MINING PLAN

(With Progressive Mine Closure Plan)

ON

BOKNA IRON & MANGANESE DEPOSIT OVER AN AREA OF 343.00 ACRES/138.81 HECTS. IN VILLAGE – BOKNA, DISTRICT – WEST SINGHBHUM, JHARKHAND

SUBMITTED UNDER RULE 22 (4) A OF MINERAL CONCESSION RULES. 1960

अनुमोदित
APPROVED

SUBMITTED BY:-

M/S RUNGTA SONS (P) LTD.
RUNGTA HOUSE
CHAIBASA, JHARKHAND

PREPARED BY :-

(1) SRI HIRAK MAZUMDER,
    REGD. NO. - RQP/CAL/170/92/A.

(2) SRI ABHIJIT SEN
    REGD. NO. - RQP/CAL/283/98/A

For RUNGTA SONS (P) LIMITED

Director

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पत्र संख्या द्वारा $8/4(3)/2005-\text{}\text{}(02)/mp-16$
VIDE LETTER NO. *Dated 27/12/2005*

SUBMITTED BY:-

M/S RUNGTA SONS (P) LTD.
RUNGTA HOUSE
CHAIBASA, JHARKHAND

PREPARED BY :-

(1) **SRI HIRAK MAZUMDER,**
    REGD. NO. - RQP/CAL/170/92/A.

(2) **SRI ABHIJIT SEN**
    REGD. NO. - RQP/CAL/283/98/A.

For RUNGTA SONS (P) LIMITED

Director

CONSENT LETTER FROM THE APPLICANT

THE MINING PLAN IN RESPECT OF BOKNA IRON & MANGANESE MINES OVER 138.81 HECTARES AT BOKNA VILLAGE IN WEST-SINGHBHUM DISTRICT OF JHARKHAND HAS BEEN PREPARED BY SRI H. MAZUMDER, REGD. NO. RQP/CAL/170/92/A AND SRI ABHIJIT SEN, REGD. NO. RQP/CAL/283/98/A. I REQUEST THE REGIONAL CONTROLLER OF MINES, IBM KOLKATA REGION TO MAKE FURTHER CORRESPONDANCE WITH THE SAID RQP'S ON THE FOLLOWING ADDRESS.

ADDRESS:-

1) SRI H. MAZUMDER
   GM (G&E)
   RQP/CAL/170/92/A

2) SRI ABHIJIT SEN
   Sr. MANAGER (GEOLOGY)
   RQP/CAL/283/98/A

M/S RUNGTA SONS (P) LTD.,
AT & P.O - BARAJAMDA
DIST. - WEST SINGHBHUM
JHARKHAND – 833 221

APPROVED

I HEREBY UNDERTAKE THAT ALL THE CONDITIONS SO MADE IN THE MINING PLAN BY THE RECOGNISED PERSONS BE DEEMED TO HAVE BEEN MADE WITH MY KNOWLEDGE AND CONSENT AND SHALL BE ACCEPTABLE TO ME AND BINDING ON ME IN ALL RESPECT

SIGNATURE OF THE :
APPLICANT IN FULL

R.C.B. SRIVASTAVA
(NOMINATED OWNER)
M/S RUNGTA SONS (P) LTD.
CHAIBASA - 833201
SINGHBHUM (WEST)
JHARKHAND
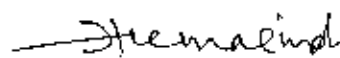
PLACE: - CHAIBASA
DATE: - 25.10.2004

CERTIFICATE – 1

This is to certify that we have been prepared the Mining Plan of Bokna Iron & Manganese Mine deposit, M/S Rungta Sons (P) Ltd. over 138.81 Hectares in West Singhbhum District of Jharkhand, uder Rule - 22 (4) of Mineral Concession Rules 1960.
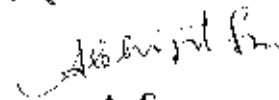
(1) The provision of mines act 1952, Mines rules 1955 & Metaliferous Mines regulation 1961 made there under have been observed in this Mining Plan and wherever specific permission are required the applicant will approach the DGMS.

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(2) The information furnished in the Mining Plan are true and correct to the best of our knowledge.
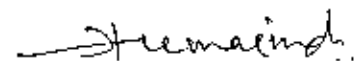
H. Mazumder
RQP/CAL/170/92/A
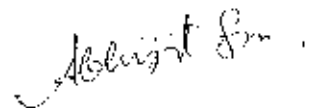
A. Sen
RQP/CAL/283/98/A

CERTIFICATE – II

This is to certify that we have prepared the Mining Plan of Bokna Iron & Manganese deposit over 138.81 hectares in West Singhbhum district of Jharkhand, under Rule 22 (4) of MCR 1960. The provision of Mineral Conservation and Development Rules, 1988 have been observed in the Mining Plan of Bokna Iron & Manganese deposit of M/S Rungta Sons (P) Ltd. and wherever specific permissions are required, the applicant will approach the Indian Bureau of Mines.

H. Mazumder
RQP/CAL/170/92/A

A. Sen
RQP/CAL/283/98/A

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For RUNGTA SONS (P) LIMITED

Director

GEOLOGIST

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R.Q.P. CALCUTTA 092

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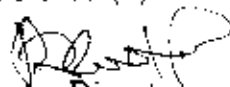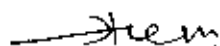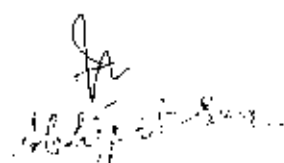
LIST OF ANNEXURE

No.	Description	Annexure no.
1.	Certificate of progressive Mine Closure Plan	I
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For RUNGTA SONS (P) LIMITED

Director

CHAPTER – 0

INTRODUCTION

Chapter – 0

Introduction

Introduction

Bokna Iron and Manganese deposit is named after the village Bokna, Noamundi Block, Dist. W Singhbhum, Jharkhand over an area of 343.00 Acres or 138.81 Hects is an old mining lease being worked for more than 40 years by the ex-lessee Smt. D.K. Bai.

After the lease was thrown open by the State Government as per Rule 59 of Mineral Conservation Rule, 1960 in Bihar Gazette notification on 06.04.1983, the mining lease was applied by M/S Rungta Sons (P) Ltd. over an area 343.00 Acres/138.81 hects on 07.05.1983 Govt. of India Dept of Steel and Mines, vide letter no. 5/18/85. Mines – 5, dated 11.09.1990 have conveyed formal approval for grant of mining lease in favour of the applicant (Annexure – IIIA). A communication from Govt. of Jharkhand vide letter no. B/M 6 – 105/41, dated 17.12.2004 is also enclosed as annexure – IIIB. The precise area map duly signed by Director of Mines & Geology is enclosed as DRG No. 12.

Though the applicant M/S Rungta Sons (P) Ltd received formal for grant of ML of Bokna Iron & Manganese deposit, the Ex-lessee Smt. D.K. Bai, worked this area for more than 40 years. As a result, large no. of small & big Iron and Manganese quarries, dumps and roads were developed throughout the area.

Bokna Iron and Manganese deposit is situated only 8 Km. away from nearest Railway Stateion at Barjamda and well connected by a all season metal road. Other infrastructural facilities like Hospital, School & College, Bank, Train & Bus service are available very near to the area.

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For RUNGTA SONS (P) LIMITED

Director

GEOLOGIST

CHAPTER – 1

GENERAL

CHAPTER – 1

General

1.0 General
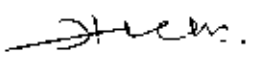
a) Name of the Applicant: M/S Rungta Sons (P) Ltd.

Rungta House

P.O. – Chaibasa

Dist. – West Singhbhum

Jharkhand – 833 201

Phone No. – (06582) 256861, 256761

b) Status of Applicant: It is Private limited Company primarily dealing with mining & trading business of various minerals and having registered office at Kolkata. The company is the Sister concern of M/S Rungta Mines Ltd. having vast experience in mining of Iron and Manganese in Orissa & Jharkhand State.
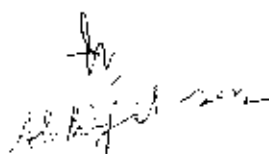
The Board of Directors include
(1) Sir N.L. Rungta
(2) Sri M. Rungta

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c) Mineral which the applicant: Iron & Manganese ore
intend to Mine

d) Period for which mining: It is a fresh area. The applicant applied for lease of 20 years.
to be granted

e) Name of RQP's preparing: (1) Hirak Mazumder
the Mining Plan Regd No. – RQP/CAL/170/92/A
Valid up to 2010

(2) Abhijit Sen
Regd No. – RQP/CAL/283/98/A
Valid up to – 2010

Address. M/S Rungta Sons (P) Ltd.
At & P.O. – Barajamda
West Singhbhum
Jharkand – 833221
Phone No. – 06596 – 262321

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GEOLOGIST
RQP No. RQP/Cal/283/98/A
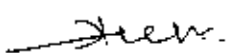
f) Name of prospecting agency: M/S Rungta Sons (P) Ltd. with the help of its own
                                 Geologist
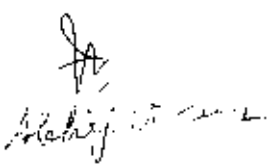
   Address.   M/S Rungta Sons (P) Ltd.
                                 Rungta House
                                 Chaibasa
                                 West Singhbhum
                                 Jharkhand – 833201

g) Reference no. and date of :   Copy of conditional approval letter for grant of mining
   consent letter from the   lease in favour of the applicant side letter no. 5/18/85.
   State Government.   Mines – 5. dated 11.09.1990 is enclosed as annexure   III

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CHAPTER – 2

LOCATION
&
ACCESSIBILITY

GEOLOGIST

Chapter – 2

Location & Accessibility

2.0 **Location & Accessibility**

  a) **Details of the area (location plan is enclosed)**

    Name of the area – Bokna Iron and Manganese deposit

    District & State – West Singhbhum, Jharkhand

    Sub-division – Noamundi

    Village – Bokna

    Khasra/Plot no./Block range Felling series – Khasra no. Plot no. etc enclosed as
                                      annexure – IV

    Lease area (Hectares) – 138.81 Hectares

    Whether the area is recorded to be in forest – The entire area is situated in a forest
                                         Land.

    Owner ship/Occupancy – The granted M.L. area is forest land belong to Government

Existence of public road/Railway line – If any nearby and approximate distance	The Noamundi – Kribur State highway no. – 10 is running adjacent to the lease hold area on the Eastern side Barjamda is the nearest railway station situated at a distance of 4 km from the lease hold.

Toposheet no. with latitude and longitude

The lease area falls in the Survey of India toposheet no. 73F/8 (1 50000) and bounded by

Latitude – $22^{0} 10' 00''$ to $22^{0} 11' 15''$ N

Longitude – $85^{0} 22' 00''$ to $85^{0} 23' 15''$ E
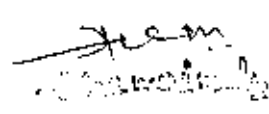
Land use pattern (forest, agriculture, grazing, barren etc.)
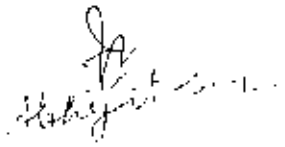
The area is freshly granted to the applicant Basically the area is a forest land which was previously based out by Ex-lessee Smt. D.K. Bai. Ex-lessee worked in this area for many years. As a result considerable amount of land was broken by Ex-lessee for mining and allied works of that time. The details of land use is given below:

(a)	Mining	–	66.046 Hects.
(b)	Storing of Mineral	–	4.480 Hects.
(c)	Dumping of overburden	–	17.964 Hects.
(d)	Construction building & Magazine	–	0.040 Hects.
(e)	Work shop/Housing colony	–	2.560 Hects.
(f)	Road	–	5.710 Hects.
		Total =	96.800 Hects.

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Attach a general location and vicinity map showing area boundaries and existing and proposed routs

(i)   A key plan (1:50000) showing the above details is enclosed (DRG no. - 1)

(ii)   A lease cum location plan (16" = 1 mile) is enclosed (DRG no. - 2)

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REG. NO. B.O./JGC/41JJ70/93/.3

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REGD. NO.   GGP/Cal/25.2/98A

CHAPTER – 3

GEOLOGY & RESERVE

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Chapter – 3

Geology & Reserve

3.0 Geology & Reserve

Bokna Iron & Mn. Mines of M/S Rungta Sons (P) Ltd., Chaibasa covers an area of 343.00 Ac/138.81 hects. of land. The area is bounded by latitude 22° 11' 15" North and Longitude 85° 22' 00" - 85° 22' 00" East situated at distance of 15 kms. from Nuamundi Sub-division or West Singhbhum of Jharkhand.

a) Topography, General Geology and local Geology

i) Topography

The area falls under Survey of India Topo-sheet No. 73 F/8 and is situated at about 4 km. from Barajamda to the North-West and well connected by an all fairy weather road to State Highway
No. 10.

There is hillock stretching in NE – SW direction having highest & lowest contour i.e 480 side River Karo running at North Eastern & Western Boundary of the lease hold area is following in South to North direction

ii) General Geology

The Bokna Iron & Mn. ore deposit from a part of Precambruan Sedimentary formation as the Iron ore & Mn. ore group of rocks developed in South Singhbhum and adjoining District of Sundargarh and Keonjhar of Orissa. The Iron ores of Singhbhum are associated with a group of rocks which occupy steep pierces inhabited forest covered hills. the tops of these rocks from the remain of an old pen plain at about 200 hects above Sea level and higher Bridges consisting mainly of banded quartzite rise to nearly 3000 ft

The Iron ore series consists mainly of philters. tuffs. lavas. banded hematite quartzite and charts. The Iron ores are more particularly associated with the banded hematite quartzite of which they represent enriched portions The banded hematite quartzite report as ridges arranged in the form of a narrow horseshoe with closed end to the South in Keonjhar and Bonai and with sides about 8 miles a part open to the Northeast in Snghbhum. Other subsiary outcrops of banded hematite quartzite occur within the horse shoe. The ridge forming the western side of this horseshoe is known as the Iron ore range. which is persistent for some 30 miles

In addition to the Iron ore series there is in Southern Singhbhum a much younger group of rocks that has called the Kolhan Series. This consists of basal Sandstone-conglomerate have been divided into various types i e massive ore soft or porous shale ore blue dust and lump ore

The Manganese deposits of Singhbhum occur both in the Iron ore series and in the Kolhan series. The deposit close to Chaibasa occurs in the basal part of the Kolhan series, replacing both the basal sandstone and limestone. The ore occurs as thin lenticels parallel to the bedding of the rocks of as lateritic material at the surface. The lateritic manganese is commonly high in Iron All the ores are concretionary and the Manganese has been segregated by solutions. which obtained their context probably for underlying manganiferous rocks of the Iron ore series. The higher grade deposits are generally associated with cherty. The largest deposits are probably of the surface lateritic types, which may be it quite high grade ore.

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The general Statgraphical succession of the region is as under:
Kolhan Series (Basal conglomerate and sand stoney)

---------------------------- Unconformity ----------------------------

Phyllites and tuffs with Manganese and rare dolomite
Banded Hematite Quartzite
Phyllites and tuffs conglomerate and basis igneeous rocks.

b) Local Geology

The lease granted area occupies the small part of Kolhan Series. The formation of the area comprises as a whole Soil, laterite, Shale, Conglomerate, Quartzite BIJ Iron ore & Manganese ore. As it is a old lease area there are many no. of old quarries existing in the area which shows the presence of Iron & Manganese ore formation Major Portion of the area occupies Manganese. which is covered with black soil & Manganifrous laterite.

There are three sets of joints observed in the massive Iron ore exposed in the abandoned Iron ore quarry. The measured directions of the joints are as follows.

(a) E – W with dip 50^0 N
(b) E – W with dip 20^0 S
(c) N 20^0 E – S 20^0 with dip 50^0 W

There are some patches of Quartzite exposed in the low-lying areas at the Southern portion lease area. Where as some hillocks covered with shales/phyllites also shows exposure of quartzite vents trending in NE – SW direction at the Eastern portion of the lease area.

The ore exposed in the abandoned quarry is covered with 5 mt. overburden i.e. Laterite & Soil and also bouldery Iron is observed at the North –Western flank of the hillock. Mainly Iron ore is observed at the Northern portion of the area where as manganese ore at the Southern part of the lease.

In the Southern part of the lese area consists the manganiferous laterite. which to contain high Fe in comparison to general grade of laterite containing manganese which may contain a good quantity of manganese below laterite capping.

The local geology of the leasehold area is given below:

Lateritic Soil
Ferruginous laterite
BHJ/BHQ with Iron ore
Manganeferous laterite/Manganeferous nodules
Manganeferous cherty quartz
Manganeferous shale with Mn. ore

The detailed litho unit`s area as under:
(i) Soil is the top most cover, which occupies the valley portions surrounding the hill area. It is of alluvial type and most of which probably was brought by the nearby flowing nalas The soil is yellowish brown and fertile and is being used for cultivation purpose.

(ii) Ferruginous Laterite occupies a major portion of the area. It is formed on the surface as a result of lateritisation and are prominent within the low – contour area. Laterite found on gentle slopes are of conglomeratic in nature containing rock fragments including pebbles of rounded to sub-rounded Iron ores cemented together in semi hard lateritic matrix.

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The laterites near the surface are very hard but at depth are soft and porous due to leaching by white ocherus substance.

(iii) Banded hematite Jaspar occurring at some places indicates replacement origin of Iron ore in laterites. The silica content of BHJ has been partially removed in course of time by leaching action of water resulting in incomplete formation of Iron ore

(iv) Manganiferous laterite and manganese nodules are one of the source of manganese ore in the area. It is a low grade ore deposit and commonly occurring mineral is psilomelane. This type of ore deposit is found to occurring the north western and south – western portion of the lease area and probably formed by the alteration of rocks containing manganese bearing minerals. On weathering of such rocks the manganese dioxide aggregate together forms as nodules and layer of residual clay, which are found to occur on the outcrop of the weathered rocks. The enrichment of manganese is caused due to leaching action of solution leading to formation of colloform structure at many places in the area.

(v) Cherty quartzite with manganese ore is the another source of manganese ore in the area. The deposit is basically low grade but occasional patches of medium to high grade ores are also found. The higher grade of the ore is comparatively having more shine and luster and also friable in nature. The ore is found inter-stratified with cherty quartzite and also shale at places and as such silica content of this ore is high and makes the ore more harder than the lateritic type.

| A Geological plan in 1:2000 scale is enclosed as DRG no. – IV| अनुमोदित

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(c) **Details of Exploration**

(i) **Already carried out:**

Bokna Iron and Manganese deposit is an old lese area which was again granted to the applicant as fresh lease. As it is a old lease area there are no. of old quarries present within the lease area. All the old trial and quarries within this area provides very good geological informations about this area. The details of exploration already done in the area is given below:

- There are 60 Nos. of existing trial pits/quarries, which gives the lithology of the exploratory data
- The entire lease hold area was topographically surveyed by group certified surveyors showing all important surface features including contours at 3.0 m. interval.

- The lease area was geologically mapped by a qualified and experienced Geologist with the help of a certified surveyors, showing the various litho-logical contacts, strike, folds & faults etc.

(d) **Exploration proposed to be carried out:**
In order to obtain more detail informations about the ore body, its behaviors, total thickness etc. within the more concentrated Iron ore & or Manganese ore area likely to be explained during the next digit of financial years. Core drilling/non-core drilling has been envisaged. It is proposed to put diamond drill (Core drill) holes up to a depth of full thickness of the ore body. In addition to these a no. of wagon drill holes to be drilled up to a depth of 25.00 mts. which will help to get a more clear picture of the ore body and help in developing a comprehensive mine planning for the deposit.

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Year wise Exploration Schedule

Table - 1

Financial Year	No. of holes	BH/DTH	Depth of holes	Total metrage
2005 – 06	10	BH_1 – BH_{10}	50 m. each	500
2006 – 07	10	BH_{11} – BH_{20}	50 m. each	500
2007 – 08	5	BH_{21} – BH_{25}	50 m. each	250
	15	DTH_1 – DTH_{15}	25 m. each	375
2008 – 09	15	DTH_{16} – DTH_{36}	25 m. each	375
2009 – 10	22	DTH_{37} – DTH_{58}	25 m. each	375
Total Metrage	65			

e) Reserve

i) Geological Reserve Estimation

The Geological reserve of Bokna Iron & Manganese deposit is estimated only on the basis of no. of small and large Iron and Manganese pits present in the lease area. All these pits give sufficient evidences of the ore zone in the area.

The Geological reserve of Iron and Mn. ore zone will be done in cross section by method For estimation of Geological reserve the following methods has been adopted.

A_1) The overall reserve has been considered under proved, probable and possible category.

A_2) 16 no. of cross section line have been drawn at 100 m. Interval on the basis of available data obtained from old quarries.

A_3) Overburden thickness is found 5.5 m. in Iron ore zone and 4.0 m. in manganese ore zone.

A_4) Proved Iron ore zone is considered as 14 m. below the overburden as the maximum depth of the Iron pit will found up to 20 m.
Proved Manganese ore zone is considered as 11.0 m. below the overburden as the maximum depth of the Manganese pit will found up to 16 m.

A_5) Probable Iron ore zone is considered up to a 5 mt. depth below the proved Iron ore zone. On Surface side probable Iron ore zone is considered up to 50 mt. distance from proved zone boundary
Probable Mn. ore zone is considered up to 3 mt. depth below the proved Mn. ore zone on Surface side possible Mn. ore zone is considered up to 25 mt. distance from proved Mn. ore zone boundary

A_6) Excluding proved and probable Iron and Manganese ore zone area, the balance area of Iron and Manganese zone area, the balance area of Iron and Manganese ore zone will be considered as possible.

A_7) Length of influence is taken as 100 m. for each cross section

A_8) Recovery percentage of Iron ore is 55%
Recovery percentage of Manganese ore is 30%

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A₉) Within the total Iron ore production, saleable Iron ore production is 90% and sub-grade Iron ore production is 10%
Within the total Mn. ore production, saleable Mn. ore production is 85% and sub-grade Mn. ore production is 15 %.

A₁₀) Cut of grade for Iron ore is 60% Fe and Mn. ore is 25% Mn.

A₁₁) Sub-grade for Iron ore is considered for ore with Fe 55% to 60%
Sub-grade for Mn. ore is considered for ore with Mn. 20% to 25%

A₁₂) Specific gravity of Iron ore 3.5 and Mn. ore is 2.8

ii) **Geological Reserve**

Based on the method of estimation of reserve the details of reserve of Bokna Iron & Mn Mine is given as under

Reserve for Iron ore

Category of reserve		Reserve on Million Tones	Grade
Proved	-	10.39	> 60% - < 66%
Probable	-	8.00	- do –
Possible	-	2.03	- do -
Total	-	20.42	- do

Reserve for Manganese ore

Category of reserve		Reserve on Million Tones	Grade
Proved	-	2.03	> 25% - < 40%
Probable	-	1.09	- do –
Possible	-	0.98	- do -
Total	-	4.1	- do –

The above geological reserve of Iron and Manganese is estimated by cross sectional method. The detail calculation for geological reserve estimation of Iron and Manganese is given in table no. 3A, 3B, 3C & 4A, 4B, 4C

GEOLOGIST
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Table no. – 3A

Proved reserve estimation of Iron ore of Bokna Iron and Manganese Deposit

(1) Sr No.	(2) Section line considered	(3) Area cross section (m²)	(4) Length of influence (m)	(5) Volume of ore zone (m³)	(6) Recovery (%) percentage	(7) Actual volume of ore one (m³)	(8) Specific gravity	(9) Proved reserve of Iron ore (MT)	(10) Remarks
1.	S - 200	2508	100	250800	55	137940	3.5	482790	Total
2.	S - 300	4400	100	440000	55	242000	3.5	847000	proved
3.	S - 400	5676	100	567600	55	312180	3.5	1092630	Iron ore
4.	S - 500	3740	100	374000	55	205700	3.5	719950	reserve is
5	S - 600	4356	100	435600	55	239580	3.5	838530	103,92,690
6.	S - 700	396	100	39600	55	21780	3.5	76230	MT -
7.	S - 800	2904	100	290400	55	159720	3.5	559020	Or
8	S - 900	5676	100	567600	55	312180	3.5	92630	10.39
9.	S - 1000	11968	100	1196800	55	658240	3.5	2303840	Million
10.	S - 1100	7920	100	792000	55	435600	3.5	1524600	MT.
11.	S - 1200	4444	100	444400	55	244420	3.5	855470	
							Total =	10392690 MT.	

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Table no. – 3B

Probable reserve estimation of Iron ore of Bokna Iron and Manganese Deposit

(1) Sr. No.	(2) Section line considered	(3) Area cross section (m^2)	(4) Length of influence (m)	(5) Volume of ore zone (m^3)	(6) Recovery (%) percentage	(7) Actual volume of ore zone (m^3)	(8) Specific gravity	(9) Probable reserve of Iron ore (MT)	(10) Remarks
1.	S - 200	1140	100	114000	55	62700	3.5	219450	Total
2.	S - 300	2000	100	200000	55	110000	3.5	385000	probable
3.	S - 400	2188	100	218800	55	120340	3.5	421190	Iron ore
4	S - 500	3872	100	387200	55	212960	3.5	745360	reserve
5.	S - 600	3324	100	332400	55	182820	3.5	639870	is
6.	S - 700	6452	100	645200	55	354860	3.5	242010	8001840
7.	S - 800	2856	100	285600	55	157080	3.5	549780	MT.
8	S - 900	5524	100	552400	55	303820	3.5	1063370	Or
9	S 1000	5440	100	544000	55	299200	3.5	1047200	8.0
10.	S - 1100	6652	100	665200	55	365860	3.5	1280510	Million
11	S - 1200	2120	100	212000	55	116600	3.5	408100	MT.
							Total =	8001840 MT.	

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Table no. – 3C

Possible reserve estimation of Iron ore of Bokna Iron and Manganese Deposit

(1) Sr. No.	(2) Section line considered	(3) Area cross section (m^2)	(4) Length of influence (m)	(5) Volume of ore zone (m^3)	(6) Recovery (%) percentage	(7) Actual volume of ore zone (m^3)	(8) Specific gravity	(9) Possible reserve of Iron ore (MT)	(10) Remarks
1.	S - 500	832	100	83200	55	45760	3.5	160160	Total
2	S - 600	768	100	76800	55	42240	3.5	147840	possible
3	S - 700	3520	100	352000	55	193600	3.5	677600	Iron
4.	S - 800	5440	100	544000	55	299200	3.5	1047200	ore reserve is 2032800 MT. Or 2.03 Million MT.
							Total =	2032800 MT.	

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Table no. – 4A

Proved reserve estimation of Manganese ore of Bokna Iron and Manganese Deposit

(1) Sr. No.	(2) Section line considered	(3) Area cross section (m²)	(4) Length of influence (m)	(5) Volume of ore zone (m³)	(6) Recovery (%) percentage	(7) Actual volume of ore one (m³)	(8) Specific gravity	(9) Proved reserve of Mn. ore (MT)	(10) Remarks
1	S - 400		100		55	14800	2.8		Total
		992		99200				41664	proved
2	S - 500	2656	100	265600	55	39840	2.8	111552	Manganese
3	S - 600	3520	100	352000	55	52800	2.8	147840	ore reserve
4.	S - 1100	2368	100	236800	55	35520	2.8	99456	is 1091328
5	S - 1200	5120	100	512000	55	76800	2.8	215040	MT.
6.	S - 1300	5280	100	528000	55	79200	2.8	221760	Or
7.	S - 1400	1792	100	179200	55	26880	2.8	75264	1.09
8.	S - 1500	1824	100	182400	55	27360	2.8	76608	Million
9.	S - 1600	2432	100	243200	55	36480	2.8	102144	MT.
							Total =	1091328 MT.	

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Table no. – 4B

Probable reserve estimation of Manganese ore of Bokna Iron and Manganese Deposit

(1) Sr. No.	(2) Section line considered	(3) Area cross section (m²)	(4) Length of influence (m)	(5) Volume of ore zone (m³)	(6) Recovery (%) percentage	(7) Actual volume of ore zone (m³)	(8) Specific gravity	(9) Probable reserve of Mn ore (MT)	(10) Remarks
1.	S - 300								Total
2.	S - 400	2792	100	279200	15	41880	2.8	117264	probable
3.	S - 500	1036	100	103600	15	15540	2.8	93512	Manganese
4.	S - 600	2664	100	266400	15	39960	2.8	11888	ore reserve
5.	S - 1100	888	100	88800	15	13320	2.8	37296	is 982968
6.	S - 1200	2624	100	262400	15	39360	2.8	110208	MT.
7.	S - 1300	4180	100	418000	15	62700	2.8	175560	Or
8	S - 1400	3136	100	313600	15	47040	2.8	131712	0.98
9	S - 1500	3764	100	376400	15	56460	2.8	158088	Million MT.
10.	S - 1600	2320	100	232000	15	34800	2.8	97440	
							Total =	982968 MT.	

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Table no. – 4C

Possible reserve estimation of Manganese ore of Bokna Iron and Manganese Deposit

(1) Sr. No.	(2) Section line considered	(3) Area cross section (m²)	(4) Length of influence (m)	(5) Volume of ore zone (m³)	(6) Recovery (%) percentage	(7) Actual volume of ore one (m³)	(8) Specific gravity	(9) Possible reserve of Mn. ore (MT)	(10) Remarks
1	S - 600	394	100	39400	15	5910	2.8	16548	Total
2.	S - 1100	-	-	-	-	-	-	-	possible
3.	S - 1200	1100	100	110000	15	16500	2.8	46200	Manganese
4.	S - 1300	2992	100	299200	15	44880	2.8	25664	ore reserve
5.	S - 1400	5808	100	580800	15	87120	2.8	243936	is 526596
6.	S - 1500	2156	100	215600	15	32340	2.8	90552	MT.
7.	S - 1600	88	100	8800	15	1320	2.8	3696	Or
									0.52
								√J	Million
								⠀	MT.
							Total =	526596 MT.	

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Table no. – 3A₁

Proved Mineable reserve estimation of Iron ore of Bokna Iron and Manganese Deposit

(1) Sr No	(2) Section line considered	(3) Area cross section (m²)	(4) Length of influence (m)	(5) Volume of ore zone (m³)	(6) Recovery (%) percentage	(7) Actual volume of ore zone (m³)	(8) Specific gravity	(9) Proved reserve of Iron ore (MT)	(10) Remarks
1.	S - 200	2248	100	224800	55	123640	3.5	432740	Total proved Iron ore reserve is 8732185 MT. Or 8.73 Million MT.
2.	S - 300	4160	100	416000	55	228800	3.5	800800	
3.	S - 400	5296	100	529600	55	291280	3.5	019480	
4.	S - 500	3740	100	374000	55	205700	3.5	719950	
5.	S - 600	4356	100	435600	55	239580	3.5	838530	
6.	S - 700	396	100	39600	55	21780	3.5	76230	
7	S - 800	2904	100	290400	55	159720	3.5	59020	Considering 5% Mine loss the Mineable reserve will be 8295575 MT. Or 8 2 million MT.
8.	S - 900	5596	100	559600	55	307780	3.5	077230	
9.	S - 1000	11448	100	1144800	55	629640	3.5	203740	
10	S - 1100	7740	100	77400	55	42570	3.5	148995	
11.	S - 1200	4444	100	444400	55	244420	3 5	855470	
							Total =	8732185 MT.	

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Shriwatinoly

REG. No. R.O.P./CAL/170/92/A

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REGD. NO. -RQP/Cal/260/90A

Table no. – 3B₁

Probable Mineable reserve estimation of Iron ore of Bokna Iron and Manganese Deposit

(1) Sr. No.	(2) Section line considered	(3) Area cross section (m^2)	(4) Length of influence (m)	(5) Volume of ore zone (m^3)	(6) Recovery (%) percentage	(7) Actual volume of ore zone (m^3)	(8) Specific gravity	(9) Probable reserve of Iron ore (MT)	(10) Remarks
1	S - 200	970	100	97000	55	533500	3.5	186725	Total probable Iron ore reserve is 7084577 MT Or 7.08 Million MT
2	S - 300	1820	100	182000	55	100100	3.5	350350	
3	S - 400	1998	100	199800	55	109890	3.5	384615	
4.	S - 500	3122	100	312200	55	171710	3.5	600985	
5.	S - 600	3234	100	323400	55	177870	3.5	622545	
6.	S - 700	6452	100	645200	55	354860	3.5	1242010	
7.	S - 800	2856	100	285600	55	157080	3.5	549780	
8.	S - 900	4774	100	477400	55	262570	3.5	918995	Considering 5% Mine loss, total Mineable reserve will be 6730348 MT. Or 6.7 million MT.
9.	S 1000	5440	100	544000	55	299200	3.5	1047200	
10.	S - 1100	4677	100	467700	55	257235	3.5	900322	
11.	S - 1200	1460	100	146000	55	80300	3.5	281050	
							Total =	7084577 MT.	

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GEOLOGIST
REGD. NO. ...G/Cal/293/98A

...G/CAL/170/92/A

Table no. – 3C₁

Possible Mineable reserve estimation of Iron ore of Bokna Iron and Manganese Deposit
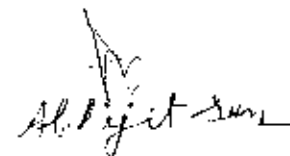
(1) Sr. No	(2) Section line considered	(3) Area cross section (m²)	(4) Length of influence (m)	(5) Volume of ore zone (m³)	(6) Recovery (%) percentage	(7) Actual volume of ore zone (m³)	(8) Specific gravity	(9) Proved reserve of Iron ore (MT)	(10) Remarks
1.	S - 500	832	100	83200	55	45760	3.5	160160	Total possible
2	S - 600	-	100	-	-	-	-	-	Iron ore
3.	S - 700	2920	100	292000	55	160600	3.5	562100	ore reserve is 809270
4.	S - 800	4520	100	45200	55	24860	3.5	87010	MT. Or 0.8 Million MT. Considering 5% Mine loss the Mineable reserve will be 768806 MT. Or 0.76 million MT.
							Total =	809270 MT.	

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GEOLOGIST
Regd. No. ROP/Cal/280/287c

RPJ/CAL/170/921♪

Table no. - 4A₁

Proved Mineable reserve estimation of Manganese ore of Bokna Iron and Manganese Deposit

(1) Sr. No.	(2) Section line considered	(3) Area cross section (m²)	(4) Length of influence (m)	(5) Volume of ore zone (m³)	(6) Recovery (%) percentage	(7) Actual volume of ore zone (m³)	(8) Specific gravity	(9) Proved reserve of Iron ore (MT)	(10) Remarks
1	S - 400	992	100	99200	55	14800	2.8	41664	Total proved Manganese ore reserve is 1091328 MT. Or 1.09 Million MT
2.	S - 500	2656	100	265600	55	39840	2.8	111552	
3	S - 600	3520	100	352000	55	52800	2.8	147840	
4.	S - 1100	2368	100	236800	55	35520	2.8	99456	
5.	S - 1200	5120	100	512000	55	76800	2.8	215040	
6	S - 1300	5280	100	528000	55	79200	2.8	221760	
7.	S - 1400	1792	100	179200	55	26880	2.8	75264	
8	S - 1500	1824	100	182400	55	27360	2.8	76608	But again considering 5% Mine loss the Mineable reserve will be 1036761 MT. Or 1.03 million MT.
9.	S - 1600	2432	100	243200	55	36480	2.8	102144	
							Total =	1091328 MT.	

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Abhijit Sen

GEOLOGIST
.... RQP:Cal/233/024

Table no. – 4B₁

Probable Mineable reserve estimation of Manganese ore of Bokna Iron and Manganese Deposit

(1) Sr. No.	(2) Section line considered	(3) Area cross section (m²)	(4) Length of influence (m)	(5) Volume of ore zone (m³)	(6) Recovery (%) percentage	(7) Actual volume of ore zone (m³)	(8) Specific gravity	(9) Probable reserve of Mn ore (MT)	(10) Remarks
1.	S - 300								Total probable Manganese ore reserve is 982968 MT. Or 0.98 Million MT
2.	S - 400	2792	100	279200	15	41880	2.8	117264	
3.	S - 500	1036	100	103600	15	15540	2.8	93512	
4	S - 600	2664	100	266400	15	39960	2.8	111888	
5.	S - 1100	888	100	88800	15	13320	2.8	37296	
6.	S - 1200	2624	100	262400	15	39360	2.8	110208	
7	S - 1300	3982	100	398200	15	59730	2.8	167244	
8.	S - 1400	3136	100	313600	15	47040	2.8	131712	After considering 5% Mine loss the Mineable reserve will be 959853 MT. Or 0.95 million MT.
9.	S - 1500	3764	100	376400	15	56460	2.8	158088	
10.	S - 1600	1980	100	198000	15	29700	2.8	83160	
							Total =	982968 MT	

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Table no. – 4C₁

Possible Mineable reserve estimation of Manganese ore of Bokna Iron and Manganese Deposit

(1) Sr No.	(2) Section line considered	(3) Area cross section (m²)	(4) Length of influence (m)	(5) Volume of ore zone (m³)	(6) Recovery (%) percentage	(7) Actual volume of ore one (m³)	(8) Specific gravity	(9) Possible reserve of Mn ore (MT)	(10) Remarks
1.	S - 600	394	100	39400	15	5910	2.8	16548	Total possible Manganese ore reserve is 487032 MT Or 0.48 Million MT
2	S - 1100	-	-	-	-	.	-	-	
3	S - 1200	460	100	46000	15	6900	2.8	193200	
4.	S - 1300	2812	100	281200	15	42180	2.8	118104	
5.	S - 1400	5592	100	559200	15	83880	2.8	234864	
6	S - 1500	1856	100	185600	15	27840	2.8	77952	
7	S - 1600	88	100	8800	15	1320	2.8	3696	
									Considering 5% Mine loss the Mineable reserve will be 462680 MT. Or 0.46 million MT
							Total =	487032 MT.	

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So, the mineable reserve of Iron and Manganese ore, of Bokna Iron and Manganese deposit will be

Mineable reserve in M.T

Type	Proved mineable reserve	Possible mineable reserve	Possible mineable reserve	Total
Iron ore	8295575	6730348	768806	15794729 MT. Or 15.79 Million MT.
Manganese ore	1036761	959853	462680	2459294 MT. Or 2.45 Million

UNFC System of Reserve

United Nations Frame work Classification for mineral resources formulated three dimension system for evaluation of deposit. The system evaluates and categories a deposit on merit of Economics, Technical Feasibility and Geology.

Based on economics of mining , a deposit can be classified as Economic (Code - 1), Potentially Economic (Code - 2) and Intrinsically Economic (Code - 3).

In Bokna Iron & Manganese Mine, Iron ore deposit is already exposed, having only 5 m. overburden and massive in nature So the cost of mining is economical viable. At present market condition of Iron ore is also very good. So for proved, probable and possible mineable reserve the Economics can be rated under code – 1

For Manganese deposit, the deposit is already exposed, having less overburden, ore is easily recoverable, ore grade is acceptable as per present recoverable ore grade is acceptable as per present market condition So for proved, probable and possible mineable reserve the Economics can be rated under code – 1

On the basis of Technical Feasibility of mining a deposit can be classified as Feasibility of mining a deposit be classified as Feasibility study and mining report prepared and concluded (Code - 1), whether pre feasibility study has been prepared (code - 2) and Geological study conducted (code - 3) before conducting (code - 1).

In Bokna Iron & Manganese deposit there of Iron and Manganese ore, which indicate that the deposit is very much feasible for both Iron and Manganese ore. The mining feasible for both Iron and Manganese ore. The mining plan is also prepared giving various parameters of exploration of the deposit So the feasibility axis will be follows.

Reserve	For Iron Ore	For Manganese ore
Proved mineable reserve	1	1
Probable mineable reserve	2	2
Possible mineable reserve	2	2

The process of Geological assessment and its economics, it is generally conducted in phases to increase the confidence level of evaluation of the deposit. Here the geological work is categories in four codes in erasing level of confidence i.e. Reconnaissance (code - 4), prospecting (code - 3), General Exploration (code - 2) and Detailed Exploration (code - 1).

Bokna Iron and Manganese deposit is an old deposit which was previously worked for 40 years by exlessee Smt. D.K. Bai There are large no of small and big Iron & Manganese pits within this lease hold, which provides sufficient data for General Geological Exploration. So for Geological axis code will be as follows

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Reserve	For Iron Ore	For Manganese ore
Proved mineable reserve	2	2
Probable mineable reserve	3	3
Possible mineable reserve	3	3

So, the U.N.F.C. system of mineable reserve of Iron and Manganese ore of Bokna deposit is as follows:

Reserve	UNFC For Iron Ore	UNFC For Manganese ore
Proved mineable reserve	112	112
Probable mineable reserve	123	123
Possible mineable reserve	123	133

Grade of Ore

Iron ore – The grade of Iron ore of this deposit is analysed by M/S Superintendence and Co. (P) Ltd. The analysis certificate is enclosed as annexure – VA

Manganese Ore – The grade of Mn. ore of this deposit is analysed by M/S Superintendence and Co. (P) Ltd. The analysis certificate is enclosed as annexure – VB.

R.Q.P./CAL/176/97/3

GEOLOGIST
REGD. NO. -RQP/Cal/283/98A

CHAPTER – 4

MINING

CHAPTER – 4

MINING

4.0   Mining

a)   Briefly describe the proposed method development/working the deposit

i)   Choice of method of mining

Geologically the area contain both Iron and Manganese ore. Iron ore is hard, massive. Iron ore and float Iron ore Manganese ore occur in the form of pocket. Both hard and soft type. Manganese ore is present in the form of both insitu ore and float ore. The principal ore mineral for Iron ore is hematite, limonite, Geothite and for Manganese psilomelane is the main mineral. The relief of the leasehold area is undulating with elevation difference of 80 mts. Mineralisation occur mainly at hill slope. In general both Iron and Manganese ore is covered by a soil & lateritic overburden of thickness 3 mt. to 6 mt. Mining operation in this area will be opencast. Mechanise for Iron ore section and Semi - mechanised for Manganese section. The recovery of Iron ore will be 55% and the Manganese ore will be 15%. Saleable Iron ore recovery is considered as 90% Saleable Manganese ore recovery is considered as 85%

The mine is proposed to work in ore shift operation of 8 hour duration within day light hours. During next five years, mining operation is proposed in both Iron and Manganese section.
For Iron ore is proposed to work in QI_1 & QI_2 and for Manganese ore it is proposed to work in QM_1 and QM_{17}.
For Iron ore section as the mining operation is mechanised, the bench height is proposed to be made up to 6 mt. and for Manganese section bench height will be vary from 3 m. to 6 m

b)   Indicate the Quantum of development and tonnage and grade of production expected pit wises.

Iron ore pit QI_1

Table No. - 5

Year	Pit name	Over Burden Waste	ROM ore MT	Saleable ore MT	Sub-grade ore	Stripping ration
1st	QI_1	210860 m³	202125	181913	20212	1:3.6
2nd	QI_1	140201 m³	238172	214355	23817	1:2
3rd	QI_1	112679 m³	444136	399722	44414	1:0.88
4th	QI_1	61525 m³	2512125	226091	251213	1:0.85
5th	QI_1	62370 m³	266805	240125	26680	1:0.81
		587635 m³	3663363	1262206	366336	

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Iron ore pit QI₁₂ → Iron ore pit QI_{12}

Iron ore pit QI_{12}

Table No. - 6

Year	Pit name	Over Burden Waste	ROM ore MT	Saleable ore MT.	Sub-grade ore	Stripping ration
1st	QI_{12}	187008 m³	88695	79825	8870	1:7
2nd	QI_{12}	210557.5 m³	188324	170392	18931	1:3.8
3rd	QI_{12}	67919 m³	159534	143581	15953	1:1.5
4th	QI_{12}	28249 m³	104164	93748	10416	1:1
5th	QI_{12}	45900 m³	196350	176715	19635	1:0.81
		539633.5 m³	737067	664261	73805	

Manganese ore pit QM_1

Table No. - 7

Year	Pit name	Over Burden Waste	ROM ore MT.	Saleable ore MT.	Sub-grade ore	Stripping ration
1st	QM_1	31100 m³	4200	3750	630	1:20
2nd	QM_1	34860 m³	9072	7711	1361	1:10
3rd	QM_1	19575 m³	8221	6988	1233	1:7
4th	QM_1	39850 m³	14070	11959	2111	1:9
5th	QM_1	33278 m³	16442	13976	2468	1:6
		158663 m³	52005	44204	7800	

Manganese ore pit QM_{22}

Table No. - 8

Year	Pit name	Over Burden Waste	ROM ore MT	Saleable ore MT.	Sub-grade ore	Stripping ration
1st	QM_{22}	53501 m³	8901	7566	1335	1:17
2nd	QM_{22}	28892 m³	6826	5802	1024	1:12
3rd	QM_{22}	31817 m³	7372	6266	1106	1:12
4th	QM_{22}	29380 m³	8736	7426	1310	1:10
5th	QM_{22}	46871 m³	15453	13135	2318	1:9
		272851 m³	47288	40195	7093	

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c) Attach individual year-wise Plan & Section

The year-wise quarry development Plans and Section for the 1st five years of mining operation for Iron ore quarry QI_1 and QI_{12} and Manganese ore quarry QM_1 and QM_{22} is enclosed as Drawing no. 5,6,7,7A.

d) Indicate proposed rate of production from the mine during first year of mining operation

In Bokna area, in both Iron & Manganese section there are no. of small and big quarries. The mining operation of the 1st five years is proposed around four such old Q_{11}, Q_{12}, QM_1 and QM_{22}. Details of mining operation in those pits in discussed below:

d₁) Yearly Pit-wise development programme of QI_1 quarry

It is proposed to start Mining operation in Iron QI_1 quarry will be mechanized opencast with 6 m. high benches. The proposed QI_1 quarry area is having top RL 450 m. and bottom RL. 418 m. After 1st year of mining operation, it is proposed to develop 6 no. of benches. Top RL. and the bottom RL. of the quarry will be 443 m. and 418 m. only.

Similarly, during 2nd year, 4th year and 5th year, the quarry benches will be developed as per the production programme. The details of the position of the quarry after the completion of mining operation of each year of 1st five year along with the production and waste generation is given below as table below:

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REG. No. R.Q.P./CAL/170/92/A

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Table no. – 9

Quarry development and production of Iron Quarry Q – I, during first five year

Year	Bench RL.	Name of bench	Area Cross Section (mt)	Length of Influence (mt)	Volume of OB executed (m³)	Volume of ore Zone executed (m³)	Recovery percentage	Volume of ore	Volume of waste with ore (m³)	Tonnage of ore (MT)	Volume of OB waste (m³)	Striping	Remarks
1" Year	TRL 443	-											Saleable Ore = 1819125 MT Sub-grade Ore = 202125 MT.
	435	OB -	440	175	77000	-							
	430	OB -	300	175	52500	-							
		Ore -	210	175		36750							
	425	OB -	144	175	25200	-							
		Ore -	390	175		68250							
	423	OB -	24	165	3960	-							
	421	OB -	30	165	4950	-							
					163610 m³	105000 m	55%	57750 m³	47250 m³	202125 MT.	210860 m³	1:3.6	
2ⁿᵈ Year	TRL 447	-											Saleable Ore = 214355 MT Sub-grade Ore – 23817 MT
	441	OB -	228	175	39900	-							
	435	OB -	144	175	25200	-							
		Ore -	96	175	-	16800							
	430	OB -	145	175	-	25375							
	423	Ore -	156	175	-	27300							
	421	OB -	111	175	19425	-							
		Ore -	310	175	-	54250							
					84525 m³	123725 m³	55%	68049 m³	5569? m³	238172 MT	140201 m³	1.2	

Bulk density of Iron is taken as 3.5-

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Quarry development and production of Iron Quarry Q – I₁ during first five year

Year	Bench RL.	Name of bench	Area Cross Section (mt)	Length of Influence	Volume of OB executed (m³)	Volume of ore Zone executed (m³)	Recovery percentage	Volume of ore	Volume of waste with ore (m³)	Tonnage of ore (MT)	Volume of OB waste (m³)	Striping	Remarks
3ʳᵈ Year	TRL 452	-											Saleable Ore = 399722 MT
	445	OB -	87.5	70	6125	-							
	439	OB - Ore -	39 114	70 160	2730 -	- 18240							Sub-grade Ore = 44414 MT.
	433	Ore -	138	160	-	22080							
	427	Ore -	122	160	-	19520							
	421	Ore -	238	160	-	41280							
	418	Ore -	810	160	-	129600							
					8855 m³	230720 m³	55%	126896 m³	103824 m³	444136 MT.	112679 m³	1:0.88	
4ᵗʰ Year	TRL 451	-	-	-	-	-							Saleable Ore = 226091 MT
	445	OB -	-	-	-	-							
	439	OB - Ore -	20 89	140 180	2800 -	- 16020							Sub-grade Ore = 251213 MT
	433	Ore -	120	180	-	21600							
	427	Ore -	186	180	-	33480							
	421	OB -	190	180	-	21600							
	418	Ore -	210	180	-	37800							
					2800 m³	130500 m³	55%	71775 m³	5875 m³	251225 MT.	61325 m³	1:0.85	

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Year	Bench RL.	Name of bench	Area Cross Section (mt)	Length of Influence	Volume of OB executed (m³)	Volume of ore Zone executed (m³)	Recovery percentage	Volume of ore	Volume of waste with ore (m³)	Tonnage of ore (MT)	Volume of OB waste (m³)	Striping	Remarks
5ᵗʰ Year	TRL 439	Ore -	120	180	-	21600							Saleable Ore = 240125 MT Sub-grade Ore = 26680 MT.
	433	Ore -	110	180	-	19800							
	427	Ore -	130	180	-	23400							
	421	Ore -	180	180	-	32400							
	418	Ore -	230	180	-	41400							
						138600 m³	55%	76230 m³	62370 m³	266805 MT.	62370 m³	1:0.81	

d_2) <u>Yearly pit wise development programme of Ql_{12} quarry</u>

It is proposed to start mining operation in Iron ore quarry Ql_{12} area also. Mining operation will be mechanised, opencast with 6 m high benches. The proposed Ql_{12} quarry area is having top T.L. of 451 m. and bottom RL of 430 m. After 1st year mining operation it is proposed to develop 4 no. of benches. Top and bottom RL of the quarry will 451 m. and 430 m only.

Similarly, during 2nd year, 3rd year, 4th year and 5th year, the quarry benches will be developed as per the production programme. The details of the position of the quarry after completion of mining operation of each year of 1st five year along with the production and waste generation is given below as table no. 11

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Table no. – 11

Quarry development and production of Iron Quarry Q - I_{12} during first five year

Year	Bench RL.	Name of bench	Area Cross Section (mt)	Length of Influence	Volume of OB executed (m³)	Volume of ore Zone executed (m³)	Recovery percentage	Volume of ore	Volume of waste with ore (m³)	Specific Gravity	Tonnage of ore	Volume of OB waste (m³)	Striping	Remarks
1" Year	TRL 451	-												Saleable Ore = 79825 MT Sub-grade Ore = 8870 MT
	445	OB -	205	165	33825	-								
		Ore -	5	165	-	823								
	440	OB -	120	180	21600	-								
		Ore –	20	180	-	3600								
	435	OB	175	200	35000	-								
		Ore	75	200	-	15000								
	430	OB –	370	205	75850	-								
		Ore -	130	205	-	26650								
					166275 m³	46075 m³	55%	25341.25 m³	20733.75 m²	3.5	83694.75	187008 m³	1:7	

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Year	Bench R.L.	Name of bench	Area Cross Section (mt)	Length of Influence	Volume of OB executed (m³)	Volume of ore Zone executed (m³)	Recovery percentage	Volume of ore	Volume of waste with ore (m³)	Specific Gravity	Tonnage of ore	Volume of OB waste (m³)	Striping	Remarks
2nd Year	TRL 445 450	OB -	90	140	12600	-								Saleable Ore = 170392 MT Sub-grade Ore = 18931MT.
	445	OB -	100	160	1600	16000								
		Ore –	100	160	-									
	440	OB -	40	170	6800	-								
		Ore	75	170	-	12750								
	435	OB –	5	180	900	-								
		Ore	70	180	-	12600								
	430	OB –	450	200	90000	-								
		Ore –	135	200	-	37000								
	427	OB –	250	160	40000	-								
		Ore –	125	160		20000								
					166300 m³	98350 m³	55%	54092.5 m³	44257.5 m³	3.5	189323.75	210557.5 m³	1:3.8	

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Table no. – 12

Quarry development and production of Iron Quarry Q – I₂ during first five year

Year	Bench RL.	Name of bench	Area Cross Section (mt)	Length of Influence	Volume of OB executed (m³)	Volume of ore Zone executed (m³)	Recovery percentage	Volume of ore	Volume of waste with ore (m³)	Specific Gravity	Tonnage of ore	Volume of OB waste (m³)	Striping	Remarks
3ʳᵈ Year	TRL. 460	-												Saleable Ore = 143581 MT
	455	OB -	225	115	25875	-								Sub-grade Ore = 15953 MT
	450	OB -	25	190	4750	-								
	445	Ore –	50	195	-	9750								
	440	Ore –	75	195	-	14625								
	435	Ore -	75	195	-	14625								
	430	Ore	75	195	-	14625								
	427	Ore -	150	195	-	29250								
					30625 m³	82875 m³	55%	45581 m³	37294 m³	3.5	159534	67919 m³	1:1.5	

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Year	Bench RL	Name of bench	Area Cross Section (mt)	Length of Influence	Volume of OB executed (m³)	Volume of ore Zone executed (m³)	Recovery percentage	Volume of ore	Volume of waste with ore (m³)	Specific Gravity	Tonnage of ore	Volume of OB waste (m³)	Striping	Remarks
4ᵗʰ Year	TRL 458													Saleable Ore = 93748 MT Sub-grade Ore = 10416 MT
	455	-	-	-	-	-								
	450	OB -	20	195	3900	-								
	445	Ore -	25	195	-	4875								
	440	Ore –	50	195	-	9750								
	435	Ore --	50	195	-	9750								
	430	Ore –	75	195	-	14625								
	427	Ore –	100	195	-	19500								
					3900 m³	54110 m³	55%	29761 m³	24349 m³	3.5	104164	28249 m³	1:1	

* TRL = Top RL

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Table no. – 13

Quarry development and production of Iron Quarry Q – I₁₂ during first five year

Year	Bench RL.	Name of bench	Area Cross Section (mt)	Length of Influence	Volume of OB executed (m³)	Volume of ore Zone executed (m³)	Recovery percentage	Volume of ore	Volume of waste with ore (m³)	Specific Gravity	Tonnage of ore	Volume of OB waste (m³)	Striping	Remarks
5ᵗʰ Year	TRL 458													Saleable Ore = 176715 MT
	455	-	-	-	-	-								
	450	-	-	-	-	-								Sub-grade Ore = 19635 MT
	445	-	-	-	-	-								
	440	-	-	-	-	-								
	435	Ore –	50	200	-	10000								
	430	Ore –	60	200	-	12000								
	427	Ore –	160	200	-	32000								
	424	Ore –	240	200	-	48000								
					30625 m³	102000 m³	55%	56100 m³	45900 m³	3.5	196350	45900 m³	1:8	

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(d₁)   Yearly pit-wise development programme of QM₁ Quarry

It is proposed to start the Manganese quarry QM₁ during 1ˢᵗ five year of mining operation. Mining operation will be of both type i.e OB will be excavated through machine. Ore and waste will also be excavated through machine. Then Manganese ore and waste will be shifted to Mn. – ore will   be stored our and waste will be shifted to the dumping yard. After 1ˢᵗ year of mining operation total 5 no. of benches will be developed at R.L. 419,417, 415,413,and 412 Top R.L of the quarry will be 420 m Quarry will be advanced on higher R.L side during 2ⁿᵈ, 3ʳᵈ, 4ᵗʰ and 5ᵗʰ . The details of production and quarry development during 1ˢᵗ five years of mining operation is given in the table below:

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Table no. -- 14

Quarry development and production of Manganese Quarry Q M₁ during first five year

Year	Bench RL.	Name of bench	Area Cross Section (mt)	Length of Influence	Volume of OB executed (m³)	Volume of ore Zone executed (m³)	Recovery percentage	Volume of ore	Volume of waste with ore (m³)	Specific Gravity	Tonnage of ore	Volume of OB waste (m³)	Striping	Remarks
1ˢᵗ Year	TRL 420													Saleable Ore = 3570 MT Sub-grade Ore = 630 MT.
	419	OB -	56	100	5600	-								
	417	OB -	76	100	7600	-								
	415	OB -	54	100	5400	-								
	413	OB -	40	100	4000	-								
	412	Ore -	140	100	-	10000								
					22600 m³	10000 m³	15%	1500 m³	8500 m³	2.8	4200 MT.	31100 m³	1:20	
2ⁿᵈ Year	TRL 420													Saleable Ore = 7711 MT Sub-grade Ore = 1361 MT
	419	-	-	-										
	417	-	-	-										
	415	-	-	-										
	413	-	-	-										
	411	OB	150	110	16500	-								
		Ore	180	120	-	21600								
					16500 m³	21600 m³	15%	3240 m³	18360 m³	2.8	9072 MT.	34860 m³	1.10	

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Table no. – 15

Quarry development and production of Manganese Quarry Q M; during first five year

Year	Bench RL.	Name of bench	Area Cross Section (mt)	Length of Influence	Volume of OB executed (m³)	Volume of ore Zone executed (m³)	Recovery percentage	Volume of ore	Volume of waste with ore (m³)	Specific Gravity	Tonnage of ore	Volume of OB waste (m³)	Striping	Remarks
3rd Year	TRL 420	-	-	-	-	-								Saleable Ore = 6988 MT
	419	-	-	-	-	-								Sub-grade Ore =
	417	-	-	-	-	-								1233 MT.
	415	-	-	-	-	-								
	413	-	-	-	-	-								
	410	-	145	135	-	19575								
					22600 m³	19575 m³	15%	2936 m³	16639 m³	2.8	8221 MT.	19575 m³	1:7	
4th Year	TRL 425													Saleable Ore = 11959 MT
	421	-	-	125	4875									Sub-grade Ore =
	417	OB -	39	125	6500									2111 MT
	415	OB -	52	125	-									
	413	Ore -	48	125	-	6000								
	410	Ore -	65	125	-	8125								
	409	Ore -	155	125	-	19375								
					11375 m³	33500 m³	15%		28175 m³	2.8	14070 MT.	39850 m³	1:9	

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Year	Bench RL.	Name of bench	Area Cross Section (mt)	Length of Influence	Volume of OB executed (m^3)	Volume of ore Zone executed (m^3)	Recovery percentage	Volume of ore	Volume of waste with ore (m^3)	Specific Gravity	Tonnage of ore	Volume of OB waste (m^3)	Striping	Remarks
5th Year	TRL 425													Saleable Ore = 13976 MT Sub-grade Ore = 2466 MT
	421	-	-	135	-									
	417	OB -	-	135	-									
	415	OB -	-	135	-									
	413	Ore -	-	135	-									
	412	Ore -	-	135	-									
	407	Ore -	290	135	-	39150								
						39150 m^2	15%	5872 m^3	33278 m^3	2 8	16442 MT.	33278 m^3	1:6	

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(d₄) <u>Yearly pit wise development programme of QM₂₂ quarry</u>

During first five years mining operation will be started in QM_{22} quarry. The top and bottom R.L. of the proposed quarry area will be 481 m. and 465 m. After 1st year of mining operation total 3 no. of benches at RL 475, RL 470 and RL 465 m. will be developed Similarly, during 2nd, 3rd, 4th and 5th year, the quarry benches will be developed as per production programme. The details of the production and waste generation of each year of 1st five years of mining operation along with the position of the quarry after the end of each year is given below as table below: 17,18,19.

It is to be noted that for this quarry ore and waste will be excavated through machine Then Then the excavated material will be carried to the proposed Manganese ore sorting yard. There manually Manganese ore will be sorted out and then waste material will be shifted to the dumping yard.

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Table no. – 17

Quarry development and production of Manganese Quarry Q M_{22} during first five year

Year	Bench RL.	Name of bench	Area Cross Section (mt)	Length of Influence	Volume of OB executed (m³)	Volume of ore Zone executed (m³)	Recovery percentage	Volume of ore	Volume of waste with ore (m³)	Specific Gravity	Tonnage of ore	Volume of OB waste (m³)	Striping	Remarks
1ʳ Year	TRL 481	-	-											Saleable Ore = 7566 MT Sub-grade Ore = 1335 MT
	475	OB –	150	130	1950	-								
	470	OB –	125	130	6240	-								
		Ore	48	130	-	6240								
	465	OB –	75	130	9750	-								
		Ore -	115	130	-	14950								
					35490 m³	21190 m³	15%	3179 m³	18011 m³	2.8	8901 MT.	53501 m³	1:17	
2ⁿᵈ Year	TRL 481													Saleable Ore = 5802 MT Sub-grade Ore = 1024 MT
	475		96	130	12480									
	470	OB	20	130	2600									
		Ore -	75	130	-	9750								
	465	Ore -	50	130	-	6500								
					15080 m³	16250 m³	15%	2438 m³	13812 m³	2.8	6826 MT.	28892 m³	1:12	

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Table no. – 18

Quarry development and production of Manganese Quarry Q M₂₂ during first five year

Year	Bench RL.	Name of bench	Area Cross Section (mt)	Length of Influence	Volume of OB executed (m³)	Volume of ore Zone executed (m³)	Recovery percentage	Volume of ore	Volume of waste with ore (m³)	Specific Gravity	Tonnage of ore	Volume of OB waste (m³)	Striping	Remarks
3ʳᵈ Year	TRL 482	-	-											Saleable Ore = 6266 MT
	478	OB –	100	130	1300	-								
	473	OB ·	30	130	3900	-								Sub-grade Ore = 1106 MT.
		Ore –	60	130	-	7800								
	470	OB –	30	130	-	3900								
	564	Ore -	45	130	-	5800								
					16900 m³	17550 m³	15%	2633 m³	14917 m³	2.8	7372 MT.	31817 m³	1:12	
4ᵗʰ Year	TRL 482													Saleable Ore = 7426 MT
	476	OB -	60	130	7800									
	471	OB –	30	130	3900									Sub-grade Ore = 1310 MT
		Ore –	60	130	-	7800								
	465	Ore -	100	130	-	13000								
					11700 m³	20800 m³	15%	3120 m³	17680 m³	2.8	8736 MT	29380 m³	1:10	

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Quarry development and production of Manganese Quarry Q M_{22} during first five year

Year	Bench RL.	Name of bench	Area Cross Section (mt)	Length of Influence	Volume of OB executed (m^3)	Volume of ore Zone executed (m^3)	Recovery percentage	Volume of ore	Volume of waste with ore (m^3)	Specific Gravity	Tonnage of ore	Volume of OB waste (m^3)	Striping	Remarks
5th Year	TRL 482	-												Saleable Ore = 13135 MT Sub-grade Ore = 2318 MT.
	475	OB –	60	130	7800	-								
	471	Ore	75	130	-	9750								
	465	OB –	110	130	-	14300								
	462	OB –	60	130	-	-								
		Ore -	98	130	7800	12740								
					15600 m^3	36790 m^3	15%	5519 m^3	31271 m^3	2.8	15453 MT	46871 m^3	19	

e) Indicate proposed rate of production when the mine is fully developed and the expected life of the Mine.

When the mine will be fully developed, the expected target production Iron ore from this mine will be 0.84 million tone/annum. This production will be started after completion of 1ˢᵗ five years of mining operation. At present total mineable reserve of the area for Iron ore is 16.02 million MT. After 1ˢᵗ five years of mining operation, it will be decreased to 13.0 million MT. As per the target rate of production the life of this mine will 15 years for Iron ore after 1ˢᵗ five years of operation. So total life of the mine will be 20 years only.

At present total mineable reserve of the area for manganese ore is 2.301 million MT. After 1ˢᵗ five years of mining operation, it will be decreased to 2.227 million MT. When the mine will be fully developed after five year the production target will be 0.03 million MT. AS per the target rate of production the life of the mine will be 7.41 years after 1ˢᵗ years i.e. total life of the mine will be 79 years.

f) Attach a note furnished a conceptual mining plan up to the life of the mine.

Conceptual Mining Plan

i) Exploration:

During 1ˢᵗ five years of mining operation it is proposed to do to 65 no. exploratory holes within this area. This proposed exploration will cover almost the whole area under consideration. So no such exploration will be required during next years of mining operation.

ii) Mine development and exploitation of mineral

The deposit within this area will be mined by convention opencast mining method. During 1ˢᵗ five years period of mining operation, all the quarries will be mined by fully mechanize as well as semi-mechanized method. In both Iron and Manganese quarries, OB will be excavated by mechanized method. Both Iron and Manganese ore along with wasted will be excavated by machines. Then the ROM of both Iron and Manganese ore will be shifted to the respective sorting yards. After sorting of Iron and Manganese ore, waste materials will be shifted to dump yards. It is proposed to deploy hydrlic excavator (0.9 m³ bucket capacity) and rear dumper (10 tone capacity) combinations for these quarries

As this mine was previously mined out by its ex-lessee Smt. D.K. Bai for 40 years. Huge area is already broken for mining and allied purpose. The present applicant, surveyed the area and it is seen that almost 96.8 hects. of area is already broken for mining and allied purposed. It is expected that purposes will be restricted within this broken area only. The details of the mine development the end of conceptual period of mining is given below in tabular form, which is based on the following:

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The conceptual Mine Plan of this lease area as may be visualized at the end of the life of the mine has been indicated in conceptual plan. The above plan has been prepared based on.

(1) The current knowledge of Iron ore mineralisation and Manganese ore mineralisation of the area.

(2) The whole mineralized area will be excavated with an ultimate pit slope angle of 45^0 from the base of the ore body, so as to extract the full extent of ore and thereby extending the pit into the ultimate pit limit. The ultimate pit limit has been demarcated based on the fact that 7.5 m. from base boundary has to be lift un disturbed as statute

(3) Some portion of waste dump will be dumped on the external dump up to its ultimate height There will be two no. of external dump which will be used for external dumping until and unless some area will be mature for backfilling through dumping Dumping in external dumps will be done by maintaining terraces of 8 mt. height and width will be more than height.

(4) After external dumping, when some portion of the quarry will get maturity for backfilling, then backfilling will be started. It is proposed to generate plantation on the backfilled part simultaneously. In this way up to the end of the life of the mine, the hole excavate part will come under plantation after backfilling

(5) Both the external dumps will also come under plantation for its stabilization. The dump is also proposed to surrounded by retaining wall and garland drain.

(6) Before execution of all the above points, during conceptual stage of mining, it is proposed the complete all the drilling programme of the area, which will prove the ultimate depth of quarry in both Iron and Manganese section

(7) There will be two subgrade stack yards one is Manganese subgrade ore stack yard and other is Iron subgrade ore stack yard. The total area of the both will be $66100 m^2$ The subgrade ore will be stacked here in the form of no. of terraces up to the end of conceptual period. The ultimate height of both the stack will be 7 m. only.

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Table no. – 20

Area to be excavated up to the end of life of mine.	761000 m²
Purpose of excavation.	To win both Iron & Manganese ore
Max. top R.L.	480 M.
Min top R.L.	415 M.
Total production of Iron and Manganese up to life of the mine.	Iron – 16.02 million MT. Manganese – 4.662 million MT.
Total OB generation up to the end of the life of mine.	4566000 m³
Total waste generation up to the end of the of mine.	Waste from Iron ore quarry excavation – 2059714 Waste from Manganese ore quarry Excavation = 1165500 m³.
Total area of two no. of major external dump.	241600 m³
Ultimate capacity of external dump.	3052784 m³.
Total volume of OB and waste to be generated during mining.	7791214 m³.
Balance volume of OB & waste to be utelised for back filling.	4738430 m³
Total area of two sub-grade dumps	44800 m²
Excavated quarry to be back filled.	473843 m³.
Thickness of back filled part	10 m
Area of excavated quarry remain after back filling.	287157 m².
Total plantation proposed on back filled part and other part exhausted quarry.	121760 m².
Total area occupied by mine colony.	26000 m²
Total area occupied by green belt.	50000 m².
Total area occupied by ore sorting side.	65500 m².
Total area occupied by road.	57100 m².

The details of the external dumps and the management of the dump at the end of the life of the mine is given below:

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Name of the dump	Ultimate Area (A)	Ultimate Height (m)	No of terraces proposed	Height of retaining wall (m)	Dimension of garland drain	No of plantation proposed
D₁	9.98 H.	32 mt	4	H.T – 1.5 m. Width – 1 0 m.	Depth – 1.5 m. Width = 1 m.	
D₂	14.18 H.	30 mt.	5	H.T – 1.5 m. Width = 1.0 m.	Depth – 1.5 m. Width – 1 m.	

In all the dumps terrace heights are proposed from 8 mt to 11 mt. It is proposed to use dozer for making the terrace properly.

iii) Sub-grade Mineral Management

In Bokna are sub-grade Iron ore with 58% - 60% Fe in the form of lump or fine are proposed to stack in separate stack yard. Manganese sub-grade ore with 15% to 20% Mn are also proposed to stack in separate stack yard. Total area of sub-grade Iron ore and Manganese ore stack are 3 75 H & 2 86 H. It proposed to analyse the ore of these stacks regularly for its despatch to buyers destination as much as possible by blending it with higher quality ore. Both the sub-grade ore stack yard are proposed to be surrounded by retaining wall and garland drain.

Afforestation

During 1ˢᵗ five years of mining operation it is proposed to generate plantation with 2000 plants per year. From 6ᵗʰ year onwards it proposed generation plantation with 5000 plants per year. Plantation is proposed along safety zone, below the toe of the dump back filled part of the mine, road side, colony area etc. The total no. of trees will also be increased with requirement.

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Post mining use

The details of the post mining land use are given below in tabular form

Table no. 22

Sr. No	Existing land use		Post mining land use
1.	Area to be excavated	66.046 H	73.27 H
2.	Over burden dump area	17.964 H	24.16 H.
3.	Sub-grade Mineral Storage	4.480 H	6.61 H.
4.	Township area	2.6 H	2.6 H.
5.	Road	5.710 H.	5.710
6.	Green belt	————	5.317
	Total -	96.80 H.	117.667 H

g) Describe briefly giving salient feature of mode of working

During 1st five years of mining operation, total 4 no. of quarries will be developed for both Iron and Manganese ore production. During this period, mining operation will be mechanized with development of 6 m. high benches in Iron ore and 4 to 6 m. high benches in Manganese ore. In Manganese quarries OB & Ore excavation will be done through machines then ore along with waste will be stacked in a separate ore sorting yard, where the Manganese ore will be sorted out manually and the waste will be send to dump yard. For mechanized operation, major mining equipments like wagon drill + compressor Jack hammer + Tractor compressor, Excavator (1.0 m^3 bucket capacity), Dumpers (10 MT.) will be used.

Estimation of Mining machinery requirement under proposed mining method.

The estimation of total mining machinery requirement for QI1, QI12, QM1 and QM22 quarry is given in table no. 23,24,25,26 below:

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* Excavator 1.0 m³ Backing

	First Year Tipper : IOT (ALT. I) ROM + OB	Second Year Tipper: IOT (ALT. I) ROM + OB	Third Year Tipper : IOT (ALT. I) ROM + OB	Fourth Year Tipper : IOT (ALT. I) ROM + OB	Fifth Year Tipper : IOT (ALT. I) ROM + OB
Effective Hrs/Shift	6	6	6	6	6
Effective Mine/Hr.	50	50	50	50	50
No. of working days / Hr	300	300	300	300	300
Transport quantity m³/ Yr.	570239	542329	410044	268685	332140
Bucket Cycle time	24	24	24	24	24
Bucket Fill Factor	0.8	0 8	0.8	0.8	0.8
Bucket Slewing Factor	0.85	0.85	0.85	0.85	0.85
Swell Factor of Material	1.3	1.3	1.3	1.3	1.3
Random delay Factor	0.8	0.8	0.8	0.8	0 8
Bucket Pass/Dumper	7	7	7	7	7
Hourly output of Working Excavator m³	59	59	59	59	59
Annual output of Excavator m³.	170000	170000	170000	170000	170000
Working Excavator Required	3.3	3.2	2.41	1.58	1.95
Excavator required in fleet (AVL = 75%) with separate Excavator	4	4	3	2	2
Excavator required in Fleet (AVL = 75%) with common Excavator	4	4	3	3	3

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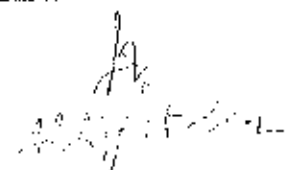
COST DUMPER TRANSPORTATION FOR FOUR QUARRIES QI, QI₁₂, QM₁ & QM₂₂
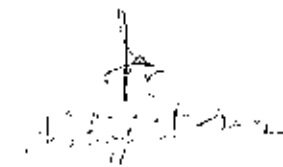
* Excavator 1.0 m³ Backing

	First Year Ore, Waste & OB 1.0 m³ + 10 t	Second Year Ore, Waste & OB 1.0 m³ + 10 t	Third Year Ore, Waste & OB 1.0 m³ + 10 t	Fourth Year Ore, Waste & OB 1.0 m³ + 10 t	Fifth Year Ore, Waste & OB 1.0 m³ + 10 t
UP (Km) (Av)	0.00	0.00	0.00	0.00	0.00
Level (Km) (Av)	1.00	1.00	1.00	1.00	1.00
Down Haul (Km.)	1.00	1.00	1.00	1.00	1.00
Total Haul (Km.)	2.00	2.00	2.00	2.00	2.00
Cycle Time					
Travel Time (Load)	6.00	6.00	6.00	6.00	6.00
Loading & Spotting	2.70	2.70	2.70	2.70	2.70
Dumping & Random delays	1.80	1.80	1.80	1.80	1.80
Travel Time (Empty)	4.40	4.40	4.40	4.40	4.40
Total Cycle Time (Min)	14.90	14.90	14.90		14.90
Effective Hrs./Shift	6	6	6	6	6
Effective Min./Hr	50	50	50	50	50
Trips / Shift	20.13	20.13	20.13	20.13	20.13
Rounding off trips/shift	20	20	20	20	20
Carrying capacity (m³)	3	3	3	3	3
m³ / shift per dumper	60	60	60	60	60
Transport Qty. (insisting)	570239	542329	410044	268685	332140
Transport Qty. (after 30% swelling)	741311	705027	533057	349290	431782
No. of working days/Yr.	300	300	300	300	300
No. of working shifts/day	1	1	1	1	1
Transport Qty./ shift(m³)	2471	2351	1777	1164	140
Working dumper Required	41	40	30	20	24
Dumper Fleet required	41	40	30	20	24
Rounding off dumper Fleet (ore & OB combined)	41	40	30	20	24

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CALCULATION OF HEMM REQUIREMENT

ESTIMATION OF DRILLING MACHINE REQUIREMENT

ROM drilling = 100 mm dia (2 5 m x 3 m)	First Year 100 mm drill ROM + OB	Second Year 100 mm drill ROM + OB	Third Year 100 mm drill ROM + OB	Fourth Year 100 mm drill ROM + OB	Fifth Year 100 mm drill ROM + OB
Waste drilling = 100 mm dia drill (3 m x 4m)					
No Drilling of Blue dust					
DATA :					
Yearly excavation (m³/Yr)	570	542329	410044	268685	332140
Working day/Yr	300	300	300	300	300
Working shifts / Yr	1	1	1	1	
Working Hr. / Shifts	6	6	6	6	
Effective Minutes/Hr.	50	50	50	50	50
Bench Height (m)	6	6	6	6	6
Burden (m)	3	3	3	3	3
Spacing (m)	3 5	3.5	3.5	3.5	3.5
% Requirement drilling & Blasting	100	100	100	100	100
Estimated drilling Rate/ Shift (m)	42	42	42	42	42
Availability of drill %	75	75	75	75	75
CALCULATION :					
No. of holes to be Drilled/Year	9051	8608	6509	4265	5272
Metrage to be drilled/ Year	54306	51648	39054	25590	31632
Metrage to be drilled/ Shifts	181	172	130	85.3	105.5
Working drills required	4	4	3	2	2.5
Drills required in fleet	4	4	3	2	3
Drills required in fleet (Combined)	4	4	3	2	3

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Now, the total machinery requirement for the project during 1st five years of mining operation is given below:

Table no. – 26

Sl. No.	Type	Capacity	1st Yr.	2nd Yr.	3rd Yr.	4th Yr.	5th Yr.	Remarks
1.	Hydrolic Excavator	1.0 m^3	4	4	3	3	3	No. of machine may change with requirement
2.	Dumper	10 T.	41	40	30	20	24	- do
3	Wagon	100 mm. dia.	4	4	3	2	3	- do
								- do –
4.	Compressor	450 Cfm.	4	4	3	2	3	
5	Jack Hammer & Tractor Compressor	33 mm dia.	3	3	3	3	3	- do
6.	Wheel Loader	1.7 m^3	1	1	1	1	1	- do –
7	Dozer	180 H.P.	1	1	1	1	1	- do –
8	Water Tanker	8000 Hr	1	1	1	1	1	- do –
9.	Jeep	2	2	2	2	2	2	- do -

h) Transportation

When the mining operation will be started, both Iron and Manganese ore will be produced. After production Iron ore will be transported directly to different crushers of S R Rungta Group by dumpers. Manganese ore after necessary sizing and sorting will be stacked in Manganese ore sorting yard. From there it will be transported to buyers destination by trucks. Transportation of ore, waste & overburden within the area under reference will also be done through dumpers.

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CHAPTER – 5

BLASTING

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Dsft. No. R.D.S.IO.M/

Chapter – 5

Blasting

5.0 Blasting

a) Use of explosives for rock breaking:

Blasting of rock to break it into smaller boulder/sized material is ore of the key operation in any mining activity. For this explosive is used as blasting agent in blast holes. Explosives perform two important functions in mining operation as given below:

To displace a rock (including mineral and / or over burden) to facilitate its removal

To fragment the rock to (i) desired size so that it can be directly loaded and transported to desired destination by the equipment provided for the purpose (ii) suitable size so these can be manually sized further for transportation.

b) Blasting parameters:

Blasting parameters play an important role to achieve above mentioned objectives most economically and safety. The various parameters to be taken into account is given below:

c) Burden (Line of least resistance):

It is the most critical of all parameter and is the perpendicular distance between hole and the nearest free face measured in the direction of bench height as follow:

Burden (in mt.) = 30 x (diameter of drill hole in mt.)
Burden can also be expressed in terms of bench height as follows

Burden = Not less than 20% of bench height and not more than 50% of bench height

Based on above norms, burden shall be kept at 3.0 mt. for deep hole Optimum burden shall be arrived at in due course.

d) Spacing:

Spacing is the distance between two drilled holes in the same row and depends on nature of rock to be blasted and method of firing adopted. *Spacing can be expressed in terms of burden* as follows:

- Twice the burden, where holes arranged singly or with large intervals sin between each succeeding hole row.

- Equal to or less than 1.5 times the burden, where holes are fired with very short intervals or simultaneously, which is the common practice.

- Less burden in very hard and tough ground.
  Based on the above it is proposed to keep the spacing at 3.5 mt. deep hole optimum spacing shall be arrived at in due course, based on experience gained for wagon drill hole

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e) **Bench Height:**

Considering the nature of deposit and use of machineries bench height for Manganese ore of 3.0 mt. & for Iron ore of 6.0 mt. has been proposed. This is to facilitate extraction of ore more economically and efficiently. However different bench heights are also adopted to facilitate the extraction conditions/situation, which may be noted in the year wise plan.

f) **Depth of hole:**

The depth of holes to be drilled depends upon the type and size of drilling machine and of course on the height of the bench as proposed. As a rule, the depth of hole should never be less than the burden to prevent blow out shorts. Normally the depth of holes is kept within 1.5 to 6.0 mts. The depth of hole will be 6.0 mt. in a normal bench and 10% of bench height is considered for sub-grade drilling, so total depth of the hole cones to 6.0 mts. based upon the strata condition and profile of the bench.

g) **Sub-grade Drilling:**

The aim of drilling should be to maintain a level floor at the mining face i.e with no formation of toe. In many cases, rock has to be seared off. At the bottom of a bench, without any assistance from planes of weaknesses in such cases, it is necessary to drill below floor level sub-grade drilling is normally kept at **~~~~** less than 10% of the bench height. In this case the sub-grade drilling shall be kept **APPROVED** 0.80 mts. for deep holes.

The holes to be drilled can be vertical or inclined of face. Inclined holes have following advantage:

    = Better slope stability

    = Burden and spacing can be increased.

    = Greater of short holes is available for changing bench height.

    = Angle of inclination of 15" to vertical shall be adopted for blast holes in the present case.

h) **Calculation of Charges:**

Explosive charge to be loaded in a hole depends on:

    − Types of explosive ,

    − Rock characteristics,

    − Burden, spacing, depth and angle of drilled holes.

    = Fragmentation required,

    − Type of initiation sequence adopted.

Normally for hard rocks like Iron ore/hard ferruginous laterite, average charge ratio is kept at 1.0 Kg. of explosive for 8 tones of rock

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i) Distribution of charge and decking:

For achieving uniform and optimum fragmentation of the rock, distribution of explosive charge in the drill holes is very important.

Normally the major portion of explosive charge is placed at bottom of the hole where the confinement of the explosive is the greatest and it has to do maximum work. Decking is also sometimes practiced for –

(i) Spacing of the explosive charge more uniformly in the hole.
(ii) Strata that have alternate hard and soft bands.

As the formation concerned here is fairly uniform and consistent. decking of holes shall not be resorted to.

j) Type of Explosive:

The most common type of explosive available and used in open cast mines are:

- Nitro-glycerin based (NG) Gelatinous explosive viz. S.G. 80% OCG etc.

- Slurry explosive (AN based) viz. power gel, acquadyne superdyne etc.

- Ammonium Nitrate Fuel Oil (ANFO) mixture.

Out of these ANFO is the most popular being most economical and hence cost effective, besides being safe to store and handle, and non-cap sensitive. It is used as a column charge and other explosives are used as booster to initiate the blast

Free flowing pilled-granulated ammonium nitrate is mixed intimately with about 6% by weight of diesel oil. The mixture so prepared in the field is then used as explosive agent with about 20% to 30% of a booster charge a the bottom ANFO however is hygroscopic and therefore can not be loaded directly into wet/water holes but can be so loaded packed in plastic tube bags.

k) Pattern of Blasting:

The pattern of initiation adopted for blasting affects the fragmentation, vibration, noise and muck pile after a blast. Sequential blasting technique is occasionally adopted as it enables muck piles to be divided into directly usable. bendable and waste material by proper selection of delays incase of deposits, which are heterogeneous (quality wise). The firing patterns generally adopted are discussed below in brief.

l) Single Row:

a) Simultaneous firing for spared out muck pile

   - 0 – 0 – 0 · 0 – 0 -

b) Using short delays single hole delay for minimum vibration

   - 0 – 0 – 0 · 0 – 0 – 0 -

   Zero   1   2   3   4   5

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c) Using short delays for maximum fragmentation

    . 0 – 0 – 0 – 0   0 – 0 – 0 · 0 – 0 – 0   0 – 0 –

    Zero 1 Zero   1 Zero 1 Zero   1 Zero   1 Zero   1

Multi Row :

In multi row blasts where in line firing systems are also used, a large of other patterns are available, which provide better fragmentation and blasting efficiency. The effective burden (BE) and the effective spacing (SE) are also shown below:

Case – I

Delays

2   - 0 - 0 - 0 - 0
1   - 0 - 0 - 0 - 0
Zero - 0 - 0 - 0 - 0

Squired grid (in line initiation) S   B and SE - BE

Case – II

Delays

0   0   0   0   0   0   0
4   3   2   1   2   3   4
0   0   0   0   0   0   0
3   2   1 Zero   1   2   3

Squired Grid: V pattern
                     S = B
But   SE– 2 BE

At this mine, square grid (in line initiation) pattern given at Case 1 above with multi row shall be adopted.

m) Secondary Blasting/Rock breaking:

Sometimes secondary blasting is required to break over sized boulders generated by deep hole blasting to the size suitable for loader loading (for OB & Waste). For this it is necessary to carry out blasting in small holes (short holes of 32 mm. dia) drilled into boulders by handheld Jackhammer drill. Pop shooting or plaster shooting may be carried out for this purpose as and when required.

n) Ground Vibration & Noise :

Permissible level of vibration (generation blasting) depends on type and distance of property from blasting site in the present area there is no public structure/house within the danger zone of blasting operation. Hence no problem on this account is anticipated. The charge pre hole as well as charge per round of holes proposed to the used in the present case will not cause any problem whatsoever on account of ground vibration. Muffling shall be adopted where necessary Noise (which is only for split second) shall be kept under control by restoring to short mile-second delay detonators.

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o) **Air Blast:**

Minor air blasts, which may result from blasting operation may cause loose doors and windows to rattle. People tend to attribute these ground vibration become apprehensive, specially as these are accompanied by noise

Generally by using short delay detonators, problem of air blast is expected to be experienced as a result of blasting operation

p) **Fly Rock:**

Fragments of rock always following result of blasting operation These fragments shall not be allowed to fly dangerously. Fly rock shall be controlled by :

1) Changing each hole and the number of holes in the same round suitable.
2) Use of muffles on top of the shot hole to be fired if required.

q) **Storage of Explosive**

Proper storage of explosives and accessories is important to:

a) Ensure that these do not fall in the hands of unauthorized persons (antisocial elements)

b) Reduce hazards of the accidental explosions (due to safe handling)

c) Maintain these in good condition for use

The capacity to be provided for storage of explosive has been provided based on the estimated rate of production and the rate of consumption of explosives as discussed below.

A magazine of 1 Tone capacity is to be installed on the W side of the lease property at safe distance for safe and secure storage of explosive as discussed below.

r) **Explosive consumption per day**

Total excavation of OB, waste in first five years will be   2548232 m³

Average annual excavation will be - 491646 m³

Average annual working days -- 300

Average daily excavation – 1639 m³

Average daily excavation through blasting - 1311 m³
(Considering 90% of total excavation needs blasting)

Total tonnage (average) excavated per day by drilling and blasting   1311x2.6 = 3409 MT.

Powder factor in – 8.0 T/Kg

Daily requirement of explosive 3409/8 – 426 Kgs.

For secondary drilling and blasting 5% extra of primary explosive will be required.

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s) Precautions to be taken during blasting operation:

Colony, Office, Public village road:-

The following additional precautions are to be taken during blasting.

- Special permission if required is to be obtained from DGMS.

- Spacing and burden are to be increased with low explosive charges to provide only having effect instead of shattering the rock.

- Direction of holes should be towards opposite direction of office site.

- Muffle blasting with covering of top of the blast hole is to be practiced.

- Delay detonators if required are to be used to restrict fly of splinters. Maximum charge per hole and maximum charge per round are not to exceed the quantity of explosive approved

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CHAPTER – 6

MINE DRAINAGE

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Chapter - 6
Mine drainage

6.0   Mine drainage:

6.1.0   Source of water in the Pit:

Mining is often beset with the problem of controlling the surface and aquifer water due to its very occurrence. Iron & Manganese mineralisation at Bokna Mine occurs on the hill range surrounding the hilly terrain land. The major drainage channel of the area is Karo River, which is located in the Western and North – East side of the leasehold area. The type and source of water to be encountered during the ore mining at Bokna Mine is as follows:

\#   Surface Water
\#   Rain Water
\#   Ground Water

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6.1.1   Surface Water:
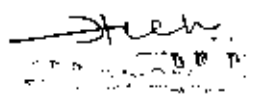
Surface water from River coursed, Lakes, Ponds and Nalas etc. As all the proposed pits of the Bokna Mine are located either at the hill or hill slope there is, therefore, no chance of inundation of pits from such water. The surface run off water from the mine/quarry site will be connected by the garland drain, which has been proposed to provide around the four quarries and will be settled at settling tank. Then the settling water to be discharge only after siltation. There after the siltation water to be discharge through the check drain to the low laying area.
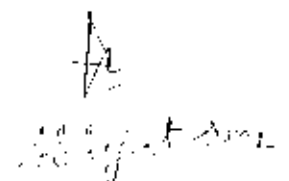
6.1.2 Rain Water:

The leasehold area is located in the West Singhbhum District of Jharkhand and the area in general, receives appreciable amount of rain fall, which is in the range of 1750 mm. to 2100 mm. per year. Most of the precipitation goes on surface run off and finally discharges into the Karo River through innumerable water cut channels. These channels which control the overall drainage system/pattern of the area are no going to be changed/redirected due to the proposed accumulation of water during heavy rain. But working experience indicates that these accumulated water remain within the pits hardly 2 – 3 hours time and ultimately passes through cracks and fissures, making the bottom working face dry. If necessary the applicant will use pumps to remove rain water also.

6.1.3   Ground Water:

During the rainy season, some of the rain water goes below the sub-surface in the leasehold area including the hill range. The rain water, which goes into the sub-surface in the hill range, finds it s way through cracks, joints and fissure and finally reaches to valley or plain land. In the valley/plain land there are some wells and will be well whose presence indicate that there is some aquifer in the area whose water is continuously being drawn for human use. The quarries on the hill top or on hill slope do not have any sign of seepage of water

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CHAPTER – 7

STACKING OF MINERAL REJECTS AND DISPOSED OF WASTE

Chapter – 7

STACKING OF MINERAL REJECTS AND DISPOSED OF WASTE

7.0 Introduction

Over burden in this area is soil (negligible amount) laterite soil, laterite, ferruginous shale etc. In additional to the above, the waste materials is to be generated from the ore zone consists of laterite, shale, Red/Yellow soil, Manganiferous shale, manganiferous laterite having Manganese content less than 10%.

During 1st five years of mining operation within this lease hold overburden & waste will be generated from QI_1 & QI_{12} quarries and QM_1 and QM_{22} quarries. The details of OB & Waste generation during 1st years of mining operation is given below.

Table No. – 27

(Details of OB & waste generation Quarry wise during 1st five years)

Year	QI_1	QI_{12}	QM_1	QM_{22}	Total	Remarks
1st Year	210860 m²	187008 m³	31100 m³	53501 m³	482460 m³	
2nd Year	140201 m³	210557 m³	34860 m³	28892 m³	464510 m³	
3rd Year	112679 m³	67919 m³	19575 m³	31817 m³	231990 m³	
4th Year	61525 m³	28249 m³	39850 m³	29380 m3	159004 m3	
5th Year	62370 m³	45900 m³	33278 m³	46871 m³	188419 m³	

7.1 Selection of Dumping Site:

In this mine total waste and OB material which will be generated during 1st five years of mining is proposed to dump in the proposed dump yard D_1 at the extreme south western corner of the area under reference. This area is fully exploited of Mn. ore float exposing underlying laterite horizon which is barren. Further it is it is proposed to give eight no. of DTH hole in this area during the beginning of 1st year of mining operation to prove the barrenness of the area.

7.2 Details of dumping process:

During 1st five years of mining operation OB & Waste materials which will be generated will be dumped in proposed dump yard D_1 occupying a total area of 99361 m². Dumping will be made over the dumping yard by making terrace of height 8 mt and slope angle of 28^0 Details of dumping during 1st five years of mining is given below. The position of dump D_1 after each year of mining operation is shown in DRG no. 8

Year	Total volume of OB & waste generation	No. of Terraces to be developed	Width of terraces	R.L. of the Terraces and Bottom R.L.	Total Height of the end of year	Slope of terrace	Remarks
1st Year	482469 m³	1 no.	240 mt.	Terrace R.L. = 415 m. Bottom R.L = 409 m.	6 mt.	28⁰	
2nd Year	464510 m³	2 no.	Terrace = 14 m. Top terrace = 50 m.	2nd terrace R.L. = 425 m. 1st terrace R.L. = 417 m. Bottom R.L. = 409 m.	16 mt.	28⁰	
3rd Year	231990 m³	3 no	1st Terrace = 14 m. 2nd Terrace = 14 m. Top terrace = 59 m.	Top terrace R.L. = 430 m. 2nd terrace R.L. = 425 m. 1st terrace R.L. = 417 m. Bottom R.L. = 409 m.	24 mt.	28	
4th Year	159004 m³	3 no.	1st Terrace = 14 m. 2nd terrace = 14 m. Top terrace = 59 m.	Top terrace R.L. = 433 m. 2nd terrace R.L. = 425 m. 1st terrace R.L. = 417 m. Bottom R.L. = 409 m	24 mt.	FORM APPROVED	
5th Year	188419 m³	4 no.	1st Terrace = 14 m. 2nd terrace = 14 m Top terrace = 120 m	Top terrace R.L. = 441 m. 3rd terrace R.L. = 433 m. 2nd terrace R.L. = 425 m. 1st terrace R.L. = 417 m. Bottom R.L. = 409 m	32 mt.	28	

7.3 Dump management:

During 1st five years of mining operation total 1526392 m³ of waste and OB will be generated. It is proposed to dump this OB & waste in D₁ dump area. At the end of five years, these total quantity of dump will be dumped in this dump yard D₁ by making 4 no. of terraces of 8 m. height and 14 m. width with slope angle of 28⁰. To prevent the outward movement of loose soil from the dump yard it is proposed to develop retaining wall (Ht = 1.5 m., width = 1 mt.) and garland drain (depth = 1.5 m., width = 1 m.) at the toe of the dump. It is proposed to generate plantation at the dead end of the dump to stop any type of soil erosion. To stop any type of soil erosion from dump to Karo river, a separate retaining wall and green belt is proposed along the M.L. boundary.

7.4 Stacking of Sub-grade ore:

During the mining operation of 1st five years along with production of saleable Iron and Manganese ore, sub=grade Iron and Manganese ore will be produced. The grade of this sub-grade Iron ore is 55% to 60% and sub-grade Manganese ore is 15% to 20%. Details of sub-grade Iron and Manganese ore production during 1st five years of mining of operation is given below:

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For Sub-grade Iron ore

Table no. 29

Year	Production of Sub-grade Iron ore From QI₁	Production of Sub-grade Iron ore from QI₁₂	Total
1st Year	20212 MT.	8870 MT.	29082 MT.
2nd Year	23817 MT	18931 MT.	42748 MT.
3rd Year	44414 MT	15953 MT.	60367 MT.
4th Year	251213 MT	10416 MT.	261629 MT
5th Year	26680 MT.	19635 MT.	46315 MT
	366360 MT.	73805 MT.	440141 MT

During first five years of mining operation total 440141 MT or 125754 m^3 of sub-grade Iron ore will be generated. This volume of subgrade Iron ore will be stack yard. Total area will be 45600 m^2 height of the sub-grade stack yard after 1st five years of mining operation will be 7 mt.. It is proposed to stack the material in the form of one terraces.

For Sub-grade Manganese ore

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Table no. 30

Year	Production of Sub-grade Manganese ore From QI₁	Production of Sub-grade Manganese ore from QI₁₂	Total
1st Year	630 MT.	1335 MT.	1965 MT..
2nd Year	1361 MT	1024 MT.	2385 MT.
3rd Year	1233 MT	1106 MT.	2339 MT
4th Year	2111 MT	1310 MT.	3421 MT
5th Year	2468 MT.	2318 MT.	4786 MT.
	7803 MT.	7093 MT.	14896 MT.

During 1st five years of mining operation total 14896 MT. or 5320 m^3 of Manganese will be generated. It is proposed to stacked this ore in a sub-grade Manganese stack yard of area 20500 m^3. The stack yard will be partly filled by the sub-grade produced during 1st five years. Total height of this stack yard after 1st years will be 1 m. only.

7.5 Sub-grade ore stack Management:

Total area of both subgrade stack yards will be 66100 m^2. It is proposed to stack the subgrade Iron & Manganese ore properly by maintaining terrace. It is proposed to surround both the stack yard with 1.5 mt. high retaining also proposed to make two rows plantation around those subgrade stack yard in course of future mining operation.

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CHAPTER – 8

USE OF MINERAL

CHAPTER – 8

USE OF MINERAL

The ore is to be produced from Bokna Iron & Manganese Mine is mainly Iron ore and Manganese ore different sizes of ore to be produced of different grades.

The Iron ore to be produced will used for domestic purposes – The specifications for user industries for export of Iron ore

Iron ore constituents		**Export grade**
Fe	-	63.5% (Rejection below 63%)
SiO_2	-	3% (Max)
Al_2O_3	-	3% (Max.)
P	-	0.09% (Max.)
Size	-	- 10 mm + 100 mm., tolerance 5% both side

For domestic industry the ores are to be produced only Iron ore lumps to be crushed into sized ore to use in the different Sponge & Iron Industries.

Iron ore constituents		**Grade**
Fe	-	634% (Min)
P	-	0 03% (Max.)
$SiO_2 + Al_2O_3$	-	3% (Max)
$CaO + MgO$	-	5% (Max.)
S	-	0.2% (Max)
Cu	-	0.03% (Max.)
Pb, Zn & Others	-	0.02 (Max)
Moisture	-	Nil
Size	-	5 mm. to 18 mm

The specification of pig Iron Industry is as under:

Iron ore constituents		**Export grade**
Fe	-	63.5%
SiO_2	-	1.5 to 2 5 (Max.)
Al_2O_3	-	1.5 to 2.5 (Max.)
$SiO_2 + Al_2O_3$	-	3.00 mm
Size	-	5 mm. to 8 mm.

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Similarly Manganese ore is to be produced from the mine is of different sizes & different grades. The sizes & different grades of Manganese are to be used different user Industries are as:

a) Low-grade ore to be Durgapur Steel Plant, Durgapur.
b) Medium grade ore to be supplied Ferro Alloy Plant at Kanhanm Garividi, Durgapur etc.
c) High-grade ore to be produced is to be kept and is to be sold, when requirement of market demand.

The stipulated specification (both mechanical and chemical) is as follows:

a) <u>For Steel Plant, Durgapur</u>:

Mn.	-	30% (acceptable up to 28% with penalty and rejection below 28%)
Fe	-	15% (Max.)
Al_2O_3	-	*7% (acceptable up to 8% with penalty)*
SiO_2	-	13% Max.
P	-	0.15% Max.
Size	-	10 – 4 mm. tolerance 10% both size acceptable up to 15% both side with penalty.

b) Khandelwal Ferro Alloys Corporation Ltd. Kanhan, Maharastra.

c) Maharastra Electrosmelt Limited, Chandrapur Maharastra.

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d) Mython Ferro Alloys, W.B.

For above Plants the specification of ore is as follows:

<u>For High Grade Ore</u>

Mn.	-	46% Min.
Fe	-	10% Max.
SiO_2	-	5% Max.
Al_2O_3	-	7% Max.
P	-	0.12% Max.
Size	-	10.75 mm. Tolerance

<u>For Medium Grade ore</u>

Mn.	-	38% Min
Fe	-	16% Max.
SiO_2	-	6% Max.
Al_2O_3	-	7% Max.
P	-	0.1% Max.

5% for + 75 mm.
10% for – 10 mm.
accepted up to 15% with penalty.

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CHAPTER – 9

EMPLOYMENT POTENTIAL

Chapter – 9

Employment Potential

9.0 Employment Potential:

9.1 The following personnel's are required for execution of mining operation:

a) Manganese & Supervisory personnel's
b) Technical personnel's
c) Clerks and others

a) Manganese & Supervisory personnel's

Following personnel's are proposed to be employed in the mine.

Designation	Qualification	Numbers
Mines Manager (B.E. Mining)	First Class (Manager's Certificate of Competency)	1
Asst. Manager	Second Class	1
Fore Man		
Mate (Blasting)		অনুমোদিত APPROVED
Mate (Production)		4
		Total = 9

b) Technical Personnel's
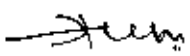
Designation	Qualification	Numbers
Mining Geologist	MSc. Geology	1
Surveyor	Restricted Certificate of Competency	1
Survey Asst.	Matric Pass	2
		Total = 4

c) Clerical and Others

(1) Office Bearers & Others

(2) Mine Worker

c₁) Office Bearers:

	Numbers
1. Clerk cum Storekeeper	2
2. Watchman	2
3. Office Assistant	2
	Total = 6

c₂) **Mine Worker:**

1. Manual Worker (sorting. Dressing etc)
2. Machine Operator

Manual Worker

	Numbers
1. For Plantation	3
2. Ore Sorting or Ore Sizing, dressing	120
3. Road Construction	10
4. Leave of absenteeism	14
	Total – 147

Machine Operator

Skilled   **Numbers**

1. Explosive Carrier	2
2. Wagon Drill Operator	2
3. Compressor Operator	2
4. Loader Operator	2
5. Tipper Operator	30
6. Excavator Operator	4
7. Dozer Operator	1
8. Tractor Cum Jackhammer Operator	1
	Total = 44

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Semi Skilled   **Numbers**

1 Excavator helper	4
2. Wagon Drill helper	2
3. Loader helper	2
4. Jack Hammer helper	1
	Total = 9

Total Worker requirement = Manual Worker + Machine Operator

= 147 Nos.   · 53 Nos.

= 200 Nos.

Total Personnel Required

1. Management & Supervisory Personnel	=	9
2. Technical	=	4
3. Clerical & Others	=	200
	Total =	213 No.

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CHAPTER – 10

MINERAL PROCESSING

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Chapter – 10
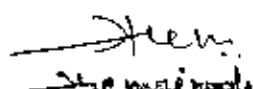
Mineral Processing
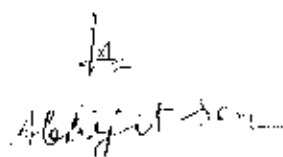
10.0   Mineral Processing:

During 1st years of mining operation both Iron and Manganese will be produced in this area. After production, Iron ore will be subjected to dry processing through mobile crusher unit of capacity 200 MT/hour. Iron ore lump of 400 mm. (max. 0 size) will be crushed 5   18 mm. and – 5 mm. size. All these sized ore will be stacked in separate ore stacking yard. There will be no beneficiation of ore either dry ore wet process is envisaged.

Manganese ore, which will be produced in this mine will be subjected to manual sizing and sorting. At first the ore will be manually sorted out from the waste. Then the ore will be separately stacked as per the grade. Then the bigger size ore will be broken manually into 10 – 40 mm and 10 – 50 mm. size as per buyer requirement.

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CHAPTER – 11

ENVIRONMENT MANAGEMENT PLAN

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Chapter – 11
Environment Management Plan

10.0   Base Line Information:

In order to assess the possible impact of mining during the first five (50) years operation of the Mine, the base line information on the environment is to be collected and generated as indicated below. It is to be noted that the existing environment in and around the mine must have to be degraded some extent from the original situation and the base line data as well the possible impact of the same are to be assessed on that basis.

General environment may be broadly classified as under:

a)   Physical Environment

b)   Ecology Environment

c)   Human Environment

a) Physical Environment

i) Existing Land Pattern

The area occupies low to medium range hills surrounded by plain land. The are under reference is totally coming under protected forest. But Ex-lessee Smt. D.K. Bai, during it mining operation period of 40 years, excavated a huge area for Iron and Manganese ore. That day mining operation was manual and an systematic. As result, large number small and big pits, dumps are lying in this area scatterdly Old Mine roads, office, Creech etc. are also present in this area. Now, the applicant after the execution of lease will start the mining operation in this area in systematic manner by mechanized and semi-mechanised method The existing land use pattern of the area is as follows:

1) Old Quarries	-	66.046 H.
2) Old dumps	-	17.964 H.
3) Old roads	-	5.710 H.
4) Office, Colony etc.	-	2.600 H.
5) Storing of minerals	-	4.480 H.
	Total =	96.800 H.

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ii) Water Regime:

Surface Water

The drainage of area is governed primarily by Karo river, which flow South to North direction adjacent to the leasehold area in Western and North side. There are numerous nalas over the area, which course the seasonal rainwater into the river.

Ground Water

The area particularly the soil-covered part is having ground water as evident by the presence of tube well in the area. The depth of the tube is about 25.0 mtrs. The local people consume water from tube well. For domestic use water from Karo river and tube well serves the purposes.

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Water Quality

No. of water samples from different sources viz tube well in-let out-let points of Karo river at different seasons and in different years have to be drawn and to be analyzed. While drawing samples, care is to be taken to obtain truly representative samples of existing condition and is to be handled it in such a way that will not deteriorate or to become contaminated before it reached the laboratory. The tested parameters are to be properly studied if the same is within the permissible limit of I.S. specification I.S. 2296 - 1982 (Class – A, no care to be taken, if the tested parameters are found to be below detection level, proper case to be taken by the monitoring agency).

iii) Climate Condition:

The area falls under tropical climate. The climatological data of the area during the last five (5) years is as under.

Rain fall

Year	Rain fall (mm)
1997	2103
1996	1889
1995	1752
1994	1901
1993	1895

Temperature

Year	Average Temperature (C^0)	
	Max.	Min.
1997	42	6
1996	40	5
1995	43	8
1994	38	4
1993	42	6
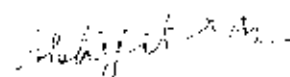
Ambient Air Quality

No. of air samples from different sources (viz. working quarries, dumping yard and camp) at different seasons at different places are to be drawn and to be tested for suspended particulate matters (SPM), repairable particulate matters (RPM) SO_2, Nox & CO. For this a high volume air sampler is to be deployed in the field. To maintain their quality within limit it is proposed to take help of M/S Superintendent Company of India (P) Ltd for ambient air quality study of the area.

Noise Level

Similar to air testes, number of noise level tests are proposed at different sources, (viz. working quarries and camp) at different seasons in different places are to be studied. To maintain the noise level within limit it is proposed monitor the noise level regularly with the help of M/S SUPCO Ltd

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b) Ecological Environment

Flora

The area is having total area categorized as forest land More important trees available in this area Mahua, Sal, Kendu, Sidhha, Dhala etc. Mining is mostly proposed at the stop of hills and a part in the valley area there is no major vegetation. Density of trees varies from 0 1 only.

Fauna

The area is devoid of any rare/endangered fauna. Only Jungle Cats, Rats, Rabbits, Snaks, Sparrow, Crow, Hen etc. encountered in this area.

c) Human Environment

Population

The area is lowly populated and average of population is less than one per hectare. The total population of the area is 12214 nos. in habituated in eleven nos. of village within 5.0 Km. radius from the Center of the area under reference. Details of villages with total population separately for male female, category, literacy etc. has been indicated below:

Table No. 31

List of Villages. Population etc.

(Within 5 Km. radius of Bokna)

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Sl. No	Name of Village/Town	Total Popula
1.	Bokna	82
2.	Gua	5710
3.	Thakura	517
4.	Barajamda	3545
5.	Khasjamda	230
6.	Nuagon	256
7.	Patahatu	76
8.	Pandrasali	279
9.	Nalda	1237
10.	Baraiburu	177
11.	Tatiba	105

The above population is based on report of Census of India 1981, which indicates an average population density of less than one per hectare. Schedule Caste and Schedule Tribes constitute approximately 80%. The average literacy rate is about 8%.

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Occupation

About 45% population is engaged in various professions broadly classified as cultivators, agriculture laboureser, household industries and other (including mining, construction, plantation, trade, commerce, business, transport, teaching, Govt. Services etc.) and generally termed as " main worker" and the balance 55% are " non worker" which also includes the marginal workers. Out of the main workers, percentages of local people engaged in various professions are as under:

Cultivators	. 41%
Agriculture laboures	: 3%
Household industry workers	. 49%

This " Others" category which mainly includes mining etc. indicates the dependences on the part of local village population on mining and also the potentialities of job opportunities that are being offered due to intense mining activities in and around this area and thereby bringing standard of living, education and overall uplift of socio economic aspect of the area.

Existing of Public Building, Monuments etc.

The area is devoid of any notable public building, national monuments, place of worship etc. monuments, place of worship etc. There is also no national part or tourist place or wild life sanctuary near to the area.

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Existing of Public Building, Monuments etc.

The area is devoid of any notable public building, national monuments, place of worship etc There is also no national part or tourist place or wild life sanctuary near to the area.

11.1 Environmental Impact Assessment:

Open pit mining of any dimension is likely to cause some amount of unbalance to the existing environment. Further any amount of chance in the existing environment brings some change in the surrounding vegetation, animal and human life. The complexity of assessment of these changes is increase by the fact that the group adversely affected are often no the same group, who are benefited by it. Therefore, while assessing the impact, a balance between the odds and benefits should be drawn properly with the background of overall perspective of the project.

Mining a Bokna will not be a new, rather it is an old mine & the mining operation was carried out by manual open cast & the same is proposed will be semi-mechanized open cast mine. Considering the proposed scale of operation and assessing the baseline data on physical environment (existing land use pattern, water, regime, climate conditions like rain fall/temperature ambient air quality, noise level etc.) ecological environment (Population, occupation, education, are has brought some positive effect on life, better employment potentiality, better health care) better living, water supply and sanitation conditions, better education facilities etc. The major adverse/ negative effects are definitely due to deforestation and land degradation that will be temporary as the area will be reclaimed by suitable reclamation scheme in future.

The Impact of mining on various important environmental parameters is as given below

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Impact on Land Use

After five years of mining operation, the change will be likely to occur in the present land use pattern is as follows:

Land use pattern after five years

1) Quarries	-	57.371 H.
2) Dumps	-	26.639 H.
3) Roads	-	5.710 H
4) Office, Colony Magazine	-	2.60 H
5) Storing of minerals	-	6.61 H.

Air Quality

Due to increase in the extent of mining activity there will be air pollution, which may disperse in the ambient air and affect the ambient air quality.

As it will be seen from the ambient air quality results that the most significant air pollution in mining is particulate mater. In mining most of the air pollution sources are non point ones, which cause positive emissions. The non point sources are:

1. Drilling
2. Blasting
3. Loading & Unloading
4. Transportation

Drilling

The drilling will be done by Jackhammer and wagon drill. Drilling will cause generation of fine dust. To reduce the dust, prior to drilling, water sprinkling will be done to moist the surface and rock. The operator will be provided with dust mast.

Blasting

The blasting will be done between 7.00 AM. to 8.00 AM. and 4.00 PM. To 5.00 PM. Blasting will cause generation of dust from it. This dust casts over in a wider area. Therefore, impact on ambient air quality will be low. At Bokna Mine this impact will reduced due to the presence of green belt around the mining ara.

Loading and Unloading

After blasting, loading of ore and overburden will be done by excavator/loader. The handling (loading and unloading) of overburden and ore causes dust generation. To reduce the dust generation water spraying will be done during the materials handling

Transportation

After loading, overburden and ore is to be transported to dumping yard siding respectively by dumpers through haul roads. Since these roads are t be Kuchha roads, a lot of dust will be generated during plying of tippers. To reduce dust water will be sprinkled on the road by a water sprinkler.

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As it will be seen in ambient air quality results that even will all the above operations on the area. It will be very low concentration of gaseous pollutions (SO_2 & NO_x) as compared to the ambient air quality standards prescribed for industrial and mixed use by Central Pollution Control Board. Suspended particulate matter (SPM) will also below

With the above observations it will be concluded that even with the increase in mining operation, due to adoption of control measures as described above, the ambient air quality of the area will remain well within the standard limit.

Noise Level

The noise pollution in the mine will be caused by the following activities:

i) Drilling
ii) Blasting
iii) Loading & Unloading
iv) Transportation

The noise level due to drilling, loading and transportation will be well within the limit of noise standard prescribed by Ministry of Environment & Forest, Government of India vide G.S.R. 1083 (E) dated 26.12.1989, if the same will be below detection level the proposed precautionary measures are to be taken care levels as listed below:

Control measures at source

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a) Silencers are to be used in mining and earth moving equipments.
b) Maintenance personnel's working near the machines are to be provided ear plugs.

Blasting

The noise due to blasting is for very limited time. Precautions are proposed to be taken to reduces the effect of noise pollution are:

a) Blasting area is to be guarded as danger zone. Except for authorized persons whose are provided with ear plugs, no one else is allowed to be entered or remains in this zone.

b) Heavy blasts are not taken at a time.

c) Proper steaming will be done for better fragmentation and less noise.

To avoid increase in noise level due to enhanced mining activities, the best control measures is to be provide barriers. Trees as to be sound barrier and the green belt surrounding the active mining areas at Bokna mine acts as to be the sound barrier.

Water Quality

At Bokna mine all the mining operations are to be dry also mining is to be done at higher elevation. Therefore, no mine water is available to be discharged. The only source of water pollution will be the wash off from the waste dumps during rainy days. The impact of this on different water bodies will not much may be noted from the data of water qualities of different seasons.

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Solid Economic Impact

The solid waste consists of overburden and mineral waste are to be generated in the course of mining activities. These consist of laterite, shale, manganiferous shale, BHJ/BHQ & etc.

Details of stacking of sub-grade, materials and disposal of waste have been stacked in the chapter No. - 7.0. The general precautionary measures to be taken for reducing the impact due to dumping are:

a) Maximum bench height of dump will be kept at 8 mtrs.
b) Boulders retaining wall will be erected at the lower level of sub-grade dump to check the rolling down of boulders.
c) Trench will be cut below the retaining wall to arrest siltation of lower lands from dump wash off.

Socio Economic Impact

The actual mining area lies on hilltops and slope ground will not inhabited by human being. So there will be displacement of the local inhabitants due to mining and as such the question of rehabilitation would not be arise

The surrounding areas have an agrarian economy which will ultimate be changed to a more mixed economy dominated by mining. This will be brought about a changed in the life styles of the people. With the growth of the mining sector, the provision of infrastructure facilities viz. social health and education have to also been increase. The trend towards urbanization has to be led the peripheral employment and benefits to the people. The local people will not only be got employment but also will benefit from roads, medical unit etc. A backward area like this has to become accessible and open for development.

11.2 Environment Management Plan

Based on the baseline information possible environmental impact due to mining activities has to be identified & to be assessed, it may be suggested that the adverse impacts can also be controlled, if proper environmental control measures are to be implemented. The major mitigation measures are proposed to be minimized the environmental degradation in respect of each affected area during operation of the mine are discussed below:

Waste dump Management

The overburden / wastes are to be generated during mining activities will dumped in a far away place from quarry faces. For proper dumping of waste and minimum degradation of environment due to such dumping following precautions as to be taken

During dump formation

The sides are required to be sloped and kept stable by planting shrubs/grass, which acts as a good binding agent.

i) After completion of dump

The tops as well as the sides are to be kept stable by regular planting of saplings of local varieties as well as shrubs / grass in between the plants. In both the above cases, plants are also required to be planted at the foot of the lower level of dump to arrest any possible rolling down of boulders from the top levels while dumping.

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ii) Dump wash off

To reduce the situation in the nala/stream from dump wash off and also to check spreading out of dump, a dry pitched stone wall will be erected at the dump. As a precautionary measure a Garland drain (say 1.0 mt. wide x 1.0 mt. deep) will be dug beyond the dry wall to hold dump wash off if any, coming out of the dry wall and to allow clear water to drain off.

Reclamation of land affected by mining activity

As mentioned earlier, this is a old mine and there are a lot of small pits/ quarries and old dumps spread over the leasehold area. Most of these pits are shallow and small in size and some of them are not promising at all. Along with these pits, small dumps also occupied a considerable area rendering the area not available for other purpose. The total area already broken is 96.800 hects All these indicates the extent of damage made on land due to pitting/quarries and calls for a very systematic development programme so that a conceptual land reclamation programme can be initiated with loss of any production.

It is proposed that, as a part of land reclamation programme, small dumps located in and around the pits are to be removed and shifted to the proposed new dump All pits, which are to be exhausted of ore or are to be not promising, can be filled up with waste materials as far as possible as a part of reclamation.

During 1st five years mining operation it is proposed to plant 5000 trees within this area. Details of plantation programme is given below The location of proposed plantation is shown in environment management plan.

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Table No. – 32

Afforestation Programme

Year	No. of Saplings to be Planted.	Area (Ha.)	Species type	Area of the plant
1st Year	1000	0.625	Chakunda, Akasia, aranj, Mango, Neem, etc.	Toe of the dump
2nd Year	1000	0.625	- do -	Colony area
3rd Year	1000	0.625	- do -	Terrace of dump
4th Year	1000	0.625	- do -	Terrace of dump
5th Year	1000	0.625	- do -	Terrace of dump
Total	5000	3.125		

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Dust Suppressions

Generation of dust due to mining activities may cause health hazard, but at Bokna area, considering medium scale operation of mining to achieve the targeted production. It is anticipated that the generation of dust due to mining and handling of materials will be minimum and it will have least adverse effect on surrounding environment due to encircling of mining zone by green belt and distant locality of human settlement. The test results will be conducted by drawing air samples from strategic points of mine. However more precautions will be taken to minimize the generation of dust particularly during and blasting operation by use dust extractor (for drilling) and by proper steaming for blasting.

11.3 Noise Pollution

Noise pollution generated due to mining operation may cause serious health hazard unless effective measures are taken to arrest the same at the point of generation. At Bokna considering the scale of operation and method of mining proposed to be adopted semi-mechanized method of mining, the noise level is likely 1 be limited. The noise level to be tested at strategic points of the mines at different times at quarterly in every seasons. If the noise level not likely to be effected any health hazard to persons either at the mine or in the surrounding area. If required personal protective me measures (ear plug etc.) would be provided to person working very close to adverse noise generation sources The surrounding forest also acts as a good barriers for noise It is proposed that noise level will be tested every quarterly seasons in a year.

11.4 Monitoring of water quality ambient air quality

It is also proposed that water quality of Bokna area Karo River at assumed at inlet and outlet points will be tested four seasons in every year. The ambient air quality will be tested thrice in a year. The monitoring points are marked on the environment management plan.

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CHAPTER – 12

PROGRESSIVE MINE CLOSURE PLAN

Abhijit Sen

GEOLOGIST

REG. No. R.O.P./CALI1701...

Chapter – 12

Progressive Mine Closure Plan

1.0. Introduction:-

1.0   The Name of Lessee

Rungta Mines Sons (P) Ltd.
P O - Chaibasa
Dist- Singhbhum (w)
Jharkhand – 833201,
  Phone no. – 06582 – 256861

Name of Directors

(1) Sri N.L. Rungta
(2) Sri M. Rungta
    Nominated Owner – R.C.B Srivastava

The Location & extent of the lease area

a)	Name of the Mine	- Bokna Iron & Mn. Mines.
b)	Area	- 138.81 Hectares
c)	The type of Lease area	- Partly flat land and partly low height hillocks
d)	The present land use pattern	- The part of the area under discussion is presently under granted New Lease area.
e)	The method of mining and mineral processing operation	- The mining operation of the lease area is to be Adopted semi-mechanized open cast mining method. It is proposed to be installed a mechanical beneficiation plan with modern technology.

1.1. Reason for Closure:-

As it has been discussed in the earlier chapter this is an old mining lease and the mining operation is not active so far. For more and more exploration work has been proposed for proper & systematic development of mining activities. In future there will be no such closure of the mine.

1.2. Statutory obligation:-

There is no statutory obligations regarding the execution of lease deed, approval of mining plan, directories issued by the I.B.M., condition imposed by the M.O.E.F., State or Central Pollution Control Board or any other organization

1.3. Closure plan preparation:-

a) Name & Address of the Applicant-

M/S Rungta Sons (P) Ltd.
At/PO.- Chaibasa
Singhbhum (W)
Jharkhand - 833201
  Phone no – 06582 – 256861

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REG. No. R.Q.P./CAL/17019/..

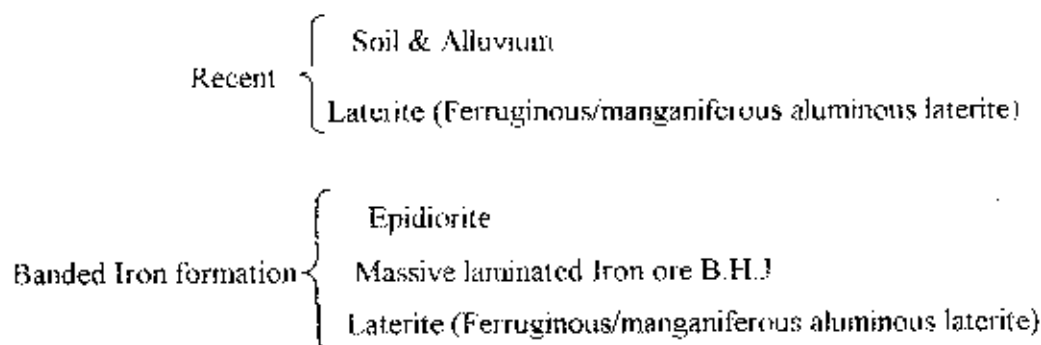|		
b) Name & Address of the RQPs who prepared the Closure Plan	I)	Sri H. Mazumdar RQP-CAL/170/92/A
	II)	Sri Abhijit Sen RQP-CAL/283/98/A
Address:-		Rungta Sons (P) Ltd. At/PO- Barajamda Dist.-Singhbhum (w) JHARKHAND.
c) The name of the Executing Agency-		M/S Rungta Sons (P) Ltd.

2.0 Mine description

2.1 Geology-

Topography-

The lease area is situated in a gently sloping valley and is largely covered with alluvium and lateritic soil. The area lies in the SE of Tohra R.F. and slopes from North – West to South – East direction. The area exhibit peneplained topography marked by linearly disposed mounds of low relief. The maximum elevation of the area is 480 MRL on the north western side, while the minimum elevation is 400 MRL on the south eastern side.

General Geology:-

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The lease area represents a part of the " Western limb" of the main " house shoe" shaped synclinorium which exposes the oldest Banded Iron formation. The Iron & Mn. deposit in the area around at Bokna are small in dimension and precipitated with oxide/leaching action of Banded Iron formations (BIF). The litho assemblages of the area belong to Gua-Kriburu group of formation of rocks and comprises a lower formation of manganiferous shale, shale, phyllite and tuff, a middle formation of Banded Iron Silica rocks and an upper formation of phyllite, shale and tuff Iron formations are extensively laterised.

Local Geology of Bokna Iron and Manganese Mine

The total stratigraphic succession of the lease area interpreted from geological mapping and exploration data can be summarized as below.

Recent
{
Soil & Alluvium

Laterite (Ferruginous/manganiferous aluminous laterite)
}

Banded Iron formation
{
Epidiorite

Massive laminated Iron ore B.H.J

Laterite (Ferruginous/manganiferous aluminous laterite)
}

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RRG. No. R (/,/2/A L/72/92/)

GEOLOGIST

2.2   Reserves -

Iron Ore

The total mineable reserve of Iron and Manganese in this mine is as follows.

Geological Reserve

Proved Reserve of Iron ore	-	8.29 million MT.
Probable Reserve of Iron ore	-	6.73 million MT
Possible Reserve of Iron ore	-	0.76 million MT

Manganese Ore

Proved mineable reserve of Mn. ore	-	1.03 million MT
Probable mineable reserve of Mn. ore	-	0.95 mmillion MT.
Possible mineable reserve of Mn. ore	-	0.46 million MT.

Life of the mine for Iron ore is 20 years and life of the mine for Mn. ore is 79 years

2.2 A)   Mining Method:-

Proposed mining method for the next five years is already discussed in chapter 4.

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B)   Mineral Beneficiation:-

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Proposed mineral beneficiation method for the five years is already discussed in Chapter – 10

3.0   Review of Implementation of Mining Plan/Scheme of Mining including five years progressive closure plan up to final closure plan :

As such there is no review implementation of mining plan/mining scheme previously. Because the area is newly granted in favour of M/S Rungta Sons (P) Ltd. Thus mining plan along with progressive mine closure plan has been submitting by the lessee for getting kind approval and subsequently mining operation will be started accordingly.

4.0   Closure plan:-

4.1   Mined out land:-

In Bokna Iron & Manganese Mine, a total 96.300 hectares of land was broken by Ex-lessee Smt. D K Bai for mining operation purpose i.e. excavation, dumping, roads, storing of minerals etc. The quarries are mainly Iron ore quarries That time no reclamation has been made in those quarries. In the present mining plan it is proposed to explore the area with DTH – holes and bore holes (by Diamond drilling). These exploration will help to confirm the limit of Iron & Mn. ore deposit vertically and horizontally. After the completion of exploration work. it will easier for the lessee to identify the area, where ore will be exhausted easily in near future. Accordingly to this, the lessee will take the decision of reclamation of future exhausted quarries by backfilling with the waste dump for its reclamation and rehabilitation to restore the original land features.

The detail of existing land use, proposed land use and conceptual land use at the end years is given below.

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Sl. No.	Item		Existing	After 5 years	Conceptual
1	Quarries	-	66.046 H	57.371 H.	73.27 H.
2.	Dumps	-	17.964 H	26.639 H	24.16 H.
3.	Roads	-	5.710 H.	5.710 H.	5.710 H.
4.	Office, Colony, Magazine	-	2.60 H.	2.60 H.	2.60 H
5.	Storing of Mineral	-	4.480 H.	6.61 H.	6.61 H
6.	Green Belt	-	Nil	Nil	5.317 H.

During conceptual period of mining operation, exploration, mine development, production, dumping etc. will done as per the proposal given in para (f) of Chapter -IV.

4.2 Water Quality Management:-

Bokna Iron & Manganese represent a topographically hilly terrain, for this reason ground water body is comparatively at more depth below the surface level. The lease hold area is traversed by a river Karo just out sides of the lease area away from the proposed workable quarries. A no. of water samples is propose to be taken form different sources (i.e. stream) inlet and outlet points of Karo river and other small rivulets in different seasons at different places of lease area and then water quality to be controlled by taking precautionary measure.

4.3 Air Quality Management:-

Presently the existing air quality status is when the medium scale of mining operation will be stated the quality of air will be changed. It is proposed. no. of air samples to be tested from different sources (i.e. working quarries, mechanical beneficiation plant, roads, camp) at different seasons in the year. To study the test results precautionary measures to be taken to prevent the air quality. As it has already been discussed in earlier chapter. Moreover water sprinkling is proposed on the haul road, quarry side, colony area, magazine site is proposed trees with big leaf is proposed.

4.4 Waste management:-

A) The waste and O.B. material to be generated during proposed mining period, will be dumped in proposed selected dumping yard. The dump yard will be sequentially graded, compacted and leveled. The year wise is indicated also. This five years dumping will be done by maintaining proper terraces. A retaining wall and garland drain is proposed at the toe of the dump to prevent to out ward movement of any loose waste materials. More over it is also proposed to generate plantation at the toe of the dump. This waste material is free from any toxicity and hazardous element.

4.5 Top soil management:-

As there is no top soil within this lease hold, no top soil management is necessary.

4.6 Tailing dam management:-

Not applicable.

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4.7 Infra structure:-

Within the area of Bokna Iron & Manganese mine, office building & colony are the infrastructure. As there is no chance of nay closure in near future, these entire infrastructure will be very much active. In distant future, when the mine will be closed at the end of the life of the mines. This infrastructure will be urelised for public benefit as the house.

4.8. Disposal of Mining Machineries:-

As the mining operation is proposed in both mechanical semi-mechanized open cast mining method, different mining machineries will be deployed within the lease hold area. During next five years thee is no chance of any type of closure of the mines. But in future, if there is any closure of the mines at the end of the life of the mines, the machineries, which will be present at that time will be shifted outside the lease hold.

4.9. Safety and Security:-

Bokna Iron & Mn. mine is an old, shallow depth manual opencast mine. For this reason, no such safety and security is required. In distant future, when the mine will be closed after the completion of any type of mining operation, all the quarries will be as far as possible back filled to get back the original landform. Moreover fencing is proposed all ground the close quarries to stop the entry of unauthorized persons.

4.10 Disaster management and Risk assessment

There is no chance landsides, subsidence flood, inundation is underground mine. Including dam failure in this area. But if it is happened any time the lessee will arrange immediately to take necessary measures against the above.

4.11. Care and maintenance during temporary discontinuance

At present there is question of the above, but if it will happen unfortunately any time, the lessee will take care of the same by arranging proper watch and ward in quarries, dump, office etc.

5.0. Economic Repercussion of Closure of Mine & Manpower Retrenchment:-

5.1 Number of local residents employed in the mine, status of continuation, family occupation & scope of joining the occupation back:-

During the five years of mining operation total 213 no. local people will work as Staffs within this proposed mine. At present there is no chance of abandonment of the mines. For this reason there is no chance of any retrenchment of any worker of the mine in near future.

5.1 Compensation given or to be given to the employees connecting with sustains of himself and their family members.

During the planning period of five years, as there is no closure of the Mines, it is not necessary to pay any type of compensation to any worker. In distant future, on closure of the mines due to any reason, the company will arrange for necessary compensation as per the rate of that time.

5.2 Satellite occupation connected to mining industry number of person engaged there in continuance of such business after mine closes.

As the mine is situated in a remote, hilly terrain no such satellite occupation is developed till date within lease hold. At present there is no closure of this mine. But on closure of mines is distant future, there will no effect of closure on Satellite occupations connected to mining industry.

5.3 Continued engagement of employees in the rehabilitated status of mining lease and any other remnant activities.

During five years of mining operation, there is no chance of any mine closure. For this reason engagement of employees in the rehabilitated status of mining lease and any other remnant activities will not arise

5.4 Envisaged repercussions on the expectation of the society around due to closure of mine.

As there is no mine closure at present, there will be no repercussions on the expectation of the society around.

6.0 Time scheduling for abandonment.

APPR

Time schedule for future abandonment of the mine is given below. This time scheduling will be necessary only for final closure of the mine at the end of the life of the mine.

Activities	Tentative mine	Time frame for completion of jobs for mine closure operation (in months) from date of cessation of production											
	01.01.2084	1	2	3	4	5	6	7	8	9	10	11	12
Reclamation of mined out land		It will start from 2015 and there it will be carried out Concurrently with the mining operation											
Waste management		Utelised for backfilling of exhausted quarries in future from 2015 concurrently with mining operation.											
Decominissioning infrastructure.		1	2	3	4	5	6	7	8	9	10	11	12
Safety & Security													
Monitoring of air & water													
Disposal of machinery													

7.0 Abandonment Cost:-

Cost has been estimated based on activities discussed in Para - 6 and explained in the following table. These abandonment cost will be required only during the final closure stage

Description	Quantum of work to be done	Approx. total cost of Process (in Rs.Lac)
(1) Reclamation & Rehabilitation of mined out land.	Reclamation of 73.27 hect. of land and plantation by 117232 plants (1600 trees/ hcts)	Rs. 12.17 lacs. For Plantation and Reclamation.
(2) Waste dump management	Plantation on dump by 38656 Plants.	Rs. 0.50 lacs. for plantation and dump Stabilization.
(3) Air & Water quality monitoring	One year every month two samples each in three location.	Rs. 7.00 lacs.
(4)Decommissioning of infrastructure	It will be done through out the year.	Rs. 12.00 lacs.
(5) Disposal of mining machinery	N.A.	-
Tentative cost of abandonment as on 01.01.2084, when the mine will be closed		Rs. 31.67 lacs.

8.0 Financial Assurance:-

For Bokna Mine the lessee will submit financial assurance in the form of Bank Guarantee. The manner in which bank guarantee is calculated is given below. This Mine is a A – category mine and financial assurance is calculated @ Rs 25000.00/hectare

The financial assurance is given in the following tabular form

TABLE

(Area in Hectares)

Sl. No.	Head	Area put on use at start of plant	Additional requirement during plan period	Total	Area considered as fully reclaimed	Net area considered for calculation
a	b	c	d	e = (c+d)	f	g g = (e-f)
1.	Area to be excavated	66.046	-----	66.046	-----	66.046
2.	Storage for top soil	N.A.	N.A.	N.A.	-----	-----
3.	Overburden/dump	17.964	8.67	26.639	-----	26.639
4.	Mineral storage	4.480	2.13	6.61	-----	6.61
5.	Infrastructure (Workshop, administrative building)	N.A.	N.A.	N.A.	APPROVED	-----
6.	Roads	5.710	-----	5.710	-----	5.710
7.	Railway	-----	-----	-----	-----	-----
8.	Green Belt	-----	5.317	5.317	-----	5.317
9.	Tailing pond	-----	-----	-----	-----	-----
10.	Effluent Treatment Plant	-----	-----	-----	-----	-----
11	Mineral Separation Plant	-----	-----	-----	-----	-----
12.	Township area	2.6	-----	2.6	-----	2.6
13.	Others to specify	-----	-----	-----	-----	-----
					Total	112.922 H.

For RUNGTA SONS (P) LIMITED

Director

REG. No. R.Q.P./CAL/179/92/A

As per the above calculation financial assurance will be made on total 112.922 hectares of land. The total financial assurance will be:

112.922 X Rs. 25000.00 — Rs. 2823050.00 i.e. Rupees Twenty eight lakhs twenty three thousand fifty only

9.0 Certificate & Undertaking of the Company

Enclosed as annexure – I & II
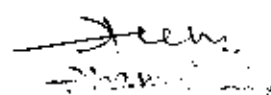
For RUNGTA SONS (P) LIMITED

Director

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ANNEXURE

REG. No. R.O.P./CAL/770/92//

GEOLOGIST

CERTIFICATE

This is to certify that " Progressive Mine Closure Plan" of Bokna Iron & Manganese Mine over 138.81 hectares of M/S Rungta Sons (P) Ltd. complies all statutory rules, regulations, order made by the Central or State Government, statutory organization, court etc. have been taken into consideration and wherever any specific permission is required the lessee will approach the concerned authorities.

Signature of the Applicant:
(in full)
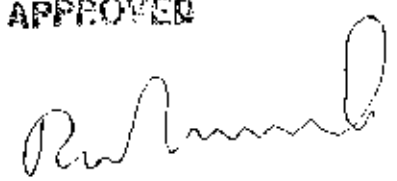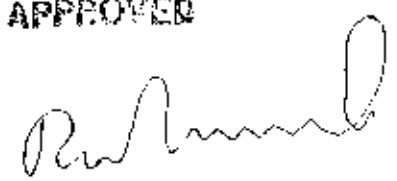
Name in full: R.C.B. SRIVASTAVA
(Block Letter)   (Nominated Owner)

Address: Rungta House

Chaibasa

West Singhbhum

Jharkhand - 833201

UNDERTAKING

I on behalf of M/S Rungta Sons (P) Ltd. do hereby undertake that during the time of final closure of the Bokna Iron & Manganese Mine, the Closure Plan will be implemented in a time bound manner as would be proposed.

अनुमोदित

APPROVED

Signature of the Applicant in full:

Name in full (Block Letter)   R.C.B. SRIVASTAVA

(Nominated Owner)

Address: Rungta House

Chaibasa

West Singhbhum

Jharkhand – 833201

Registered.

Government of India
Ministry of Steel and Mines
Department of Mines

New Delhi, the 11th Sept.1990

No.5/18/25-Mines-5.

To

The Secretary to the Govt. of Bihar
Department of Mines and Geology
Patna

Subject:- Grant of Mining Lease for Iron & Manganese Ore over
an area of 343 Acres in village-Bokna ,District   Singhbhum in favour of M/s. Rungta Sons (Pvt) Ltd.

Sir,
I am directed to refer to your letter No.3/M6-1051/84 603 dated 31.1.1985 on the above mentioned subject and to convey the approval of the Central Govt. under section 5(2) of the Mines and Minerals(Regulation and Development) Act,1957 to the grant of mining lease for iron and manganese ore over an area of 343.00 Acres in village Bokna district Singhbhum in favour of M/s. Rungta Sons (Pvt) Ltd. for a period of 20 years This approval for the grant of mining lease will take effect only after the following conditions have been fulfilled:-

i) Before grant of mining lease, the State Govt.shall
ensure compliance with the provisions of the Forest
(Conservation) Act,1980 and other relevent laws; and

ii) Even though Indian Bureau of Mines has recommended
mining in the area, a formal mining plan duly approved
by the competent authority shall be obtained before
grant of mining lease.

2.   The deemed rejection of the applicant's mining lease
application dated 7.5.83 by the State Govt. has already been
set aside by the Central Govt.vide their final order
No.399/84 dated 11.6.1984 communicated under letter no.2/329/
84/M.V dated 20.6.1984.

3.   Before allowing grant of mining lease the State Govt
may kindly ensure the compliance of the amended provisions
of the Act and Rules.

4.   A copy of the orderspassed by the State Govt. in the
matter may kindly be furnished to this department for our record.

Yours faithfully,
Sd/-I.Srinivas.
Under Secretary to the Govt. of India

Registered.
Copy to:- 1. The Controller General, IBM-Nagpur
2. D/O Steel(RMI-Section)Udyog Bhavan
New Delhi w.r.to their O.M.No.15(36)/85
RMI dated 22/23-1-86
3. Copy for Guard file.

Sd/-I.Srinivas
Under Secretary to the Govt. of India

झारखण्ड सरकार
खान एवं भूतत्व विभाग
खान निदेशालय!

संख्या — बी0 / एम0–6–105 / 11   1727   रांची दिनांक 17.12.04

प्रेषक,

आई0 डी0 पासवान
निदेशक, खान।

अनुमोदित
APPROVED

सेवा में

सर्वश्री रूँगटा सन्स प्रा0 लि0
चाईबासा।

विषय :– **पं0 सिंहभूम जिलान्तर्गत मौजा–बोयना के 343.00 एकड़ क्षेत्र पर लौह अयस्क एवं मैंगनीज के खनन पट्टा की स्वीकृति हेतु सर्वश्री रूँगटा सन्स प्रा0 लि0 का आवेदन पत्र।**

महाशय,

उपर्युक्त विषय के संदर्भ में संदर्भ में आपका ध्यान आकृष्ट करते हुए कहना है कि प्रस्तावित उक्त के प्रसंग में वन एवं पर्यावरण मंत्रालय का पूर्वानुमति स्वीकृति पत्र की छायाप्रति प्राप्त/प्रमाणित कार्यालय स्तर/शीघ्र उपलब्ध करायी जाय, ताकि प्राप्त आवेदन पत्र के आधार पर समुचित कार्रवाई किया जा सके।

विश्वासभाजन

निदेशक, खान झारखण्ड
5/12

Land Schedule

Land Schedule of Bokna Iron & Mn. Mines of M/S Rungta Sons (P) Ltd over an area of 343.00 Acres or 138.81 Hects in Village Bokna. Thana - Kolhan, Dist- West Singhbhum, Jharkhand.

Village – Bokna.

Sl. No.	Plot No.	Khata No.	Kissam	Tenant	Area in Acres.
1.	4		Protected forest.	Govt. Land.	184 Acs.
2.	676		Protected forest.	Govt. Land.	159 Acs.
				Total -	343 Acres. or 138.81 Hects.

Phones Kolkata Office : (033) 288-1571/1515
Phones Kolkata Office : (033) 288-1571/1515
Nalda 06767-276414 / 06390-262231

Superintendence Company of India (Private) Ltd.
P. O. NALDA KEONJHAR ORISSA

Regd. Office "Everest House"
46C Chowringhee Road
Kolkata-70002

Ref. SCI/NLD/RSPL - 721/05-06   *Date* 17/06/2005   200

Name : M/s. Sungta Sons (P) Ltd.,

Address : D e r a j a m d a .

Certificate of sampling & analysis.

One sample of Iron Ore of Bokna   Mines submitted by you
on 16/06/2005 has been analysed with the following result :-

Analysis of the sample dried at
105^0 C

Iron Ore   :   Iron (fe): 65.60 %

For, Superintendence co. of India (P) Ltd../Nalda.,

This inspection has been carried out the best of our knowledge and ability and our responsibility is limited to the exercise of due care. This report/certificate reflects of our findings at time and place of inspection and is not intended to relive the sells from there contractual obligations.

Ref. SC/NLD/RSPL – 722/05-06   Date 17/06/2005   200

Name M/s: Rungta Sons (P) Ltd.,

Address : B a l a s o r e .

Certificate of sampling & analysis.

One Manganese Ore sample of Bokna Mines submitted by you on
16/06/2005, has been analysed with the following result :-

Analysis of the sample dried at
105°C

Mn.Ore '   :   Manganese(Mn): 35.45 %

F. Superintendence co. of India (P) Ltd.,/Nalda.,