occurred to this part of area.
- Keeping in view the past occasions, flooding is not expected, as the lease hold is located in hilly terrain and much above the HFL of the area.
- No mine fire is possible, since eruption of inflammable gas in the workings is a remote possibility.

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However, it has been planned to make all types of arrangement to meet any type of eventualities.

The dumps will be stabilized properly. No disaster is foreseen keeping in view last 10 years of mining record of the mines.

Risk assessment is a process whereby risks are analyzed, assessed and risk management priorities are evaluated. It is defined as the characterization of the potential adverse effect to human health & environment due to environmental hazards.

Objectives of risk assessment:-

- identifying hazardous activities
- assessment of risk level and severity in different operations
- identification of control measures
- setting monitoring process
- reduce the impact of mishaps of all kinds
- reduce the inherent potential for major accidents

Methodology of Risk assessment:-

- Collection of information & identification of hazard
- Classify their severity and probability of occurrence
- Identification of exposed risks
- Assess the risk and risk rating based on
  - Probability
  - Exposure
  - Consequence
- Prioritization of the risks
- Implementation of control measures
- Monitoring risk assessment
- Evaluation and correction

Risk assessment is mainly based on the environmental impact of various parameters.

i) **<u>Land contamination</u>**:-

The potential for contamination during operation of mine site is, waste rock dump which is regard as contaminated land.

ii) **<u>Aquatic toxicity:-</u>**

The risk assesement in aquatic toxicity system is based on the total metal concentration in various chemical form or oxidation state. Mn ore does not contain appreciable concentration of toxic elements.

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(ii) Acid mine drainage:-

The mining of iron ore does not involve any processing operation by using chemicals. Hence there is no risk at mine site with regard to control of acid mine drainage

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iv) Tailing dam:-

Not Applicable

v) Human health:-

The chemicals from tailing dam and waste heaps may severely affect the human health. However there is no tailing dam or any effluent generation during the mining of iron ore. Hence there is no risk involved to human health due to iron ore mining operation.

Factors of risks involved due to human induced activities in connection with mining operations are 1) Removal of O.B and side burden 2) Drilling 3) Blasting 4) Excavation of ore and 5) transportation of ore.

Other factors due to natural activities are 1) fire 2) water inundation 3) electricity and 4) natural calamities.

S.No	Factors	Causes of risks	Control measures
1	Removal of O.B	a) Top soil & O.B bench may slide due to its unconsolidated nature. b) Vibration due to movement of vehicles in the O.B benches	Over all O.B bench slope angle will be maintained not more than 45°.Bench height shall not exceed 10 m in O.B
2	Drilling	a) Due to high pressure of compressed air hoses may burst.	During preventive & Periodical maintenance and replacement of worn out accessories in the compressor and drill equipment
3	Blasting	a) Fly rock, ground vibration and noise etc., b) Improper charging of explosives	Burden and spacing will be kept optimum on trail basis and inclined drilling will be done. Explosive charge per delay will be minimized.
4	Excavation of Ore	a) Hauling and loading equipment are in such proximity while excavation b) Swinging of bucket over the body of tipper c) Driving of un authorized person	Operator shall not operate the machine when person & vehicles are in such proximity Shall not swing the bucket over the cab and operator leaves the machine after ensuring the bucket is on ground Shall not allow any unauthorized person to operate the machine by effective supervision

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5	Transportation of ore	a) Operating the vehicle " noise to tail" b) Overloading of material c) While reversal & overtaking of vehicle d) Operator of truck leaving his cabin when it is loaded	It will be ensured that all these causes will be nullified by giving training to the operators. No over loading. Audio visual reverse horn will be provided. Proper training will be given.
6	Fire due to electricity and Oil	a) Due to the short circuit of cables & other electrical parts. b) Due to the leakage of inflammable liquid like diesel, oil etc,	Commutator & electrical parts shall be cleaned frequently with the help of dry air blower All fastening parts and places will be lighted.
8	Natural calamities	Unexpected happenings	The mine management is capable to deal with the situation

Disaster Management Plan:-

The management is able to deal with the situation efficiently to reduce confusion keeping in view of the likely sources of danger in the mine.

Structure of the Disaster Management Plan:-

1) Out line of Disaster management plan :-

The purpose of disaster management plan is to restore the normalcy for early resumption of mining operation due to an unexpected, sudden occurrence resulting to abnormalities in the course of mining activity leading to a serious danger to workers or any machinery or the environment

2) System of communication:-

An internal communication system for the department head and to their line of command with telephone will be provided. Also the telephone nos and addresses of adjoining mines, rescue station, police station, Fire service station, local hospital, electricity supply agency and standing consultative committee members are made available for the mine management.

3) Consultative committee:-

A standing consultative committee will be formed under the head of Mines manager. The members consists of safety officer / medical officer / Asst. manager/ public relation officer/ Foreman/ and environmental engineer.

4) Facilities & Accommodation:-

Accommodation and facilities for medical centre, rescue room and for various working groups will be provided.

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5) First Aid & medical facilities:-

The mine management will have first aid for use in emergency situation. All casualties would be registered and will be given first aid. The centre will have facilities for first aid & minor treatment, resuscitation, ambulance and transport. It will have proper telephone / wireless set for quick communication with hospitals where the complicated cases are to be sent.

6) Stores and equipment :-

A detailed list of equipment available its type & capacity and items reserved for emergency.

7) Transport services:-

A well-defined transport control system will be provided to deal with the situation.

8) Functions of public relations group:-

To make a cordial relation with government officials and other social service organization and working groups. To liaise with representatives of the mine to ameliorate the situation of panic, tension, sentiments, grievances and misgivings created by any disaster. To ameliorate the injured, survivors and family members of affected persons by providing moral support and establishing contact with relatives of victims.

9) Security :-

Manning of security posts

10) Catering & Refreshment :-

Arrangement to be made for the victims, rescue teams and others

8.5 Care and maintenance during temporary discontinuance:

Temporary discontinuance may happen due to various causes such as,

- Court order.
- Natural Calamities.
- Accident (Mine related).
- Slope failure.
- Failure in fulfilment of statutory requirement.
- Local issue.
- Any other unforeseen circumstance.

However, since it will be a temporary discontinuance, the following measures can be under taken partly/fully depending upon the causes.

- If the mine will be discontinued temporarily for more than 120 days, notice will be given 30 days before the date of such discontinuance to the concerned authorities.
- During discontinuance period safety arrangement and fencing will be provided to avoid the entry of unauthorized persons.
- The accessibility to the mine from the surface will be prevented by providing fencing arrangement.
- Care & maintenance of machineries as per the machine operating manuals.

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- Tightening of the security at the time of discontinuance.
- Repair & maintenance of haul road.
- Regular monitoring of air, water, noise etc. in the permitted area and inspection of quarry working by competent persons/experts.

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8.6 Financial Assurance:

Sl. No a	Head b	Area put in use at the start of plan (Existing land use) c	Additional requirement during plan period. d	Total e= (c + d)	Area considered as fully reclaimed & rehabilitated f	Net area considered for calculation g = (e –f)
1.	Area to be excavated.	12.581	22.236	35.589* 0.772(road to be included in mining)	Nil	35.589
2.	Storage for top soil.	Nil	Nil	Nil	Nil	Nil
3.	Overburden dump.	0.364	3.339	3.703	Nil	3.703
4.	Mineral storage	Nil	Nil	Nil	Nil	Nil
5.	Infrastructure (Workshop, administrative building).	0.100	Nil	0.100	Nil	0.100
6.	Roads.	0.915	Nil 0.772* (To be included in mining)	0.143	Nil	0.143
7.	Railways	N.A	N.A.	N.A.	N.A.	N.A.
8.	Tailing Pond	N.A.	N.A.	N.A.	N.A.	N.A.
9	Effluent Treatment Plant	N.A.	Nil	Nil	Nil	Nil
10	Mineral separation plant	Nil	7.314	7.314	Nil	7.314
11	Township area	Nil	Nil	Nil	Nil	Nil
12	Others to specify.	Nil	0.510	0.510 (way bridge work shop)	Nil	0.510 (way bridge work shop)
13	Exploration	Nil	0.005	0.005	Nil	0.005
		13.960	**33.404**	**47.364**	**Nil**	**47.364**

As per Mineral Conservation and Development (Amendment) Rules – 2017 under Rule 27(1) the lessee will have to provide financial assurance of Rs.300000.00 per hectare for the area utilized since the area falls in A-Category mine. The financial assurance is calculated to be 47.364 Ha x Re.300000/- = Rs.14209200.00 **(Rupees one Crore fourty two lakhs nine thousand two hundred only)** at the rate of Rs 300000/- per hectare. The copy of the bank guarantee is attached **as Annexure**

9.0 Certificate & Undertaking:

A copy of resolution, certificate and an undertaking are enclosed.

10.0 Plans, Sections etc.

Attached in the documents as per list of plates

P.MOHANTRA
Qualified Person

18/12/2017
क्षेत्रीय खान नियंत्रक
Regional Controller of Mines
भारतीय खान ब्यूरो
Indian Bureau of Mines

Nirmal Kumar Pradeep Kumar
MINE OWNER

Phone . Chaibasa : 256781
E-mail : nkpkcbsa@yahoo.in
nkpkjmd@yahoo.com

CHAIBASA. Dist - West Singhbhum (Jharkhand) 833201
Head Office . RANCHI

TIN 20941200746

Ref. No. : NP/...../.....

Chaibasa 21.11.2017

CONSENT LETTER FROM APPLICANT

The Review of Mining Plan in respect of Ghatkuri Iron Ore Mine over an area of 149.7343 Hectares, Village- Taliba, Baraiburu, P.O. - Barajamda, Dist: West Singhbhum, State: Jharkhand, under Rule 17(3) of MCR, 2016 has been prepared by Qualified Person **Shri Pradeept Mohapatra, MSc (Geology)**

This is to request the Regional Controller of Mines, Indian Bureau of Mines, Ranchi to make further correspondence regarding any correction of the Review of Mining Plan with the said Qualified person at his address below:-

Sri Pradeept Mohapatra
At- Unchabali, Po- Bamebari,
Via- Joda, Dist-Keonjhar, Odisha
E mail: pmohapatra_07@yahoo.com
Mobile No. - +919438149715.

We hereby undertake that all modification/updating as made in the said Review of Mining Plan by the said Qualified person be deemed to have been made with our knowledge and consent and shall be acceptable on us and binding in all respects.

Signature of the Applicant in full: Pradeep Kumar Jain

Name in full Block letters: (PRADEEP KUMAR JAIN)
(LESSEE)

Addrass: Jain Mandir Road, Gandhi Tola,
P.O. - Chaibasa - 833201, Jharkhand
Phone No : 06582 — 256781 (Chaibasa)

Place: Chaibasa.
Date: 21 .11.2017.

Nirmal Kumar Pradeep Kumar
MINE OWNER

Phone . Chaibasa 256781
E-mail . nkpkcbsa@yahoo.in
nkpkjmd@yahoo.com

CHAIBASA, Dist - West Singhbhum (Jharkhand) 833201
Head Office RANCHI

TIN - 20941200745

Ref. No. : NP/...../.....

Chaibasa 21.11.2017

DECLARATION

It is Certified that the Progressive Mine Closure Plan of Ghatkuri Iron Ore Mine of Pradeep Kumar Jain over an area of 149.7343 Hectares complies with all statutory rules, Regulation, Orders Made by the Central or State Government, Statutory organization, Court etc which have been taken into consideration and wherever any specific permission is required the lessee will approach the concerned authorities.

The information furnished in the Progressive Mine Closure Plan is true and correct to the best of our knowledge and records.

For **M/s Nirmal Kumar Pradeep Kumar**

Pradeep Kumar Jain
(LESSEE)

Place: Chaibasa.
Date :21.11.2017

Nirmal Kumar Pradeep Kumar
MINE OWNER

Phone . Chaibasa : 256781
E-mail . {nkpkcbsa@yahoo.m
nkpkjmd@yahoo.com

CHAIBASA, Dist.- West Singhbhum (Jharkhand) 833201
Head Office . RANCHI

TIN : 20941200746

Ref. No. : NP/...../..... ....

Chaibasa 21.11.2017

CERTIFICATE

"The Provision of Mines Act, Rule and regulations made there under have been observed in the Review of Mining Plan over an area of 149.7343 hectares in West Singhbhum District in Jharkhand State belonging to Ghatkuri Iron Ore Mine and where specific permissions are required, the applicant will approach to the D.G.M.S. Further, standards prescribed by D.G.M.S. in respect of miners' health will be strictly implemented".

For M/s Nirmal Kumar Pradeep Kumar

Pradeep Kumar Jain

(LESSEE)

Place: Chaibasa
Date :21.11.2017

Nirmal Kumar Pradeep Kumar
MINE OWNER

Phone : Chaibasa : 258781
E-mail : nkpkcbsa@yahoo.in
nkpkjmd@yahoo.com

CHAIBASA, Dist.- West Singhbhum (Jharkhand) 833201
Head Office RANCHI

TIN : 20941200746

Ref. No. : NP/...../..... *Chaibasa* 21.11.2017

UNDERTAKING

Regarding approval of the Review of Mining Plan in respect of Ghatkuri Iron Ore Mine over an area of 149.7343Ha, village- Tatiba, Dist: West Singhbhum, State: Jharkhand.

We do hereby undertake that

a) Ghatkuri Iron Ore Mine over an area of 149.7343 Ha, village- Tatiba, District – West Singhbhum, State: Jharkhand has been granted in the name of Nirmal Kumar Pradeep Kumar.

b) I am holding other mining lease in Jharkhand i.e. Bihar Iron Ore Mine over an area of 66.781 hectares of Nirmal Kumar Pradeep Kumar falls in Meralgora Village under Noamundi Protected Forest, Block no – 40, Chaibasa Forest Division, Chaibasa in the District Singhbhum West of Jharkhand State. There is no any other mining lease in the name of Nirmal Kumar Pradeep Kumar out of Jharkhand State.

c) If there is any change in the name/address/partnership in respect to the above said mine, during the pendency of approval, the same shall be informed promptly to the IBM authority with immediate effect.

d) I do hereby undertake to complete the exploration within Ghatkuri Iron Ore Mine over an area of **149.7343 hectares as** proposed in the Review of the Mining Plan in a time bound manner.

For **Nirmal Kumar Pradeep Kumar**

Pradeep Kumar Jain
(LESSEE)

Place: Chaibasa.
Date : 21.11.2017

Nirmal Kumar Pradeep Kumar
MINE OWNER

Phone : Chaibasa 256781
E-mail : nkpkcbsa@yahoo.in
nkpkjmd@yahoo.com

CHAIBASA, Dist.- West Singhbhum (Jharkhand) 833201
Head Office : RANCHI

TIN : 20941200746

Ref. No. : NP/...../.....

Chaibasa 21.11.2017

UNDERTAKING

Regarding high resolution satellite images obtained from CARTOSAT-2 satellite LISS-IV sensor on the scale of cadastral map, covering the mining lease and an area of two Kilometers from the lease boundary, in respect of Ghatkuri Iron ore Mine belonging to M/s Nirmal Kumar Pradeep Kumar over an area of 149.7343Ha in West Singhbhum district of Jharkhand

I hereby undertake that I will submit the high resolution satellite images obtained from CARTOSAT-2 satellite LISS-IV sensor on the scale of cadastral map, covering the mining lease and an area of two Kilometres from the lease boundary within a period of six months.

Place: Ranchi

Date: 21.11.2017

For M/s Nirmal Kumar Pradeep Kumar

Pradeep Kumar Jain

(Pradeep Kumar Jain)

Lessee

Nirmal Kumar Pradeep Kumar
MINE OWNER

Phone Chaibasa 256781
E-mail : nkpkcbse@yahoo.in
nkpkjmd@yahoo.com

CHAIBASA, Dist.- West Singhbhum (Jharkhand) 833201
Head Office RANCHI

TIN : 20941200746

Ref. No. : NP/...../.....

Chaibasa 21.11.2017

UNDERTAKING

I hereby undertake that other than mining business I involved in the following firms/organization/company.

Sl no	Name of the organisation	Designation
1	Nirmal Kumar Jain(Godrej Dealer)	Proprietor

Place: Ranchi

Date: 21.11.2017

For M/s Nirmal Kumar Pradeep Kumar

Pradeep Kumar Jain

(Pradeep Kumar Jain)

Lessee

Nirmal Kumar Pradeep Kumar
MINE OWNER

Phone : Chaibasa 256781
E-mail : nkpkcbsa@yahoo.in
nkpkjmd@yahoo.com

CHAIBASA, Dist.- West Singhbhum (Jharkhand) 833201
Head Office : RANCHI

TIN : 20941200746

Ref. No. : NP/...../.....

Chaibasa 21.11.2017

UNDERTAKING

Regarding pillaring of boundary pillar as per Rule 12(v) of MCR 2016 in respect of Ghatkuri Iron ore Mine belonging to M/s Nirmal Kumar Pradeep Kumar over an area of 149.7343Ha in West Singhbhum District of Jharkhand

I hereby undertake that pillaring of Boundary pillars will be done as per the Rule 12(v) of

MCR 2016 will be carried out within a period of six months.

Place: Ranchi

Date: 21.11.2017

For M/s Nirmal Kumar Pradeep Kumar

Pradeep Kumar Jain

(Pradeep Kumar Jain)
Lessee

Nirmal Kumar Pradeep Kumar
MINE OWNER

Phone : Chaibasa 256781
E-mail : nkpkcbsa@yahoo.in
nkpkjmd@yahoo.com

CHAIBASA, Dist - West Singhbhum (Jharkhand) 833201
Head Office RANCHI

TIN 20941200746

Ref. No. : MP/...../..... ....

Chaibasa 21.11.2017

UNDERTAKING

Regarding incorporation of GTS point/Triangulation point, and duration of DGPS reading of each station in the DGPS report (As per CCOM's Circular no. 2/2010), obtained from authorized agency, in respect of Ghatkuri Iron ore Mine belonging to M/s Nirmal Kumar Pradeep Kumar over an area of 149.7343Ha in West Singhbhum district of Jharkhand

I do hereby undertake that I will submit DGPS report within a period of two months by incorporating the GTS point/Triangulation point and duration of DGPS reading of each station as per CCOM's Circular no. 2/2010, obtained from authorized agency, in respect of Ghatkuri Iron ore Mine over an area of 149.7343Ha in West Singhbhum district of Jharkhand

Place: Ranchi
Date: 21.11.17

for M/s Nirmal Kumar Pradeep Kumar
Lessee

Nirmal Kumar Pradeep Kumar
MINE OWNER

Phone : Chaibasa 256781
E-mail {nkpkcbsa@yahoo.in
nkpkjmd@yahoo.com

CHAIBASA, Dist.- West Singhbhum (Jharkhand) 833201
Head Office RANCHI

TIN : 20941200746

Ref. No. : NP/...../ . . .

Chaibasa ...21.11.2017...

UNDERTAKING

Regarding DGPS surveyed map by rectifying the pillar No in clock wise direction from authorized agency, in respect of Ghatkuri Iron ore Mine belonging to M/s Nirmal Kumar Pradeep Kumar over an area of 149.7343Ha in West Singhbhum district of Jharkhand

I do hereby undertake that I will submit rectified **DGPS surveyed map** within a period of two months by rectifying the **pillar No in clock wise direction from authorized agency**, in respect of Ghatkuri Iron ore mine over an area of 149.7343Ha in West Singhbhum district of Jharkhand

for M/s Nirmal Kumar Pradeep Kumar

Lessee

Place: Ranchi

Date: 21.11.17

Pradeept Mohapatra

(QUALIFIED PERSON)

CERTIFICATE

The provisions of the Mineral Conservation and Development Rules 2017 have been observed in the preparation of the Review of the Mining plan for Ghatkuri Iron ore Mine over an area of 149.733Ha. of M/s Nirmal kumar pradeep kumar, in West Singhbhum district, Jharkhand State and Whenever specific permissions are required, the applicant will approach the concerned authorities of Indian Bureau of Mines.

The information furnished in the Review of the Mining plan is true and correct to the best of our knowledge.

Place: Joda
Date: 21.11.2017

(Pradeept Mohapatra)
Qualified Person

At - Unchabali, Po- Bamebari, DIST. :Keonjhar, Odisha: 758034,
MOB : 09438149715, Email : pmohapatra_07@yahoo.com