Annexure - XXIV

207

भारत सरकार
GOVERNMENT OF INDIA
खान मंत्रालय
MINISTRY OF MINES
भारतीय खान ब्यूरो
INDIAN BUREAU OF MINES

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'इंदिरा भवन' 'Indira Bhavan'
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खान नियंत्रक और खनिज संरक्षण प्रभाग (पूर्व क्षेत्र)
Mines Control & Conservation of Minerals Division (Central Zone)

No. CAL/KJ/Fe&Mn/MP-514

दिनांक 19 /3/98.
Dated, the

To,
Dr. Sarojini Pradhan
At-Tolchapa Bazar
P.O./Dist-Cuttack. 753009.(Orissa)

Sub: Approval of mining plan for grant of lease, submitted under Rule 22 of Mineral Concession Rules, 1960, for Sidhomatha Iron & Manganese Deposit over an area of 94.259 Hects in Keonjhar District, Orissa State.

Ref: 1) Your letter No. 1) Nil dated 6.8.97
2) Nil dated 26.11.97
3) Nil dated 27.2.98

2) Our letter No: 1) CAL/KJ/Fe & Mn/MP-514, dated 15/9/97
2) CAL/KJ/Fe & Mn/MP-514, dated 11/2/98

Sir,

In exercise of the powers conferred by the clause (b) of sub-section (2) of section 5 of the Mines & minerals (Regulation Development) Act, 195 read with Government of Indian Order no.S.O.445(E) dated 20.4.1987, I hereby approve the above said mining plan. This approval is subject to the following conditio

1) That the mining plan is approved without prejudice to any other laws applicable to the mine/area from time to time whether made by the Central Govt., State Govt., or any other authority;

ii) That this approval of the mining plan does not in any way imply the approval of the Government in terms of any other provisions of the Mines & Minerals(Regulation & Development) Act, 1957 or the Minerals Concession Rules 1960, or any other laws including Forest(Conservation)Act 1980, Environment protection Act, 1986 and the rules made thereunder.

iii) That the mining plan is approved without prejudice to any other order or direction from any court of competent Juriadiction.

iv) Your attention is invited to the Supreme Court interim order in W.P.(C). No202, dated 12.12.96 for compliance. The approval of mining paln is therefore issued without prejudice to and is subject to the said directions of the Supreme court as applicable.

Yours faithfully,
(D.K. Singh)
Controller of Mines(CZ)

Encl: Two copies of approved mining plan

For DR.SAROJINI PRADHAN

MINING PLAN
ON

SIDHAMATH MANGANESE & IRON ORE DEPOSIT OVER 232.92 ACRES OR 94.269 HECTARES IN SIDHAMATH R.F. UNDER CHAMPUA SUB-DIVISION OF KEONJHAR DISTRICT, ORISSA.

(UNDER RULE-22 OF MCR'1960, Ammendment 1987)

NOVEMBER - 1997

VIDE LETTER No. CH-IX J/Fe&Mn/MP-511 Dated 18.3.98

M/S DR. SARODINI PRADHAN
Mining Lessee

GEOMIN CONSULTANTS (PVT.) LTD.
Geological & Mining Consultants,
(Regd No. - RQP/CAL/167/92-B)
301, Kharavela Nagar, Bhubaneswar-751001.

M/s. Geomin Consultants (P) Ltd.
Geological & Mining Consultants.

Dr. S. Pradhan.
Mining Lessee

CONTENTS

* * * * *

AUTHORISED SIGNATORY
M/S GEOMIN CONSULTANTS (P) LTD.
Regd. No. [illegible]

M/s. Geomin Consultants (P) Ltd.
Geological & Mining Consultants.

Dr. S. Pradhan.
Mining Lessee

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M/s. Gemin Consultants (P) Ltd.
Geological & Mining Consultants.

Dr. S. Pradhan.
Mining Lessee

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Geological & Mining Consultants.

Sr. S. Pradhan.
Mining Lease

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x x x x

MINING PLAN ON SIDHAMATH MANGANESE AND IRON ORE DEPOSIT OVER 202.92 ACRES OR 94.259 HECTARES IN SIDHAMATH R.F. UNDER CHANDUA SUB-DIVISION OF KEONJHAR DISTRICT, ORISSA.

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Geological & Mining Consultants.

Sri. S. Pradhan.
Mining Lessee

1.0 INTRODUCTION:

1.1 The development and industrial growth of any country depends to a great extent on the availability of mineral resources of economic importance. Amongst the major economic minerals, iron and manganese ore occupies the top most place due to its varied use in producing quality steel. Besides these are an important raw material in chemical industries. They are also used in the manufacture of pig iron, sponge iron and other ferro alloys products.

1.2 Amongst the important iron and manganese ore deposits of India, deposits of Gonasika-Iskar belt occupies a major place due to its quality. Most of the economic deposits in this belt are associated with the Banded Iron Formation of Keonjhar group of rocks. More commonly known as Bonai-Keonjhar-Singhbhum belt of iron ore group. These deposits are being exploited systematically by a number of organisations, both in government as well as private sector.

1.3 The mining lease area under reference is a part of Sidhanath reserved forest and is located within Champua Sub-division, district: Keonjhar, Orissa. The lease area comprises of 94.258 hect. or 232.92 acres and falls in Sl. No. 39 of India Toposheet No: 73 F/8, between the latitudes 22° 0'42" - 22° 1'38" N and longitudes 85° 21'01" - 85° 21'56" E.

1.4 Besides, the lease area under consideration, the Lessee, M/s Dr. B. Pradhan, holds other leases as described below.

Sl.No.	Name of the area	District	M.L/P.L	Mineral	Area (in hects)
1.	Kalita	Keonjhar	M.L	Iron	24.75
2.	Ingamjharan	Keonjhar	M.L	Iron & Manganese	10.70
3.	Baitarani	Keonjhar	M.L	Iron	52.693
4.	Nukra	Keonjhar	M.L	Limestone & dolomite	586.50

1.5 The lease area is virgin and hence no excavation work has been carried out so far. As numerous steel plants are proposed in the State of Orissa, the ore due to be raised here got tremendous prospects for utilisation in these industries.

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Mining Leasee

1.6 The lease has been granted over 640 acres vide state Mining & Geology Department, letter no 6151/MG dated 5-6-1984. Subsequently 170.510 hectares has been surrendered by the lessee from the total granted area of 640 acres. Accordingly the mining plan is prepared over the retained area of 92.340 ha or 91.285 hects under rule 22 of MCR-1960 (Amended-1987). (Annexure I & II).

COPY

Government of Orissa
Mining & Geology Department

Proceeding

No. 6507 / MG. Bhubaneswar , the 20.6.84.
III(A)MG.60/84

Sub: Grant of Mining lease in the district of Keonjhar.

Read: Application presented on 15.6.70 by Dr. Sarojini Pradhan for grant of a Mining Lease for Iron & Manganese over an area of 1277.50 acres in Sidhamatha area in the district of Keonjhar.

Order:

Whereas Dr. Sarojini Pradhan has applied to the State Government for grant of a Mining Lease by her application read above;

Whereas the mineral in the land in respect of which the mining lease has been applied for belongs to Government and the land is at their disposal;

Whereas the applicant holds a valid Certificate of Approval from the State Government;

Whereas the applicant being an individual is a Citizen of India;

Whereas the applicant by herself or with any person joint in interest with him does not in respect of Iron & Manganese or related group of minerals held such area in the State as with the area over which the mining lease has now been asked for will exceed ten square kms. in the aggregate;

Whereas the Government of India have conveyed their approval to the grant of Mining Lease under section 5(2) of the Mines & Minerals (Regulation & Development) Act, 1957 and also in exercise of the powers conferred by Section 30 of the Said Act, directed the State Government to take into consideration this application and pass order thereon;

Whereas the party was ~~was~~ asked in Mining & Geology Department letter No.6151/MG. dt.4.6.84 to accept the terms and conditions under which the Mining Lease was proposed to be considered for grant and the party in his letter No.SP/ML-50/33/84 dt.11.6.84 accepted these conditions;

Therefore, the State Government are hereby pleased to order that a Mining Lease in respect of the land over the Southern half of 640.00 acres of the above noted area be granted to Dr. Sarojini Pradhan subject to the conditions laid down in the State Government letter No.6510/MG dt.5.6.81. The party should comply with all the terms & conditions including furnishing of a surveyed map and description within three months from the date of this order to the Collector, Keonjhar.

By order of the Governor ,
P.C.Nayak
Additional Secretary to Government

217.

Government of Orissa
Department of Steel & Mines
.....

No. 10924 / St. Bhubaneswar, the 19.10.95.
III(A)SM-62/95.

From:
Shri N. Mohanty
Deputy Secretary to Govt.

To
The Legal Representative of
Late Dr. Sarojini Pradhan
At/P.O: Telenga Bazar,
Cuttack
Dist: Cuttack

Sub: Grant of M.L. for Iron/Manganese ores over an area of 640 Acres in village Sidhamath R.F. of Keonjhar District in favour of Dr. Sarojini Pradhan-Cancellation thereof.

Ref: Grant Proceedings No.6507 dt.20.6.84.

Sir,

I am directed to invite a reference to your letter No.SP/ML-50/1434/95 dt.7.9.95 on the subject mentioned above and to intimate that your proposal for surrender of 170.510 Hects. area from total granted area of 640 Acres for Iron/Manganese Ore in village Sidhamath R.F. of Keonjhar district is accepted.

You are therefore advised to initiate the proposal for dereservation of forest lands included in the retained area over 94.259 Hects. vigorously & furnish approved mining plan over the revised area within a period of 6 months positively. You are further advised to furnish revised map over the retained area to the Collector, Keonjhar/Director of Mining and Geology for information and further action.

Yours faithfully,

Sd/-19.10.95
Deputy Secretary to Government

Memo No. _____/St, Bhubaneswar, the

Copy forwarded to the Director of Mining, Govt. of Orissa, Bhubaneswar/Collector, Keonjhar for information and necessary action.

Deputy Secretary to Government

2.0 GENERAL

2.1 Name of the Applicant with complete address

M/s Dr. Sarojini Pradhan
At/P.O: Telenga Bazar
Cuttack
Tele 0671-618742/618414

2.2 Status of the Lessee

List of Partners

1. Dr. M.M. Pradhan, Telenga Bazar, Cuttack
2. Mr. S.S. Pradhan, -do-
3. Mr. S.N. Pradhan, -do-
4. Mr. S. Pradhan, -do-
5. Mr. S.J. Pradhan, -do-

All partners shall remain faithfull to each other and each legal heir shall be authorised to sign and receive cheques, drafts or other papers on behalf of the firm. The shares of the partners, in both profit and loss, are equal.

2.3 Mineral or minerals which the lessee intends to mine

Iron and Manganese ore.

2.4 Name, address and registration number of the recognised company who prepared the mining plan

The mining plan has been prepared by M/s Geomin Consultants (P) Ltd., who has been recognised by Indian Bureau of Mines, Govt. of India.

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Regd. No. HOT/OR/167/2-11

The name & address of the key persons involved in preparing the plan are as follows:

M/s Geomin Consultants (P) Ltd.
301, Kharavela Nagar
Bhubaneswar - 751 001
Tel: 0674-402080
Fax: 0674-400687
Regd.No: CGP/CAL/167/97-B
Date of Registration: 18.08.1992
Renewal upto: 18.08.1998.

Key Persons involved
1. Dr. S.K. Sarangi
2. Mr. N.S. Sarangi
3. Mr. D. Gouda

2.5 **Name and address of the prospecting Agency:**

M/s. Dr. Sarojini Pradhan.
At : Telenga Bazar
P.O/Dist : Cuttack (Orissa)

2.6 **Details of the Area:**

2.6.1 The lease covers an area of 94.259 hects. or 232.93 acres bounded by latitudes 22° 0'42" - 22° 1'28" N and longitudes 85° 21' 04" - 85° 21'56" E in Survey of India Toposheet No: 73 F/8.

2.6.2 **The details of the lands covered in the area:**

District/ State	Taluk	Village	Khata No./ Plot No. Block, Range	Area in hects.	Ownership or Tenancy
Keonjhar, ORISSA	Barbil	-	Forest division Keonjhar, Forest range, Champua	94.259	Sidheswath Reserved Forest.

2.7 Period for which the mining lease is required

The mining lease has been granted on 3-6-1984 and will be worked till the expiry of the lease.

2.8 Infrastructure

2.8.1 The said lease area of M/s Dr. Sarojini Pradhan is located at a distance of about 10.5 Kms. from Barbil, by Barbil-Rourkela State Highway No: 10 and is about 7 Kms. southwest of Bhadrasahi junction where the road for Joda, Barbil and Rourkela meets. Joda township is located at a distance of 12.5 Kms. from the lease area. Barbil is well communicated by both rail & road network. It is about 200 Kms. from Bhubaneswar viz: Keonjhar, the district headquarters and about 140 Kms. from Rourkela Barbil can also be approached from Talcher Viz: Chaibasa by rail. On a welfare scheme, a helipad was made by the State Government to engage the local labourers expecting its future occasional use. The said helipad has not been used till date by the Government or any other companies. Barbil railhead is on the Kharagpur - Bolani branch of South Eastern Railway. Nearest port facilities are available at Paradeep on the eastern coast of India at a distance of 350 Kms. from the area.

2.8.2 Primary level education is available ... [illegible] ... Tanto. Dispensary and High school level education facility is available at OMC's Sarenda colony at a distance of 8.5 Kms. from the lease area. Hospital and college level education facility is available at Barbil & Joda, located at a distance of 13 Km. west & NW of the area. The nearest weekly market is at Bhadrasahi at a distance of 4 Kms. Other facilities like Banks, Telecommunication, Lodging etc. are available at Joda & Barbil.

2.8.3 The nearest consuming industries are Rourkela Steel Plant, (SAIL) Kalinga Iron Works (IDC), IPITATA Sponge Iron Plant (TISCO) at Bilaipada and Orissa Sponge Iron Plant (OSIL) at Palaspanga. Besides, numerous miniature Pig Iron Plants, Steel Plants and other allied industries are proposed to be set up in the vicinity during near future.

2.8.4 Karo River which constitutes the main drainage of the area, flows due north at a distance of 6 Kms. west of the lease area. Whereas Kundra Nala, a stream of the main Baitarani River flows due north east at a distance of 3 Kms. east of the leasehold. Natiaram River is flowing due north easterly direction at an aerial distance of 12 Kms. in the direction of lease area. Seasonal nalas flow out in all directions from the lease area as it is situated on the Sidhowith Parbat.

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Mining Lessee

TABLE - 1

BOUNDARY DESCRIPTION

The granted M.L. area is in favour of M/s Sri. S. Pradhan has an areal extent of 232.92 acres or 94.259 hectare for Iron and Manganese ore in Sidhamatha R.F. under Champua Sub-division of Keonjhar district.

Starting point

Starting point 'B' is situated with a magnetic bearing of 90° 00' and 269° 00' and for the distance of 320 feets or 97.536 meters and 4524 feets or 1378.91 meters respectively from the B.T.S. 80 in Sidhamatha pahar. From the starting point 'B', the boundary line moves as per the details given below.

Station	Magnetic bearing	Interior angle	Distance in feet	Distance in meter	Remarks
B	57° 00'	57° 00'	5276	1607.51	
C		215° 55'	379	115.52	
D		87° 05'	1600	487.68	
E		69° 31'	5179	1578.56	
E/2C		110° 29'	2644	805.89	

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3.0 ECOLOGY AND RESERVES

3.1 Physiography

The area is marked by a hilly terrain having highest altitude of 808 mtrs. and lowest altitude of 562 mtrs. above mean sea level. The trend of the hill is due NE - SW. The highest altitude point is located at the central portion of the hilly terrain and the lowest altitude point is situated at the North-West corner of the lease area. The calculated average gradient is approximately 1:2.5. As the lease area is surrounding the hill, the slope is due all directions from the centre. No perennial streams flow within the lease area. However, numerous streams fan out from the lease in all directions. The whole area is covered by dense mixed jungle comprising mainly of sal. The area forms a part of the Sidhamath Reserved Forest and there is no village or hamlet within the lease area. 'Tanto' village is situated 2.5 kms. north of the lease boundary. Adjacent TISCO colony is at a distance of 1 km. South West of the lease area.

3.2 Geology

3.2.1 Regional Geology

The lease area forms a part of the western flank of the eastern limb of the Horse-shoe shaped Singhbhum-Donki-Keonjhar iron ore belt. Geologically the terrain forms a part of the oldest metasedimentary formations representing the pre-cambrian iron ore group.

The major lithounits identified in the region are schists, tuffs, phyllites, shales, banded iron formation comprising of Banded Hematite Jasper (BHJ) and Banded Hematite Quartzite (BHQ) with traces, at some places of lateritic manganese ores.

3.2.1.2 Regional Stratigraphy

The pre-cambrian rocks of this region were first mapped by Jones in 1934 and then was subsequently modified by Dunn in 1940. Later on extensive work has been done in this region by a host of workers. The regional stratigraphy of the area based on earlier workers can be framed as follows.

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Kolhan Group	Sandstone, Conglomerate - Breccia
	Unconformity
Mixed facies formation	- Basic Lava, tuffs and tuffites of volcanic facies. - Iron, Manganese, lenses of iron formation, chert, small dolomite of chemical facies. - Minor lenses of sandy and salty shales of clastic facies.
Banded shale formation	- Banded shale Black shale
Koira Group:	
Banded Iron formation	- Black shale-chert Finely banded Jaspillite (BHJ) Coarsely banded Jaspillite (BHJ)
Volcanic formation	- Tuffaceous shale Basic Lava
Basal Sandstone	- Gritty sandstone, quartzite, Conglomeratic at places with interbedded lava at top.
	Unconformity

Singhbhum granite with enclaves of older metabasic and meta sedimentary rocks.

3.2.1.3 **Regional Structural Set-up**

The structural set-up of the entire area is a folded plunging synform, with its southern closure attaining comparatively open nature plunging gently towards NE. The effects of the structural deformation in the form of [illegible] and planar features on the associated litho-assemblage of this Horse-shoe belt.

The rocks of the area have been affected by three sets of folds of which the effects of first generation folding (F-1) are rarely preserved. Identifiable in localised zones only this E-W (F-1) fold which is superimposed by another set of N-S (F-2) folds developing ENE - WSW trending axial planes. These folds plunge to the ENE as well as WSW at moderately steep angles. This superposed folding has resulted in the formation of a number of domes and basin structures in the area. The older rocks are exposed in the domes while the basins preserve the younger stratigraphy. The effect of the third generation of folding (E-W) is limited to the younger rocks and has resulted in the development of open axial planes. Mesoscopic folds of upright or slightly overturned nature are observed mainly in the ESJ and rarely preserved in the Sandod shale formations. Several large and minor faults are also observed resulting in three dimensional discontinuity of the lithounits.

3.1.2 Geology of the Target Areas

The [illegible] in the area of the Horse-Shoe shaped [illegible] Singhbhum-Gangpur-Sundergarh district of Bihar and [illegible] The rock types found within the lease area [illegible] are various. The main lithounits copied in this area [illegible] Sandod Shale Formation with intercalation [illegible]

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Dr. S. Pradhan.
Mining Lessee

Hematite Jasper and Banded Hematite Quartzites, lateritic rock bearing manganese ore, phyllites and float iron ore. The entire lease area was deep more or less covered by lateritic soil. The lithounits of Banded Iron Formation usually trend in a NNE-SSW direction with dips varying from 35° to 40° in NW direction. Based on the field studies the litho stratigraphy of the area is as follows:

Iron Ore Group	Soil & Alluvium Ferruginous and manganiferous laterite. Float Iron Ore Insitu Iron Ore Banded Hematite Jasper/ Quartzite.

Within the lease area float iron ore are concentrated mainly around the seasonal nalas within the Insitu Iron Ore which lies towards North Eastern side of the lease area. Whereas the South Western side has been covered with manganese ore bearing lateritic rocks. The south western side of the lease area is covered with shale and phyllites.

3.2.3 Ore Incidences

3.2.3.1 Incidence of Iron Ores

It is observed from geological mapping of the lease area as well as the adjoining areas that the insitu Iron Ore Zone is invariably capped with certain quantity of ferruginous lateritic waste materials consisting of ferruginous laterites.

65% of the total excavation, 10% of the total excavation has been considered under waste-cross ore. Taking into consideration all these factors a ore incidence factor of manganese ore has been calculated to be 25%.

3.3. Details of Explorations:

3.3.1 Exploration already carried out:

The lessee had sunk four trial pits to know the depth and extent of the existence of ore zones. Of the four trial pits sunk, two are in the iron ore zone and the other two are in the manganese ore bearing zone adjacent to the hills. The depth attained by the trial pits within the iron ore zone and manganese ore zone are 5 m. and 3 m. respectively.

Details of trial pits

Pit No./ Name	Elevation R.L. in m.	Total excavation. (Cum.)	Location	Description.
T-1	2.3+5	45	302N-320E	Iron ore at depth of 5m upto the top of the rock.
TP-2	2 [illegible]	45	414N-454E	Iron ore at depth of [illegible] upto the base of the T.

TP-3	[illegible]	[illegible]	3TGN-6958	Lateritic soil, depth 0.4 to 0.5 mtrs. Boulders are found upto the base of the pit.
TP-4	280.5m3.5	17.5	4TGN-8402	Lateritic soil, depth 0.4 to 0.5 mtrs. Boulders are found upto the base of the pit.
		320.5		

Location of the trial pits has been shown in geological plan (Plate III).

3.3.2 **Exploration proposed to be carried out**

For methodic mining & total utilisation of resources available within the lease area, it is proposed to carry out a suitable exploration programme simultaneously with the development of quarries. This will help in estimation of geological reserves and grade of ore available in the lease area. During the first five years plan period, seven(7) boreholes and twenty(20) trial pits has been proposed in this end [illegible] will be taken with [illegible] ore body as well as to prove the boundaries of the dumping yard, two bore holes are proposed. The details of proposed exploration has been given in table - 3 of this [illegible]. These exploration will be undertaken within two(2) years of the proposed mine plan period.

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Dr. S. Pradhan.
Mining Lessee

3.4. Method of Reserve Estimation:

Ore bearing zone has been delineated based on the existing exploration carried out and geological traverses taken during geological mapping. Occurrence of ore outside these zone are yet to be proved and will be taken up for exploration. The ore bearing zone is associated with massive and laminated haematite with patches of float ore bodies. These are mostly capped with ferruginous laterite of 0.5 m thickness in an average.

The proved, probable reserves of manganese ore within the lease area has been calculated based on the ~~ore~~ body along the nala exposures and trial pits sunk along the nala flanks. Three nalas are there within the manganese ore zone of the lease area. Surrounding the nala (Plate-II) one mining block have been delineated for development. The block, namely Mining Block-I, has been delineated as per the ~~lease~~ reserves of respective categories in accordance with the guidelines.

To calculate the proved ore of manganese ~~in the~~ influence and for probable category 1.5 x depth of influence has been considered. The proved ore ~~reserve~~ has been calculated as the area is based ~~on~~ the trial pits

by

drawn within the Mineral Block-I. As the occurrence of manganese ore is observed on the floor of the two trial pits drawn 1.5 m depth of influence from the 3 m depth proved ore zone has been considered for probable category of reserve.

The possible category of reserve of manganese ore has been estimated out of the Block considered for proved and probable categories of ore). The depth of influence considered has been same as that of the proved category of reserve.

Based on the geological mapping the insitu and float iron ore zone has been delineated on plate-III. The reserve estimation has been done based on surfacial area method of calculation. Float ore has been mapped around the pits within the iron ore zone. As evident from the pits cuttings the calculated average depth of proved float iron ore has been considered as five metres below the surface level.

Mineralisation/Incidence Factor (Marketable iron ore in Float Zone):

From the pit observation figures of float iron ore and [illegible] it has been evident that 70% (60-80%) of the [illegible] consisted ores as waste, 10% as sub-grade ore and 20% as marketable iron ore. In general float ore occurrence

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Dr. S. Pradhan
Mining Expert

about 50% with respect to total excavation. Since available pitting data is appeared to be in very lower side, the average occurrence of marketable float iron ore is considered to be 35% i.e. (50 + 20)/2. Accordingly, waste and sub-grade ore quantity are considered at 55% and 10% respectively.

Mineralisation/Incidence Factor (Marketable Iron Ore in Insitu Zone)

On the basis of above concept, incidence factor for marketable iron ore is calculated as below:

Marketable iron ore in insitu zone w.r.t. total pit excavation.	:	60%
General incidance of Marketable iron ore in insitu zone.	:	80%
Average occurrence of marketable iron ore in insitu zone considered for the work.	:	60% + 80% = 70%
Incidence of sub-grade iron ore	:	10%
Waste in the ore	:	100 - 70 = 30%

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Mineralisation/Incidence factor (Marketable Manganese Ore):

Incidence of marketable manganese ore from the pit data.	:	20%
Incidence of dust of the manganese ores.	:	30%
Average incidence	:	(20 + 30)/2 = 25%
Sub-grade manganese ore	:	10%
Waste in manganese ore zone	:	65%

One mining block (Mining Block-II) in Plate-III has been delineated to demark the proved and probable reserve of both float and insitu iron ore. Depth of five meters, for proved ore of both insitu and float, has been considered. Within the mining block, probable reserve of insitu iron ore only has been considered under the proved depth of five meters. The depth of probable ore has been kept at 3 mtrs. below the proved part.

Outside the mining block-II, possible reserve for both insitu and float ore of iron ore has been calculated in surficial strata without keeping the depth of extraction as 5 mtrs. below the surface level.

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Formula used for calculating the proved, probable and possible categories of reserve has been given below.

Q = S x D x T x R

where

Q = Quantity of geological reserve. (MT)

S = Surficial area (Sq.m.)

D = Depth of avilement (m)

T = Tonnage conversion factor (in MT/Cu.m.)

R = Incidence factor.

- 95% for float iron ore
- 70% for insitu iron ore
- 95% for manganese ore

Tonnage factors

The tonnage conversion factor for iron ore in the lease hold area has been taken as 3.5 MT/Cu.m.

In case of manganese ore tonnage conversion factor has been considered as 2.7 MT/Cu.m. and recovery factor has been adopted as 0.2 . The figures are based upon the [illegible] conditions of iron ore and manganese ore in the region in their volumetric generation.

3.5 **Reserve & Grade:**

3.5.1 **Reserves**

The ore reserve under proved, probable and possible categories estimated in Table- 3 are as below:

	Proved	Probable	Demonstrated Proved+probable	Possible	
	MT	MT	MT	MT	
Iron Ore	15,47,022	10,52,406	25,99,976	12,50,388	38,50,364
Manganese Ore	80,250	37,144	1,17,374	3,58,368	4,75,742

3.5.2 **Grade:**

The manganese and iron ore samples have been collected from four stations within manganese ore zone and five stations within the iron ore zone, from where mainly manganese and iron contents have been analysed. The average of which has been given below.

Content:

Mn [illegible] (Manganese ore zone)

Fe [illegible] (Iron ore zone)

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3.5. Minable reserves & anticipated life of the mines

3.5.1. Minable Reserves

Minable reserve of iron ore has been estimated assuming 85% of the geological reserve. Balance 15% would account for the mining losses during normal mining.

The minable reserve of manganese ore has been estimated assuming 80% of geological reserve. The balance 20% will account for mining loss.

Total demonstrated minable reserve for iron ore has been estimated to be about 20,00,000 MT or say 2.00 million tonnes against that of manganese ore has been estimated to be 93000 MT or say 0.09 million tonnes.

3.5.2 Anticipated life of the mines

The production of iron and manganese ore has been kept at a ceiling of 75,000 MT and 2,000 MT per annum respectively.

With these rates of production, the demonstrated reserves will be exhausted in approximately 30 years for both iron & manganese ore. However, a completion of the proposed exploration programme, it is evident that the present reserves of iron as well as manganese ores would substantially [illegible] the life of the mines.

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TABLE : 2

EXPLORATION SCHEDULE TO BE CARRIED OUT WITH LOCATION AND DESCRIPTION IN MINING PLAN PERIOD.

Year	Unit of Exploration borehole/ level pit.	Dimension (Depth)	Location	Remarks
Boreholes:				
1st	PH-1	25m	700E-240N	To prove southward continuity of iron ore.
	PH-2	25m	400E-440N	- do -
	PH-4	15m	775E-420N	To prove southward continuity of manganese ore.
	PH-8	15m		To prove the barrenness of the area for waste dumping.
	PH-9	15m		- do -
2nd	PH-3	25m	0 E-340N	To prove southward continuity of manganese ore.
	PH-5	15m	600E-300N	To prove southward continuity of manganese ore.
	PH-6	10m	200E-200N	To prove lateral spread in depth and continuity of manganese ore.
	PH-7	15m	400E-100N	- do -
Pits & Trenches:				
1	TP-(1-5)	2 x 2 x 3	Plate : III	To prove the southward and lateral extension of the ore body.
	TP-(11-20)	2 x 2 x -	- 60 -	- do -
2	TP-(1-10)	2 x 2 x 3	- 60 -	- do -
	TP-(11-20)	2 x 2 x 3	- 60 -	- do -

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TABLE - 3

Geological Reserve of Manganese Ore
(Estimated by sectional area method)

Proved Reserve

Surface area	39,620 Sq.m.
Depth of influence	3m.
Volume of manganese ore zone	39,620 x 3 = 118,860 Cu.m.
Mineralisation factor	0.25
Volume of manganese ore zone	118,860 x 0.25 = 29,715 Cu.m.
Tonnage factor	2.7 MT/Cu.m.
Geological reserve	29,715 x 2.7 = 80,230 MT.

Probable Reserve

Surface area	39,620 Sq.m.
Thickness of probable ore zone	1.5m.
Volume of manganese ore	39,620 x 1.5 = 59,430 Cu.m.
Mineralisation factor	0.25
Volume of manganese ore	14,857 Cu.m.
Tonnage factor	2.7 MT/Cu.m.
Geological reserve	14,857 x 2.7 = 37,146 MT.

Demonstrated Reserve

Proved reserve	= 80,230 MT
Probable reserve	= 37,146 MT
Demonstrated reserve	= 80,230 + 37,146 = 1,17,376 MT. = 80,230 MT.

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Possible reserves

Its Area
Average depth of influence
Adjacent ore zone

176,972 Sq.M.
Sa
176,972 x 7
= 900,016 Cu.M.
0.35
309,005.6 x 2.75
= 1,97,725 Cu.M.
2.7 MT/Cu.M.
1,72,729 x 2.7
= 466365
= 0.350 - MT.

Mining factor
For pillar reserve

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TABLE - 3(i)

Geological reserves of Iron Ore
(Estimated by surface area method)

Proved Reserve

Surface area of float iron ore zone	[illegible] Sq.m.
Depth of influence	10m.
Volume of ore zone	1,09,000 Cu.m.
Mineralisation factor	0.35
Volume of float iron ore	1,09,000 x 0.35 = 38,150 Cu.m.
Tonnage factor	2.5 MT/Cu.m.
Geological reserve	38,150 x 2.5 = 1,07,025 = 0.21 mMT.

Surface area of insitu iron ore zone	1,09,412 Sq.m.
Depth of influence	5m.
Volume of proved area ore zone	1,09,412 x 5 = 5,47,060 Cu.m.
Mineralisation factor	0.7
Volume of iron ore	5,47,060 x 0.7 = 3,82,942 Cu.m.
Tonnage factor	2.5 MT/Cu.m.
Geological reserve	3,82,942 x 3.5 = 13,40,297 = 1.34 mMT.

Probable Reserve

Surface area	[illegible] + 1,09,412 = 1,19,412 Sq.m.
Depth of [illegible] ore zone	5m.
Volume of ore zone	1,19,412 x 5 = 5,97,060 Cu.m.
Mineralisation factor	0.7
Volume of ore	[illegible] x 0.7 = [illegible] Cu.m.
Tonnage factor	[illegible] x 3.5
Geological reserve	10,43,605 = 1.04 mMT.

[illegible]

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Demonstrated Geological Reserve

Proved reserve of float iron ore	2,07,025 MT
Proved reserved of insitu iron ore	13,40,297 MT
Probable reserve of insitu iron ore	10,52,600 MT
Demonstrated geological reserve	2,07,025 + 13,40,297 + 10,52,600= 25,99,922 say 2.60 mMT.

Possible Reserve

Surface area of float iron ore zone	29,240 + 31,900 = 61,140 Sq.m.
Thickness of possible ore zone	5m.
Volume of float iron ore zone	61,140 x 5 = 4,05,600 Cu.m.
Mineralisation factor	0.35
Volume of float iron ore	4,05,600 x 0.35 = 1,41,960 Cu.m.
Tonnage factor	3.5 MT/Cu.m.
Geological reserve	1,41,960 x 3.5 = 4,9a,860 say 0.50 mMT.
Surface area of insitu iron ore zone	61,500 Sq.m.
Thickness of possible ore zone	5a.
Volume of insitu iron ore zone	61,500 x 5 = 3,07,540 Cu.m.
Mineralisation factor	0.70
Volume of insitu iron ore	3,07,540 x 0.70 = 2,15,278 Cu.m.
Tonnage factor	3.5 MT/Cu.m.
Geological reserve	2,15,278 x 3.5 = 7,53,473 say 0.75 mMT.

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SUMMARY
(In Million Metric Tonnes)

Ore	Proved	Probable	Demonstrated	Possible
Iron (float)	0.21	-	0.21	0.59
Iron (insitu)	1.24	1.65	2.39	0.45
Total	1.45	1.65	2.60	1.04
Manganese	0.06	0.04	0.12	0.04

S. - 261/365.

Barbil 12th July 1977.

R. V. BEIGGS & Co. PRIVATE LTD.

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Telephone : 248-2507
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248-7805

CERTIFICATE OF EXAMINATION

[illegible]

[illegible]	Fe. Cont.	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

[illegible]

[illegible]

Ref: 253/256.

Barbil 8th July 1997

R.V.BRIGGS & Co. PRIVATE LTD.

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CERTIFICATE OF EXAMINATION

We hereby certify that 4 average samples of "MANGANESE ORE", drawn by our representative from Sidhamath Iron & Mn. Ore Mines, on the 5th July 1997, on account of M/s. DR. S. PRADHAN., have been analysed with the following results.

Analysis on sample dried at 105/110 °C.

Marks	Mn. Cont:	Our ref. no: 1997-
S.P.M.-1.	22.50%	253.
S.P.M.-2.	27.00%	254.
S.P.M.-3.	32.45%	255.
S.P.M.-4.	35.20%	256.

([illegible])
Area Manager

Dr-vii.

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Geological & Mining Consultants.

Dr. S. Pradhan.
Minfry Leasy

4.0. MINING

4.1. Yearwise development for the first five year

The development during the first five year has been proposed in manganese as well as in iron ore zone. For production of iron ore, both float and insitu ores are taken into consideration.

The yearwise development proposal for the next five year period for iron and manganese ore are as follows:

Iron Ore:

Iron ore zone having the surface area of 1,43,212 Sq.m. have been considered for iron ore production where, 93,200 Sq.m. includes both iron ore and 1,09,412 sq.m. waste from the. Individual bench height has been kept at 3m and the working slope of the quarry will be maintained at 45° with the horizontal line. Sections have been prepared to show the five year proposals.

Manganese ore:

An area of 1,27,500 sq.m. has been considered for development and production in manganese ore zone. Height of two benches are proposed to be kept at 1.5 m only while the overall quarry slope will be maintained at 45° with the horizontal line.

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Cycle of Operations:

- Stripping of lateritic top (infertile) soil for use in haulage roads.
- Drilling of ore benches (wherever required) by jack-hammer drills.
- Blasting of the drilled benches with special explosive of 60% strength.
- Excavation of blasted materials through hand shovels, spades etc.
- Loading of excavated materials in to 8-12 MT trucks/dumpers.
- Preparation of next bench for drilling & blasting.

4.1.1 Development during 1st years:

Sl. No.	DESCRIPTION	UNIT	QUARRY-1 (Manganese)	QUARRY-2 (Iron)
1.	R.L. of the bench floors.	m	657,654,651	764,756, 752,746, 740,734
2.	No. of benches		2	7
3.	Section considered		B1P2,C1C2,D1S6	H1P2 B [illegible] I2.
4.	Total length of development.	m	50	200
5.	[illegible] of the bench	m	[illegible]	[illegible]
6.	Generation of waste	Cu.m.	2526	[illegible]
7.	Production of ore	MT	2097	[illegible]
8.	[illegible] (Waste: ore considered)		MT:Cu.m.	1:2

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4.1.2 Development during 2nd years

Sl. No.	DESCRIPTION	UNIT	QUARRY-1 (Manganese)	QUARRY-2 (Iron)
1.	R.L. of the bench floors.	m	657,654,651, 648	770,764, 758,752, 746,740, 734,728
2.	No. of benches		2	3
3.	Section considered		B1C2,C1C2,D1D2	G1G2, H1H2, I1 I2, J1J2
4.	Total length of development.	m	75	300
5.	Height of the bench	m	1.5	3
6.	Generation of waste	Cu.m.	2424	9040
7.	Production of ore	MT	2179	69660
8.	Stripping ratio (Ore:Waste)	MT:Cu.m.	1:1.2	1:0.14

4.1.3 Development during 3rd year:

Sl. NO.	DESCRIPTION	UNIT	QUARRY-1 (Manganese)	QUARRY-2 (Iron)
1.	R.L. of the bench floors.	m	457,454,451, 448,445.	776,770, 764,760, 752,746, 740,734, 728,722.
2.	No. of benches		3	3
3.	Section considered		A1A3,B1B3,C1C3 D1D3,E1E3.	G1G3,H1H3 I1 I3.
4.	Total length of development.	m	100	300
5.	Height of the bench	m	1.5	1.5
6.	Generation of waste	Cu.m.	2640	13670
7.	Production of ore	MT	3192	71429
8.	Stripping ratio (Overburden)	MT:Cu.m.	1:1.96	1:0.2

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6.1.4 Development during 4th year:

Sl. No.	DESCRIPTION	UNIT	QUARRY-1 (Manganese)	QUARRY-2 (Iron)
1.	R.L. of the bench (Level)		657,654,651, 648,645,642	770, 764, 760, 756, 744, 740, 734, 728.
2.	No. of benches		2	2
3.	Section considered		B1B2, B1B2, B1C2 B1B2, B1E2	B1B2, B1C2 B1 B2.
4.	Total length of development.	m	125	250
5.	Height of the bench	m	1.5	2
6.	Generation of waste	B.C.M.	3149	12870
7.	Production of ore	MT	3633	22054
8.	Stripping ratio: (Ore:Waste)	MT:C.M.	1:2	1:0.18

4.1.5 **Development during 5th years**

SL. NO.	DESCRIPTION	UNIT	QUARRY-1 (Manganese)	QUARRY-2 (Iron)
1.	S.L. of the bench floor	m	651,648,649, 647,649,636.	730,728, 726,724, 726,724 728,722.
2.	No. of benches		2	2
3.	Section considered		A1A2,B1B2,C1C2 D1D2,E1E2.	F1F2,G1G2, H1 H2.
4.	Total length of development.	m	125	250
5.	Height of the bench	m	1.5	3
6.	Generation of waste	Cu.m.	3195	7275
7.	Production of ore	MT	2646	15011
8.	Stripping ratio (Ore:Waste)	MT:Cu.m.	1:1.2	1:0.48

4.2 **Yearwise production for the first five year**

Based on the mining operation in the surrounding areas and findings of the M.L. area, it is assumed that there will be the following percentage rate of recoveries of different excavated materials.

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Types of ore zones	Nature of excavation	Grade	Percentage of generation	Overall Recovery factor.
Insitu Iron ore	Marketable Iron Ore	Above 60% Fe	59.5% (85% of 70%)	0.595
	Sub-grade Iron Ore	51% to 59% Fe	10%	0.10
	Waste		20%	0.30
	Mining Loss		10.5% (15% of 70%)	0.105
Float Iron	Marketable Iron Ore	Above 56% Fe	29.75% (85% of 35%)	0.2975
	Sub-grade Iron Ore	51 to 56% Fe	10%	0.10
	Waste		55%	0.55
	Mining Loss		5.25% (15% of 35%)	0.0525
Manganese	Marketable Manganese Ore	Above 20% Mn.	30% (80% of 35%)	0.2
	Sub-grade		10%	0.10
	Waste		55%	0.55
	Mining Loss		5%	0.05

This data has been used for calculating the production of marketable ore, average grade, and generation of waste, the mining losses, reduction and generation of these are as follows

For GAUNTA CONSULTANTS (P) LTD.
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4.2.1. **First Year**

PRODUCTION	UNIT	QUANTITY IRON ORE	MANGANESE ORE
Marketable Ore	MT	47993	2097
Sub-grade ore	MT	12240	1019
Waste	Cu.m.	14305	3926

4.2.2. **Second Year**

PRODUCTION	UNIT	QUANTITY IRON ORE	MANGANESE ORE
Marketable Ore	MT	69660	2179
Sub-grade ore	MT	12932	1090
Waste	Cu.m.	9840	3624

4.2.3. **Third Year**

PRODUCTION	UNIT	QUANTITY IRON ORE	MANGANESE ORE
Marketable Ore	MT	71429	2197
Sub-grade ore	MT	14420	1097
Waste	Cu.m.	19070	2640

4.2.4. **Fourth Year**

PRODUCTION	UNIT	QUANTITY IRON ORE	MANGANESE ORE
Marketable Ore	MT	76	2633
Sub-grade ore	MT	240	1317
Waste	Cu.m.	0170	2567

For BEDIA CONSULTANTS (P) LTD.
Director

4.2.5. **Fifth Year**

PRODUCTION	UNIT	QUANTITY IRON ORE	MANGANESE ORE
Marketable Ore	MT	75011	2646
Sub-grade ore	MT	12660	1323
Waste	Cu.m.	7339	3185

4.3. **Proposed rate of production when the mine is fully developed:**

The proposed rate of production will be achieved from the fourth year onwards. Production of iron ore and manganese ore varies from 67,000 MT to 75,011 MT and 2,000 MT to 2,646 MT respectively during the proposed planning period.

4.4. **Proposed method of mining:**

The deposits are proposed to be exploited by opencast mining method on single shift basis. The mode of working is semi-mechanised with the help of bull dozer, compressor, J.H. drills, blasts and dumpers. Top (unfertile) soil found only in manganese ore zone will be scraped off and used for construction of road. Side working and loading of ore will be done by manual labour.

4.5 A complete report showing [illegible] development [illegible]

[illegible]

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4.5.1 Height and width of the benches in iron ore quarries have been proposed to be kept at 3m each. For manganese ore production, the height and width of the benches are proposed to be kept at 1.5m each. Overall slope of quarries (f 6 ft) are proposed to be kept at 45°. The individual bench slope will be kept nearly vertical both in iron & manganese ore zones.

4.5.2. **Salient features of the mine:**

1.	Type of ore to be mined	:	Hard massive insite and soft float iron ore and manganese ore.
2.	Production target/annum	:	75,000 MT Iron Ore 2650 MT Manganese Ore
3.	Mode of mine working	:	Opencast manual method on single shift basis.
4.	Average number of working days per year.	:	300
5.	OMS	:	0.3 for manganese and 1.40 for iron ore.
6.	Road gradient	:	Flat to 1:20.
7.	Overall quarry slope	:	1:1
8.	Machineries/vehicles	:	J.H. Drill, Compressor, Dumper, and Water bowser.
9.	Mineral benefi. type	:	Manual sorting, sizing, breaking and blending.
10.	Overall stripping ratio (Including) i) O.B. (MT:Ore MT) ii) Waste (MT:Ore MT)	: :	0.14 Nil

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4.5.3. **Drillings**

Blast hole drilling is proposed to be carried out by the jack hammers feeded by compressed air from the compressors. The specifications of the jack hammers which will be used for blast hole drilling are as follows:

Weight of the jack hammer	:	22-25 kgs.
Diameter of the drill rod	:	32 mm.
Consumption of compressed air	:	2 - 2.5 Cu.m/min.
Pressure of the air supplied	:	6 Kgs/Sq.cm.

4.5.4 About 60% of total excavation from insitu moderate coal will be taken up through blasting. The rest 40% loose sediments will be obtained manually with the help of spades, hand shovels etc. Likewise about 80% of total excavation will be achieved through blasting and 20% manually in manganese as well as in float iron ore zone.

Annual excavation through blasting

Maximum production will be achieved in fifth year of the first five year. Annual excavation through blasting for fifth year will be as follows:

Excavation in insitu coal for 5th year = [illegible]

Percentage of blasting requirement = 80%

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Excavation through blasting = 35671 @ 0.8
= 28696 Cu.M.

Excavation of float iron ore zone = 300 Cu.M.
Percentage of blasting requirement = 50%
Excavation through blasting = 150 @ 0.5
= 75 Cu.M.

Excavation of manganese iron ore zone = 4900 Cu.M.
Percentage of blasting requirement = 50%
Excavation through blasting = 4900 @ 0.5
= 2450 Cu.M.

Total excavation through blasting = 28696 + 75 + 2450
= 31221 Cu.M.

Meterage of drilling

Excavation from ore hole = Burden x spacing x depth of hole
= 1.0x1.2x1.5 = 1.8 Cu.M.

Anual requirement of blast holes = 31221 / 1.8 = 17345 Nos.

Daily requirement of blast holes = 17345 / 300 = 57.8 nos. or say 58 nos.

Daily meterage of drilling required = 58 x 1.5 = 87

Requirement of jack-hammer

Average speed of jack-hammer = [illegible]

Effective drilling hours in a shift = [illegible]

Meterage to be drilled per day = [illegible]

No. of jack hammers required = 87 / 30

Standby = One (1)

[illegible]

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Total requirements of drill : 3 + 1 = 4

For Compressors

As one 3½" hammer consumes 2.5 cms/min. of compressed air, a compressor unit of 12 cu.m./min. capacity would be required at the mine site to operate three drills effectively at a time.

4.5.4 **Loadings**

Loading of trucks and tippers will be carried out manually.

4.5.6 **Transportation of Ores**

Average annual rate of production of marketable ore :

Iron	=	75,050 MT
Manganese	=	2,650 MT
		77,650 MT

Average daily production of marketable ore :

= 77,650 / 300 = [illegible] MT

Capacity of truck and/or tipper = [illegible]

Required number trips/day = [illegible]

[illegible]

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The excavated ore is due to be transported to the nearest railway siding of Joda which is at a distance of 12 km. from the mining site.

Distance between the quarry and unloading site	:	= 12 Km.
Distance covered by truck during to and fro journey	:	= 24 km.
Average speed of truck = 30 Km/hr	:	= 1 Km/2 min.
Time taken for to and fro journey = 24 x 2 1 hour	:	=72 min. or say 12 months.
Time taken for loading and unloading etc.:		= 1hr/60min.
Total time taken for a trip = 60 + 72 = 132 min.	:	= 2 hours & 12 months
Effective transporting hours in a day	:	= 8 hr. = 8 x 60
No. of trips by one truck	:	= 480 min. = 480/132 =2.44 or say 4.

Total no. of trucks required $= \frac{24}{4} = 6.5$ or say 7 nos.

Hence (nos. of trucks will be required for transportation of excavable ore to despatch point. One more truck of 10 MT capacity will be kept as standby and is proposed to be used at the time of maintenance and repairing. Two nos. of pay loader of 0.5 M³ capacity will also be provided for loading the ore in the trucks and for supporting the staff at the quarry face and road side.

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Transportation of Waste:

Total intercalation waste generated = 73,658 Cub.m.
from iron and manganese.

Annual excavation of waste and = 73,658.0 = 14,732 Cubm.
overburden.

Average daily excavation of waste = 14,732/30 = 49.1 Cu.m.
= say 50 Cu.m.

Capacity of truck or tipper = 10 MT

Required no. of trips/day $= \frac{50}{10} = 5$ trips

The average distance between the quarries and dumps= 750 m.

Distance covered by truck to and fro = 1.5 km.

Average speed of tippers in mine area = 10km. hr =1km/6 min.

Time taken for to and fro journey = 1.5 x 6 = 9 min.

Time taken for loading & unloading etc. for a trip = 30 min.

Total time taken for a trip = 30 + 9 = 39 min.

Working hours in a day = 7 hr = 420 min.

No. of trips by one truck $= \frac{420}{39} =$ 10.76 or say 7

Total no. of trucks required $= \frac{5}{7} =$ 0.7

Standby = 30%

Total = 0.7 + 0.3 = 1 truck.

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4.5.7 **List of machineries**

Sl.No.	Types	Capacity	Nos.	Purpose
01.	Jack Hammer	2.2 to 2.5 Cum/min.	4	Drilling.
02.	Compressor	12Cum/min.	2	Power for drilling.
03.	Tipper/Truck	10MT	2	Transporting
04.	Water Tanker	8 MT	1	Watering for dust suppression.
05.	Hammer, Crowbar Buckets, spade etc.	As required	--	Excavating, sizing & loading.
06.	Drilling rods	As required	--	Drilling.
07.	Safety equipments	As required	--	Drilling.
08.	Exploder	--	--	Blasting.
09.	Dry, dust extractor	--	2	Removal of dust.

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TABLE – 4

YEARWISE EXCAVATION OF MANGANESE ORE ZONE

Year	Section considered	Strip No.	C/S area Sq.m.	Length of influence m.	Volume of excavation Stripwise Cu.m.	Total Cu.m.
1st	B1C2	1	20	12.5	250	
		2	32	12.5	400	
		3	25	12.5	312	
	C1C2	1	22	12.5	550	
		2	26	25	650	
		3	20	25	500	3062
	D1D2	1	21	12.5	262	
		2	31	12.5	387	
		3	30	12.5	375	
2nd	B1B2	1	25	12.5	312	
		2	40	12.5	500	
		3	32	12.5	400	
		4	23	25	625	
	C1C2	4	20	25	500	4037
	D1D2	1	24	12.5	300	
		2	40	12.5	500	
		3	37	12.5	606	
		4	25	25	500	
	[illegible]		23	[illegible]	287	
			33	12.5	412	
			14	[illegible]	175	
		4	19	12.5	238	
			20	[illegible]	250	
	E1F1	4	25	[illegible]	312	
	C1C2	4	20	[illegible]	500	
	D1D2	4	19	25	475	
	[illegible]	1	25	12.5	312	
		2	40	12.5	500	

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Year	Section considered	Strip No.	C/S area Sq.m.	Length of influence m.	Volume of excavation Stripwise Cu.m.	Total Cu.m.
[illegible]	A1B2	1	25	12.5	300	
		2	32	12.5	400	
		3	33	12.5	412	
		4	10	12.5	125	
		5	19	12.5	238	
		6	20	25	500	
	B1B2	6	23	25	575	4075
	C1C2	6	28	25	700	
	D1D2	4	50	25	1250	
	E1E2	3	30	12.5	375	
515	A1B2	7	33	25	825	
		8	16	25	400	
	B1B2	7	17	25	420	
		8	23	25	575	4900
	C1C2	7	17	25	425	
		8	23	25	475	
	D1D2	7	40	25	1000	
	E1E2	1	70	12.5	875	
Total					21750	21750
Average					4975	4975

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TABLE - 4(i)
(REF: TABLE -4)

YEARWISE PRODUCTION OF MARKETABLE MANGANESE ORE

Year	Volume of excavation	Mineralisation factor	Volume of Mn ore	Tonnage factor	Recovery factor	Quantum of Mn Ore
	Cu.m.		Cu.m.	MT/Cu.m.		MT
1st	3806	0.25	971	2.7	0.8	2097
2nd	1987	0.25	1009	2.7	0.8	2179
3rd	4062	0.25	1015	2.7	0.8	2192
4th	4975	0.25	1219	2.7	0.8	2633
5th	4904	0.25	1225	2.7	0.8	3646
Total	21760		4088			11747
Average	4352		218			2210

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TABLE - 4(ii)
(REF: TABLE -4)

VEINWISE DESCRIPTION OF SUB-GRADE MANGANESE ORE

Year	Volume of ore reserves	Sub-grade conversion factor	Volume of sub-grade	Tonnage factor	Quantity of Reserve
	Cu.m.		Cu.m.	MT/Cu.m.	MT
1st	3886	0.10	388.6	2.7	1049
2nd	4037	0.10	403.7	2.7	1090
3rd	4062	0.10	406.2	2.7	1097
4th	4075	0.10	407.5	2.7	1100
5th	1900	0.10	490.0	2.7	1323
Total	21760		2176.0		5875
Average	4352		435.2		587.5

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TABLE - 4 (xii)
(REF: TABLE -4)

YEARWISE GENERATION OF WASTE IN MANGANESE ORE ZONE

Year	Volume of excavation	Waste generation factor	Volume of waste
	Cu.m.		Cu.m.
1st	3884	0.65	2524
2nd	4037	0.65	2624
3rd	4062	0.65	2640
4th	4875	0.65	3169
5th	4900	0.65	3185
Total	21760		14144
Average	4352		2829

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TABLE - 4.13(a)

OPENCAST EXCAVATION OF FLOAT IRON ORE ZONE

Year	Section considered	Calculated average Cross sectional area	Length of influence	Volume of excavation	Total
		Sq.m.	m.	Cu.m.	Cu.m.
1st	H1H2	192	100	12800	21600
	I1I2	57	100	5700	
2nd	H1H2	52	100	5200	7000
	I1I2	18	100	1800	
3rd	H1H2	58	100	5800	13800
	I1I2	40	100	4000	
4th	H1H2	83	100	8300	13000
	I1I2	47	100	4700	
5th	H1H2	3	100	300	300
Total		560		56000	56000
Average		112		11200	11200

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TABLE - [illegible]
(REF: TABLE -4 (iv))

YEARWISE PRODUCTION OF MARKETABLE IRON ORE (FLOAT)

Year	Volume of excavation	Mineralisation factor	Volume of Fe-ore	Tonnage factor	Recovery factor	Quantity of Fe-ore
	Cu.m.		Cu.m.	MT/Cu.m.		MT
1st	21900	0.35	7665	2.8	0.20	21463
2nd	7000	0.35	2450	3.5	0.05	7209
3rd	13800	0.35	4830	3.5	0.85	14349
4th	13000	0.35	4550	3.5	0.85	13520
5th	300	0.35	105	2.8	0.25	312
Total	56000		19600			56916
Average=11200			3920			11383

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TABLE - [illegible]
REF: TABLE -4 (iv)

YEARWISE GENERATION OF SUB-GRADE IRON ORE (FLOAT)

Year	Volume of excavation	Sub-grade generation factor	Volume of sub-grade	Tonnage factor	Quantity of Iron Ore
	Cu.m.		Cu.m.	MT/Cu.m.	MT
1st	21900	0.1	2190	3.5	7665
2nd	7000	0.1	700	3.5	2450
3rd	13800	0.1	1380	3.5	4830
4th	13000	0.1	1300	3.5	4550
5th	300	0.1	30	3.5	105
Total	56000		5600		19600
Average	11200		1120		3920

[illegible]

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TABLE - 4(vii)
(REF: TABLE -4(iv))

ESTIMATE GENERATION OF WASTE IN IRON ORE [illegible] ZONE

Year	Volume of excavation	Waste generation factor	Volume of waste
	Cu.m.		Cu.m.
1st	21900	0.55	12045
2nd	7000	0.55	3850
3rd	13800	0.55	7590
4th	13000	0.55	7150
5th	300	0.55	165
Total	54000		[illegible]
Average	11200		[illegible]

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TABLE - V (viii)

YEARWISE EXCAVATION OF INSITU IRON ORE

Year	Section considered	Calculated average Cross section area	Length of influence	Volume of excavation	Total
		Sq.m.	m.	Cu.m.	Cu.m.
1st	E1E2	217	100	21700	21700
2nd	F1F2	375	50	18750	29950
	G1G2	224	50	11200	
3rd	G1G2	496	50	24800	27400
	H1H2	52	50	2600	
4th	F1F2	396	50	19800	28400
	G1G2	81	100	8100	
	H1H2	7	100	700	
5th	F1F2	446	50	22300	35870
	G1G2	123	100	12300	
	H1H2	127	100	1270	
Total		2430		143520	143520
Average		486		28704	28704

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TABLE - I (a)
(PART-A PARA-11(vi)(a))

YEARWISE PRODUCTION OF MARKETABLE INSITU IRON ORE

Year	Volume in cu.m.	Mineralised Iron factor	Volume in cu.m.	Tonnage factor MT/Cu.m.	Recovery factor	Quantity of Ore in MT
1st	21700	0.7	15190	3.5	0.85	45190
2nd	29950	0.7	20965	3.5	0.85	62371
3rd	27400	0.7	19180	3.5	0.85	57060
4th	28600	0.7	20020	3.5	0.85	59550
5th	35870	0.7	25109	3.5	0.85	74699
Total	143520		100464			298870
Annual	9701		20093			59774

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TABLE - 6(a)
(REF: TABLE -1(viii))

YEARWISE GENERATION OF SUB-GRADE FROM INSITU IRON ORE ZONE

	Volume of excavation	Sub-grade generation factor	Volume of sub-grade	Tonnage factor	Quantity of iron ore
	Cu.m.		Cu.m.	MT/Cu.m.	MT
1st	21700	0.1	2170	3.5	7595
2nd	29950	0.1	2995	3.5	10482
3rd	27400	0.1	2740	3.5	9590
4th	28600	0.1	2860	3.5	10010
5th	35870	0.1	3587	3.5	12555
[illegible]	[illegible]		14352		50232
	[illegible]		2870		10045

[illegible]

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TABLE - 4 (...)
(REF: TABLE -4 (...))

PLANWISE GENERATION OF WASTE FROM INSITU IRON ORE EXCAVATION

Year	Volume of excavation	Waste generation factor	Volume of waste
	Cu.m.		Cu.m.
1st	21700	0.2	4340
2nd	29950	0.2	5990
3rd	27400	0.2	5480
4th	28600	0.2	5720
5th	35870	0.2	7174
Total	143520		28704
Average	28704		5741

Contd.....

ANNEXURE
PLAN 4(b)

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SUMMARY OF YEARWISE PRODUCTION OF MARKETABLE ORE & WASTE IN BOTH MANGANESE AND IRON ORE ZONE

Year	Marketable Ore				Waste Generated			
	Mn-ore Fe-Ore	Float Fe-ore	Insitu Fe-ore	Total	Mn-Ore zone	Iron Ore Zone Float	Insitu	Total
	MT	MT	MT	MT	Cu.m	Cu.m.	Cu.m	Cu.m.
[illegible]	[illegible]	[illegible]	15190	[illegible]	2524	12045	4340	[illegible]
[illegible]	[illegible]	[illegible]	42071	[illegible]	2624	3850	5990	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2640	7590	5460	[illegible]
[illegible]	[illegible]	[illegible]	59540	[illegible]	3169	7150	5720	[illegible]
[illegible]	2646	312	74699	[illegible]	3185	165	7174	[illegible]
[illegible]	11747	[illegible]	298880	[illegible]	14144	30880	28704	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2829	5160	5741	[illegible]

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TABLE : 4 (Contd)

CHEMICAL ANALYSIS OF IRON ORE WASTE

Fe%	SiO % 2	Al 2 O 3 %	P%
58.3	7.6	8.7	0.08
57.8	8.1	7.9	Traces
55.6	8.4	6.8	0.09

CHEMICAL ANALYSIS OF MANGANESE ORE WASTE

Mn%	Fe%	SiO % 2	Al 2 O 3 %	P%
17.9	22.7	14.3	7.3	0.10
18.3	21.6	11.8	7.5	0.19
16.3	20.9	12.2	6.8	0.14

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5.0 BLASTING:

5.1 i) Broad blasting parameters (Iron Ore Zone):

Average depth of blast holes	:	1.5 m.
Burden	:	1m
Spacing	:	1.2m
Diameter of the hole	:	32mm.
Diameter of the catridge	:	25mm
Powder factor of the explosive	:	5 Cum/Kg.
Length the explosive catridge	:	Depending on the blast hole design and nature of the strata.
Volume yield per hole	:	Burden x Spacing x Depth of hole = 1 x 1.2 x 1.5 = 1.8 Cu.m.

ii) Broad blasting parameters (Manganese Ore Zone):

Average depth of blast holes	:	1.5m
Burden	:	1m
Spacing	:	1.2m
Diameter of the hole	:	32mm.
Powder factor of the explosive	:	5 Cu.m/Kg.
Length the explosive catridge	:	300mm.
Weight of the catridge	:	140 gm.
Volume yield per hole	:	Burden x Spacing x Depth of hole = 1 x 1.2 x 1.5 = 1.8 Cum.

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5.2 **Type of Explosives:**

To carryout blasting operation, Class-III (Special gelatine, 80% strength) and Class - VI explosive (detonator and safety fuse of standard length) will be utilised in the mine.

5.3 **i) Explosive Consumption (Iron Ore Zone):**

Powder factor of the explosive : 5Cum/Kg.

Average daily production of ore including waste and sub-grade from blast hole. (5th year) : (2669+375)/300 = 96 Cu.m.

Total quantity of explosives required/day: $\frac{96}{5}$ = 19.2 Kg.

No. of holes required per day : = 19.2 or say 20 nos.

ii) Explosive Consumption (Manganese Ore Zone):

Powder factor of the explosive : 5Cum/Kg.

Average daily production of ore including waste and sub-grade from blast hole. : 2450/300 = 8 Cu.m

Total quantity of explosives required/day: $\frac{8}{5}$ = 1.6 Kg

No. of holes required per day : $\frac{8}{1.6}$ = 4.4 nos. or say 5 nos.

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5.4 **Annual Requirement Explosive:**

Quantity of explosives required per day for excavation in iron ore zone.	: 23 kg.
Quantity of explosives required per day for excavation in manganese ore zone.	: 1.6 kg.
Quantity of explosives required per day for excavation in both the ore zones.	: 23 + 1.6 = 24.6 kg say 25.
Quantity of explosives required per annum	: 300 x 25 = 7500 kg or 7.5 MT.

5.5 **Storage of Explosives**

For secure and safe storage of explosives the existing magazine has been proposed to be constructed at a safe site in the North-Western side of the area (Ref. Plate VII). The capacity of the magazine is proposed to be as follows:

Class	Commercial designation	Amount
Class - III	Special gelatine (80% strength)	400 Kg.
Class - VI	Safety fuse	2000 m.
Class - VI	Detonators	2000 nos.

Apart from the above, a set of carrying box consisting of two boxes, one for carrying 5 kg. of explosives and other for carrying 200 nos. of detonators and approved by the safety authorities shall be provided for carrying explosive from magazine to blasting site.

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The blasting materials can only be procured and utilized against valid explosive licence.

5.4 **Precautions to be observed during drilling and blasting:**

Shallow hole blasting is proposed in the ensuing five year plan period. Proper charging, stemming and muffle blasting are proposed against fly rock fragments while other preventive measures like marking of danger zone, arrangement of warning signals by hooting are also proposed. Blasting shelters are proposed to be provided within the blasting zone.

Effects on noise level would be negligible since drilling and blasting operations and movement of vehicles are limited.

Dust prevention measures like use of approved type of dry dust extractors are being proposed to combat the dust arising from drilling.

Proposal is also being made to put drill holes of 32 mm. dia and 4.5 to 6 m depth with the help of compressed air operated jack hammer. All the holes are proposed to be blasted by safety fuse firing system to control the throw and vibration.

4.0 MINE DRAINAGE:

4.1 The mineable areas for first five year, in all quarries of the target area occupy the hilly terrains and are located at levels higher than 560 MRL. The R.L. of the low lying ground in the lease is at 580 meters. Hence the chances of inundation of the proposed mine working because of surface water is remote.

4.2 In the lease area, there is a hill peak in the middle with the highest altitude of 608m above mean sea level. Hill slopes in all directions. Rain water dropped on the hill top flows along the slopes to meet with several dry nalas located in and around the lease boundaries. Dry nalas are indicated colored by arrow marks (Ref. Plate : II).

4.3 The position of the water table as could be assessed is at less than 560 MRL. The existing nalas are of seasonal nature only. Hence the danger of flooding of the mining areas due to percolation of ground water is not there.

4.4 There can be two sources of water in the mine i.e. (1) Surface water (direct precipitated water and surface runoff from the adjoining ar and (2) ground water (water table and aquifers). Since water table is not to be intercepted during first five year, drainage of ground

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water is not required. A part of the surface water gently gets absorbed in the sub-soil/scorum or gets seeped through the various cracks etc. and rock surfaces. Surface water (rain water) in the quarry will pass through the natural drainage pattern. A suitable plan is prepared to show the drainage pattern. (Ref. Plate : IV(b)).

6.5 Regular drains are cut around the quarry faces to prevent the inflow of surrounding surface run-off water into the quarry.

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7.0 DISPOSAL OF MINE WASTE AND SEPARATE STACKING OF SUB-GRADE MINERAL(S).

7.1 Nature of Waste and its rate of yearly generations

The wastes likely to be removed from the area are identified as:

i) Laterites
ii) Banded Iron Formations(BIF)
iii) Intercalated chert
iv) Shale

Yearwise generation of wastes are as follows :
(Ref. Table No. 6 to 9).

a) From Zones

Year	Wastes from Insitu Zone (Cu.m.)	Wastes from Float Zone	Total
	Intercalated waste.		
1st	4340	12015	16345
2nd	5990	3050	9040
3rd	6180	7590	13870
4th	5720	7150	12870
5th	7174	163	7337
	28,704	30,000	59,504

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b) Manganese Ore Zones

Year	Intercalated waste.
1st	2526
2nd	2624
3rd	2640
4th	3160
5th	3185
	14,144

So, the generation of wastes during the course of mining will be about 99,504 Cum. for Iron and 14,144 Cum. for Manganese.

After multiplying it with swelling factor i.e., 1.6 volume of waste become 99,504 × 1.6 = 95,206 Cum. from Iron ore zone.

14,144 × 1.6 = 22,630 Cum. from Manganese ore zone.

So the grand total of wastes to be dumped will be :

For both Iron and Manganese = 95,206 + 22,630
= 1,17,836 Cu.m.

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7.2 **Selection of Dumping Site:**

Dumping site have been proposed separately for the waste generated from iron zone and from Manganese ore zone. Proposed Dump is proposed along the NW portion of the area (Ref. Plate: VII). The lithology of the area comprises of shale with phyllitic soil. However, to prove the depthward barrenness of the area, two(2) bore holes are proposed (Ref. Plate : III).

A road has been proposed at the gradient of 1:16 to bring materials from proposed mines site to the dumping area.

7.3 **Method of dumping and maximum height and spread of dump(s):**

The dumping is being proposed to be done by contour filling method. The maximum height of individual bench has been kept as (Ref. Plate No. VII).

Total wastes to be dumped : 1,17,836 Cum.

Total spreading area of the proposed dump. = 12,000 sq.m.

Individual height of bench (average) = 3.5m

Total no. of benches. = 7

Maximum height of the dump = 24.5m

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

The following precautions have been proposed for confinement of dumps.

a) A boulder wall has been proposed to prevent the loss of material to the nearby nala.

b) A garland drain and settling tank have been proposed to arrest suspended solids that will come mixed with rain water.

c) Plantation has been proposed in the slopes and around the dumps.

7.5 **Steps taken for Consolidation of Dumps:**

During dumping, the following steps are proposed to be undertaken for consideration of waste.

- Simultaneous levelling and compacting of the waste materials with the help of bulldozer.
- Segregation of the waste materials of different size ranges) during dumping.
- Water sprinkling to suppress the dust which also helps in consolidation.

7.6 **Arrangements of separate stacking of sub-grade minerals:**

Area near the mine site has been demarcated for stacking purpose of the sub-grade materials because of its temporary nature. (Ref. Plate No: VII). Two proposed sub-grade stacks (separately for Iron and Manganese) have been proposed. The details of each stack is as follows:

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Name of the stack	Proposed Stack-1	2
Amount of sub-grade (Cum) Materials generated	19,952 Proposed Quarry-II	2176 Proposed Quarry (Mn)
Height of stack (m)	3	3
Surface area (Sq.m)	6651	725

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8.0 USE OF MINERALS

8.1 Since the iron ore of this deposit contains 65% Fe. at an average, it is proposed to be marketed for consumers like 1078 Metallics, Kharagpur (W.B); Bihar Sponge Iron Ltd, Chandil (Bihar); TISCO Ltd., Jamshedpur (Bihar); Anand Industries Traders, Dhanbad (Bihar) and M/s. Minerals Trading Corporation, Dhanbad (Bihar).

The manganese ore are likely to be marketed to Bourkela Steel Plant, Ispat Alloys (Balasore), Indian Metal & Ferro Alloys Ltd (Therubeli) and Kalinga Iron Works (Barbil).

8.2 Specifications of different user industries for producing iron and manganese ore are as follows:

Chemical constituents	Iron Ore	
	Sponge Iron Industry.	Steel Plant
Fe	65 - 67%	64 - 66%
SiO_2	3% Max.	2 - 3%
Al_2O_3	5% Max.	2 - 3 %
$SiO_2 + Al_2O_3$	5% Max.	5%
$Al_2O_3 : SiO_2$	1:6 Max.	0.03 - 0.1%
P	0.15% Max.	--
Size	5 - 20 mm	10 - 30 mm

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Manganese Ore

Chemical Constituents.	Steel Plant's B.F. Grade
Mn	28% Min.
Fe	26% Max.
SiO_2	13% Max.
Al_2O_3	7.5% to 8% Max.
P	0.05% Max.

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9.0 MINERAL BENEFICIATION:

The ore raised from the mines requires sizing, sorting/screening, blending etc., prior to despatch.

9.1 There is not having any iron/manganese ore beneficiation plant in the applied M.L. area or else where and also there is no proposal for the erection of the same. Therefore iron/manganese ore raised from the mine will be marketed after manual breaking, sizing, sorting and blending. A sizeable quantity of saleable ore may be obtained at the quarry site after sorting and blending only.

9.2 Blending of run-off mine (ROM) ore will be done to obtain the size in the range of 5mm to 80 mm as per the user industries specifications. Sorting will be done to avoid the undesired/deleterious materials and blending will be carried out to maintain the minimum average grade of iron ore & manganese ore as 45% Fe (Steel Plant) & 45% Fe (Sponge Iron Industry) and 28% Mn. (B.F. Grade) respectively.

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10.0 SURFACE TRANSPORT:

10.1 Mineral/ore produced from the mine will be transported by truck/tippers to Jodo Railway siding which is at a road distance of 10 Kms. from the proposed mine site. Waste generated in course of mining will be transported to the dumping site through truck/tippers. Dumping site is located at a road distance of 0.75 Km. from the proposed quarry site.

10.2 Mining approach road in the lease area will be maintained in gradient of about 1:16 to 1:20 for easy movement of truck/tippers. Steps are proposed to be developed between the benches for movement of the workers with/without tools.

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11.0 SITE SERVICES:

11.1 As the mine will be developed a fresh, statutory constructions such as mines office, magazine, rest shed, creche, first aid-centre, blasting shed etc., are proposed to be made in the place as earmarked in the applied M.L. area (Ref. Plate : VII).

11.2 Size of the rest shed will be made as per DGMS specifications. Portable blasting sheds (with one and open) are proposed to be provided. Magazine will be constructed suitably as per the capacity along with a guard house at a safe distance therefrom.

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12.0 **EMPLOYMENT POTENTIAL:**

As discussed in Chapter-4 the production of ore from the mine will be increased in phasewise manner from 60000 MT in total from 1st year to about 75000 MT in fifth year approximately. Accordingly the employment will be increased. However, the management and supervisory personnel will remain same for all the years.

12.1 **Management and Supervisory Personnels**

Mines Manager	First Class Mines Manager's (certificate of competency)	1no.
Geologist	M.Sc., Geology	1no.
Surveyor	Competency Certificate holder	1no.
Clerical & Technical Supervisory personnel like foreman & mining mate.		3nos.
	Total :	6Nos.

12.2 **Proposed work force potentials (Labour : Skilled/ Semi-skilled/Un-skilled)**

Average daily production of marketable ore in the fifth year (maximum) would be around 250 MT. Assuming OMS at 1.6MT around 156 number of labourers would be employed in the proposed mines when the mines are fully developed and taking absentism at 10%. The total labourers to be deployed is 172 numbers. Proposals for different category of man power are as below:

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Skilled	25%	43
Semi-skilled	35%	60
Unskilled	40%	69
	100%	172

13.0 ENVIRONMENT MANAGEMENT PLAN:

13.1 I. Baseline Informations:

a) Location:

The mining lease area under consideration is located within Sidhanath Reserved Forest in which Sidhnath Parbat is situated adjoining to the lease boundary. The hill peak of 808 m. GTS point is named as Pahlu Buru under Champua Sub-division of Keonjhar District, Orissa.

b) Reference: Survey of India Toposheet No. 73 F/8.

i) Latitude : 22° 0'42" - 22° 1'26"N

ii) Longitude: 85° 21'04"-85° 21'54"E

c) Total lease area: 232.97 acres or 94.259 hects.

d) Elevation of the area above MSL : Maximum - 808 mts.
Minimum - 564 mts.

e) Nearest Railway siding : Joda (18 kms.)

f) Nearest Air Port : Calcutta.

g) General Topography:

The mining lease area represents a hilly terrain. The trend of the hill is due NE-SW having the hill top at central portion of the lease area. Both the hill sides are gently to steeply sloping. The area is situated

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within the lowest & highest contour of 565 mts. and 909 mts. (least count = 5 mts.) respectively. The area is observed to have been traversed by few seasonal nalas.

b) Details of the features existing within 5 Kms. radius of the project site.

1) Forest : Sidhamath Reserved Forest representing M.L. area.

2) Pahar : Sidhamath Parbat (775 m), Pahla Dara (608 m), Hosel Gutu (633 m), Pala Parbat (714 m), Sarpak Parbat (760 m), Dara Parbat (605m).

3) River/Nala: Sala river is flowing at a distance of 5 Kms. aerially due west of western boundary and flowing in north-eastern direction. A perennial nala namely Kundra Nala flows due north-eastern direction at a distance of 4 Kms. in eastern direction. Several seasonal nalas flow within and outside the lease area as a natural means of flowage of surface water.

4) Villages: A list of villages within 5 Kms. radius are given in socio-economic demographic profile (Table : 5).

5) Road : All weather unmetalled road as well as metalled road exists within the TISCO mining lease area. No road exists within the mining lease area as the same is a virgin area. The proposed road is to be drawn from the TISCO area to the proposed excavation area and dumping ground in the mining lease area.

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6) Railway : Nearest railway siding is at Joda which is at a distance of 18 Kms. from the mining lease area.

7) Power/Telephone line: Nearest power line and telephone lines are at a distance of 2.5 kms. from the lease boundary due east.

II. Existing land use pattern:

i) Total mining lease area is coming under Sidheswath Reserved Forest.

ii) As the area is virgin area and the lease is extended towards end of 1995 no mining activities have carried out so far.

III. Seasonal Nalas (streams) flowing in all directions from within the lease area as the lease is a hilly terain.

IV. Climatic Conditions: (Source : Directorate of Economics and Statistics).

Temperature (C)	Maximum	Minimum
	b	o
Winter	31	6
	d	
Summer	45	24

Rainfall: The annual rainfall is between 1000 & 1500 mm.

Wind Speed : Predominant wind speed - 5 to 10 Km./hour

Wind direction: Predominant wind direction - NW-NE.

Humidity : Summer - 75%, Winter - 60%.

V. Important Towns:

Joda township is at a distance of nearabout 17 Kms., Barbil at 14 Kms. Other townships are Kiriburu, Bolani etc.

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VI. Flora & Fauna:

a) Flora: Tree population in the M.L. area is appeared to be 9 - 13 nos. per hects. The existing trees observed in the R.F./M.L. area are as follows:

i)	Sal	- Shorea robusta.
ii)	Mahua	- Madhuca indica.
iii)	Mango	- Mangifera indica.
iv)	Jackfruit	- Artocarpus heterophyllus.
v)	Amla	- Emplica officinalis.
vi)	Neem	- Azardica indica.
vii)	Pipal	- Ficus rdegiosa.
viii)	Palas	- Butea frondosa.

b) The varieties of shrubs and bushes existing in the area are given below:

i)	Tulasi	- Ocimum sanctum
ii)	Indian plums	- Ziaplens canoplica
iii)	Ekada giyas	- Nicher been

c) The common varieties of grass observed in this area are as follows:

i)	Nutha grass	- Cyperus rotundus
ii)	Stay grass	- Pasano sproids.

The general character of the vegetation is tropical dry deciduous type and density of forest cover in the core zone is found to be medium.

d) Fauna: Fauna in the surrounding area are wild animals, birds and fishes.

The wild animals include:

Elephants
Bears
Rabbits
Wild Pigs
Monkeys
Jackals

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The bird species include;

Crows
Parrots
Peacocks
Wild fowls
Pigeons etc.

The common variaties of fishes available in the nearby nalas and water bodies are Magura, Rautia, Gadisha etc. these are so named locally. The mining lease area does not represent the migratory path of any wild animals or birds.

13.2 **Environment Impact Assessment:**

a) Impact of mining and allied activities on environment.

i. Land use pattern:

Mining excavation	:	12.34 hects.
Dumping	:	1.2 hects.
Sub-grade stacking	:	0.74 hects.
Site services (including magazine)	:	0.23 hects.
Road	:	0.52 hects.

b. Impact on water environments

Source of Water : Natural hilly springs and dug wells.

Consumption of Water : In a day about 2550 litres of water will be consumed by the workers, taking into account 15 litres of water per head. In addition, 3000 litres will be required for laying road, dusping site, mine roads to supress the generation of dust. Another 3000 litres is required for the carrying of plantation in the forest area.

Total : 8550 litres per day.

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C. Solid waste and dumping:

Quantity of solid waste likely to be removed.	:	79660 Cu.m. (insitu) 117837 Cu.m (broken)
Nature of solid waste	:	Intercalated waste and weathered laterite.
Waste disposal method	:	Waste removed from the proposed excavation will be disposed to the proposed dumping site.
Waste spreading area	:	1.2 hectare.
Average height of the dumps proposed.	:	10 m.

D. Impact on Environment:

i) Due to formation of dust:

As proposed, the manganese ore raising is confined to the eastern side and iron ore raising to the northern side of the lease area. Sprinkling of water would be done on the haulage road, quarry face and dump, to supress the generation of dust. The impact on air and water would be negligible.

ii) Due to emission of noxious gas:

The mining activities shall not generate any noxious gas to pollute the air and the natural habitat.

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(iii) Health Hazards:

The mining operation only emanating dust as pollutants may not have any problem on health hazards. Various operation like drilling, blasting and transportation shall increase the noise level to the same extent in the area.

E. Impact on socio-economy & demography:

As observed, there will be no displacement of any human settlement as the total lease area is coming under Sidhamath Reserved Forest. Hence there would not be any adverse impact on socio-economy and demography. On the other hand some persons will be employed in mining and other ancilliary works. With the progress of mining, infrastructural facilities around the target area will be improved.

F. Impact on Flora & Fauna:

Flora: The forest cover in the area is dry mixed and deciduous type. Principal species of trees, shrubs and grass with other species have already been listed. The proposed mining activities are confined to eastern and northern side of the lease area. Total area proposed for mining will be 12.56 hectares in five years. The amount of degraded land has been proposed to be compensated by the lessee through

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preliminary afforestation. Number of trees of various girths likely to be cut in the order of 12.36 (mining) + 11 (average number of trees in proposed mining area) = 136 number during first five years.

Fauna: Since the area is mostly in hilly terrain and forest, commonly occurring species around target area are fox, jackal, monkey, cattle, rabit and reptiles. No endangered species are observed in the area. The core zone being projected for mining is devoid of wild animals. The continuation of mining in the area shall not create any detrimental adverse effect on the area and its surrounding natural zone.

13.3 Environment Management Plan:

i) Storage and Preservation of Top Soil:

As the top soil cover of the proposed mining area is of thickness varying from 0.3 to 0.5 mtrs., the generation of top soil generation would be minimal. The fertility value of the top-soil generated is very negligible. Hence, the scrapped off the top-soil generated has been proposed to be used for road making.

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(i) Proposal for reclamation of land affected by mining activities

As proposed, quarries during the coming five year plan period may not be exhausted. Hence, no reclamation have been proposed for these quarries.

(ii) Compensatory afforestation

As the total lease area is coming under Sidhamath Reserved Forest, no area has been proposed within the lease area for afforestation. However, the lessee has proposed to undertake compensatory afforestation in the non-forest land which is to be located outside the lease area.

(iv) Measures for dust control

a) Dust extractors are proposed to be provided with adoption of wet drilling.

b) Water carried through tank mounted on tractors will be sprinkled at the quarry faces, mine approach roads, loading and unloading sites.

(v) Measures to minimise vibration and noise level within OB shall be taken up utilising delay detonator blasting. A regular monitoring on ground vibration studies shall be carried out.

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vii) Treatment & disposal of water from the mines

If the mine is in hilly terrain, there will not be any accumulation of surface run-off and/or seepage water in the quarry floor causing problems of de-watering and drainage. Precautionary steps are proposed to be taken to prevent entering of surface run-off to the quarry site. No unconsolidated waste or loose sediments shall be kept on working benches.

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TABLE : 6

Socio Economic Demographic Profile (As per 1991 Census)

Sl. No.	Name of village	No. of house hold	Total Population P	M	F	S.C. M	S.C. F	S.T. M	S.T. F	Literate M	Literate F	Total worker M	Total worker F	Main Marginal Worker M	Main Marginal Worker F	Non worker M	Non worker F
1.	[illegible]	69	280	144	136	25	25	105	97	33	14	74	45	1	1	69	90
2.	[illegible]	270	1138	579	559	22	22	421	459	178	53	270	98	12	48	297	413
3.	[illegible]	313	1336	742	644	81	81	179	169	373	162	353	89	10	15	379	540
4.	[illegible]	349	1469	757	712	101	101	572	531	208	35	392	173	--	3	365	536
5.	[illegible]	51	593	291	182	9	9	99	88	94	24	103	23	3	3	109	156
6.	[illegible]	120	605	303	302	28	28	196	201	93	18	157	49	1	1	145	253
7.	[illegible]	214	891	453	438	42	42	240	267	169	52	251	142	--	1	202	295
8.	[illegible]	690	2968	1504	1507	229	229	1115	1157	498	122	754	378	2	--	746	1129
9.	[illegible]	119	676	337	339	44	44	216	216	120	26	154	55	1	3	182	284
10.	[illegible]	[illegible]	21369	10,380	10989	2750	2650	5440	5477	9267	4280	7999	1917	76	199	8304	13573

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14.0 **CONCEPTUAL PLANS: (Ref. Plate Nos VIII & VIII(a)).**

The total demonstrated minesble reserve under proved & probable category has been estimated to be about 2.20 MT for iron ore and 0.09 MT for manganese ore. Near about 0.96 MT of iron ore is proposed to be excavated during the plan period. Hence the balance 1.84 MT of Iron ore will be excavated in 25 years keeping the target of annual production at 75,000 MT per year. Similarly maximum of 12000 MT of manganese ore is due to be raised in the proposed five years of plan period. The balance 81,000 MT of reserve would be exhausted in 25 years keeping the annual production target at 3000 MT of manganese ore per year. A map showing conceptual mining and their corresponding sections are drawn in Plates VIII & VIII(a).

14.1 **The ultimate extent & size of the pit:**

The depth of influence has been kept at 5 m. below surface level. Hence, total area mapped for iron ore and manganese ore has been considered for conceptual limit of respective ores.

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14.2 Final slope angle at the close of the mines

The height and minimum width of individual benches will be kept at 3 m. to maintain the maximum slope angle at 45° with the horizontal at the close of the mining.

14.3 Ultimate pit limit boundaries:

The ultimate pit limit boundaries have been earmarked in conceptual plan (Plate : VIII) and the ultimate pit depth are reflected in Plate VIII(a). This plan shows the ultimate faces of the proposed quarries and ultimate quarries.

14.4 Ultimate capacity of dumps:

The interculated waste excavated from both iron and manganese has been proposed to be dumped by contour filling method below the proposed dumping (Ref. Plate : VIII).

14.5 In Plate : VII (Conceptual Plan), quarry faces are shown tentatively in hatching lines. In iron ore zone, one face represents three benches of 9m height each and in manganese ore zone one face represents 3 benches of 1.5m height each. For an example, a haulage road is shown passing through the iron as well as manganese quarries to connect with the waste dump and to the despatching point. Likewise, roads are to be developed to each bench. Owing to congestion, an example of only one haul road development is shown. (Ref.Plate:VII).

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14.4 Land degradation/reclamation/afforestation:

In the conceptual period, total area required for mining and other allied activities would be around 60 hectares. Utmost care will be taken to ensure minimum degradation of the area. Accordingly, afforestation program will be carried out by the lessee in phased manner in a suitable non-forest patch which is to be located outside the M.L. area.

Progressive backfilling/resturation/reclamation as well as plantation on the reclaimed land will be taken up once the ore in the quarries is completely exhausted.

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Controller of Mines (Central)
Indian Bureau of Mines

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CONSENT LETTER FROM APPLICANT

I, the mining plan in respect of Sidhamatha area for 94.259 (hects.) mineral Iron & Manganese in district Keonjhar State Orissa has been prepared by M/s GEOMIN CONSULTANTS (P) LTD., Regd. No: RQP/CAL/167/93-E. I request Regional Controller of Mines, Calcutta to take further correspondence regarding modification of the mining plan with the said recognised company on his following address.

M/s Geomin Consultants (P) Ltd.
301, Kharavela Nagar
Bhubaneswar - 751 001
Orissa.

I hereby undertake that all the modifications so made in the mining plan by the recognised company be deemed to have been made with my knowledge and consent and shall be acceptable to me and binding on me in all respect.

Dated : Cuttack

Sabya Sachi Pradhan
Signature of the applicant in full.

(SABYA SACHI PRADHAN)
Name in full in Block Letters

Address : Dr. Sarojini Pradhan
Tolenga Bazar
Cuttack-753009
Orissa.

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MINING PLAN ON SINGHBHUM MANGANESE & IRON DEPOSIT OVER AN AREA OF 74.259 HECTARES UNDER P.L. BARBIL, DISTRICT - KENDUJHAR, ORISSA.

Certified that the provisions of metalliferous opencast mines Act, Rules and Regulations made thereunder have been observed in mining plan and whatever specific permission are required, the applicant will approach the D.G.M.S.

Certified that the informations furnished in the mining plan are correct to the best of our knowledge.

Authorised Signatory:

(H. S. Pradhan)

M/s. Geosin Consultants (P) Ltd.
Geological & Mining Consultants.
Regd.No: ROP/CAL/167/93-5.

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Geological & Mining Consultants.

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Mining Lessee

MINING PLAN ON SIDHAMATH MANGANESE & IRON DEPOSIT OVER AN AREA OF 94.259 HECTARES UNDER P.S. DARBIL, DISTRICT - KEONJHAR, ORISSA.

Certified that the provisions of Mineral Conservation & Development Rules and Regulations made thereunder have been observed in mining plan and whatever specific permission are required, the applicant will approach the Indian Bureau of Mines (IBM).

Certified that the informations furnished in the mining plan are correct to the best of our knowledge.

Authorised Signatory:

(H.S. Sarangi)
M/s. Geomin Consultants (P) Ltd.
Geological & Mining Consultants,
Regd.No: ROP/GAL/167/92-B.