MINING PLAN
&
PROGRESSIVE MINE CLOSURE PLAN
(UNDER RULE 24(A) OF MCR 1960 & 23(B) OF MCDR 1988)

अनुमोदित
APPROVED
14/8/13
खान नियंत्रक (मध्यक्षेत्र)
Controller of Mines (Central Zone
भारतीय खान ब्यूरो
Indian Bureau of Mines

VOLUME – I (TEXT)

IN RESPECT OF

GANDHAMARDAN-A LEASE

LEASE AREA: 618.576 HECTARES

FOREST AREA: 519.7472 HECTARES

[VILLAGE FOREST: 33.6132 HECT. & PROTECTED FOREST: 486.1340 HECT.]

NON FOREST AREA: 98.8288 HECTARES

MINERAL: IRON ORE

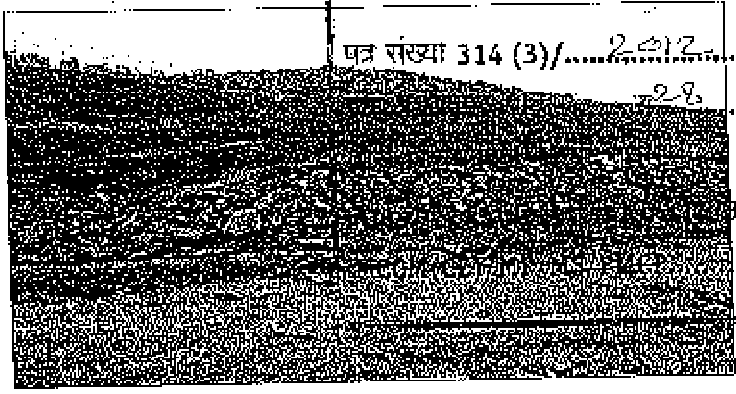
VILLAGES: DANALA, SUAKATI TEHSIL: TELKOI, DISTRICT: KEONJHAR,

STATE: ODISHA

CATEGORY: FULLY MECHANISED (FM)

PROPOSAL PERIOD IN THE MINING PLAN: 21.5.2013 TO 31.3.2018
DATE OF EXECUTION OF LEASE: 21.5.1963
LEASE PERIOD: 21.5.2013 TO 20.5.2033 (Applied for Renewal)

पत्र संख्या 314 (3)/...2012...एमसीसीएम (मध्य)/एमपी-28 दिनांक 14-8-2013
)/...2012... ...28 dated 14.8.20



APPLICANT

THE ODISHA MINING CORPORATION LIMITED

OMC House, Post Box No. 34, Bhubaneswar- 751001

Registration No. (Under rule 45): 4269

PREPARED BY

MECON LIMITED, RANCHI – 834002, JHARKHAND

REG.NO. RQP/RNC/113/2004/B VALID UPTO 16.12.2014

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Name of Chapters	**Page No.**

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(PK Bhattacharjee, key person)
MECON LIMITED
RQP/RNC/113/2004/B

OMC	MINING PLAN OF GANDHAMARDAN-A LEASE (618.576 HA) APPLICANT: THE ODISHA MINING CORPORATION LTD RQP : MECON LIMITED

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(PK Bhattacharjee, key person)
MECON LIMITED
RQP/RNC/113/2004/B

The Odisha Mining Corporation Ltd.

OMC

(A Gold Category State PSU)
(A Government of Odisha Undertaking)
BHUBANESWAR - 7510 01

GOVT. OF INDIA-INDIAN BUREAU OF MINES

CERTIFICATE

The mining plan along with Progressive mine closure plan in respect of Gandhamardan-A iron ore lease of M/s Odisha Mining Corporation Limited over an area of 618.5760 Ha. in Keonjhar District of Odisha State has been prepared by M/s MECON Limited (RQP No.RQP/RNC/113/2004/B).

I request the Regional Controller of Mines, Bhubaneswar Region /Controller of Mines, Central Zone, Indian Bureau of Mines to make further correspondence regarding the mining plan along with progressive mine closure plan with the said recognized qualified person at the following address.

Address of RQP

MECON Limited
RM & Mining Section
P.O-Doranda, Ranchi
Jharkhand, PIN-834002
Tel. (0651) 2483645/2481093
Fax. (0651)2482189/2482214
E mail: pkb@meconlimited.co.in
mining@meconlimited.co.in

I hereby undertake that all the modifications so made in the mining plan along with progressive mine closure plan by the above RQP may be deemed to have been made with my knowledge & consent and shall be binding on me in all respect. I have understood the content of the mining plan along with the progressive mine closure plan and I agree to implement the same in accordance with the law.

(Sudhansu Kumar Das)
Signature of the applicant in full
Name in block letters:
Address:**S. K. Das**
Sr. Manager (Geo)
Power of Attorney Holder
Odisha Mining Corporation Ltd.
Bhubaneswar-751001

Date: 12/7/13
Place: Bhubaneswar

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(4)

The Odisha Mining Corporation Ltd.

(A Gold Category State PSU)
(A Government of Odisha Undertaking)
BHUBANESWAR - 7510 01

CERTIFICATE

The provisions of Mines Act, Rules & Regulations made there under have been observed in the mining plan along with Progressive mine closure plan of Gandhamardan - A iron ore lease of M/s Odisha Mining Corporation Limited over an area of 618.5760 Ha. in Keonjhar District of Odisha State and wherever specific permissions are required, the applicant will approach the DGMS. Further, standards prescribed by DGMS in respect of miner's health will be strictly implemented.

Date: 12-12-13

Place: Bhubaneswar

(Sudhansu Kumar Das)

Signature of the applicant in full
Name in block letters:
Address: S. K. Das
Sr. Manager (Geo)
Power of Attorney Holder
Odisha Mining Corporation Ltd.
Bhubaneswar-751001

www.orissamining.com
Phone : 0674-2393431, 2395689, 2396421, Fax : 0674-2396889, 2391629

The Odisha Mining Corporation Ltd.

OMC

(A Gold Category State PSU)
(A Government of Odisha Undertaking)
BHUBANESWAR - 7510 01

CERTIFICATE

The Progressive Mine Closure Plan of Gandhamardan-A iron ore lease of M/s Odisha Mining Corporation Limited over an area of 618.5760 Ha., which has been prepared by RQP, M/s MECON Limited (RQP Reg. No.RQP/RNC/113/2004/B) complies all the statutory rules, regulations & orders made by the Central or State Government, Statutory Organisations, Courts etc, which have been taken into consideration and wherever any specific permission is required, the lessee will approach the concerned authorities.

I also given an undertaking to the effect that all the measures proposed in this closure plan will be implemented in a time bound manner as proposed.

Date: 12/7/13
Place: Bhubaneswar

(Sudhansu Kumar Das)
Signature of the applicant in full
Name in block letters:
Address: S. K. Das
Sr. Manager (Geo)
Power of Attorney Holder
Odisha Mining Corporation Ltd.
Bhubaneswar-751001

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www.orissamining.com
Phone : 0674-2393431, 2395689, 2396421, Fax : 0674-2396889, 2391629

The Odisha Mining Corporation Ltd.

(A Gold Category State PSU)
(A Government of Odisha Undertaking)
BHUBANESWAR - 7510 01

OMC

UNDERTAKING REGARDING SUBMISSION OF
GEO-REFERRED CADASTRAL MAP

We shall submit the geo-referred cadastral map of the Mining lease area to Indian Bureau of Mines as soon as the necessary survey work is completed by a recognized agency(ORSAC) of the state government as stipulated by Indian Bureau of Mines in circular no. 2/20101 dt. 06.04.2010

Date: 12/7/13
Place: Bhubaneswar

(Sudhansu Kumar Das)
Signature of the applicant in full
Name in block letters:
Address: S. K. Das
Sr. Manager (Geo)
Power of Attorney Holder
Odisha Mining Corporation Ltd.
Bhubaneswar-751001

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(7)

www.orissamining.com
Phone : 0674-2393431, 2395689, 2396421, Fax : 0674-2396889, 2391629

मेकॉन लिमिटेड (भारत सरकार का संस्थान)
MECON LIMITED (A GOVERNMENT OF INDIA ENTERPRISE)
प्रधान कार्यालय (Head Office) : राँची-2, झारखण्ड, भारत , Ranchi-2, Jharkhand, India, फोन/Phone : 0651-2460900, फैक्स/Fax : 0651-2482189/2482214
ई-मेल/E-mail : ranchi@meconlimited.co.in, वेबसाइट/Website : http://www.meconlimited.co.in

GOVT. OF INDIA-INDIAN BUREAU OF MINES

CERTIFICATE

This is to certify that the provisions of Mineral Conservation & Development Rules – 1988 and MMDR Act 1957 have been observed in the Mining Plan of Gandhamardan-A iron ore lease in Distt. Keonjhar, Odisha state over an area of 618.576 Hectares of land and where ever specific permissions are required the applicant will approach the concerned authorities of Indian Bureau of Mines for grant of permission.

12/7/13

Place: Ranchi
Date: 12.7.2013

(PK BHATTACHARJEE)
(key person)
MECON LIMITED
RANCHI – 834002
RQP NO. RQP/RNC/113/2004/B

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(8)

LIST OF ANNEXURE

Annexure No	Description
1	List of Board of Directors
2	Authorisation to the power of attorney holder by CMD
3	Photo id of the power of attorney holder
4	Address proof of the power of attorney holder
5	List of leases held by OMC
6	Copy of RQP certificate
7	Lease Deed
8	Acknowledgement for 1st renewal of mining lease
9	Acknowledgement for 2nd renewal of mining lease
10	Land schedule of the lease area
11	Environment clearance letter
12A	Balance geological reserves/resources at 45% Fe cut-off
12B	Calculation of Ore, Subgrade & Waste from Hilltop quarry for scheme period from 2014-15 to 2017-18
12C	Calculation of Ore, Subgrade & Waste from Float quarry for scheme period from 2014-15 to 2016-17
13	Stage-I forestry clearance letter
14	Permission from Mining Office for selling accumulated fines from Gandhamardan-B lease stacked at Gandhamardan-A lease
15	Consents from the State Pollution Control Board
16	Environment monitoring data
17	Feasibility report
18	Borehole logs
19	Latest approved scheme of mining
20	Mine photographs
21	Bank guarantee submitted
22	Review of production/ dispatch for the last lease period and review of the last scheme of mining

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(PK Bhattacharjee, Key Person)
MECON LIMITED
RQP/RNC/113/2004/B

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LIST OF DRAWINGS

Description of Drawing	Drawing No.
Key Plan	MEC/Q6ZJ/11/16/01
Lease Plan	MEC/Q6ZJ/11/16/02
Surface Plan	MEC/Q6ZJ/11/16/03 – 03A
Geological Plan	MEC/Q6ZJ/11/16/04 – 04A
Geological Cross-sections	MEC/Q6ZJ/11/16/05A to MEC/Q6ZJ/11/16/05C
Pit Development Plan at the End of FY 2013-14, 14-15, 15-16, 16-17 & 17-18	MEC/Q6ZJ/11/16/06A to 06E
Pit Section at the End of Year 2013-14, 14-15, 15-16, 16-17 & 17-18	MEC/Q6ZJ/11/16/07A to 07E
Conceptual Pit Plan	MEC/Q6ZJ/11/16/08
Conceptual Pit Section	MEC/Q6ZJ/11/16/09
Backfill Plan	MEC/Q6ZJ/11/16/10 – 10A
Conceptual Backfill Sections	MEC/Q6ZJ/11/16/11
Sub-grade Dump Plans & Sections	MEC/Q6ZJ/11/16/12 – 12A
Environmental Management Plan	MEC/Q6ZJ/11/16/13
Environment Plan	MEC/Q6ZJ/11/16/14
Progressive Mine Closure Plan	MEC/Q6ZJ/11/16/15

(PK Bhattacharjee, Key Person)
MECON LIMITED
RQP/RNC/113/2004/B

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INTRODUCTION

Odisha Mining Corporation Limited (OMC) was born on 16th May' 1956 as a joint venture Company of Govt. of Odisha and Govt. of India to explore and harness mineral wealth of the State of Odisha and make value addition. Subsequently on 17th Nov'1961, OMC became a wholly State-owned Corporation of Govt. of Odisha. The Authorised Capital of the Corporation is Rs. 100 crore and the Paid Up Capital is Rs. 31.45 crore. The major minerals mined by OMC are chrome, iron and manganese ore which cater to the requirement of mineral based industries such as steel, sponge iron, pig iron, ferro-manganese, ferro-chrome, etc. The growth of OMC has been impressive over these years and today it stands as the largest State PSU in the mining sector of the country. It recorded the highest turn-over of Rs. 2756 crore in 2010-11. As on date, OMC is a 100% Debt-free Company. OMC is managed by a Board of Directors consisting of Government Directors and Independent Directors. The day-to-day management of the Corporation is looked after by the Chairman and the Managing Director as authorized by the Board of Directors. OMC has adopted SAP software, an ERP tool, since 2004 to streamline its business processes, bring synergy in functional activities across the organization, handle numerous business locations and expanding volumes. It also helps in bringing greater transparency in financial transactions and effective monitoring and financial control enabling the organization to take informed and timely decisions. For successfully implementing the ERP package, OMC was awarded with the Golden Peacock Award in 2006-07 by the Institute of Directors, New Delhi. The Odisha Mining Corporation Ltd. has been classified as a "Gold" Category State PSU.

Gandhamardan -A lease is owned by Odisha Mining Corporation Limited (OMC Ltd.), A Govt. of Odisha Undertaking. The lease deed has been executed on 21.05.1963 for a period of 30 years (copy enclosed as Annexure - 7. Application for further renewal of the lease for a period of 20 years w.e.f. 21.05.1993 was made on 06.04.1992 and is under deemed to be renewed stage (copy of receipt of 1st lease renewal application is enclosed as Annexure – 8). Application for 2nd renewal of the lease for a further period of 20 years has been made on 01.05.2012 (copy of receipt of 2nd lease renewal application is enclosed as Annexure – 9). The mining lease hold area of Gandhamardan-A is 618.576 Ha. and comprises of 519.7472 Ha and 98.8288 Ha of forest and non-forest land respectively. Gandhamardan -A is a geographical & geological continuity of adjoining Gandhamardan – B lease of Odisha Mining Corporation Limited. The present submission is the mining plan of Gandhamardan –A lease alongwith progressive mine closure plan prepared under rule 24(A) of MCR 1960 & 23(B) of MCDR 1988 is for renewal of mining lease. The environment clearance of the mine has been accorded by MoEF. A copy of the same is enclosed as Annex.- 11. The mine also has stage-I forestry clearance for a part of the forest land within its lease (copy enclosed as Annexure – 13). But, as per the recent guidelines of supreme court, the mine has initiated actions for diversion of the entire forest land within the lease. Copy of the consents granted by the state pollution control board is also enclosed as Annex.- 15. A copy of the permission for evacuation of fines stacked at Gandhamardan-A from Gandhamardan-B, by the mining officer is also enclosed as Annex.- 14. A copy of the last approved scheme of mining is also enclosed as Annex.- 19.

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14/8/12

खान नियंत्रक (मध्यांचल)
Controller of Mines (Central Zone)
भारतीय खान ब्यूरो
Indian Bureau of Mines

(PK Bhattacharjee, Key Person)
MECON LIMITED
RQP/RNC/113/2004/B

1.GENERAL	
a) Name of the applicant	**Odisha Mining Corporation Limited** A list of board of directors is enclosed as Annexure – 1. A copy of photo Id & address proof of the nominated owner of the mine is enclosed as Annexure – 3 & 4. The number of state wise leases already held by the applicant/ applied for, indicating the type of minerals, areas, location etc is enclosed as Annexure – 5. A copy of the resolution of the board of directors nominating the owner of the mine is enclosed as Annex. – 2.
Address	Odisha Mining Corporation Limited OMC House, Post Box No. 34, Bhubaneswar- 751001, Odisha
District	Khurda
State	Odisha
Pin Code	751001
Phone	0674-2393431, 2395689, 2393389
Fax	0674-2391629, 2396889, 2394772
Gram	-
Telex	-
e-mail	info@odishamining.com, immcon_mine@yahoo.co.in
b) Status of the applicant	
Private individual	No
Cooperative Association	No
Private Company	No
Public Company	No
Public Sector Undertaking	Yes
Joint Sector Undertaking	No
Other (pl.specify)	Not Applicable
c) Mineral(s) which are occurring in the area and which the applicant intends to mine	Iron ore

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MECON LIMITED
RQP/RNC/113/2004/B

d) Period for which the mining lease is granted / renewed / proposed to be applied	The lease deed has been executed on 21.05.1963 for a period of 30 years (copy enclosed as Annexure - 7. Application for further renewal of the lease for a period of 20 years w.e.f. 21.05.1993 was made on 06.04.1992 and is under deemed to be renewed stage (copy of receipt of 1st lease renewal application is enclosed as Annexure – 8). Application for 2nd renewal of the lease for a further period of 20 years has been made on 01.05.2012 (copy of receipt of 2nd lease renewal application is enclosed as Annexure – 9).
e) Name of the RQP preparing the mining plan	MECON Limited Copy of the RQP certificate is enclosed as Annexure – 6.
Address	P.O – Doranda, Ranchi – 834002 Jharkhand
Phone	0651 - 2481093, 2483645
Fax	0651 - 2482189, 2482214
e-mail	pkb@meconlimited.co.in/ mining@meconlimited.co.in
Telex	-
Registration No.	RQP/RNC/113/2004/B
Date of grant / renewal	17.12.2004
Valid upto	16.12.2014
f) Name of the prospecting agency	Directorate of Mines, Govt. of Odisha & Odisha Mining Corporation Limited
Address	1. Directorate of Mines, Govt. of Odisha 2. Odisha Mining Corporation Limited OMC House, Post Box No. 34, Bhubaneswar- 751001, Odisha
Phone	2. 0674-2393431, 2395689, 2393389
g) Reference no. and date of consent letter form the State Govt.	The lease deed has been executed on 21.05.1963 for a period of 30 years (copy enclosed as Annexure - 7. Application for further renewal of the lease for a period of 20 years w.e.f. 21.05.1993 was made on 06.04.1992 and is under deemed to be renewed stage (copy of receipt of 1st lease renewal application is enclosed as Annexure – 8). Application for 2nd renewal of the lease for a further period of 20 years has been made on 01.05.2012 (copy of receipt of 2nd lease renewal application is enclosed as Annexure – 9).
2. LOCATION AND ACCESSIBILITY	APPROVED
a) Details of area (with location map)	Gandhamardan – A lease is located in village Suakati, Daunala and Gandhamardan pahar in Sadar sub-division of Keonjhar district of Odisha state and is covered by survey of India toposheet no. 73 G/6 & G/10. The latitudes and longitudes of the area are given below:

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RQP/RNC/113/2004/B

	Latitude: 21°36'00" to 21°37'09" ; Longitude: 85°29'20" to 85°31'30" The location map is shown as Plate No. MEC/Q6ZJ/ 11/16/1. The reference point taken for demarcation of the lease is pillar No. A as shown in the surface plan having a RL of 1008.888m above mean sea level. The GPS coordinate of pillar A is 21° 37' 13.2" / 85° 30' 3.7".

District and State	Distt. Keonjhar, Orissa
Taluka & P.S	At/ PO - Suakati
Village	Suakati
Khasra No./ Plot No./ Block Range / Felling Series etc.	The land schedule is enclosed as Annexure – 10.
Lease Area (hectares)	618.576 Hectares.
Whether the area is recorded to be in forest (please specify whether protected, reserved etc.)	486.134 Ha. of the lease area is under Protected Reserved Forest category and 33.6132 Ha. Of the lease area is under village forest. The land schedule of the leasehold area is enclosed as Annexure – 10.
Ownership / Occupancy	OMC Limited
Existence of public road / railway line, if any nearby and approximate distance	Gandhamardan-A Iron Ore deposit is located on Gandhamardan hill in Sadar sub-division of Keonjhar district of Odisha state. The lease area is well connected with Keonjhar town at a distance of 16 km due west of Keonjhar on NH-6. The nearest railway station is Keonjhar (on Banspani-Daitari-Jakhapura branch line of South Eastern and East Coast Railway) at a distance of about 16 km from the mine lease.
Toposheet No. with latitude and longitude	It is located between 21°36'00" to 21°37'09North Latitude and between 85°29'20" to 85°31'30" East Longitude as shown in Survey of India Topo-sheet No. 73 G/6 & 73 G/10.
Land Use Pattern (Forest, Agricultural, Grazing, Barren etc.)	see table below

Type of land	Non forest land	Forest: Protected reserved	Forest: Village	Forest: Total
Area, ha.	98.8288	486.134	33.6132	519.7472

b) **General location and vicinity map showing area boundaries and existing and proposed access routes:**

The same is shown in the key plan as Plate No. MEC/Q6ZJ/ 11/16/1.

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RQP/RNC/113/2004/B

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PART - A

3. GEOLOGY AND EXPLORATION

a) Topography and general geology and local / mine geology of the mineral deposit including drainage pattern.

Physiography :

The lease area is centered on a ridge like escarpment, which runs in the North – South direction. The top of the ridge at the lease has a peak at 1010 mRL. The bottom of the escarpment at the lease is at about 620 mRL. A number of gullies lead down from the top of the escarpment on both the eastern and western slopes.

The lease area has dendritic pattern of drainage because of its hilly topography. The ridge of the Gandhamardan hill roughly divides the mine lease area into eastern and western half. The drainage channels emerging from of the eastern half of the lease area flow down to join the Kadal Nadi, which flows northward to join the Ardei Nadi, which is a tributary of the Baitarani River. The western half of the lease area is drained by several channels, which form the Patarpagi Nadi and the Bamni Nadi which flow towards WNW and NW respectively. The Patarpagi Nadi joins the Bamni Nadi about 7.8 km NW of the mine lease. The Bamni Nadi flows towards the NW and joins the Baitarani River 19 km NNW of the lease area. Some streams from western side of the lease join Chamda nala, which flows towards west to join Baitarani river.

Regional Geology of Gandhamardan – A Area

The region comprising the Keonjhar and Sundergarh Districts of Odisha and the adjoining Singhbhum District of Bihar has attracted the attention of several geologists, since Jones (1934) mapped the area and included the rocks of volcanic sedimentary belt known as Bonai-Keonjhar-Singhbhum belt in the Iron Ore series. Subsequently based on remapping of some sections in the Northern part of the belt, Dunn (1940) revised the stratigraphic succession of Jones and separated a new group of rocks distinct from and younger than the iron ore group and included them under the Kolhan series. Prasad Rao (1956) mapped the area and put the gritty Quartzite to be of Kolhan age. The contact between underlying Iron Ore group and the over laying Kolhan Group is marked by a major unconformity represented by Kolhan conglomerate-breccia. Dunn however indicated the following general stratigraphic succession for the rocks of the area.

Kolhan Group
-----------------------------Unconfirmity-----------------------------
Upper Shale
Banded Hematite Jasper
Basic Lava

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Based on radiometric age data, Sarkar Saha and Miller (1969) concluded that the rocks of the iron ore group was evolved in an orogeny (The Iron ore Orogeny) that culminated with the emplacement of Singhbhum Granite around 2900 million years ago. The rocks to the north of shear zone included in the Singhbhum group were involved in an orogeny (Singhbhum orogeny) whose closing data was around 900 million years. Thus the rocks of iron ore group occurring to the South of Singhbhum shear zone in parts of north Odisha and east and South of Singhbhum are considered to be one of the oldest.

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Following, Prasad Rao and others (1964) Murty and Acharya (1975) believed that the rocks of the Bonai-Keonjhar-Singhbhum belt form a part of a descrete basin, whose basement was marked by the Singhbhum granite. The area around Gandhamardan was mapped by Prasad Rao and others and more recently Banerjee (1974) summarised the regional geology of the Keonjhar-Sundergarh-Mayurbhanj and Singhbhum Districts.

The succession of rocks given by them is as follows.

Kolhan Series (1584 million years)	
---------Unconformity---------	
Singhbhum Granite	
Iron Ore Series	Epidiorites (Intrusives)
	Upper Shale with Sandstone and Volcanics
	Banded Hematite Jasper
	Lower Shale
	Lavas
	Sandstone & Conglomerates
	Black Phyllites
---------Unconformity---------	
Older Metamorphic	Mica Sillimanite
	Hornblende, Chlorite and Quartz Schist

Regional Structure:

The volcanic sedimentary pile occurring to the west of Singhbhum granite is folded in to a major-low-north –plunging synclinorium (slightly overturned to the east) which is manifested in the spectacular U – shaped closure facing south in Bonai. The complementary anticlinorium's lies to the east of major synclinorium in which the lavas are exposed right up to the Gandhamardan hill. The Gandhamardan hill itself represents a remnant of another syncline in which the younger iron-formation is preserved.

Superposed on the N-S trending first fold are cross folds having E-W axial planes. The resultant interference pattern of the folds led to the development of irregular 'basin' and 'dome' structure on all scales in the Bonai-Keonjhar belt west and northwest of Gandhamardan hill.

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Local Geology

In-situ Iron Ore bodies located in Gandhamardan Block A are designated as main ore body on the hill top; and flank ore in quarry - 9 hill slope deposits. Flank ore bodies are confined to the lower levels (as compared to the hill top deposit) between Banded Iron Formation (BIF) and shale / volcanics (foot wall).

The area was originally mapped by Prasad Rao (unpublished G.S.I. report). Prasad Rao (1964) and others equated the iron-formation of the Gandhamardan hill with that of the Bonai-Keonjhar belt laying to the

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RQP/RNC/113/2004/B

west. Banerjee (1974) on the other hand, considered the Iron-formations of Gandhamardan hill to be equivalent to the Iron formations of Gorumahisani Group. But based on the detailed mapping and the some geological considerations the Gandhamardaan and Bonai Iron formations are considered to be coeval.

The stratigraphic succession of the Gandhamardan hill is as shown below:

4. Banded Iron Formation
3. Altered tuffs (Clay shale)
2. Volcanic (Basic Lava) in the West and dolerite in the east
1. Gritty quartzite (Felspathic at places)

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

Granite

Gritty quartzite's are confined to the Eastern and Southern part of Gandhamardan hill and exhibit normal stratigraphic sequence. They are hard compact and fine to medium grained rocks, with less developed bedding planes. The quartzite's are sometimes predominantly admixed with argillaceous materials and occasionally intruded by milk white quartz veins in zones of disturbance. The formation has got an N-S trend having a westerly dip and is conformable to tuffs underlying the iron formation.

The volcanics except in one patch in the eastern sector are confined only to Western and Northern part of the area. They are hard compact fine to medium grained rocks with colour varying from mesocratic to melanocratic. The lavas exhibit conchoidal fracture vesicular structure, the vesicles being filled mainly with quartz and zeolites at places.

In the drill hole No. DNR/1 & DNR/2 stratigraphic sequence of western flank deposit is exibited. Hard massive ore in the western flank is overlain by laterite capping. Ferrugineous shale & volcanics forms the base of western flank.

The tuff or tuffaceous shale is mapped in the eastern and southern flanks of Gandhamardan. It is soft, fine grained with colour varying from Grey, purple, yellowish, greenish to white and occasionally seen to contain zeolite crystals and therefore appears to be a volcanogenic sediment (tuffs) having sedimentary features like colour banding, bedding, plains etc. The trend of the bedding in the rock varies from NNE to NNW conformable to that of iron-formation.

Banded Hematite Jasper, Banded Hematite Chert and Banded Hematite Shale occurring at the top of entire Gandhamardan hill as a blanket over the tuff, in the eastern sector and over volcanics in the western sector are included in the Iron formation. The Banded Hematite Jasper consisting mostly of hematite, Jasper and clay impersistently occur on the north-eastern part of the Gandhamardan Iron ore deposit. They are hard compact, brown, purple and gray coloured rocks yielding a conchoidal fracture. This impersistent band of Banded Hematite shale or Jaspilite is within the normal stratigraphic sequence underlying Banded hematite Jasper/Chert and overlaying tuffaceous shale in South eastern sector and Banded Chert in North Eastern sector. Thus it forms a sharp line of distinction between the ferruginous and non-ferruginous rocks. In the North-Eastern sector of Gandhamardan hill hard compact fine grained and mostly greenish banded chert formations were mapped underlying banded hematite shale, which is sometime pyritiforrous at places.

Banded Iron formation is typified by Banded Hematite Jasper and Chert and because of its tabular extension in the top of Gandhamardan hill; the lower soft rocks have escaped erosion. Stratigraphically and structurally the iron ore body overlies Banded Hematite Jaspor as evidenced from the drill holes. The

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bedding in Banded Hematite Jasper has a NNE-SSW trend in both flanks of Iron ore body having a gentle westerly dip.

The In-situ Iron ore body of Gandhaardan –A lease is the continuation of the main ore body of adjoining Gandhamardan – B lease of OMC. In Gandhamardan – A lease it extends from –1400 N to -900 N. Besides hard massive ore types are also located on the Western flank of the deposit near Daonra (Long. 85° 29'30", Lat. 21° 36'30)

Geological Map of Gandhamardan (Block A) iron ore deposit is presented in drawing no. MEC/Q6ZJ/11/16/04.

Local Structure

The main Gandhamardan deposit strikes in north south direction (N5°E – S5°W) with gentle to moderate westerly dipping beds (5° to 30° due west). The strike length of the (Gandhamardan Block -A) deposit is 450 M and average width is 700 m. The ore body is bulging towards south and tapers down to north. The deposit is surrounded from all sides by banded hematite jasper (BHJ) with laterite capping at the top. The deposit is intensively folded in the form of synclynorium both along N-S & E-W directions forming a U shape. Maximum depth of occurrence of ore is 103 m with an average depth of occurence as 35.74 m. Average thickness of the deposit is 35 m.

b) Details of exploration already carried out:

- **Hilltop Main Ore Body**

i. Geological Mapping

Regional geological mapping covering the Gandhamardan region of 42 km² on 1: 15000 scale for delineating the ore deposit and different litho units was done by OMC. An area of 4.5 sq. km was also mapped in greater details on 1:5000 scale demarcating the ore waste contacts & different ore types. Topographical map of Gandhamardan –A lease has been prepared at 10 m contour interval.

ii. Pitting

A total of 11 Nos. Of deep & shallow pits at 200 m grid were sunk to delineate the waste contact zones, identification of overburden and different ore types in Gandhamardan –A Block.

iii. Core Drilling

Hilltop ore body has been explored by GSI at 100 m grid interval. A total of 12 nos. of exploratory boreholes with a total meterage of 358.4 m has been drilled at Hilltop.

A summary of the exploration carried out for G1 areas indicating mapping, pitting, drilling (No./ spacing), sample drawn/ analyzed etc, existing pit data, grade variation, thickness for Hill top area is given in the table below:-

Gandhamardan-A (Hill top area)	Borehole data				
	No. & spacing	Depth From/ to	Grade From/ to	Samples drawn and analyzed	Level of exploration
Core drilling	13 Nos. (100 x 100m grid)	0.15/ 132.9m	4.97/ 68.2% Fe	374 Nos.	G1

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Gandhamardan-A (Hill top area)	Pit data or trenching/pitting (m^3)		
	Dimensions & Area	Samples drawn and analyzed	Level of exploration
Shallow / Deep pits	Shallow pit, 4 x 4m Deep pit, 6 x 4m Total – 11 pits at a grid of 200 x 200m	Approx. 1400 m^3 of samples drawn	G1

- **Flank Ore Deposits**

In general, OMC has explored the deposit up to 40m depth. The details of exploration carried out in Block-A flank ore deposits and float ore bodies are given below:

(a) Geological mapping

Flank Ore Deposit such as Daonra deposit has been mapped geologically on a scale of 1:1000. The ore/waste boundaries and other surface geological & structural features such as dip & strike of beds have been demarcated on the geological map.

(b) Core drilling :

The exploration wing of M/s Orissa Mining Corporation have explored the Daonra deposit with the help of only two bore holes DNR/1 & DNR/2. The formations encountered in the bore holes are BHJ, hard massive iron ore and shale. The location of bore holes has been marked on the geological plan & sections.

A summary of the exploration carried out for G1 areas indicating mapping, pitting, drilling (No./ spacing), sample drawn/ analyzed etc, existing pit data, grade variation, thickness for Flank area is given in the table below:-

Gandhamardan-A (Flank area)	Borehole data				
	No. & spacing	Depth From/ to	Grade From/ to	Samples drawn and analyzed	Level of exploration
Core drilling	2 Nos. (100 x 100m grid)	0.6/ 30m	6.75/ 68.85% Fe	39 Nos.	G1

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- Float Ore Deposits

Float ore deposit has been explored by 25 nos. of DTH boreholes covering a total meterage of 849 m. Besides, A number of float quarries have been developed to the west of Daonra flank deposit in western side of the lease area. Of these quarry VD is under active operation. The ore body in this region has been proved up to the base rock which is 5m from surface level in an average.

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A summary of the exploration carried out for G2 areas indicating mapping, pitting, drilling (No./ spacing), sample drawn/ analyzed etc, existing pit data, grade variation, thickness for float area is given in the table below:-

Gandhamardan-A (Float area)	Borehole data				
	No. & spacing	Depth From/ to	Grade From/ to	Samples drawn and Analyzed	Level of exploration
DTH drilling	13 Nos. (100 x 100m grid)	3/ 35m	11.15/ 63.28% Fe	125 Nos.	G1

Gandhamardan-A (Float area)	Borehole data				
	No. & spacing	Depth From/ to	Grade From/ to	Samples drawn and Analyzed	Level of exploration
DTH drilling	11 Nos. (200 x 200m grid)	3/ 48m	11.39/ 61.24	123 Nos.	G2

Twenty-one (21) experiments were conducted from the samples collected from entire Gandhamardan deposit for determination of bulk densities for different ore types and eleven (11) experiments conducted for determination of bulk densities of non-ores. The main bulk density of each ore type has been averaged for evaluating insitu bulk density of the deposit for calculation of ore reserve. A summary of ore type-wise bulk density experiments with sample location is given in table 3.1

(Table 3.1) Bulk Density of Ores and Non-ores

S. No.	Ore types	Location	Bulk density	Avg.
1.	Lateritic and Goethitic Ore.	TB No. III	2.90	
		GN/4	2.50	
		GN/2	2.65	2.65
		GN/74	2.15	
		1200N/100W	3.07	
2.	Soft laminated Ore	TB.No. II	3.60	
		GN/ 52	3.32	
		GN/1	3.50	3.45
		TB NO. II	3.30	
		GS/ 9	3.25	
		GS/18	3.40	
3.	Hard laminated Ore	TB No. I	3.53	
		TB No. I	3.76	3.63
		GN/ 54	3.60	
4.	Hard massive ore	TB No. IV	3.75	3.75
5.	Blue dust and powdery ore	GN/ 10	2.62	

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		GN/ 15	2.42	
		GS/ 2	2.50	
		GS/ 18	2.55	2.52
		GS/ 39	2.60	
		GS/35	2.45	
6.	Laterite (Ore type)	500N/100W	3.40	
		0 / 0	2.40	2.53
		900S/300E	1.80	
7.	Laterite (non ore type)	100N/300W	1.80	
		400N/300w	1.80	1.81
		200W/500W	1.70	
		1200N/100w	1.95	
8.	B.H.J	0 / 0	1.90	
		0 / 100E	1.90	1.86
		0 / 100W	1.85	
		0 / 100S	1.80	

The average specific gravity & bulk density of different ore types is given in table 3.2

(Table 3.2) Average Specific Gravity & Bulk Density of Different Ore Types

Sl. No.	Ore Type	Avg. Bulk Density, t/m^3	Avg. Specific Gravity
1.	Laterite/OB	2.53	2.83
2.	Lateritic Ore	2.65	2.97
3.	Soft Laminated Ore	3.45	3.99
4.	Hard Laminated Ore	3.63	4.34
5.	Blue Dust/Powdery Ore/Friable Ore	2.52	3.82
6	Hard Massive Ore	3.57	4.30

c) Geological plans & sections:

The following plans and sections have been prepared:

(i) Key plan of the area on 1:50,000 scale. The same is enclosed as Plate No. MEC/Q6ZJ/11/16/1.

(ii) Detailed geological plan of Gandhamardan – A Lease in the scale of 1: 2000. The same is enclosed as Plate No. MEC/Q6ZJ/11/16/4-4A.

(iii) Detailed geological sections of Gandhamardan – A Lease in the scale of 1: 2000. The same is enclosed as Plate No. MEC/Q6ZJ/11/16/5A & MEC/Q6ZJ/11/16/5B.

d) Year-wise future program of exploration:

In order to ascertain the availability of ores in the float zone towards the western & eastern side of the lease, 15 nos. of boreholes have been proposed to be carried out in two phases in year 2014-15 & 2015-16 respectively. The details of the proposed exploration program is given below:-

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BHID	Northing	Easting	Approx. Depth, m
PHASE-1			
MEC/1	-2200	-1200	30
MEC/2	-2600	-1400	30
MEC/3	-3400	-600	30
MEC/4	-2800	0	30
MEC/5	-1200	600	30
MEC/6	-1400	-400	30
MEC/7	-1800	0	30
Total Meterage			210
PHASE-2			
MEC/8	-2000	-500	30
MEC/9	-2000	-200	30
MEC/10	-2000	200	30
MEC/11	-2200	0	30
MEC/12	-2200	400	30
MEC/13	-2400	-200	30
MEC/14	-2400	200	30
MEC/15	-2600	-200	30
MEC/16	-3850	-1650	30
MEC/17	-3850	-1575	30
Total Meterage			300

e) Geological and recoverable reserves and grade:

MECON has re-assessed the quarry-wise reserves for Hilltop main ore body, flank deposit and float deposit based on 3-dimensional resource model prepared on the basis of above exploration data using "SURPAC".

Parameters considered for estimation of Mineral Resources

(a) The threshold value considered as per the IBM guidelines is 45% Fe.

(b) The entire data has been transferred to form a geological database in an ore body modeling software namely 'SURPAC'.

(i) Preparation of Database

Four basic files namely collar, survey, assay and litho files are required in Comma Separated Value (CSV) format for further processing by SURPAC Software. Ore type-wise litho codes used for database preparation is given below.

Ore Type-wise Litho Codes Used for Database Preparation

Sl. No.	Litho	Litho Code
1.	Soil Cover/Clay/Laterite	1
2.	Lateritic Ore	2

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3.	Soft Laminated Ore	3
4	Hard Laminated Ore	4
5	Blue Dust/Powdery Ore	5
6	Friable Ore/Bisculty Ore	6
7	Hard Massive Ore	7
8	Shale/Ferruginous Shale/Lithomargic Shale/Tuffaceous Shale	8
9	Banded Hematite Chert, Banded Hematite Jasper, Banded Hematite Chert/Jasper, Banded Hematite Jasper/Chert, Banded Hematite Jasper/Quartzite, Japeroid, Quartzite	9
10	Weathered Dolerite	10
11	Volcanics/Yellow Ochre	11

(ii) Delineation of Ore Geometry and Construction of Ore Body

Preparation of Transverse Sections

Boreholes were displayed in SURPAC graphics window alongwith litho, Fe%, SiO_2% & Al_2O_3%. 17 nos. of transverse sections at 100 m interval were extracted from -900N to -3020N in the strike direction. The ore type-wise envelopes were delineated at each section considering the continuity of mineralisation, lithology and other geological features. Length of influence for extrapolation of the section has been considered on the basis of thickness of ore in neighbouring boreholes. In general, it has been considered as 50 m.

Preparation of Digital Terrain Model (DTM) of Surface Topography

The digitized contour of updated surface plan with Z values have been transformed into digital terrain model (DTM) utilizing the principle of triangulation and wire framing of points with X, Y and Z co-ordinates. Digital terrain model is the most effective way of representing a surface in three dimensional computerized form. It is an important tool to calculate volume between two or more surfaces. The digital terrain model of surface topography with drill holes of Gandhamardan-A Iron Ore Mines is shown in the figure below:-

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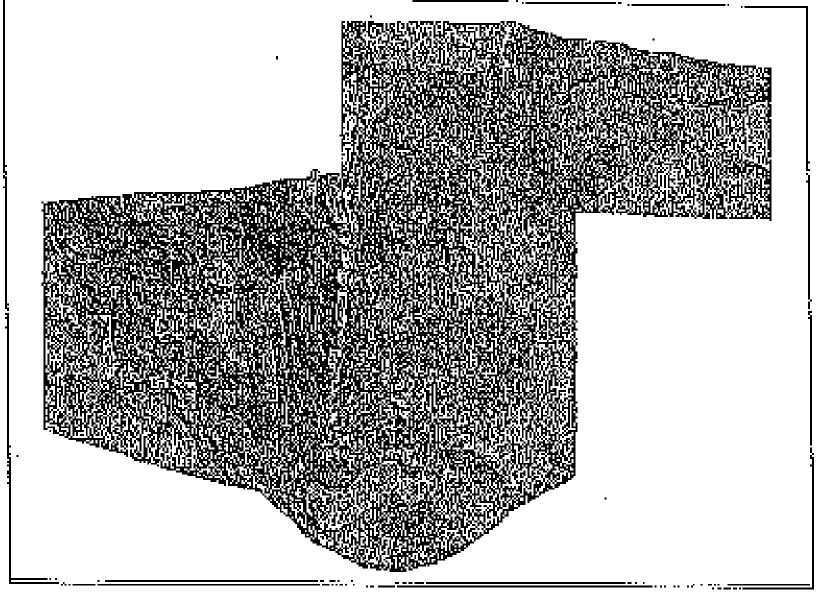
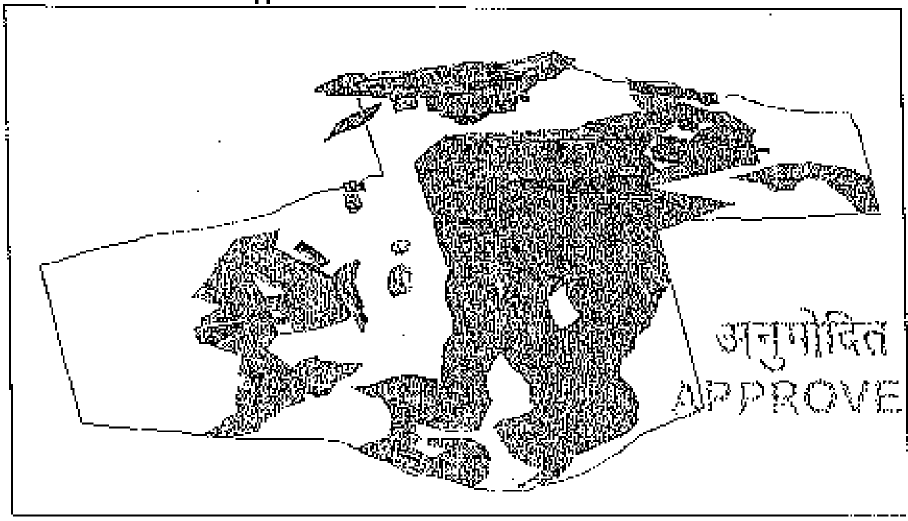
Digital Terrain Model (DTM) of Surface Topography with drill holes



3-D Solid Modeling of Ore Body

The litho-wise ore zones of the respective transverse cross sections have been connected/ joined to form litho-wise solid ore body models. Ore type-wise 3-D solid model of Gandhamardan-A iron ore deposit is presented in the figure below:-

Ore type-wise three dimensional solid model



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(iii) **Geo-statistical analysis (Variogram modeling)**

The continuity of mineralization in different directions can be well judged through analysis of variograms. In addition, the range of influence of sample in different directions can be deciphered. A varoigram is evaluated with respect to sill, range and nugget effect. The variogram function is defined as follows.

$\gamma(h) = 1/2n \sum [z(x+h) - z(x)]^2$

Where, n = Number of sample pairs at distance 'h'

$\gamma(h)$ = Variogram value at distance 'h'

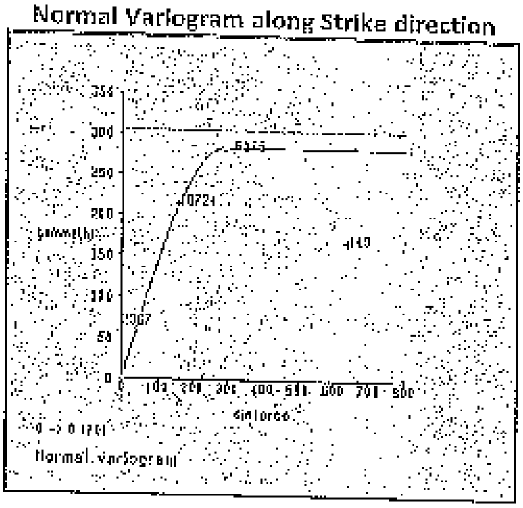
Z(x) = Assay value at point x

Z(x+h) = Assay value at point x+h

The γ(h) is calculated for different distance pair 'h' and is plotted against distance pair. As the distance pair increases the γ(h) value also increases and levels off after certain distance pair. The distance pair at which the γ(h) value levels off is known as 'Range' beyond which samples become statistically independent without any correlation. This distance provides an idea of range of influence of a particular sampling point. The value of γ(h) at which the graph levels off is known as 'sill'. This value is related to the theoretical variance of the data set. 'Nugget' is the value of γ(h) at zero distance pair. The inherent variability of the data is represented by nugget. The deposit with zero or very low nugget effect possesses uniform grade distribution.

Variogram modeling has been carried out for determining the spatial variability of mineralisation & grade distribution in different directions. Composites (1m length) of each ore containing Fe% were individually used for ore type-wise variogram modeling. In order to ascertain the variability of entire deposit of Gandhamardan Block – A, composites all the samples of 1 m length within the leasehold of Block –A were extracted & the normal variograms of composited assay data have been developed along strike & dip direction of the deposit and also along borehole depth. The fitted Variogram model along strike, dip and along the borehole direction of the deposit is shown in figures below. The variogram model parameter for the above directions is presented in the table below. Besides the same, ore type-wise variogram model were also plotted. Results of variogram modeling for above three directions for Gandhamardan-A iron ore deposit is given in table below.

Normal Variogram along Strike direction



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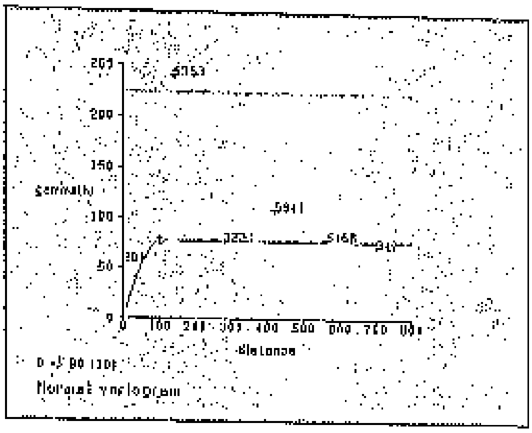
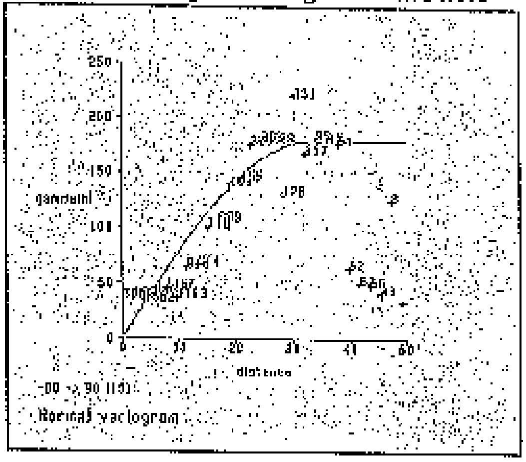
Normal Variogram along Dip direction



Normal Variogram along down the hole



Variogram model parameters in three orthogonal directions

Sl. No.	Direction	Azimuth	Plunge	Spread	Lag	Maximum Distance
1	Along Dip Direction	90	0	10	100 m	800 m
2	Along Strike direction	0	0	10	100 m	800 m
3	Along Borehole depth	0	-90	10	1 m	50

Results of variogram modeling in three orthogonal directions

Sl. No.	Direction	Nugget	Sill	Range
1	Along Dip Direction	0.286702	76.910240	102.303
2	Along Strike direction	0.286702	245.764700	357.472
3	Along Borehole depth	0.286702	178.887100	33.451

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Block model estimation parameters derived from Variogram Modeling

A summary of the ore type-wise estimation parameters alongwith the anisotropy ratio utilized for block model estimation is given below.

Ore type-wise Block Model estimation parameters

Ore Type	Bearing of Major Axis	Anisotropy Factor		No. of Samples		Max Search Dist. Major axis	Max. Vert. Search distance
		Semi-major	minor	Min	Max		
Blue Dust/ Powdery Ore/ Friable Ore	0	1	13	3	15	1500	50
Hard Laminated Ore	0	1	11	3	15	1500	50
Soft Laminated Ore	0	3.3	13.94	3	15	1500	50
Hard Massive Ore	0	1	2	3	15	1500	50
Lateritic Ore	0	1	6	3	15	1500	50

(iv) Block Modeling

The entire deposit is divided into no. of judiciously chosen sub-blocks for proper estimation of grade and quantity, keeping in view of the structural discontinuity of the deposit, extent etc. The estimated blocks in the block model has been used for optimum pit generation, mine planning and production scheduling.

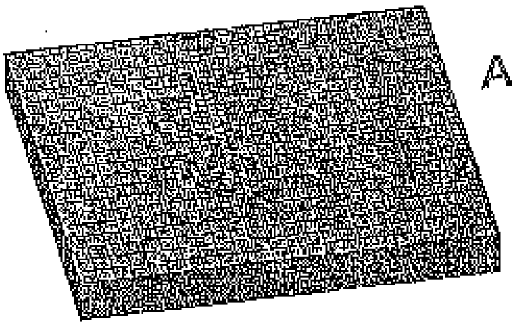
- Selection of Block Size

Considering the accuracy desired, borehole spacing and mining constraints, a unit block of 10 m x 10 m x 1 m has been selected for block wise grade estimation.

- Development of Block Model

In order to cover the entire extent of Gandhamardan-A iron ore deposit in three dimensions, a dummy block model with unit block sizes as indicated above have been generated. An un-constrained dummy block model is shown in the figure below:-

Unconstrained dummy block model



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- Addition of Attributes

  Attributes are the properties of individual block such as Fe, SiO_2, Al_2O_3, specific gravity, litho code etc. These attributes were added in the dummy block model using suitable technique.

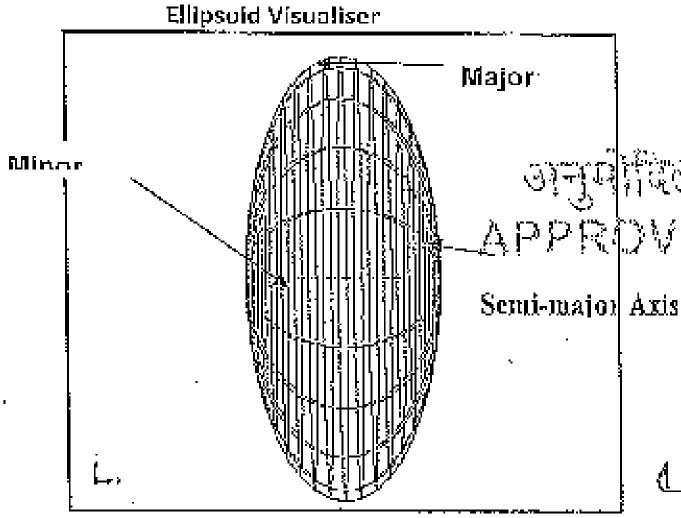
- Application of Constraints

  Constraints are the logical combination of spatial operators and objects such as DTM of surface contour, solid model of ore zone, block etc. with which the block model can be enveloped/ intersected with respect to inside/ outside and above/ below their spatial position. *The block model developed for Gandhamardan-A iron ore deposit has been constrained with the surface DTM with updated pit positions, mining lease boundary, statutory safety barriers, individual quarry boundaries as well as ore type-wise 3-D solid models as developed and discussed in the preceding paragraphs.* In this way, the blocks have been enveloped within ore zone boundary and surface topography for the purpose of grade interpolation and reserves estimation.

- Block model estimation

  Block model estimation parameters such as anisotropic ratio, search distances etc. were derived from the results of variogram analysis discussed in previous para. Gandhamardan Block-B iron ore deposit is uniform in mineralisation. It is not erratic in behaviour. The coefficient of variation of grades in all the ores are low in the range of 0.03 – 0.1 indicating uniform grade distribution and the deposit has also been explored at almost uniform grid of 100 m x 100 both along dip and strike direction, the globally accepted technique of Inverse Square Distance (ISD) method has been used for ore reserve estimation for different ore types. The parameters for reserve estimation have been derived from the statistical and geo-statistical analysis done previously. A search ellipsoid as indicated below has been used to select samples for assigning grade to the blocks. The axial parameters and its search orientation were derived from the results of geo-statistical analysis.

Ellipsoid Visualiser



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The specific gravity of the individual ore types given in table 3.5 were taken as the in-situ densities of the respective ore type. Horizontal & vertical limit constraints have been prepared on the basis of the level of exploration to calculate the resources. A recovery factor of 40% for the float ore zone has been applied as an attribute inside the block model.

For estimation resources the following parameters have been considered:-

Measured resources: -

- The entire exploratory drill holes with grid spacing of 100m X 100m has been considered as G1 category and has been categorized under 331 as per UNFC code.

Indicated resources: -

- The entire exploratory drill hole with grid spacing at more than 100m X 100m grid interval and also where the borehole density is quite low has been considered as G2 category and has been categorized under 332 as per UNFC code.

The details of the reserves/ resources established at 45% Fe cut off for Gandhamardan-Adeposit as on 1.4.2013 is given in table below. The detailed calculation of the quarry-wise reserves/ resources established at 45% Fe cut off for Gandhamardan-A deposit as on 1.4.2013 is given in Annexure 12A.

Resources type	Total tonnage cut-off (+45% Fe) (in Tons)		
	Hill top	Flank	Float
Measured mineral resources (331)	38130514	3526296	3194840
Indicated mineral resources (332)	0	2346221	3042472
Total	38130514	5872517	6237312

Resources type	Saleable grade (+58% Fe) (in Tons)		
	Hill top	Flank	Float
Measured mineral resources (331)	37185807 (63.91% Fe)	3526296 (63.16% Fe)	2469336 (60.68% Fe)
Indicated mineral resources (332)	0	2346221 (61.46% Fe)	1901488 (59.16% Fe)
Total	37185807 (63.91% Fe)	5872517 (62.48% Fe)	4370824 (60.02% Fe)

Resources type	Non saleable grade (+45-58% Fe) (in Tons)		
	Hill top	Flank	Float
Measured mineral resources (331)	944707 (49.55% Fe)	0	725504 (49.82% Fe)
Indicated mineral resources (332)	0	0	1140984 (49.4% Fe)
Total	944707 (49.55% Fe)	0	1866488 (49.56% Fe)

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The Measured / Indicated resources under different classes of land are given below:-

Resources type	Block	Total tonnage	Non Forest land	Forest land: Already Diverted	Forest land: All remaining forest land applied for diversion
		(in Tons)			
Measured mineral resources (331)	Hill top	38130514	0	0	38130514
	Flank	3526296	0	0	3526296
	Float	3194840	3194840	0	0
	Total	44851650	3194840	0	41656810
Indicated mineral resources (332)	Hill top	0	0	0	0
	Flank	2346221	0	0	2346221
	Float	3042472	0	0	3042472
	Total	5388693	0	0	5388693

The Measured / Indicated resources under mineable and non-mineable portions are:-

Resources type	Block	Total tonnage	Mineable	Blocked/Non-mineable: Low grade part	UPL: Already diverted forest land	UPL: All rem. forest land applied for diversion	Non forest land	Stat. barrier	Total
		(in Tons)							
Measured mineral resources (331)	Hill top	38130514	30259267	865067	0	7006180	0	0	7871247
	Flank	3526296	3252086	0	0	274210	0	0	274210
	Float	3194840	2359200	701504	0	0	134136	0	835640
	Total	44851650	35870553	1566571	0	7280390	134136	0	8981097
Indicated mineral resources (332)	Hill top	0	0	0	0	0	0	0	0
	Flank	2346221	2260473	0	0	85748	0	0	85748
	Float	3042472	1643592	759768	0	623112	0	16000	1398880
	Total	5388693	3904065	759768	0	708860	0	16000	1484628

Out of the total mineable reserves, of 39774618 tonnes, the total volume of waste anticipated to be removed is 10775321 cu.m at a stripping ratio of 0.27 cu.m per tonne of ore. Feasibility Study was then carried out as enclosed in Annexure – 17 and the reserves/ resources classified thereafter for the Hilltop

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area are given below:-

RESERVES				REMAINING RESOURCES				
Economic (Mineable) Reserves	Quantity (recoverable) (in Tons)	Break-up land wise (in Tons)		Potentially Economic (Non-mineable)	Qty. (in Tons)	Constraints wise quantities (in Tons)		Remaining Measured Resources
Proved (111)	30259267	30259267	# All remaining forest land applied for diversion	Feasibility Mineral Resources (211)	7871247	7006180	Ult. pit limit	NIl
						NIL	Lease barrier	
						865067	Low grade part	

The reserves/ resources classified thereafter for the Flank area are given below:-

RESERVES				REMAINING RESOURCES				
Economic (Mineable) Reserves	Quantity (recoverable) (in Tons)	Break-up land wise (in Tons)		Potentially Economic (Non-mineable)	Qty. (in Tons)	Constraints wise quantities (In Tons)		Rem. Measured Resources
Proved (111)	3252086	3252086	#All remaining forest land applied for diversion	Feasibility Mineral Resources (211)	274210	274210	Ult. pit limit	Nil
						NIL	Lease barrier	
						NIL	Low grade part	
Probable (122)	2260473	2260473	#All remaining forest land applied for diversion	Pre-Feasibility Mineral Resources (222)	85748	85748	Ult. pit limit	NIL
		NIL	Non-forest land			NIL	Lease barrier	
						NIL	Low grade part	

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The reserves/ resources classified thereafter for the Float area are given below:-

RESERVES				REMAINING RESOURCES				
Economic (Mineable) Reserves	Quantity (recoverable) (in Tons)	Break-up land wise (in Tons)		Potentially Economic (Non-mineable)	Qty. (in Tons)	Constraints wise quantities (in Tons)		Remaining Measured Resources
Proved (111)	2359200	2359200	Non-forest land	Feasibility Mineral Resources (211)	835640	134136	Ult. pit limit	Nil
						NIL	Lease barrier	
						701504	Low grade part	
Probable (122)	1643592	1643592	#All remaining forest land applied for diversion	Pre-Feasibility Mineral Resources (222)	1398880	623112	Ult. pit limit	NIL
						16000	Lease barrier	
						759768	Low grade part	

* A recovery factor 99.5% can be applied on the economic mineable reserves for the insitu ore which include the reserves lost in the contact zones of ore & waste in order to avoid dilution of the ore.
# Subject to forestry clearance.

Category wise updated reserve with grade

Category wise updated reserves with grade are given in table 3.6.

(Table 3.6) Reserves as per UNFC classification (in tonnes and as on 1.4.2013)

Sl. No	Reserve Category (UNFC Classification)	Mine	Qty. in Tonnes	Grade (Fe%)
1	Proved Mineral Reserves (111)	Float	2359200	60.64
		Total	2359200	60.64
	Proved Mineral Reserves (111)	Hill top	30259267	63.84
		Flank	3252086	63.3
		Total	33511353	63.79
	Probable Mineral Reserves (122)	Flank	2260473	61.46
		Float	1643592	59.17
		Total	3904065	60.50
3	Feasibility Mineral Resource (211)	Float	835640	51.56 %
		Hill top	7871247	62.26 %
		Flank	274210	63.16 %

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		Total	814540	61.29 %
	Feasibility Mineral Resource (222)	Flank	85748	61.16 %
		Float	1398880	53.85 %
		Total	1484628	54.29 %
4	Remaining measured resource (331)	All areas	NIL	NA
5	Indicated Resource (332)	All areas	NIL	NA
6	Inferred Resource (333)	All areas	NIL	NA
7	Reconnaissance Resource (334)	All areas	NIL	NA

4. MINING

a) Existing / proposed method for developing / working the deposit with all design parameters.

The Gandhamardan-A block comes under Category-A (Fully Mechanized category) as per the IBM guidelines. The deposit is worked by opencast mining method with formation of benches by drilling and blasting. The proposed height of bench at hilltop quarry is 10 m with 10 m width at the ultimate stage. Whereas, in the float quarry, height of the bench has been considered as 5 m with 5 m width at the ultimate stage. Bank slope angle for both the quarries has been considered as 75^0. Ultimate pit slope for hill top quarry & float quarry are 35^0 and 38^0 respectively.

The conventional mining method using 115 mm diameter drilling and blasting with low density (LD) explosives in combination with 20 t dumper/ tipper with matching capacity hydraulic excavators/ loaders for drilling, loading and transportation of ore to crusher and transportation of waste/ sub grade materials to their respective dumps as envisaged in this scheme of mining. The minimum working width of the benches will be 20 m.

2.5- 4.0 cu.m bucket capacity hydraulic excavators (diesel powered) will be put to use in conjunction with 20 t struck capacity dumpers. The ROM will be transported to a mobile screening plant for segregating the CLO (10-40mm), fines (-10mm) & the oversize (+40mm). The ROM will be fed to a screening plant using 2.5- 4.0 cu.m hydraulic excavators. Waste & sub grade materials generated will be transported to respective dumping/ stacking locations. Front end loader of 1.5- 2.0 cu.m bucket capacity will be deployed to load & haul the oversize of the screen to a crusher located nearby. The oversize will then be

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fed to a crusher using 1.5 – 2.0 cu.m hydraulic excavators. The CLO & fines generated after screening the crushed product will be loaded by loader of 2.5- 4.0 cu.m capacity & transported through 20 t tippers/ dumpers to the respective stockyard at the foothill.

Adequate capacity of screening & crushing plant will be installed at the hilltop quarry/ float workings. The screening & crushing plants will be located within the broken area of the quarry.

Only float quarry V-D & V-D1 located on the western side of the lease and hill top quarry will be operated w.e.f 2014-15, after acquiring the stage-II forestry clearance. Besides, sub-grade dump stacked at hilltop quarry – 1A & float quarry-4D has also been planned to be evacuated in a phased manner within 3 years of the plan period as per the order made by the Mining officer, Keonjhar (Copy of the letter of mining officer for the same is enclosed as Annexure -14.

b) Quantum of development and tonnage of production expected pit-wise.

A summary of the quarry-wise quantum of ore, waste & sub-grade generation is given below.

Year	Quarry	Waste	Ore	Subgrade	Mineral Rejects	Stripping Ratio
		cu. m	Tonnes	Tonnes	Tonnes	cu.m/tonne
2013-14	Hilltop Quarry	0	0	0	0	0.00
	Float (Quarry-VD & VD1)	0	0	0	0	0.00
	Total	**0**	**0**	**0**	**0**	**0.00**
2014-15	Hilltop Quarry	6836	188814	0	0	0.04
	Float (Quarry-VD & VD1)	79200	163200	0	0	0.49
	Total	**86036**	**352014**	**0**	**0**	**0.24**
2015-16	Hilltop Quarry	13313	106371	7980	0	0.12
	Float (Quarry-VD & VD1)	84000	242400	46400	0	0.29
	Total	**97313**	**348771**	**54380**	**0**	**0.24**
2016-17	Hilltop Quarry	9828	216033	0	0	0.05
	Float (Quarry-VD & VD1)	73200	134256	0	0	0.55
	Total	**83028**	**350289**	**0**	**0**	**0.24**
2017-18	Hilltop Quarry	20566	348941	18002	0	0.06

Detailed year-wise production plan from FY 2013 – 14 to FY 2017-18 is given below.

Year	Quarry	Ore				Subgrade	Waste	Stripping Ratio
		Tonnes	Fe%	SiO2%	Al2O3%	Tonnes	Cu. M	cu.m/tonne
2013-14	Hilltop Quarry	0	0	0	0	0	0	0
	Float Quarry	0	0	0	0	0	0	0
	Total	0	0.00	0.00	0.00	0	0	0.00
2014-15	Hilltop Quarry	188814	65.94	1.53	0.69	0	6836	0.04
	Float Quarry	163200	62.43	2.68	3.51	0	79200	0.49
	Total	352014	64.31	2.06	2.00	0	86036	0.24

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	Float Quarry	242400	62.19	2.77	3.64	46400	84000	0.29
	Total	348771	62.97	2.48	2.95	54380	97313	0.24
2016-17	Hilltop Quarry	216033	64.8	1.83	1.39	0	9878	0.05
	Float Quarry	134256	61.75	2.98	3.78	0	73200	0.55
	Total	350289	63.63	2.27	2.31	0	83028	0.24
2017-18	Hilltop Quarry	348041	63.04	3.62	1.71	18002	20566	0.06

c) Individual year wise plans and sections.

The year wise plan & section for the period ending 2013-14 , 2014-15 , 2015-16, 2016-17 & 2017-18 are shown in Plate Nos. MEC/Q6ZJ/ 11/16/6A to MEC/Q6ZJ/ 11/16/6E &. MEC/Q6ZJ/ 11/16/7A MEC/Q6ZJ/ 11/16/7E respectively.

d) Composite plan and section showing pit layouts, dumps and stacks of sub-grade mineral, if any, etc.

The surface plan of the mine as on 1.02.2013 is shown as Plate No. MEC/Q6ZJ/ 11/16/3. Composite plan & sections showing the pit layout/ dumps for the period ending 2013-14 , 2014-15 , 2015-16, 2016-17 & 2017-18 are shown in Plate Nos. MEC/Q6ZJ/ 11/16/6A to MEC/Q6ZJ/ 11/16/6E &. MEC/Q6ZJ/ 11/16/7A MEC/Q6ZJ/ 11/16/7E respectively. The year wise plan & sections of the waste dumping/ backfilling are shown in Plate no. MEC/Q6ZJ/ 11/16/10 & MEC/Q6ZJ/ 11/16/11 and year-wise sub-grade dumping plans & sections is shown in Plate no. MEC/Q6ZJ/ 11/16/12.

e) Proposed rate of production when the mine is fully developed, and the expected life of the mine and the year from which effected.

Gandhamardan – A lease has been designed for a maximum production capacity of 3,50,000 t per year. The expected life of the mine at the above mentioned rated capacity will be substantial.

f) Conceptual mining plan for the life of the mine (for 'A' Category mines) based on the geological, mining and environmental considerations.

Gandhamardan – A lease comes under Category – A (fully mechanized category) as per the IBM guidelines. Therefore, conceptual plan of Gandhamardan – A lease is prepared on the basis of life of the deposit considering the proved existence of the mineral upto 630 mRL. Conceptual mining plan has been prepared following the guidelines of IBM, keeping in view the present knowledge of the deposit, topography of the area, surface drainage pattern, mineable reserves available, mining technology and selection of the sites for waste disposal etc.

The main Gandhamardan deposit strikes in North - South direction (N5°E – S5°W) with gentle to moderate westerly dipping beds (5° to 30° due west). The ore body is bulging towards south and tapers down to north. Gandhamardan (Block A) block is physically bifurcated into three mines namely Hill top mine, Flank quarry & Float quarry. A part of the mined out pit will be backfilled in the ultimate stage with the mine wastes where non persistence of ore has been proved. However, prior permission will be taken from IBM before commencement of the backfilling operations. Keeping into consideration the drainage pattern of the area and the prior knowledge of the areas which are supposed to be backfilled at a later stage, adequate length of parapet walls/ garland drains & settling tanks will be designed.

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On the basis of available exploration data, the resource model of the deposit has been created in a mine planning software viz. surpac. The ultimate pit has been designed using the following bench configurations:-

Quarry	Bench Height, m	Bench Width, m	Bank Slope Angle	Ultimate Pit Slope
Hilltop Quarry	10	10	75^0	35^0
Float / Flank Quarry	5	5	75^0	39^0 TO 38^0

A safety barrier of 7.5 m width all along inside the lease area except with the common lease boundary with Gandhamardan – B lease has been kept as per the provisions of the statutes. Besides, 10 m safety zone from public roads & 15 m safety distance from HT lines has also been considered. The ROM ore produced will be screened & sized to produce the lumps & fines fractions within the lease. Gandhamardan – A will be mined at a maximum rated capacity of 3,50,000 tonnes per year. The wastes generated from the Gandhamardan – A will be backfilled in the voids created during mining.

Life of Mine: The quantity of mineable reserves as on 1.4.2013 stands at 39.77 million tonnes, from Gandhamardan – A. Therefore, the life of the mine at the proposed production rate of 3,50,000 tones per annum will be substantial.

Disposal of Sub grade mineral: A part of the sub grade materials generated from the main hill top ore body during the course of mining operations will be brought to the foot hill for stacking it as sub grade stockyard. These sub grade stock yards will also be provided with retaining walls, garland drains/ settling tanks depending upon the drainage pattern of the area. A total of 2.33 million tonnes of sub-grade will be generated upto conceptual stage which has been proposed to be stacked in sub-grade dump SGD1 & SGD2 on the western side of the lease. The sequence of generation of sub grade materials is given in the table 4.1a

Table 4.1a (Sub grade generation upto Conceptual period, qty. in tonnes)

Year	Hilltop Mine	Float Quarry	Flank Quarry	Total
2013-14	0		0	
2014-15	0	0	0	0
2015-16	7980	46400	0	54380
2016-17	0	0	0	0
2017-18	18002	0	0	18002
2018 - Conceptual	839085	1414872	0	
Total	**865067**	**1461272**	**0**	**2326339**

The details of the sub grade stacking plans are given in table 4.1b. The locations of these stocks, their individual area of extent along with maximum holding capacity are also shown in the conceptual plan.

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Table 4.1b (Sub grade stocking plan upto Conceptual period)

Subgrade Dump No.	Location	Area (Hect.)	Total quantity (Mt)
SGD1	SW Side of Lease	1.91	0.072
SGD2	Western Side of Lease	7.35	2.254
Total		9.26	2.33

Waste Disposal: Dump-sites selected for disposal of the waste have been considered after considering the following criteria.

- All dumpsites have been located outside the mineralized zone beyond ultimate pit limits.
- Topography features have been taken into account, particularly in the context of water drainage.

A total of 1,07,75,321 m^3 of mine wastes will be generated from entire Gandhamardan – A. The quantity generated from Gandhamardan – A will be backfilled in the backfill 1 & backfill 2 area of the float quarry & backfill 3 area at hilltop quarry. Quarry-wise waste generation upto end of mine life is given in table 4.2a.

Table 4.2a (Waste generation upto Conceptual period, qty. in cu.m)

Year	Hilltop Mine	Float Quarry	Flank Quarry	Total
2013-14	0	0	0	0
2014-15	6836	79200	0	86036
2015-16	13313	84000	0	97313
2016-17	9828	73200	0	83028
2017-18	20566	0	0	20566
2018 to Conceptual Period	3686160	3886800	2915418	10488378
Total	3736703	4123200	2915418	10775321

The manner of disposal of wastes, upto the conceptual stage is given in Table 4.2b.

Table 4.2b (Waste management plan upto Conceptual period)

Year	Backfill Destination	Backfill Location	Area (Hect.)	Quantity, M cu. m
2013-14	0	0	0	0
2014-15	Backfill 1	Quarry -VC1	2.92	0
2015-16	Backfill 1	Quarry -VC1	0	0.08
2016-17	Backfill 1	Quarry -VC1	0	0.09
	Backfill 2	Quarry -VD	0.8	0.02
2017-18	Backfill 2	Quarry -VD	0	0.02
2018 - Conceptual	Backfill 1	Quarry -VD	13.34	3.04
	Backfill 2	Float Quarry VB & VD	7.94	1.94
	Backfill 3	Hill top	13.86	5.59
Total			38.86	10.78

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No external dumping is being proposed. The wastes generated will be backfilled in the mined out voids as shown in the conceptual plan. The Backfill areas will be compacted and afforestation will be carried out on the terraces as well as along the slopes after spreading a layer of top soil over it before rehabilitation. The capacity and area occupied by backfilled pit is given in Table 4.2. The location of the backfilled area is marked on conceptual plan. Afforestation by the end of conceptual period is given in Table – 4.5. The quantity of top soil generated upto the conceptual period will be 3,08,900 cu. m. Due to low shelf life of the top soil; it shall be used for concurrent reclamation/ rehabilitation of the backfilled voids & also for avenue plantation due to very low shelf life of the lateritic soils. The phase-wise generation of topsoil is given in table 4.3.

(Table 4.3) Top soil generation

Year	Top Soil Generation, cu. m
2013-14	0
2014-15	3560
2015-16	2522
2016-17	2384
	2534
2017-18	0
2018 - Conceptual	297900
Total	**308900**

Backfilled area will be afforested to check against wash off and guarded with retaining walls at their toes along the lower contours. Following the retaining wall a garland drain will be developed for carrying water to the natural drainage system. Settling pits have also been proposed in the drains to arrest solid particles. The backfilled area will be rehabilitated upto the conceptual period by adequate plantation at the rate of 300 trees per hectare so as to avoid any wash off. A summarized table indicating the details like production, waste generation, waste backfill location, reclamation & rehabilitation proposed with plantation details are given in table 4.4.

(Table 4.4) Summary of material movement

Year	Quarry to be mines	Ore Production, Tonnes	Waste Generation, cu. m	Backfill Location	Reclaimed Backfill area	No. of saplings to be planted
2013-14	None	0	0	0	0	0
2014-15	Hilltop	188814	6836	Backfill 1	2.92	0
	Float	163200	79200			
2015-16	Hilltop	106371	13313	Backfill 1	0	0

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	Float	242400	84000			0
2016-17	Hilltop	216033	9828	Backfill 1	0	0
	Float	134256	73200	Backfill 2	0.8	0
2017-18	Hilltop	348941	20566	Backfill 2	0	0
2018 - Conceptual	Hilltop	29399108	3686160	Backfill 1	13.34	4878
	Float	3462936	3886800	Backfill 2	7.94	2622
	Flank	5512559	2915418	Backfill 3	13.86	4158

Exploration: In order to ascertain the availability of ores in the float zone in the western & eastern side of the lease, 15 nos. of boreholes have been proposed to be carried out in two phases in year 2014-15 & 2015-16 respectively. The details of the proposed exploration program is given below:-

BHID	Northing	Easting	Approx. Depth, m
PHASE-1			
MEC/1	-2200	-1200	30
MEC/2	-2600	-1400	30
MEC/3	-3400	-600	30
MEC/4	-2800	0	30
MEC/5	-1200	600	30
MEC/6	-1400	-400	30
MEC/7	-1800	0	30
Total Meterage			**210**
PHASE-2			
MEC/8	-2000	-500	30
MEC/9	-2000	-200	30
MEC/10	-2000	200	30
MEC/11	-2200	0	30
MEC/12	-2200	400	30
MEC/13	-2400	-200	30
MEC/14	-2400	200	30
MEC/15	-2600	-200	30
MEC/16	-3850	-1650	30
MEC/17	-3850	-1575	30
Total Meterage			**300**

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Environmental monitoring: Noise, air, water and other environmental parameters will be monitored periodically to have a close check on the environmental pollution parameters. Spraying of water on haul roads, use of wet drilling techniques & prevention of vibration by utilization of minimum quantity

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of explosive per delay will be carried out. As reflected in the table below a total of 11658 saplings will be planted over an area of 38.86 Ha. over the backfilled areas.

Table 4.5 (Afforestation plan upto conceptual period)

Backfill No.	Location	No. of saplings to be planted per Ha.	Area (Hect.)	Total no. of saplings to be planted
Backfill 1	Float Quarry VC	300	16.26	4878
Backfill 2	Float Quarry VB & VD	300	8.74	2622
Backfill 3	Hill top	300	13.86	4158
Total			38.86	**11658**

Out of 618.576 Ha of total lease area 519.7472 Ha of land is forest land. In the post-mining scenario all the forestland would naturally be reverted to forest department. Land use pattern at the end of conceptual period is given below in Table 4.6. The pit position at the end of conceptual period is depicted as Plate No. MEC/Q6ZJ/ 11/16/8 and conceptual section as Plate No. MEC/Q6ZJ/ 11/16/9. The ultimate pit presented in this mining plan covers the area which has been explored by some means of sub surface exploration. However, considering the proposed exploration plans, the area of the conceptual pit is given in the table below:-

Table 4.6 (Land use at the conceptual stage)

Heads	Area (Ha.)		
	As on 1.4.13	At the end of 5th year	At conceptual period
Mining	59.5	63.22	436.7594 *
Dumping of OB	0.55	0.55	10.4716
Stacking of Ore	4.39	4.39	15.1420
Sub - Grade Ore Stack	1.61	3.52	13.6025
Processing & Stacking/ Infrastructure	1.45	1.45	49.5873
Housing / Colony	11.33	11.33	11.3276
Area covered by Plantation	12.91	12.91	1.9573 #
Roads	15.21	15.21	7.3604
Magazine & its Safety Zone	33.0541	33.0541	33.0541
Prohibited and protected safety zone area for mining operation	-	-	21.4300
Land used for Public Purpose + Agricultural Land and Home-stead Land	-	-	22.8838

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* This area will be totally reclaimed/ rehabilitated at the end of the deposit.
\# 10.9527 Ha. of the area covered under present plantation under non forest land will be covered under the conceptual pit and thereafter reclaimed/ rehabilitated.

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g) Opencast mines :

a) **Salient features of the mode of working**

The Gandhamardan-A block comes under Category-A (Fully Mechanized category) as per the IBM guidelines. The deposit is worked by opencast mining method with formation of benches by drilling and blasting. The proposed height of bench at hilltop quarry is 10 m with 10 m width at the ultimate stage. Whereas, in the float quarry, height of the bench has been considered as 5 m with 5 m width at the ultimate stage. Bank slope angle for both the quarries has been considered as 75°. Ultimate pit slope for hill top quarry & float quarry are 35° and 38° respectively.

The conventional mining method using 115 mm diameter drilling and blasting with low density (LD) explosives in combination with 20 t dumper/ tipper with matching capacity hydraulic excavators/ loaders for drilling, loading and transportation of ore to crusher and transportation of waste/ sub grade material to their respective dumps as envisaged in this scheme of mining. The minimum working width of the benches will be 20 m.

2.5- 4.0 cu.m bucket capacity hydraulic excavators (diesel powered) will be put to use in conjunction with 20 t struck capacity dumpers. The ROM will be transported to a mobile screening plant for segregating the CLO (10-40mm), fines (-10mm) & the oversize (+40mm). The ROM will be fed to a screening plant using 2.5- 4.0 cu.m hydraulic excavators. Waste & sub grade materials generated will be transported to respective dumping/ stacking locations. Front end loader of 1.5- 2.0 cu.m bucket capacity will be deployed to load & haul the oversize of the screen to a crusher located nearby. The oversize will then be fed to a crusher using 1.5 – 2.0 cu.m hydraulic excavators. The CLO & fines generated after screening the crushed product will be loaded by loader of 2.5- 4.0 cu.m capacity & transported through 20 t tippers/ dumpers to the respective stockyard at the foothill.

Adequate capacity of screening & crushing plant will be installed at the hilltop quarry/ float workings. The screening & crushing plants will be located within the broken area of the quarry.

Only float quarry V-D & V-D1 located on the western side of the lease and hill top quarry will be operated w.e.f 2014-15, after acquiring the stage-II forestry clearance. Besides, sub-grade dump stacked at hilltop quarry – 1A & float quarry-4D has also been planned to be evacuated in a phased manner within 3 year of the plan period as per the order made by the Mining officer, Keonjhar (Copy of the letter of mining officer for the same is enclosed as Annexure -34.

The present bench configurations are given below:-

Parameters	Ore	OB
No. of benches	2	2
Ht. of benches	5 - 10m – Hill top * 5m – Float/ Flank	-
Width of benches	5 - 10m – Hill top 10m – Float/ Flank	

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The reduced level of the benches in hill top/ flank/ float quarries have been shown in the surface plan.
* A part of the mine is having a bench height of 5 m wherein two benches will be merged during the proposed production period to form a full bench height of 10m.

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ii) Layout of mine workings, the layout of faces and sites for disposal of overburden / waste.

Year wise production and development plans are depicted at Plate no. MEC/Q6ZJ/ 11/16/6A to 6E & MEC/Q6ZJ/ 11/16/7A to MEC/Q6ZJ/ 11/16/7E respectively. The details of the calculation of level wise production of ore, subgrade & removal of waste from hilltop quarry & float quarry for the period ending 2013-14 , 2014-15 , 2015-16, 2016-17 & 2017-18 year are given in Annexure-12B & 12C respectively. Overall targets of ROM and Waste removal from Gandhamardan - A Lease is given in Table 5.1. the proportion of CLO/ fines from the ROM ore will be in the ratio of 50: 50.

Table No. 5.1 (Overall Targets for ROM and Waste removal)

Year	Quarry	Ore				Waste	Stripping Ratio
		Tonnes	Fe%	SiO_2%	Al_2O_3%	Cu. M	cu.m/tonne
2013-14	Hilltop Quarry	0	0	0	0	0	0
	Float Quarry	0	0	0	0	0	0
	Total	0	0.00	0.00	0.00	0	0.00
2014-15	Hilltop Quarry	188814	65.94	1.53	0.69	6836	0.04
	Float Quarry	163200	62.43	2.68	3.51	79200	0.49
	Total	352014	64.31	2.06	2.00	86036	0.24
2015-16	Hilltop Quarry	106371	64.74	1.82	1.39	13313	0.12
	Float Quarry	242400	62.19	2.77	3.64	84000	0.29
	Total	348771	62.97	2.48	2.95	97313	0.24
2016-17	Hilltop Quarry	216033	64.8	1.83	1.39	9828	0.05
	Float Quarry	134256	61.75	2.98	3.78	73200	0.55
	Total	350289	63.63	2.27	2.31	83028	0.24
2017-18	Hilltop Quarry	348941	63.04	3.62	1.71	20566	0.06

The quantity & quality of the ore stocks lying within the Gandhamardan-A lease is given in the table below:-

Sl.No	Quantity, tonnes	Quality
1	603.67	58-60% Fe CLO
2	40665.938	62-65% Fe CLO
3	35726.806	+65% Fe CLO
4	910839..150	60-62% Fe fines
5	37498.655	62-65% Fe fines

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Controller of Mines (Central Zone)
भारतीय खान ब्यूरो
Indian Bureau of Mines

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iii. **Extent of mechanization**

It has been planned to operate the hill top workings & float quarry with the proposed fleet of mining machineries as given in table 5.2.

(Table 5.2) Proposed Fleet of Major HEMM & Auxiliary Mining Equipment

Parameters	HEMM Fleet
Hydraulic Excavator, 2.5 – 4.0 cu.m	1
Hydraulic Excavator, 1.5 - 2.0 cu.m	1
Loader, 1.5 – 2.0 cu.m	3
Dumper, 20t	9
Drill, 115mm	1
Dozer, D-155 Equivalent (for mine/ dump)	2
Explosive van	1
Service van	1
Pick up van	1
Water tanker	2
Diesel tanker	1
Portable lights for face lighting	6
Tractor	1

The details of the calculations for major HEMM are given in tables 5.3 to 5.6.

(Table 5.3) Drilling Fleet Calculation

Parameters	(Hill top)
Drill diameter, mm	115
Annual running hours	4000
Drill factor, T/m	42
Drill meterage, m/hr.	12
Productivity per drill per year, Mt	2.02
Max. handling, Mt	0.35
Drills required to operate, Nos.	0.2
% Availability	75
Drill machines required, Nos.	1

(Table 5.4) Excavator Fleet Calculation

Capacity, cu.m	3.2	2.0
Purpose	ROM handling	Crusher feeding
Annual running hours	4000	4000
Productivity, tph	300	200
Production per m/c per year, Mt	1.2	0.8
Max. handling, Mt	0.35	0.18
Exc. required to operate, Nos.	0.30	0.23
% Availability	75%	75%
Excavators required, Nos.	1	1

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(Table 5.5) Dumper Fleet Calculation

Payload, t	20	20	20
Purpose	ROM handling	Product handling from screen	Product handling from crusher/screen
Annual running hours	4000	4000	4000
Productivity, tph	76	76	76
Production per m/c per year, Mt	0.304	0.304	0.304
Max. handling, Mt	0.35	0.18	0.35
Dumpers required to operate, Nos.	1.15	0.595	1.15
% Availability	75%	75%	75%
Dumpers required, Nos.	2	2	2

(Table 5.6) Loader Fleet Calculation

Capacity, cu.m	1.7	1.7	1.7
Purpose	CLO/ fines handling from screen	Oversize handling from screen	CLO/ fines handling from crusher/screen
Annual running hours	4000	4000	4000
Productivity, tph	170	170	170
Production per m/c per year, Mt	0.68	0.68	0.68
Max. handling, Mt	0.35	0.18	0.35
Loaders required to operate, Nos.	0.51	0.26	0.51
% Availability	75%	75%	75%
Loaders required, Nos.	1	1	

5. BLASTING

a) Broad blasting parameters like charge per hole, blasting pattern, charge per delay, maximum number of holes blasted in a round, manner and sequence of firing, etc.

The broad blasting parameters of the blasting operations proposed to be carried out at Gandhamardan-A lease (float workings) is given below:

Burden: 3 m
Spacing: 4 m
Height: 5 m
Hole depth: 5.5 m
Hole diameter: 115 mm
Drilling pattern: Square/ Staggered
No. of holes fired per round: 18 Nos.
No. of rounds fired: 1 No.
Frequency of blasting: Twice a week

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Firing pattern: 'V' pattern
Loading density: 8.5 kgs/m
Charge length: 3.5m
Charge per hole: 29.75 Kgs
Charge per delay: 60 Kgs. (Max.)

However for Hilltop quarry following blasting configuration is proposed:-
Burden: 3 m
Spacing: 4 m
Height: 10 m
Hole depth: 11 m
Hole diameter: 115 mm
Drilling pattern: Square/ Staggered
No. of holes fired per round: 45-50 Nos.
No. of rounds fired: 1 No.
Frequency of blasting: Thrice a week
Loading density: 8.5 kgs/m
Charge length: 7 m
Charge per hole: 59.5 Kgs
Charge per delay: 119 Kgs. (Max.)

The mine management has requested quotations from reputed educational institutions in the field of blast induced ground vibration monitoring for establishing a site specific vibration predictor equation for the mine. Once, the quotes have been received from the above institutes, one of the institute shall be awarded the job of carrying out the ground vibration study.

b) Type of explosives used
Cartridge slurry explosive/bulk explosive will be used for blasting.

c) Powder factor in ore and overburden / waste
The powder factor proposed to be achieved in blasting of ore/ OB at Gandhamardan-A lease (inclusive of secondary blasting) will be around 8 t/kg.

d) Whether secondary blasting is needed, if so describe it briefly
Secondary blasting will be done by plaster shooting on as and when required basis.

e) Storage of explosives (like capacity and type of explosive magazine)
The mine management has a magazine of 3.5 t capacity for both Gandhamardan-A & B lease.

6. MINE DRAINAGE

a) Likely depth of water table based on observations from nearby wells and water bodies
It is to be noted that the existing groundwater levels on the hill top are well below the ore-body floor, expectedly more than 40 m bgl.

b) Workings expected to be minimum 40 m above water table during the ultimate pit stage.

c) Quantity and Quality of water likely to be encountered, the pumping arrangements and places

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where the mine water is finally proposed to be discharged

Quarries are located mainly on slopes and open ended towards the general slope. Therefore, these are/ will be of self draining. The floor of the quarry benches is proposed to be inclined towards the natural slope so that the direct precipitated water will be drained down the slope automatically. Waste materials generated/ loosened during mining do not contain any toxic materials. There is no perennial nala or pond near the quarries.

7. STACKING OF MINERAL REJECTS AND DISPOSAL OF WASTE

b) Nature and quantity of top soil, overburden / waste and mineral rejects likely to be generated during the next five years:

A total of 2,86,943 cu. m of mine wastes will be generated during the scheme period from Gandhamardan - A lease. The entire waste generated will be backfilled in Backfill 1, Backfill 2 & Backfill 3 as already detailed in the chapter on conceptual mine plan. The quantity of top soil generated during the scheme period will be 11,000 cu. M. Due to low shelf life of the top soil, it shall be used for concurrent reclamation/ rehabilitation of backfilled area.

Nature of Waste: The lease area comes under very low soil covered zone. The Lateritic soil which is the major soil type of the area has an average thickness of less than 0.5 m. Lateritic soils are rich in Iron and Aluminium and are formed under hot and wet tropical conditions. Mostly they are rusty-red because of iron oxides. They are developed by intensive and long-lasting weathering of the underlying parent rock. Tropical weathering (Laterization) is a prolonged process of chemical weathering which produces a wide variation in the thickness, grade, chemistry and mineralogy of the resulting soils. The mineralogical and chemical compositions of Lateritic soil are dependent on their parent rocks. Lateritic soil consists mainly of Silica and Oxides of Titanium, Zircon, Iron, Tin, Aluminium and Manganese, which remain during the course of weathering. The concept of the conservation of soil takes into account, the strategies for preventing the soil from getting eroded and preventing it from losing its fertility due to an adverse alteration in its chemical composition. Some important ways to conserve top soil are plantation of trees, terracing, erection of breast walls and retaining walls, plantation of indigenous crops etc. Planting native crops is known to be beneficial for soil conservation. If non-native plants are grown, the fields should be bordered by indigenous crops to prevent soil erosion and achieve proper soil conservation. Lateritic soils are rich in Iron but poor in Lime, Potash and Magnesium. This soil contains low organic content resulting in little nutrients and low biological activity. Iron and Aluminum oxide produced by prolonged exposure to water forms an intensely hard and erode-free rock. These soils support the indigenous crops like cashew, rubber, coconut, tea, coffee etc. Sal trees which are the Bio-Geo indicators of the Iron rich soil are the most prominent natural vegetation of the area. Particularly to conserve the soil fertility and soil erosion in top soil dumps, saplings of species like Acaccia Auriculiformis, Babul should be planted, which has a proven survival rate and requires less of water. Apart from these some special grass species like lemon grass is the most proven grass for prevention of soil erosion and subsequent protection of its nutrition content. The quantum of waste generated during the scheme period of this mining plan is shown in the table below.

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Year	Top Soil Generation, cu. m	Waste Generation, cu. m	Mineral Rejects, cu. m
2013-14	0	0	0
2014-15	3560	86036	0
2015-16	2522	97313	0
2016-17	2384	83028	0
2017-18	2534	20566	0
2018 to Conceptual Period	297900	10488378	0
Total	**308900**	10775321	0

c) **Land chosen for disposal of waste with proposed justification**

Dumpsites selected for disposal of the waste have been considered after considering the following criteria.

- All dumpsites have been located outside the mineralized zone beyond ultimate pit limit.
- Topography features have been taken into account, particularly in the context of water drainage.

c) Note indicating the manner of disposal and configuration, sequence of build-up of dumps alongwith the proposals for the stacking of sub-grade ore, to be indicated, year-wise.

A total of 1,07,75,321 cu. m of mine wastes will be generated from entire Gandhamardan - A lease. The quantity generated from Gandhamardan - A will be backfilled in backfill 1, backfill 2 & backfill 3. The quantity of top soil generated upto the conceptual period will be 308900 cu. m. Due to low shelf life of the top soil; it shall be used for concurrent reclamation/ rehabilitation of the backfilled voids. The manner of disposal of wastes, upto the conceptual stage is given in Table 7.1.

Table 7.1 (Waste management plan upto Conceptual period)

Year	Backfill Destination	Backfill Location	Area (Hect.)	Quantity, M cu. m
2013-14	0	0	0	0
2014-15	Backfill 1	Quarry -VC1	2.92	0
2015-16	Backfill 1	Quarry -VC1	0	0.08
2016-17	Backfill 1	Quarry -VC1	0	0.09
	Backfill 2	Quarry -VD	0.8	0.02
2017-18	Backfill 2	Quarry -VD	0	0.02
2018 - Conceptual	Backfill 1	Quarry -VD	13.34	3.04
	Backfill 2	Float Quarry VB & VD	7.94	1.94
	Backfill 3	Hill top	13.86	5.59
Total			38.86	10.78

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No external dumping is being proposed. However, waste generated from float quarries to be mine based on the proposed exploration in the float zone has been proposed to be stacked in external dumps in the area indicated in the conceptual plan The height & width of individual terrace will be 10 m with bank slope angle of

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37° of individual lift. The Backfill will be compacted and afforested on the terraces as well as along the slopes after spreading a layer of top soil over it before rehabilitation.
Backfilled area will be afforested to check against wash off and guarded with retaining walls at their toes along the lower contours. Following the retaining wall a garland drain will be developed for carrying water to the natural drainage system. The backfilled area will be rehabilitated upto the conceptual period by adequate plantation at the rate of 300 trees per hectare so as to avoid any wash off.

Rate of yearly generation of sub-grade mineral with reference to threshold values and proposals for stacking for next five years:
Sub grade materials are actually the ores having a Fe% in the range of 45-55%. The same is being identified in the filed by evaluating the blast hole sample quality and thereafter the blasted muck is being categorized as sub grade or ore. A total of 23,26,339 tonnes of sub-grade ore will be generated which have been planned to be stacked separately in sub-grade dump SGD1 & SGD2 proposed on western side of the lease. Year-wise generation of sub-grade from Gandhamardan –A lease is given below.

Year	Hilltop Mine	Float Quarry	Total
2013-14	0	0	0
2014-15	0	0	0
2015-16	7980	46400	54380
2016-17	0	0	0
2017-18	18002	0	18002
Total	**25982**	**46400**	**72382**

Year-wise schedule of sub-grade dumping is given below.

Year	Sub-grade dump	Sub-grade dump Location	Base area, Ha.	Sub-grade Quantity, Tonnes
2013-14	-	-	-	-
2014-15	-	-	-	-
2015-16	SGD1	SW Side of Lease	1.91	54380
2016-17	-	-	-	-
2017-18	SGD1	SW Side of Lease	-	18002
Total	**SGD1**	**SW Side of Lease**	**1.91**	**72382**

The extent of the existing sub grade dumps / CLO stocks alongwith their quantity and RL have been shown in the surface plan. The stocks will be consumed in a phased manner as shown in the para below in line to the order of the Mining officer (copy of the order enclosed as Annex. 14.)
Quantities and grade of sub-grade material available at the mine as on date with precaution for storage:
Presently two sub-grade dumps are located in the mine. Sub-grade dump 1D is located in the hill top quarry. A part of the sub-grade dump 1A fall in the Gandhamardan – B lease also. Total quantity of sub-grade stacked in sub-grade dump 1A is 2295000 tonnes, which has been planned to be evacuated in three years period as detailed below:-

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Hilltop Sub-grade 1D Evacuation Plan	
Year	Qty, Tonnes
1st Year	1005000
2nd Year	1020000
3rd Year	270000
Total	2295000

Sub-grade dump 4D is located in the float quarry 4D. Total quantity of sub-grade stacked in sub-grade dump 4D is 700000 tonnes, which has been planned to be evacuated in two years period as follow.

Quarry - IV D Sub-grade Evacuation Plan	
Year	Qty, Tonnes
1st Year	495000
2nd Year	205000
Total	700000

8. USE OF MINERAL

a) End-use of the mineral (sale to intermediary parties, captive consumption, export, industrial use)

The production of iron ore from Gandhamardan-A lease is dispatched to sponge iron plants and steel plants. The iron ore fines of less than 58% Fe (produced from Block – B and stacked in Block-A lease of Gandhamardan hill) have been dispatched to specific buyers during 2012-13 to a quantity of approx. 40000 tonnes. It has been anticipated that in future this figure may rise to a quantity of around 2 lakh tones per annum or more as per the expression of interest received from different parties.

b) Physical and chemical specifications stipulated by buyers

The specification (grade & size) of the dispatched ores were as follows:

Sl. No.	Type	Grade	Size	Consuming industry
1	Lumpy & hard iron ore	65% Fe	(+) 10 – 180mm	Sponge plant
2	-do-	64% Fe	-do-	Crushing unit
3	Lumpy & soft iron ore	65% Fe	-do-	-do-
4	-do-	65% Fe	-do-	
5	Sized iron ore	64% Fe	+ 10 - 30 mm + 10 - 40 mm	Steel plant
6	-do-	65% Fe	+5 - 18 mm	Sponge plant

c) **Details in case blending of different grades of ores is being practiced or is to be practiced at the mine to meet specifications stipulated by buyers.**

The ore will be blended at the mine faces itself with suitable deployment of the loading equipments at different faces having different grades of ore.

9. OTHER

a) Site services:

The site services envisaged is common for both Gandhamardan-B & A leases.

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Industrial Services:

Power: The electric power is drawn from 33 KV line from Keonjhargarh substation of Grid Corporation of Orissa.

Workshop Facilities:

The servicing & repairing shop facilities include:

- Servicing & repairing space
- Emergency spares room (store) with tools
- Services station (with water treatment facilities)
- Mechanical (garage) Engineer – Cum- Record Room.
- Foreman's office
- Toilet

Water Supply:. The nearest water source is Suakati nala at a distance of 1km from colony. However, Chamdih nala flowing at a distance of 3km and Baitarani river at 10km distance west of Gandhamardan hill range are the major sources of water. Two number of 20 HP pumps (1 working & 1 standby) are presently catering to water supply need of the camp.

Other Support Facilities:

All the statutory facilities such as crèche, canteen, first-aid centre, vocational training centre etc have been provided. To take care of the drinking water needs at different working areas, water tankers have been envisaged for the mine. The rest shed-cum-Lunch rooms have been provided near quarry site as per Mines Rules-55. First –aid facilities and toilet are attached to the rest shed. Portable blasting sheds of one end open type have been provided at the mine site for giving protection to the blasters during blasting. These blasting sheds are made up of steel and are shifted in accordance with the shifting of blast hole locations

An administrative block is made available to house the following rooms:

- Office for Mines Manager, assistant mines manager, Geologist, Surveyor & Labour Welfare Officer
- Vocational Training Centre
- Canteen
- General office (records, time keeping & cash counter, typing facilities etc)
- Toilet

b) **Employment potential :**

The mine is headed by the Additional General Manager (Mining) and the total work force for both Block-A and Block-B Gandhamardan Mine being contiguous to each other is 707. The details of the employment in the mine are as follows:

OMC (Department)	Executives		13
	Class III		79
	Class IV		65
	Non-permanent employees		14
	Contractual		10
	Miners	Piece Rated Miner	160
		Daily Rated Miner	06
	Sub Total		347
Contractor	All Category		360
	Total		707

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10. MINERAL PROCESSING

a) Nature of the processing / beneficiation carried out.
No mechanical processing or beneficiation of ore will be carried out at Gandhamardan-A lease. Only screening & crushing will be done to produce the desired lumps & fines fraction.

b) Method for disposal of tailings or waste from the processing plant.
Not applicable.

c) Flow sheet or schematic diagram of the processing procedure.
No processing of Iron ore will be carried out at present.

d) Quantity and type of chemicals used in the processing plant.
Not applicable.

e) Quantity and type of chemicals stored on site / plant.
Not applicable

f) Quantity (cu.m. per day) of water required for mining and processing and sources of supply of water. Disposal of water and extent of recycling.
Not applicable, as no mineral processing will be carried out.

PART - B

11. ENVIRONMENTAL MANAGEMENT PLAN

Environment plan of the mine is prepared as depicted in plate no. MEC/Q6ZJ/11/16/14. The environment management plan is shown as plate no. MEC/Q6ZJ/11/16/13. Para wise description is given as under.It can be observed from the summary of the observations as enclosed in Annexure – 16 that the ambient air quality, water quality etc are within the permissible limits.

Status of baseline information with regard to the following :

Existing land use pattern in a tabular form.
The existing land use pattern as on 1.4.2013 is shown in the table below:

S.No	Head	Area, Ha.
1	Excavated area (Mining)	59.50
2	Top Soil Storage	0.00
3	OB dumps	0.55
4	Mineral storage	4.39
5	Infrastructure	1.02
6	Roads	15.21
7	Railways	0.00
8	Green belt	12.91
9	Tailing Pond	0.00
10	Effluent treatment plant	0.00
11	Mineral seperation plant	0.43
12	Township area	11.33
13	Sub grade stock	1.61
14	Total area	106.95

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Water regime

Gandhamardan hill range in the lease area has several streamlets flowing down the hill slope which is mostly seasonal in nature. Chamda nala, a perennial water source, flows in the south-west of the lease area. Western part of Gandhamardan area is drained by Bamani Nadi. However, drainage of the deposit is via ephemeral and perennial streams.

Finally, running water flows in to Baitarani River, the principal drainage system of the area.

The nearest water source is Suakati nala at a distance of 1km from colony. However, Chamdih nala flowing at a distance of 3km and Baitarani River at 10 km distance west of Gandhamardan hill range are the major sources of water

Flora and Fauna

Flora

The area supports a large variety of trees; the major species include sal (Shorea robusta) Palash (Butea frondosa), Kusum (Seheleichera trijug), Kadamba (Anthocephalus Cadamba), Seesum (Delbergia latifolia) and Bija (Pterocarpus marsupim). In addition, fruit trees like, Jackfruit (Artoicarpus lakocha), Mango (Mangifera indica), Grava (Psidium guava), Jamun (Syzygium cumini), etc are also found.

Fauna

The major species include Elephant (Elephas Indicus), Wild Boar (Cuscpiststus), Nilgri (Protose Pictus), Jacal (Canisavruss), Fox (Vulpus bengalensis), etc.

Aquatic Fauna

The area contain numerous small and large species of fish, the principal ones being Rohu.

Quality of air, ambient noise level and water

The same is enclosed as Annexure – 17.

Climatic conditions

The climatic condition in & around the Gandhamardan-A lease is dry. The peak summer temperature goes to around 45 deg. Celcius, where as the winter temperature are as low as around 6 deg. Celcius.

Human settlements

Only two villages have been found in the buffer zone of the area. The names of the villages are Daunara and Suakati. The details of the population of the villages in the buffer zone are given in the table below:-

Name of villages in the buffer zone	Population, Nos.
Daunara	2130
Suakati	2648

Public buildings, places of worship and monuments

There is no place of archaeological or religious importance within 5 km of the lease. अनुमोदित

Attach plans showing the locations of sampling stations APPROVED

The sampling stations are shown in the key plan & environment plan.

The area does fall under the notified area under Water (Prevention & Control of Pollution), Act, 1974.

b) Environmental Impact Assessment Statement describing the impact of mining and beneficiation on environment on the following upto conceptual plan period for 'A' category mines)

i) Land area likely to be degraded.

Land use pattern at the end of conceptual period is given below.

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Heads	Area in (Ha.) At conceptual period
Mining	436.7594
Dumping of OB	10.4716
Stacking of Ore	15.1420
Sub - Grade Ore Stack	13.6025
Processing & Stacking/ Infrastructure	49.5873
Housing / Colony.	11.3276
Area covered by Plantation	1.9573
Roads	2.3604
Magazine & Its Safety Zone	33.0541
Prohibited and protected safety zone area for mining operation	21.4300
Land used for Public Purpose + Agricultural Land and Home-stead Land	22.8838

ii) Air quality

Air pollution due to dust is likely on account of movement of HEMM & tippers on the road. Dust is also likely to be generated due to crushing & screening operations.

iii) Water quality

Water regime is not likely to be intercepted during the mining operations. However, surface water quality is likely to be affected due to increase in suspended solids only on account of movement of water over the waste dumps/ quarry, especially during monsoons.

iv) Noise levels

Air pollution due to noise is likely on account of movement of HEMM & tippers.

v) Vibration levels (due to blasting)

Vibration (due to blasting) is anticipated due to deep hole blasting operations.

vi) Water regime

It is to be noted that the existing groundwater levels on the hill top are well below the ore-body floor, expectedly more than 40 m bgl. These would therefore remain unaffected by mining operations.

vii) Socio-economics

This mining employment has greatly benefited the income levels of the natives. In addition, creation of comparatively well paid jobs in the area has generated not only sizeable trade in household supplies (including vegetables, milk, food, textile, etc) but also some household employment. It has also generated demand for tertiary services like transport and repair shops. The impact of mining operations in the area on socio-economic has been a positive one. The infrastructure of the area roads, public transport P&T facilities and electricity supply, has also improved after the advent of mining operation in the area.

viii) Historical monuments etc.

There are no historical monuments or places of archeological interest within 5 km radius of the lease.

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c) Environmental Management Plan

Temporary storage and utilization of topsoil

The quantity of top soil generated upto the conceptual period will be 308900 cu. m. Out of above quantity, 11000 cu. m of top soil will be generated during the scheme period. Due to low shelf life of the top soil; it shall be used for concurrent reclamation/ rehabilitation of the backfilled voids & also for avenue plantation due to very low shelf life of the lateritic soils. Year-wise generation of topsoil is given in table below.

Year	Top Soil Generation, cu. m
2013-14	0
2014-15	3560
2015-16	2522
2016-17	4918
2017-18	0
Total	11000

Year-wise proposal for reclamation of land affected by abandoned quarries and other mining activities during first five years (and upto conceptual plan period for 'A' category mines).

The overburden waste generated from the hill top quarry, float quarry & flank quarry will be has been proposed be backfilled into the mined out void in the conceptual stage. The detailed scheme of movement of waste materials for backfilling upto the conceptual stage is given in table below.

Backfilling schedule of mine wastes

Year	Backfill Destination	Backfill Location	Area (Hect.)	Quantity, M cu. m
2013-14	0	0	0	0
2014-15	Backfill 1	Quarry -VC1	2.92	0
2015-16	Backfill 1	Quarry -VC1	0	0.08
2016-17	Backfill 1	Quarry -VC1	0	0.09
	Backfill 2	Quarry -VD	0.8	0.02
2017-18	Backfill 2	Quarry -VD	0	0.02
2018 - Conceptual	Backfill 1	Quarry -VD	13.34	3.04
	Backfill 2	Float Quarry VB & VD	7.94	1.94
	Backfill 3	Hill top	13.86	5.59
Total			38.86	10.78

Programme of afforestation, year wise for the initial five years and upto conceptual plan period for 'A' category mines.

Around 500 saplings per year will be planted in the avenue plantation area and to replace the dead saplings, totaling to a figure of 2500 nos. in a span of 5 years.

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Stabilisation and vegetation of dumps alongwith waste dump management year-wise for the first five years and upto conceptual plan period for 'A' category mines.

As reflected in the table below a total of 11658 saplings will be planted over an area of 38.86 Ha. over the backfilled areas.

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(Afforestation plan upto conceptual period)

Backfill No.	Location	No. of saplings to be planted per Ha.	Area (Hect.)	Total no. of saplings to be planted
Backfill 1	Float Quarry VC	300	16.26	4878
Backfill 2	Float Quarry VB & VD	300	8.74	2622
Backfill 3	Hill top	300	13.86	4158
Total			38.86	11658

Measures to control erosion / sedimentation of water courses.

Depending upon the drainage pattern of the area where the dump / backfill area is located, retaining walls, garland drain with settling tanks will be provided. The quantum of work envisaged for construction of drains, retaining walls and settling tanks are given in table below.

Steps for water quality management

Period	Garland drain		Retaining wall		Settling tank	
	Name/ No.	Length,m	Name/ No.	Length,m	Name/ No.	Nos.
2012-13	-	-	R4 to R8	682	-	-
2014-15	-	-	R9	279	S2	1

Treatment and disposal of water from mine.

Depending upon the drainage pattern of the area where the dump / backfill area is located, retaining walls, garland drain with settling tanks will be provided. The quantum of work envisaged for construction of drains, retaining walls and settling tanks are given in table below.

Steps for water quality management

Period	Garland drain		Retaining wall		Settling tank	
	Name/ No.	Length,m	Name/ No.	Length,m	Name/ No.	Nos.
2012-13	-	-	R4 to R8	682	-	-
2014-15	-	-	R9	279	S2	1
2015-16	D1	120	R1	405	S1	1

The measures as envisaged above will be strictly implemented alongwith continued monitoring of

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Measures for minimising adverse effects on water regime.

It is to be noted that the existing groundwater levels on the hill top are well below the ore-body floor, expectedly more than 40 m bgl. These would therefore remain unaffected by mining operations.

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Protective measures for ground vibrations / air blast caused by blasting.

The blasting frequency will be limited to 2-3 times per week. The charge per delay will also be limited to control the ground vibrations.

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Measures for protecting historical monuments and for rehabilitation of human settlements likely to be disturbed due to mining activity. There are no historical monuments or places of archeological interest within 5 km radius of the mine.
Socioeconomic benefits arising out of mining. This mining employment has greatly benefited the income levels of the natives. In addition, creation of comparatively well paid jobs in the area has generated not only sizeable trade in household supplies (including vegetables, milk, food, textile, etc) but also some household employment. It has also generated demand for tertiary services like transport and repair shops. The impact of mining operations in the area on socio-economic has been a positive one. The infrastructure of the area roads, public transport P&T facilities and electricity supply, has also improved after the advent of mining operation in the area.
d) Monitoring schedules for different environmental components after the commencement of mining and other related activities. (for 'A' category mines only) The monitoring of Ambient air quality, surface water & ground water quality and noise quality will be carried out for all the four quarters of the year by the forest & environment section of OMC.

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PROGRESSIVE MINE CLOSURE PLAN

1.0 INTRODUCTION

Consequent upon introduction of progressive mine closure plan in the statutes mineral concession rules 1960 and MCDR 1988 vide GSR No. 329 (E) and 330 (E) both dated 10.4.2003, this report is being prepared in respect of Gandhamardan-A lease belonging to M/s OMC.

a) Name of the lessee	Gandhamardan Iron Ore Mine, Odisha Mining Corporation Limited
Address	Gandhamardan Iron Ore Mine, At/P.O – Suakati, Distt. – Keonjhar (Odisha) PIN - 770052
District	Keonjhar
State	Odisha
Pin Code	770052
Phone	0674-2393431, 2395689, 2393389
Fax	0674-2391629, 2396889, 2394772
Gram	-
Telex	-
e-mail	immcon_mine@yahoo.co.in
a) Details of area (with location map)	Gandhamardan Iron ore mine (Block-A) is located near Suakati of Keonjhar district of Odisha state and is covered by survey of India toposheet no. 73 G/6 & G/10. The latitudes and longitudes of the area are given below: Latitude: $21^0 36'00''$ to $21^0 37'09''$; Longitude: $85^0 29'20''$ to $85^0 31'30''$ The location map is shown as Plate No. MEC/Q6ZJ/ /11/16/1.
District and State	Distt. Keonjhar (Odisha)
Taluka & Police station	Tehsil- Telkoi, P.S- Suakati
Village	At/P.O - Suakati
Khasra No./ Plot No./ Block Range / Felling Series etc.	The land schedule of the leasehold area is enclosed as Annexure – 10.
Lease Area (hectares)	618.576 Hectares.
Whether the area is recorded to be in forest (please specify whether protected, reserved etc.)	486.134 Ha. of the lease area is under Protected Reserved Forest category and 33.6132 Ha. Of the lease area is under village forest. The land schedule of the leasehold area is enclosed as Annexure – 10.
Ownership / Occupancy	OMC

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Existence of public road / railway line, if any nearby and approximate distance	Gandhamardan M.L area is well connected with Keonjhar town which is at a distance of 16km due west. The said 16km long road consisting of 11km long metalled road in NH-6 between Keonjhargarh & Suakati and 5 km all weather road between Suakati & the lease area via Daonra village. The nearest railway station is Banspani, located at a distance of 80 km from NH-6. Barbil & Badjamada railway stations are located at a distance of 90 km and 100 km respectively.
Toposheet No. with latitude and longitude	Gandhamardan Iron ore mine (Block-A) is located near Suakati of Keonjhar district of Odisha state and is covered by survey of India toposheet no. 73 G/6 & G/10. The latitudes and longitudes of the area are given below: Latitude: 21°36'00" to 21°37'09" Longitude: 85°29'20" to 85°31'30"
Land Use Pattern (Forest, Agricultural, Grazing, Barren etc.)	see table below
Method of Mining & Mineral Processing	Mining is proposed to be done by open cast method by drilling, blasting of benches, mechanical excavation & transportation to portable screening plant/ crushing plant & transportation of products to a stack located at foothill for its dispatch. The wastes encountered are transported to its respective dump.

Land Use Pattern:

Type of land	Non forest	Forest		
		Protected reserved	Village	Total
Area, ha.	98.8288	486.134	33.6132	519.7472

1.1 **Reason for closure:** At present the mine is not under operation due to pending stage – II forestry clearance. However, regular dispatch of the accumulated fines & sub-grade fines within the lease, is being done with permission from the State Government.

1.2 **Statutory Obligations:** Gandhamardan -A lease is owned by Odisha Mining Corporation Limited (OMC Ltd.), A Govt. of Odisha Undertaking. The lease deed has been executed on 21.05.1963 for a period of 30 years (copy enclosed as Annexure - 7. Application for further renewal of the lease for a period of 20 years w.e.f. 21.05.1993 was made on 06.04.1992 and is under deemed to be renewed stage (copy of receipt of 1st lease renewal application is enclosed as Annexure – 8). Application for 2nd renewal of the lease for a further period of 20 years has been made on 01.05.2012 (copy of receipt of 2nd lease renewal application is enclosed as Annexure – 9). A copy of the environment clearance received from MoEF is enclosed as Annexure- 11.. A copy of the permission received from the Mining officer for lifting of accumulated fines & sub-grade fines from the lease is enclosed as Annexure-14.

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1.3 Progressive mine closure plan preparation:

a) Name of the applicant	Odisha Mining Corporation Limited
Address	Gandhamardan Iron Ore Mine, At/P.O – Suakati, Distt. – Keonjhar (Odisha) PIN - 770052
District	Keonjhar
State	Odisha
Police station	Suakati
Pin Code	770052
Phone	0674-2393431, 2395689, 2393389
Fax	0674-2391629, 2396889, 2394772
Gram	-
Telex	-
e-mail	immcon_mine@yahoo.co.in
b) Name of the RQP preparing the progressive mine closure plan	MECON Limited Copy of the RQP certificate is enclosed as Annexure – 6.
Address	P.O – Doranda, Ranchi – 834002 Jharkhand
Phone	0651 - 2481093, 2483645
Fax	0651 - 2482189, 2482214
e-mail	mining@meconlimited.co.in pkb@meconlimited.co.in
Telex	-
Registration No.	RQP/RNC/113/2004/B
Date of grant / renewal	17.12.2004
Valid upto	16.12.2014

2.0 **Mines Description**

2.1 **Geology**

The above have been described in detail in chapter 3.0 of this mining plan.

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2.2 **Reserves**

The above have been described in detail in chapter 3.0 of this mining plan.

2.3 **Mining Method**

The above have been described in detail in chapter 4.0 of this mining plan.

2.4 **Mineral Beneficiation**

The above have been described in detail in chapter 10.0 of this mining plan.

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3.0 Review of Implementation of Scheme of mining including five years Progressive Closure Plan

The scheme of mining including the PMCP has been followed to an extent as permission for diversion of the forest land for non-forestry use (stage-II forestry clearance) was not received. Stage-I clearance has been received in the year 2009 and no production from the mine workings have been envisaged during the year 2013-14 in the existing first five years period of the Mining Plan so that Stage-II clearance can be achieved and the proposed scheme could be exactly implemented.

4.0 Progressive Mine Closure Plan

4.1 Mine out land:

The existing land use pattern as on 1.4.2013 is shown in the table below:

S.No	Head	Area, Ha.
1	Excavated area (Mining)	59.50
2	Top Soil Storage	0.00
3	OB dumps	0.55
4	Mineral storage	4.39
5	Infrastructure	1.02
6	Roads	15.21
7	Railways	0.00
8	Green belt	12.91
9	Tailing Pond	0.00
10	Effluent treatment plant	0.00
11	Mineral seperation plant	0.43
12	Township area	11.33
13	Sub grade stock	1.61
14	Total area	106.95

The overburden waste generated from the hill top quarry, float quarry & flank quarry will be has been proposed be backfilled into the mined out void in the conceptual stage. The detailed scheme of movement of waste materials for backfilling upto the conceptual stage is given in table below.

Year	Backfill Destination	Backfill Location	Area (Hect.)	Quantity, M cu. m
2013-14	0	0	0	0
2014-15	Backfill 1	Quarry -VC1	2.92	0
2015-16	Backfill 1	Quarry -VC1	0	0.08
2016-17	Backfill 1	Quarry -VC1	0	0.09
	Backfill 2	Quarry -VD	0.8	0.02
2017-18	Backfill 2	Quarry -VD	0	0.02
2018 - Conceptual	Backfill 1	Quarry -VD	13.34	3.04
	Backfill 2	Float Quarry VB & VD	7.94	1.94
	Backfill 3	Hill top	13.86	5.59
Total			38.86	10.78

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4.2 Water Quality Management:

Depending upon the drainage pattern of the area where the dump / backfill area is located, retaining walls, garland drain with settling tanks will be provided. The quantum of work envisaged for construction of drains, retaining walls and settling tanks are given in table below.

Steps for water quality management

Period	Garland drain		Retaining wall		Settling tank	
	Name/ No.	Length,m	Name/ No.	Length,m	Name/ No.	Nos.
2012-13	-	-	R4 to R8	682	-	-
2014-15	-	-	R9	279	S2	1
2015-16	D1	120	R1	405	S1	1

The measures as envisaged above will be strictly implemented alongwith continued monitoring of environmental parameter as per the statutes.

4.3 Air quality management:

Following measures were proposed for management of air quality:-

- Water sprinkling on haul roads.
- Dense plantation along the safety zone.
- No overloading of tippers/ Dumpers.
- Provision of dust extractors with the drill machines/ wet drilling practices.
- Water spraying/ fogging in the dump hopper of crusher.
- All the conveyors will be completely covered.
- Provisions of dust masks to the persons exposed to dust.

Apart from the above, regular monitoring of the ambient air quality as per the statutes will be strictly followed.

4.4 Waste Management:

The overburden waste generated from the hill top quarry & float quarry has been proposed be backfilled into the mined out void during the proposed scheme period. The scheme of movement of waste material from the hill top mine to the respective mined out void for backfill is given in Table below.

Handling of mine waste from Hill top mine

Year	Waste Generation, cu. m	Backfill Destination	Backfill Location	Backfilled Quantity, cu. m
2013-14	-	-	-	-
2014-15	6836	Backfill 1	Quarry -VC1	6836
2015-16	13313	Backfill 1	Quarry -VC1	13313
2016-17	9828	Backfill 1	Quarry -VC1	9828
2017-18	20566	Backfill 2	Quarry -VD	20566
Total	50543			50543

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The scheme of movement of waste material from the Float quarry to the respective mined out void for backfill is given in Table below.

Handling of mine waste from Float quarry

Year	Waste Generation, cu. m	Backfill Destination	Backfill Location	Backfilled Quantity, cu. m
2013-14	-	-	-	-
2014-15	79200	Backfill 1	Quarry -VC1	79200
2015-16	84000	Backfill 1	Quarry -VC1	84000
2016-17	73200	Backfill 1	Quarry -VC1	46860
		Backfill 2	Quarry -VD	26340
2017-18	-	-	-	-
Total	236400			236400

4.5 Top soil management:

The quantity of top soil generated upto the conceptual period will be 308900 cu. m. Out of above quantity, 11000 cu. m of top soil will be generated during the scheme period. Due to low shelf life of the top soil; it shall be used for concurrent reclamation/ rehabilitation of the backfilled voids & also for avenue plantation due to very low shelf life of the lateritic soils. Year-wise generation of topsoil is given in table below.

Top soil generation

Year	Top Soil Generation, cu. m
2013-14	0
2014-15	3560
2015-16	2522
2016-17	4918
2017-18	0
Total	11000

4.6 Tailing Dam Management:

Not applicable

4.7 Infrastructure:

The site services envisaged is common for both Gandhamardan-B & A lease.

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Industrial Services:

Power: The electric power is drawn from 33 KV line from Keonjhargarh substation of Grid Corporation of Orissa.

Workshop Facilities:

The servicing & repairing shop facilities include:

- Servicing & repairing space
- Emergency spares room (store) with tools
- Services station (with water treatment facilities)
- Mechanical (garage) Engineer – Cum- Record Room.

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- Foreman's office
- Toilet

Water Supply:. The nearest water source is Suakati nala at a distance of 1km from colony. However, Chamdih nala flowing at a distance of 3km and Baitarani river at 10km distance west of Gandhamardan hill range are the major sources of water. Two number of 20 HP pumps (1 working & 1 standby) are presently catering to water supply need of the camp.

Other Support Facilities:

All the statutory facilities such as crèche, canteen, first-aid centre, vocational training centre etc have been provided. To take care of the drinking water needs at different working areas, water tankers have been envisaged for the mine. The rest shed-cum-Lunch rooms have been provided near quarry site as per Mines Rules-56. First –aid facilities and toilet are attached to the rest shed. Portable blasting sheds of one end open type have been provided at the mine site for giving protection to the blasters during blasting. These blasting sheds are made up of steel and are shifted in accordance with the shifting of blast hole locations

An administrative block is made available to house the following rooms:

- Office for Mines Manager, assistant mines manager, Geologist, Surveyor & Labour Welfare Officer
- Vocational Training Centre
- Canteen
- General office (records, time keeping & cash counter, typing facilities etc)

4.8 **Disposal of mining machinery:**

Most of the machinery proposed to be deployed will be through contractors. Therefore after the closure of the mine, the machinery will be retrenched by the contractor for its deployment elsewhere. However, there is no proposal of disposal of mining machinery during the first five years of the plan period.

4.9 **Safety and Security:**

The mining lease area is free from habitation and villages are situated at a very considerable distance from the mining lease area. In order to prevent entry of outsiders into the mining lease area, solid masonry wall will be provided at entrance. All entries to mining area are restricted to people working in the mine. Signboards have been displayed at various entry points to check the entry of unauthorized persons into mining area. Mining operations are strictly carried out as per statutory provision provided under MMR, 1961 and allied circulars and MCDR, 1988 under the guidance of statutory qualified persons such as Mining Engineer, Mines Manager, Assistant Manager, Mines Foreman, Blaster, and Mechanical Engineer. Security is also provided round the clock to check any inadvertent entry of unauthorized person into the mining area. The facility provided shall continue person into the mining area. The facility provided shall continue to be available during progressive mine closure stage.

4.10 **Disaster Management and Risk Assessment:**

The objective of on-site disaster management plan for the mine is to in a state of perpetual readiness through training and development to immediately control and arrest any emergency situation so as to avert a full fledged disaster and the consequence of human and property damage and in the event of a disaster still occurring, to manage the same so that the risk of the damage to life and property in minimized.

HCL have a demand procedure for Emergency Preparedness and Responses. The emergency situations arising out of the situations as defined in the clause shall be addressed in the document.

The salient features are elaborated as below:

- Emergency Response Organization
- Communication System
- Action on the site
- Facilities available at site
- Medical treatment for Injured personnel's
- Emergency Response Organization

Following officers of the mines will be responsible for co-ordination in case emergency situated in any sections of the mine.

Person	Responsibility
Head of Department / Mine Agent	Site Controller
Mines Manager / Shift In-charge	Accident Controller / Communication Officer
Employee who gives the first information about the incident / accident	Primary Controller
P & A Department (HOD)	Liaison Officer

Key Personnel and their responsibilities

Site Controller:

- The head of the department / mine agent shall have an overall responsibility for controlling the incident / accident and directing the personnel.
- To prepare a full proof plan for control of accident like, landsides, subsidence flood and other natural calamities.
- To inform statutory bodies of the State and Central Government.
- To inform communication officer about the emergency, control centre and assembly point.
- To provide all assistance and call for fire squad, security officer and other services required for removing / control of danger.
- To ensure that all necessary personnel assemble at assembly point.
- Make arrangement for medical treatment to the personnel injured seriously.

Accident Controller:

- Mines manager shall act as accident controller/ communication officer.
- Mock rehearsal of management plan prepared for accident.
- To withdraw men / machine from the affected area with priority for safety of personnel, minimize damage to the machines, environment and loss of material.
- To make a report based on the facts and figure and submit to the site controller.
- To communicate to the site in charge and make arrangement for first aid and transportation of the Injured personnel.

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Primary Controller:

- To inform the Accident Controller / shift in-charge from the nearest means of communication about the location and the nature of accident.
- To assist in clearing any obstruction in relief of accident.
- To carry out all instructions of accident controller.
- To provide first aid treatment and communicate to the shift in-charge.

Capability of Lessee:

Following facilities are available at mine site:

- Public address system
- Telephone / Mobile handsets
- Runners / Messenger
- Emergency alarm
- Fire fighting equipment and accessories with trained manpower
- Full fledge hospital at a distance of 4 km from the mine.
- Training centre
- Fire tender
- Ambulance van
- Jeeps

4.11 Care and Maintenance during temporary discontinuance:

When the mine is temporarily discontinued due to any unforeseen circumstances the following care and maintenance shall be carried out:

- Notice to be served to all the concerned authority.
- Temporary fencing shall cover the mine entries.
- All access roads/openings to the pit / face shall be closed by parapet wall as per rule.
- Warming shall be displayed on the 'Notice Board' at appropriate places.
- Security personnel shall be posted at every danger point.
- No unauthorized person shall be allowed to enter into the mine without prior permission of the management.
- Garland drain shall be made all around the mine and dumps to prevent water flow towards mine for prevention of landslide/side fall and siltation etc.
- All men and machinery shall be withdrawn from the mine and shall be kept in a compound and safe place.
- All safety precautions shall be taken care of as per rule.

5.0 Economic Repercussions of closure of mine and manpower retrenchments:

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

The manpower deployment is discussed in Chapter – 11 and local population has been engaged in workers category. The manpower provided for carrying out mining activity shall continue to be employed during this progressive mine closure stage.

5.2 Compensation given or to be given to the employees connecting with substance of himself and their family:

Not applicable at this stage. However, at the time of temporary closure compensation / benefits as per rule shall be given to the employees.

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5.3 **Satellite occupations connected to the mining industry – Number of persons engaged therein – continuance of such business after mine close:**
Presently, there is no proposal for mine closure; therefore, question of affecting satellite occupation does not arise.

5.4 **Continued engagement of employees in the rehabilitated status of mining lease area and any other remnant activities:**
At present, no rehabilitation of manpower has been planned due to continuing mining operation in the area. However, at the mine closure stage, manpower shall be suitably rehabilitated as per the prevalent site conditions and agreement.

5.5 **Envisaged repercussion on the expectation of the society around due to closure of mine:**
Continuance of mining activity in the area has resulted into overall improvement of society due to direct / indirect job opportunities, improved communication, education, medical facilities, transport, drinking water, road networking. This is likely to continue during future progressive mine closure plan also. During final closure plan expectation of society shall be taken care of on mutual basis.

6.0 **Time Scheduling for abandonment:**
A tentative time frame for completion of jobs for mine closure operation (in months) from date of cessation is shown in table below.

Time scheduling for abandonment

Activities	Tentative time frame for completion of Jobs for mine closure operation (in months) from date of cessation.											
Months →	1	2	3	4	5	6	7	8	9	10	11	12
Reclamation & Rehabilitation of mined out land.	The overburden waste generated from the hill top quarry, float quarry & flank quarry will be has been proposed be be backfilled into the mined out void in the conceptual stage. The detailed scheme of movement of waste materials for backfilling upto the conceptual stage is given in table 11.5. (Table 11.5) Backfilling schedule of mine wastes (see below)											
Waste Management	Not Applicable											
Decommission of												

(Table 11.5) Backfilling schedule of mine wastes

Year	Backfill Destination	Backfill Location	Area (Hect.)	Quantity, M cu. m
2013-14	0	0	0	0
2014-15	Backfill 1	Quarry -VC1	2.92	0
2015-16	Backfill 1	Quarry -VC1	0	0.08
2016-17	Backfill 1	Quarry -VC1	0	0.09
	Backfill 2	Quarry -VD	0.8	0.02
2017-18	Backfill 2	Quarry -VD	[illegible]	0.02
2018 - Conceptual	Backfill 1	Quarry -VD	[illegible]	3.04
	Backfill 2	Float Quarry VB & VD	[illegible]	1.94
	Backfill 3	Hill top	13.86	5.59
Total			38.86	10.78

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Activities	Tentative time frame for completion of jobs for mine closure operation (in months) from date of cessation.											
Months ⟶	1	2	3	4	5	6	7	8	9	10	11	12
infrastructure												
Safety & Security												
Monitoring of air & water												
Disposal of mining m / c.												

7.0 Abandonment cost:

The tentative abandonment cost based on the activities required for implementing the protective and rehabilitation measures including their maintenance and monitoring for the 2013 – 14 is as given below:

Sl.No	Items	Details	Area (Hect.)	Quantity	Expenditure (Rs)
			Proposed	Proposed	Proposed
A	Reclamation & Rehabilitation of Mined out Land area	(i) Backfilling (ii) Afforestation on the backfilled area. (iii) Other (please specify) e.g Afforestation on exhausted benches (iv) Pisciculture (v) Converting into water reservoir. (vi) picnic spot	Not Applicable		-
B	Stabilization & Rehabilitation of Dumps (with lease)	(i) Terracing	-	-	-
		(ii) Pitching	-	-	-
		(iii) Construction of Parapet walls/ Retaining wall at toe of dumps.	Parapet wall, m	682	68200
		(iv) Construction of Check Dams along slope of vallies etc.	-	-	-
		(v) Construction of settling ponds, (Garland drain etc.)	Drain	-	-
			Settling tank	-	-
		(vi) Desilting of settling ponds, channels.	-		-
		(vii) Afforestation on dumps	-		-
		(viii) Others (Please specify)	-		-
C	Rehabilitation of Barrened Area within Lease	(i) Afforestation (Green belt building)	Replacement of dead saplings on the plantation done at foothill	500	7500

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Sl.No	Items	Details	Area (Hect.)	Quantity	Expenditure (Rs)
			Proposed	Proposed	Proposed
		(ii) Others (Please specify)	-	-	-
D	Environmental Monitoring (Core zone & Buffer Zone separately)	(i) Ambient Air Quality (ii) Water Quality (iii) Noise Level Survey (iv) Ground Vibration (v) Others (Please Specify)	For the total lease	As per the statutes	1250000
Total					1325700

The tentative abandonment cost for the 2014 – 15 is as given below:

Sl.No	Items	Details	Area (Hect.)	Quantity	Expenditure (Rs)
			Proposed	Proposed	Proposed
A	Reclamation & Rehabilitation of Mined out Land area	(i) Backfilling (ii) Afforestation on the backfilled area. (iii) Other (please specify) e.g Afforestation on exhausted benches (iv) Pisciculture (v) Converting into water reservoir. (vi) picnic spot	Not Applicable		-
B	Stabilization & Rehabilitation of Dumps (with lease)	(i) Terracing	-	-	-
		(ii) Pitching	-	-	-
		(iii) Construction of Parapet walls/ Retaining wall at toe of dumps.	Parapet wall, m	280	28000
		(iv) Construction of Check Dams along slope of vallies etc.	-	-	-
		(v) Construction of settling ponds, (Garland drain etc.)	Drain Settling tank	- -	- -
		(vi) Desilting of settling ponds, channels.	-	-	-
		(vii) Afforestation on dumps	-	-	-
		(viii) Others (Please specify)	-	-	-
C	Rehabilitation of Barrened Area within Lease	(i) Afforestation (Green belt building)	Replacement of dead saplings on the plantation done at foothill	500	7500
		(ii) Others (Please specify)	-	-	-
D	Environmental	(i) Ambient Air Quality	For the total	As per the	1250000

(PK Bhattacharjee, Key Person)
MECON LIMITED
RQP/RNC/113/2004/B

Sl.No	Items	Details	Area (Hect.)	Quantity	Expenditure (Rs)
			Proposed	Proposed	Proposed
	Monitoring (Core zone & Buffer Zone separately)	(ii) Water Quality	lease	statutes	
		(iii) Noise Level Survey			
		(iv) Ground Vibration			
		(v) Others (Please Specify)			
		Total			1285500

The tentative abandonment cost for the 2015 – 16 is as given below:

Sl.No	Items	Details	Area (Hect.)	Quantity	Expenditure (Rs)
			Proposed	Proposed	Proposed
A	Reclamation & Rehabilitation of Mined out Land area	(i) Backfilling	Not Applicable		-
		(ii) Afforestation on the backfilled area.			
		(iii) Other (please specify)			
		e.g Afforestation on exhausted benches			
		(iv) Pisciculture			
		(v) Converting into water reservoir.			
		(vi) picnic spot			
B	Stabilization & Rehabilitation of Dumps (with lease)	(i) Terracing	-	-	-
		(ii) Pitching	-	-	-
		(iii) Construction of Parapet walls/ Retaining wall at toe of dumps.	Parapet wall, m	405	5[illegible]0
		(iv) Construction of Check Dams along slope of vallies etc.	-	-	
		(v) Construction of settling ponds, (Garland drain etc.)	Drain, m	120	
			Settling tank, Nos.	1	
		(vi) Desilting of settling ponds, channels.	-	-	-
		(vii) Afforestation on dumps	-	-	-
		(viii) Others (Please specify)	-	-	-
C	Rehabilitation of Barrened Area within Lease	(i) Afforestation (Green belt building)	Replacement of dead saplings on the plantation done at foothill	500	7500
		(ii) Others (Please specify)	-	-	-
D	Environmental	(i) Ambient Air Quality	For the total	As per the	1250000

(PK Bhattacharjee, Key Person)
MECON LIMITED
RQP/RNC/113/2004/B

Sl.No	Items	Details	Area (Hect.)	Quantity	Expenditure (Rs)
			Proposed	Proposed	Proposed
	Monitoring (Core zone & Buffer Zone separately)	(ii) Water Quality	lease	statutes	
		(iii) Noise Level Survey			
		(iv) Ground Vibration			
		(v) Others (Please Specify)			
		Total			1310100

The tentative abandonment cost for the 2016 – 17 is as given below:

Sl.No	Items	Details	Area (Hect.)	Quantity	Expenditure (Rs)
			Proposed	Proposed	Proposed
A	Reclamation & Rehabilitation of Mined out Land area	(i) Backfilling	Not Applicable		-
		(ii) Afforestation on the backfilled area.			
		(iii) Other (please specify)			
		e.g Afforestation on exhausted benches			
		(iv) Pisciculture			
		(v) Converting into water reservoir.			
		(vi) picnic spot			
B	Stabilization & Rehabilitation of Dumps (with lease)	(i) Terracing	-	-	-
		(ii) Pitching	-	-	-
		(iii) Construction of Parapet walls/ Retaining wall at toe of dumps.	Parapet wall, m	-	-
		(iv) Construction of Check Dams along slope of vallies etc.	-	-	
		(v) Construction of settling ponds, (Garland drain etc.)	Drain, m	-	
			Settling tank, Nos.	-	
		(vi) Desilting of settling ponds, channels.	-	-	-
		(vii) Afforestation on dumps	-	-	-
		(viii) Others (Please specify)	-	-	-
C	Rehabilitation of Barrened Area within Lease	(i) Afforestation (Green belt building)	Replacement of dead saplings on the plantation done at foothill	500	7500
		(ii) Others (Please specify)	-	-	-
D	Environmental	(i) Ambient Air Quality	For the total	As per the	1250000

अनुमोदित
APPROVED

(PK Bhattacharjee, Key Person)
MECON LIMITED
RQP/RNC/113/2004/B

Sl.No	Items	Details	Area (Hect.)	Quantity	Expenditure (Rs)
			Proposed	Proposed	Proposed
	Monitoring (Core zone & Buffer Zone separately)	(ii) Water Quality	lease	statutes	
		(iii) Noise Level Survey			
		(iv) Ground Vibration			
		(v) Others (Please Specify)			
		Total			1257500

The tentative abandonment cost for the 2017 – 18 is as given below:

Sl.No	Items	Details	Area (Hect.)	Quantity	Expenditure (Rs)
			Proposed	Proposed	Proposed
A	Reclamation & Rehabilitation of Mined out Land area	(i) Backfilling	Not Applicable		-
		(ii) Afforestation on the backfilled area.			
		(iii) Other (please specify)			
		e.g Afforestation on exhausted benches			
		(iv) Pisciculture			
		(v) Converting into water reservoir.			
		(vi) picnic spot			
B	Stabilization & Rehabilitation of Dumps (with lease)	(i) Terracing	-	-	-
		(ii) Pitching	-	-	-
		(iii) Construction of Parapet walls/ Retaining wall at toe of dumps.	Parapet wall, m	-	
		(iv) Construction of Check Dams along slope of vallies etc.	-	-	
		(v) Construction of settling ponds, (Garland drain etc.)	Drain, m	-	
			Settling tank, Nos.	-	
		(vi) Desilting of settling ponds, channels.	-	-	-
		(vii) Afforestation on dumps	-	-	-
		(viii) Others (Please specify)	-	-	-
C	Rehabilitation of Barrened Area within Lease	(i) Afforestation (Green belt building)	Replacement of dead saplings on the plantation done at foothill	500	7500
		(ii) Others (Please specify)	-	-	-
D	Environmental	(i) Ambient Air Quality	For the total	As per the	1250000

APPROVED

(PK Bhattacharjee, Key Person)
MECON LIMITED
RQP/RNC/113/2004/B

Sl.No	Items	Details	Area (Hect.)	Quantity	Expenditure (Rs)
			Proposed	Proposed	Proposed
	Monitoring (Core zone & Buffer Zone separately)	(ii) Water Quality	lease	statutes	
		(iii) Noise Level Survey			
		(iv) Ground Vibration			
		(v) Others (Please Specify)			
		Total			1257500

8.0 **Financial Assurance:**

The financial assurance is given in the table below.

S.No	Head	Area put to use at the start of scheme i.e. as on 1.4.13	Additional area required during the scheme period in the plan upto 31.3.2018	Total	Area considered as fully reclaimed & rehabilitated	Net area considered for calculation of financial assurance
1	Excavated area (Mining)	59.50	3.72	63.22	0.00	63.22
	Top Soil Storage	0.00	0.00	0.00	0.00	0.00
2	OB dumps	0.55	0.00	0.55	0.00	0.55
3	Mineral storage	4.39	0.00	4.39	0.00	4.39
4	Infrastructure	1.02	0.00	1.02	0.00	1.02
5	Roads	15.21	0.00	15.21	0.00	15.21
6	Railways	0.00	0.00	0.00	0.00	0.00
7	Green belt	12.91	0.00	12.91	0.00	12.91
8	Tailing Pond	0.00	0.00	0.00	0.00	0.00
9	Effluent treatment plant	0.00	0.00	0.00	0.00	0.00
10	Mineral separation plant	0.43	0.00	0.43	0.00	0.43
11	Township area	11.33	0.00	11.33	0.00	11.33
12	Sub grade stock	1.61	1.91	3.52	0.00	3.52
13	Total area	106.95	5.63	112.58	0.00	112.58

The total financial assurance upto 31.3.2018 will be Rs. 2814500 /- @ Rs.25000/- per hectare. A copy of the bank guarantee submitted is enclosed as Annexure – 21.

9.0 **Certificate:**

A certificate in this effect is enclosed along with this report.

10.0 **Plans/ Sections etc.**

The Progressive Mine Closure Plan is enclosed as Plate No. MEC/QGZJ/11/16/15.

अनुमोदित
APPROVED

14/8/17

खान नियंत्रक (मध्यांचल)
Controller of Mines (Central Zone)
भारतीय खान ब्यूरो
Indian Bureau of Mines

(PK Bhattacharjee, Key Person)
MECON LIMITED
RQP/RNC/113/2004/B

ANNEX. - 1

भारत सरकार - भारतीय खान ब्यूरो
GOVT. OF INDIA - INDIAN BUREAU OF MINES

Annexure 1A

List of Board of Directors

Name	Designation	Telephone Nos.
Shri Saswat Mishra,IAS	Chairman-cum-Managing Director, Odisha Mining Corporation Limited,	2392778(O) 2394655(O)
Shri Rajesh Verama, IAS	Principal Secretary to Govt., Steel and Mines Deptt, Odisha, Bhubaneswar	2392903
Shri Ashok Kumar Tripathy, IAS	Principal Secretary to Govt., Public Enterprises Deptt, Odisha, Bhubaneswar	2536623
Shri B.K Rath,OFS	Special Secretary to Govt., Finance Department, Odisha, Bhubaneswar	2394054
Shri Priyanath Padhy, IFS	Principal Chief Conservator of Forest, Odisha Aranya Bhavan, C.S.Pur, Bhubaneswar	2300853(O) 2300049(Fax) 2535680(R)
Shri Deepak Kumar Mohanty,IFS	Director of Mines, Odisha, BBSR	2391537(O)
Shri Chittaranjan Das, Independent Director	Ex-CMD, Mahanadi Coal Field Plot No.C/91, Palaspalli, Bhubaneswar	2591164(R) 94370-66672(M)
Shri D K Roy, Independent Director	Former Chairman,OERC, Plot No. N-2/63, IRC Village, Bhubaneswar	9437049003(M) 2554462(R)
Shri S.N.Padhi, Independent Director	Retired Director General Mines Safety A/8, Pallaspalli, Bhubaneswar	9437301992(M) 2593396(R)
Dr S.Acharya, Independent Director	Former Vice-Chancellor, Utkal University, Plot No.155, VIP Colony, IRC Village, Bhubaneswar	9437131037(M) 2554118(R)
Shri G.S.Khuntia, Independent Director	Rtd. Executive Director, SAIL 21-B, Jai Durga Nagar, Bhubaneswar-751006 .	9437071764(M) 2571764(R)

अनुमोदित
APPROVED

ANNEX. - 2

Cable ORMINCORP, Bhubanesw

Tel. (0674 2393431, 2395689, 2393389 (EPABX), 2392747(Dir)
Fax: 0674-2391629, 2396889, 2394772

The Orissa Mining Corporation Ltd.
(A Government of Orissa Undertaking)
OMC HOUSE, BHUBANESWAR -751001

RESOLUTION OF THE BOARD OF DIRECTORS

Resolved that the Managing Director be and is hereby authorised to sign, execute and modify the document, Contract, Power of Attorney, Statutory Declaration, etc. furnished/to be furnished to the different authorities for and on behalf of Orissa Mining Corporation Ltd.

The Managing Director is further authorised to delegate this authority given to him by the Board of Director of O.M.C.Ltd. through this resolution, to any of the officers of OMC Ltd. to file the same before the IBM and the M.O.E.F. authorities.

(J.B.Das)
Company Secretary
Orissa Mining Corporation

अनुमोदित
APPROVED

भारतीय गैर न्यायिक

पचास रुपये

FIFTY RUPEES

Rs.50 Rs.50

INDIA

INDIA NON JUDICIAL

SPECIAL ADHESIVE

उड़ीसा ORISSA

BIBEKANANDA BISWAL
CITY NOTARY, BBSR.
Regd. No.-ON-01/2000
Mobile- 8018618347

NOTARY GOVT. OF ODISHA (INDIA)

POWER OF ATTORNEY

BE IT KNOWN TO ALL THAT on behalf of the Orissa Mining Corporation, Bhubaneswar, I Shri Saswat Mishra, IAS, Chairman-cum-Managing Director, OMC Ltd., Bhubaneswar aged about 39 years, son of Shri Basanta Kumar Mishra hereby appoint Shri Sudhansu Kumar Das, aged about 55 years, son of Shri Prahallad Chandra Das of Jajpur at present residing at Quarter No.C-8, OMC Colony, Unit-8, Nayapalli, Bhubaneswar, Dist: Khurda as the Attorney to act in the

Contd.P/2

APPROVED

S.K. Das
S.M.(GEO) OMC

Page 75

ANNEX. - 2

भारतीय गैर न्यायिक

बीस रुपये

रु.20

Rs.20

TWENTY RUPEES

INDIA

INDIA NON JUDICIAL

ଓଡ଼ିଶା ओडिशा ORISSA

name of the Corporation and on its behalf to sign for filing applications for all Reconnaissance Permits, Prospecting Licences, Mining Leases, Quarry Leases and Surface Right permission and to execute all Reconnaissance Permits, Prospecting Licences, Mining Leases and Quarry Lease deeds.

Contd.P/3

NOTARY
N. BISWAL
BHUBANESWAR
Regd. No. ON-0312600
GOVT. OF ODISHA (INDIA)

अनुमोदित
APPROVED

भारतीय गैर न्यायिक

बीस रुपये Rs.20

रु.20 TWENTY RUPEES

INDIA

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ଓଡ଼ିଶା ओड़िशा ORISSA

670798

AND the Corporation do hereby agree to ratify all acts, deeds, instruments done or made by the above named Sr. Manager(Geology) which shall be deemed to be done or made by the Corporation and shall be binding on the Corporation with full force and effect.

Contd.P/4

अनुमोदित
APPROVED

41

ANNEX. - 2

भारतीय गैर न्यायिक

दस रुपये रु.10

TEN RUPEES RS.10

INDIA

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ଓଡ଼ିଶା ओडिशा ORISSA

2698

In witness whereof, this power of attorney is signed in the presence of the witnesses hereinafter mentioned this day of 13.9.2012.

(S. Mishra)
Chairman-cum- Managing Director
Orissa Mining Corporation Ltd.
Bhubaneswar

Witnesses:

1. Saroj Kumar Parsad
Manager (Legal)
Orissa Mining Corporation Ltd.
Bhubaneswar

Parthajyoti Mortha
Sr Asst Gr I
Legal Cell
OMC Ltd, Bbsr

Certified that the executant is my client and the documents has been typed by my typist according to my dictation.

Advocate, Bhubaneswar

BIBEKANANDA BISWAL
CITY NOTARY, BBSR.
Regd. No. ON-01/2009
Mobile- 8018818347

अनुमोदित
APPROVED

ANNEX. - 3

आयकर विभाग   भारत सरकार

INCOME TAX DEPARTMENT   GOVT. OF INDIA

SUDHANSU KUMAR DAS

PRAHALLAD CHANDRA DAS

10/10/1957

Permanent Account Number

AANPD9674J

Page 79

Sudhansu Kumar Das

Signature

4

ANNEX. - 3

In case this card is lost / found, kindly inform / return to :

Income Tax PAN Services Unit, UTIITSL

Plot No. 3, Sector 11, CBD Belapur,

Navi Mumbai - 400 614.

इस कार्ड के खोने/पाने पर कृपया सूचित करें/लौटाएं :

आयकर पैन सेवा यूनिट, UTIITSL

प्लॉट नं: 3, सेक्टर 11, सी.बी.डी.बेलापुर,

नवी मुंबई-४०० ६१४.

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ANNEX. - 4

Address proof of Power of Attorney holder Sri S.K.Das

CESU
ELECTRICITY BILL
BILL MONTH: OCT-12
BILL NO: 09562 VER 5.02N
BILLED FOR 1 MONTHS
SUB DIV: BCDD-1 BHUBANESWAR
SECTION: SDO-1
CONSUMER A/C NO. 01593750
CESU
NAME: S.K.DAS
ADDRESS: QRT NO. 8 TYPE
COLONY
3.000
ACTUAL
50.00
119.80
525.00
220.50
METER RENT
PRES. BILL AMT 35.62
1042.12
254.58
-116.28
MISC CHARGES 0.00
TOTAL BILL BY DUE DT 1180.42
24.58
1156.00
REBATE DATE 26-10-12
PAY AFT DUE DT 1180.00
LAST PAYMENT DETAILS
ECS Message

CESU
ELECTRICITY BILL
BILL MONTH: OCT-12
CONSUMER A/C NO. 01593750
CESU
NAME: S.K.DAS
3.000
ACTUAL
PRES. BILL AMT
1042.12
TOTAL BILL BY DUE DT
1156.00
REBATE DATE 26-10-12
PAY AFT DUE DT 1180.00
LAST PAYMENT DETAILS
ECS Message

अनुमोदित
APPROVED

LIST OF LEASES OF THE APPLICANT

Sl. No	Name of M.L area	Mineral	Area (ha)	District	Date of grant	Date of renewal	Period (years)
1	SGBK	Iron	1011.500	Keonjhar			
2	Tiringpahar	Iron	79.300	-do-	24.08.64	24.08.94	30
3	Kurmitar	Iron	1212.470	Sundargarh	29.04.65	29.04.85	20
4	Rantha	Iron	408.870	-do-	-do-	31.12.98	30
5	Gandhamardan (A)	Iron	618.576	Keonjhar	21.05.63	21.05.63	30
6	Gandhamardan (B)	Iron	1590.867	-do-	11.07.70	11.07.70	30
7	Banspani	Iron	380.400	-do-	21.05.66	21.05.66	30
8	Khandbandha	Iron	366.310	-do-	30.11.63	30.11.93	30
9	BPJ	Iron	861.521	-do-	27.02.70	27.02.2002	30
10	Koira-Kalsra	Iron	418.360	Sundergarh	13.10.76	13.10.96	20
11	Koire-Bhanjpali	Iron	141.240	-do-	07.05.82	07.05.2012	30
12	Daitari	Iron	190.200	Keonjhar & Jajpur	27.01.66	27.01.96	30
13	Balda-palsa	Iron	861.521	Keonjhar	27.02.70	27.02.2000	30
14	Tomka	Iron	1225.027	Jajpur	--	--	--
15	Sekradihl	Iron	189.63	Keonjhar	28.12.59	28.12.89	30
16	Seremda-Bhadrashi	Iron & manganese	1734.570	-do-	30.08.86	30.08.2006	20
17	Dubna-Sekradihi	Iron & manganese	1332.019	-do-	28.12.59	28.12.89	30
18	Dalki	Iron & manganese	265.290	-do-	07.08.76	07.08.96	20
19	Nishikhal	Manganese	501.67	Koraput	28.09.87	28.09.2007	20
20	Parlipada	Manganese	104.86	Keonjhar	25.04.81	25.04.2001	20
21	Roida	Manganese	78.711	-do-	25.04.81	25.04.2001	20
22	Dubna	Manganese	1135.419	-do-	08.09.71	08.09.91	20
23	Koilha-Rolda	Manganese	192.81	-do-	08.02.77	08.02.77	20
24	Kaliapani	Chromite	971.245	Jajpur	08.07.67	08.07.87	20
25	South-kaliapani	Chromite	552.457	-do-	22.01.80	22.01.2000	20
26	Sukragi	Chromite	382.709	-do-	20.09.80	20.09.2000	20
27	Banipank (Boula-B)	Chromite	1582.583	-do-	--	--	20
28	Bangur	Chromite	145.850	-do-	0.09.75	0.09.75	20
29	Boula	Chromite	207.360	-do-	07.08.65	07.08.65	20
30	Base of mahagiri	Chromite	165.810	-do-	09.09.70	09.09.70	20
31	Saruabil-Sukarangi	Chromite	23.243	-do-	29.01.81	29.01.81	15
32	Kathapal	Chromite	264.466	Dhenkanal	10.02.69	10.02.69	20
33	Birsal	Chromite	583.21	-do-	04.11.76	04.11.76	20
34	Kalarangi,	Chromite	936.220	Jajpur	09.12.66	09.12.66	20
35	Baphlimali	Bauxite	1388.74	Rayagada & Kalahandi	अनुमोदित	--	--
36	Umpavalley	Limestone	859.990	Koraput	APPROV [illegible]	10.08.95	20
37	Jillingdhar	Gemstone	35.686	Kalahandi	01.10.92	01.10.2002	10
38	Hinjilibahal	Gemstone	57.465	-do-	14.06.2003	14.06.2003	10

ANNEX. - 5

Sl. No	Name of M.L area	Mineral	Area (ha)	District	Date of grant	Date of renewal	Period (years)
39	Budhapara	Gemstone	38.950	Nuapara	14.06.93	14.06.2003	10
40	Kumardubi	Titanium bearing vanadiferous magnetite	289.852	Mayurbhanj	--	--	--
41	Dumuria	China clay	142.70	Mayurbhanj	09.08.78	09.08.98	20

CERTIFICATE OF RECOGNITION AS QUALIFIED PERSON TO PREPARE MINING PLANS

(Under Rule 22 (c) of Mineral Concession Rules 1960)

M/s........MECON Limited.................................having registered office at Doranda, Ranchi - 834002 (JHK).........and having given satisfactory evidence of the qualifications and experience of their key persons is hereby granted recognition under Rule 22 (c) of the Mineral Concession Rules 1960 as a Qualified Person to prepare Mining Plans.

The registration number is RQP/RNC/113/2004/B

This recognition is valid for a period of ten years ending ....16.12.2014.....................................

Place: Ranchi
Date: 17.12.2004.

17.12.04
Regional Controller of Mines
Indian Bureau of Mines
........Ranchi..........

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

<u>Name of the recorded Key Persons:</u>

1. Sh. Abhijit Bhattacharya, B.Tech. (Mining), M.Tech.
2. Sh. H.K. Bhanj Deo, M.Tech. (Applied Geology)
3. Sh. Sanjay Kumar, M.Sc. Tech. (Applied Geology)
4. Sh. Rajesh Thakur, B.E. (Mining Engg.)

<u>Name of the recorded Key Persons (As on 19/07/2006):</u>

1. Sh. H.K. Bhanj Deo, M.Tech. (Applied Geology)
2. Sh. Sanjay Kumar, M.Sc. Tech. (Applied Geology)
3. Sh. Rajesh Thakur, B.E. (Mining Engg.)
4. Sh. Prasad Kumar Bhattacharjee, B.E. (Mining Engg.)

Regional Controller of Mines
भारतीय खान ब्यूरो
Indian Bureau of Mines

4

INDIA NON JUDICIAL

Rs.500

FIVE HUNDRED RUPEES

OFFICE OF THE COLLECTOR MINING DEPARTMENT KEONJHAR DISTRICT

Registering Officer

FORM K

MINING LEASE

(See Rule 31)

Rs. 1665.00
Rs. 832.50
Rs. 8.50
Rs. 0.75
2506.75

THIS INDENTURE made this 21st day of May 1963 between the Governor of Orissa (hereinafter referred to as the "State Government" which expression shall where the context so admits be deemed to include the successors and assigns) of the one part, and

M/S Orissa Mining Corporation Limited (name of the company) a company registered under I.C.Act 1956 (Act under which incorporated) and having its registered office at Bhubaneswar District Puri (Address) hereinafter referred to as the lessees which expression shall where the context so admits be deemed to include its successors and permitted assigns) of the other part represented by Shri K.S.Ramachandran,I.A.S., age 35 years, occupation Managing Director of Orissa Mining Corporation Ltd.

-2-

WHEREAS the lessees have applied to the State Government in accordance with the Mineral Concession Rules, 1960 (hereinafter referred to as the said rules), for a mining lease for Iron Ore in respect of the lands described in Part I of the Schedule hereunder written and have deposited with the State Government the sum of Rs. 1000/- as security and the sum of Rs. 500/- for meeting the preliminary expenses for a mining lease and whereas the lessees is in possession of a valid certificate of approval and Income-tax Clearance Certificate (and WHEREAS the Central Government has approved the grant of the lease).

WITNESSETH that in consideration of the rents and royalties covenants and agreements by and in these presents and the schedule hereunder written reserved and contained and on the part of the lessees to be paid observed and performed, the State Government (with the approval of the Central Government) hereby grants and demises unto lessees.

All those the mines beds/veins seams of Iron (here state the mineral or minerals) (hereinafter and in the schedule referred to as the said minerals) situated lying and being in or under the lands which are referred to in Part I of the said schedule, together with the liberties, powers and privileges to be exercised or enjoyed in connection herewith which are mentioned in Part II of the said Schedule subject to the restrictions and conditions as to the exercise and enjoyment of such liberties, powers and privileges which are mentioned in Part III of the said Schedule EXCEPT and reserving out of this demise unto the State Government the liberties, powers and privileges mentioned in Part IV of the said Schedule TO HOLD the premises hereby granted and demised unto the lessees from the 21st day of May 1963 for the term of 30 (thirty) years thence next ensuing YIELDING AND PAYING therefore unto the State Government the several rents and royalPage 88ntioned in Part V of the said Schedule at the respective times therein

INDIA NON JUDICIAL

₹500 Rs500

भारत

पाँच सौ रुपये FIVE HUNDRED RUPEES

- 4 -

specified subject to the provisions contained in Part VI of the said Schedule and the lessees hereby covenant with the State Government as in Part VII of the said Schedule is expressed and the State Government hereby covenants with the lessees as in Part VIII of the said Schedule as expressed AND it is hereby mutually agreed between the parties hereto as in Part IX of the said Schedule is expressed.

IN WITNESS WHEREOF these presents have been executed in manner hereunder appearing the day and year first above written.

The Schedule above referred to -

PART I
THE AREA OF THIS LEASE

All that tract of lands situated at Suakati and Doanra village Gandamardan Hills (Description of area or areas) the Registration district of Keonjhar sub-district Sadar and Thana Sadar containing an area of 1528.54 acres or 618.576 hectares delineated on the plan hereto annexed and bounded as follows.

On the North - By)
On the South - By)
On the East - By) The starting point 'A'
and)
On the West - By) is situated at the Trig.

Station △ 3310' on Gandamardan hill in topo sheet No. 73 G/10.

NORTHERN BOUNDARY :- Starts from station point 'A' (the starting point) and runs upto station point 'H' with a bearing of 271°-50' for a distance of 4753 ft. through the intermediate station Nos.1 to 9.

WESTERN BOUNDARY :- Starts from station point 'H' and runs upto station point 'G' making an interior angle of 90° at station point 'H' with the line joining station Nos. H & A for a distance of 4016 ft. through the intermediate station No. 1 to 6.

SOUTHERN BOUNDARY :- Starts from station point 'G' and runs upto station point ~~'F'~~ along the Suakati and Deanra road as shown in the plan.

EASTERN BOUNDARY :- Starts from station point 'F' and runs upto station point 'E' making an interior angle of 131°-00' at station 'F' with the line joining station Nos. 'F' & 19' for a distance of 4770 ft. through the intermediate station 1 to 6. Then, it runs upto station point 'D' making an

interior angle of 270°-00' at station No.'E' with the line joining station Nos. 'E' & 'F' for a distance of 3114 ft. through the intermediate station Nos. 1 to 5. Then it runs upto station point 'C' making an interior angle of 90°-00' at station point 'D' with the line joining station Nos. D & E for a distance of 2904 ft. through the intermediate stations 1 to 3. Then it runs upto station 'B' making an interior angle of 90°-00' at 'C' with the joining station Nos. 'C' & 'D' for a distance of 6866 ft. through the intermediate stations 1 to 11. Then it runs upto station point 'A' (the starting point) making interior angle of 90°-00' at station point 'B' with the line joining station Nos. 'B' & 'C' for a distance of 2904 ft. through the intermediate stations 1 to 7.

Lastly it makes an interior angle of 270°-00' at station point 'A' with the starting line joining 'A' & 'H'

hereinafter referred to as "the said lands".

100 Rs. R.500

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पाँच सौ रुपये FIVE HUNDRED RUPEES

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PART II

LIBERTIES, POWERS AND PRIVILEGES TO BE EXERCISED AND ENJOYED BY THE LESSEES SUBJECT TO THE RESTRICTIONS AND CONDITIONS IN PART III

1. Liberty and power at all times during the term hereby demised to enter upon the said lands and to search for mine, bore, dig, drill for win work dress process convert carry away and dispose of the said mineral.

2. Liberty and power for or in connection with any of the purposes mentioned in this part to sink, drive, make, maintain and use in the said lands any pits, shafts, inclines, drifts, levels, waterways, airways and other works (and to use, maintain, deepen or extend any existing works of the like nature in the said lands).

3. Liberty and power for or in connection with any of the purposes mentioned in this part to erect, construct, maintain and use on or under the said lands any engines machinery, plant, dressing floors, furnaces, coke ovens, brick-kilns, workshops, store houses, bungalows, godowns, sheds and other buildings and other works and conveniences of the like nature on or under the said lands.

भारत

Rs500

FIVE HUNDRED RUPEES

4. Liberty and power for or in connection with any of the purposes mentioned in this part to make any tramways, railways, roads, aircraft landing grounds and other ways in or over the said lands and to use maintain and go and repass with or without horses, cattle wagons, aircrafts, locomotives or other vehicles over the same (or any existing tramways, railways, roads and other ways in or over the said lands) on such conditions as may be agreed to.

5. Liberty and power for or in connection with any of the purposes mentioned in this part to quarry and get stone gravel and other building and road materials and clay and to use and employ the same and to manufacture such clay into bricks or tiles and to use such bricks or tiles but not to sell any such material bricks or tiles.

6. Liberty and power for or in connection with any of the purposes mentioned in this part but subject to the rights of any existing or future lessees and with the written permission of Collector to appropriate and use water from any streams, water courses, springs or other sources in or upon the said lands

INDIA NON JUDICIAL

Rs 500

FIVE HUNDRED RUPEES

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and to divert step up or dam any such stream or water course and collect or impound any such water and to make, construct and maintain any water course, culverts, drains or reservoirs but not as to deprive any cultivated lands, villages, buildings or watering places for livestock of a reasonable supply of water as before accustomed nor in any way to foul or pollute any streams or springs. Provided that the lessees shall not interfere with the navigation in any navigable stream nor shall divert such stream without the previous written permission of the State Government.

(. Liberty and power to enter upon and use a sufficient part of the surface of the said lands for the purpose of stacking, heaping, storing or depositing therein any produce of the mines or works carried on and any tools, equipment earth and materials and substances dug or raised under the liberties and powers mentioned in this part.

8. Liberty and power to enter upon and use a sufficient part of the said lands to beneficiate any ore produced from the said lands and to carry away such beneficiated ore.

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9. Liberty and power for or in connection with any of the purposes mentioned in this part and subject to the existing rights of others and save as provided in clause 3 of Part III of this Schedule to clear undergrowth and brushwood and to fell and utilise any trees or timber standing or found on the said lands provided that the State Government may ask the lessees to pay for any trees or timber felled and utilised, by them at the rates specified by the Collector or the State Government.

PART III

RESTRICTIONS AND CONDITIONS AS TO THE EXERCISE OF THE LIBERTIES, POWERS AND PRIVILEGES IN PART II.

1. No building or thing shall be erected, set up or placed and no surface operations shall be carried on in or upon any public pleasure ground burning or burial ground or place held sacred by any class of persons or any house or village site, public road or other place which the State Government may determine as public ground nor in such a manner as to injure or prejudicially affect any buildings works property or rights of other persons and no land

FIVE HUNDRED RUPEES Rs.500

shall be used for surface operation which is already occupied by persons other than the State Government for works or purposes not included in this lease. The lessees shall not also interfere with any right of way, well or tank.

2. Before using for surface operations any land which has not already been used for such operations, the lessees shall give to Collector of the district two calendar months' previous notice in writing, specifying the name or other description of the situation and the extent of the land proposed to be so used and the purpose for which the same is required and the said land shall not be so used if objection is issued by the Collector within two months after the receipt by him of such notice unless the objections so stated shall on reference to the State Government be annulled or waived.

3. The lessees shall not without the express sanction of the Collector cut down or injure any timber or trees on the said lands but may without such sanction clear away any brushwood or under growth which interferes with any operations authorised by these presents. The Collector or

भारत

पाँच सौ रुपया FIVE HUNDRED RUPEES

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the State Government may require the lessees to pay for any trees or timber felled and utilised by them at the rates specified by the Collector of the district.

4. Notwithstanding anything in this schedule contained the lessees shall not enter upon any reserved forest included in the said lands without previous sanction in writing of the District Forest Officer nor fell, cut and use any timber or trees without obtaining the sanction in writing of that Officer nor otherwise than in accordance with such conditions as the State Government may prescribe.

5. The Lessees shall not work or carry on or allow to be worked or carried on any mining operations at or to any point within a distance of 50 metres from any railway line except with the previous written permission of the Railway Administration concerned or from any reservoirs, canal or other public works such as public roads and buildings or inhabited site except with the previous written permission of the Collector or any other Officer authorised by the State Government in this behalf and otherwise than in accordance with such

RS.100

ONE HUNDRED RUPEES

instructions, restrictions and conditions either general or special which may be attached to such permission. The said distance of 50 metres shall be measured in the case of railway, reservoir or canal horizontally from the outer toe of the bank or the outer edge or the cutting as the case may be and in case of a building horizontally from the plinth thereof. In the case of village roads no working shall be carried on within a distance of 10 metres of the outer edge of the cutting except with the previous permission of the Collector or any other officer duly authorised by the State Government in this behalf and otherwise than in accordance with such directions, restrictions and additions, either general or special, which may be attached to such permission.

Explanation - For the purposes of this clause the expression 'Railway Administration' shall have the same meaning as it is defined to have in the Indian Railway Act, 1890, by clause (6) of section 3 of that Act, 'Public Road' shall mean a road which has been constructed by artificially surfaced as di Page 98 from a track resulting from

TWO RUPEES भारत TWO RUPEES

[illegible] use. Village road will include any track shown in the Revenue record as village road.

Facilities for adjoining Government licenses and leases.

6. The lessees shall allow existing and future holders of Government licenses or leases over any land which is comprised in or adjoins or is reached by the land held by the lessees reasonable facilities of access thereto :

PROVIDED THAT no substantial hindrance or interference shall be caused by such holders of licences or leases to the operations of the lessees under these presents and fair compensation (as may be mutually agreed upon or in the event of disagreement as may be decided by the State Government) shall be made to the lessees for all loss or damage sustained by the lessees by reason of the exercie of this liberty.

PART IV

LIB-ERTIES, POWER AND PRIVILEGES RESERVED TO THE STATE GOVERNMENT

To work other minerals.

1. Liberty and power for the State Government or to any lessee or persons authorised by it in that behalf to enter into and upon the said lands and to search for, win, work, dig, get, raise, dress, process, convert and carry away minerals other than the said minerals and any other

पन्द्रह नये पैसे

भारत

FIFTEEN NAYE PAISE

subs-tances and for those purposes to sink, drive, make, erect, construct, maintain and use such pits, shafts, inclines, drifts, levels and other lines, waterways, airways, watercourses, drains, reservoirs, engines machinery plant, buildings, canals, tramways, Railways roadways and other works and conveniences as may be deemed necessary or convenient :

PROVIDED THAT in the exercise of such liberty and power no substantial hindrance of interference shall be caused to or with liberties, powers and privileges of the lessees under these presents and that fair compensation (as may be mutually agreed upon or in the event of disagreement as may be decided by the State Government) shall be made to the lessees for a loss or damage sustained by the lessees by reason or in consequence of the exercise of such liberty and power.

2. Liberty and power for the State Government or any lessee or person authorised by it in that behalf to enter into and upon the said lands and to make upon, over or through the same any railways,

[illegible] ropeways or pipelines for any purpose other than those mentioned in Part II of these presents and to get from the said lands stones, gravel, earth and other materials for making, maintaining and repairing such railways, tramways and roads or any existing railways and roads and to go and repass at all times with or without horses, cattle or other animals, carts, wagons, carriages, locomotives or other vehicles over or along any such railways, tramways, roadslines and other ways for all purposes and as occasion may require; provided that in the exercise of such liberty and power by such other lessee or person no substantial hindrance or interference shall be caused to or with the liberties, powers and privileges of the lessees under these presents and that fair compensation, as may be mutually agreed upon or in the event of disagreement as may be decided by the State Government, shall be made to the lessees for all loss or damage sustained by the lessees by reason or in consequence of the exercise by such lessee or person of such liberty and power.

PART V

RENT AND ROYALTIES RESERVED BY THIS LEASE

1. The lessee shall pay, for every year, except the first year of the lease yearly dead rent as specified in clause 2 of this Part in respect of each mineral :

Provided that the lessee shall be liable to pay the dead rent or royalty in respect of each mineral whichever is higher in amount but not both.

2. Subject to the provisions of clause 1 of this part during the subsistence of the lease, the lessees shall pay to the State Government annual dead rent

Rate and mode of payment of dead rent.

[illegible] following rates or at such revised rate which may be communicated in writing to the lessees by the State Government per mineral per hectare of the land demised and described in Part I of this Schedule :-

Name of mineral.	Dead rent fixed per hectare.	Area of demised land.	Dead rent payable half yearly.	Total dead rent payable in a year.
Iron	Rs.12.50 np per hectare per annum	618.676 hectares.	Rs.3868.75 np.	Rs.7737.50 np.

(Here inset the manner in which and the time at which the dead rent, surface rent and water rate should be paid).

The first payment of dead rent to be made on or before 21.6.64 for the period commencing from the 21.5.64 to the 30.6.64 calculated at the said half-yearly rate of rent and subsequent payments to be equal and to be made every half year thereafter, that is for the period from January to June be paid on or before 15th January and for the period from July to December on or before 15th July each year.

Rate & mode of payment of royalty.

3. Subject to the provision of clause 1 of this Part, the lessees shall, during the subsistence of this lease, pay to the State Government at such times and in such manner as the State Government may prescribe royalty in respect of any mineral removed by them from the leased area at the rate for the time being specified in the Second Schedule to the Mines and Minerals (Regulations and Development) Act, 1957.

Payment of surface rent and water rate.

4. The lessees shall pay rent to the State Governmen[t] in respect of all parts of the surface of the said lands which shall, from time to time, be occupied or used by the lessees under the authority of these presents at the rate of Rs. 2.50 for waste lands and at

ANNEX 7

... exceeding rates of land revenue and cess for cultivated lands and water rate at the rates as may be fixed from time to time per annum per hectare of the area so occupied or used and so in proportion for any area less than an hectare during the period from the commencement of such occupation or use until the area shall cease to be so occupied or used and shall as far as possible, restore the surface land so used to its original condition. Surface rent and water-rate shall be paid as hereinbefore detailed in clause 2; PROVIDED THAT NO such rent/water rate shall be payable in respect of the occupation and use of the area comprised in any roads or ways to which the public have full right of access.

PART VI

PROVISION RELATING TO THE RENTS AND ROYALTIES

Rent and royalties to be free from deduction

1. The rent, water rate and royalties mentioned in Part V of this schedule shall be paid free from any deductions to the State Government at Keonjhargarh and in such manner as the State Government may prescribe PROVIDED ALWAYS and it is hereby agreed that Rupees nil the balance standing to the credit of the lessees on account of the deposit made by them as a licensees over an area which included the said lands shall be retained and accepted by the State Government in satisfaction of the rents and royalties mentioned in Part V until they reach that amount.

Mode of computation of royalty

2. For the purposes of computing the said royalties the lessees shall keep a correct account of the mineral produced and despatched. The accounts as well as the weight of the mineral in stock or in the process of export may be checked by an officer authorised by the Central or State Government.

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...le of ...puta- ...tion of royalty.

2. For the purposes of computing the said royalties the lessees shall keep a correct account of the mineral produced and despatched. The accounts as well as the weight of the mineral in stock or in the process of export may be checked by an officer authorised by the Central or State Government.

The lessee shall, before despatch, whether the ore has been sold at site or not, or before beneficiation shall grade the ore into such qualities as may be prescribed by the State Government and every consignment despatched or sent for beneficiation shall not contain ore of more than one such grade. The lessee shall produce evidence of analysis of each consignment despatched or sold or beneficiated by laboratory recognised in the trade for such analysis within two months of the sale, despatch or beneficiation and such analysis report which shall contain analysis of the various factors which the State Government may specify in this behalf shall be taken subject to the following proviso as the quality report for assessing quality of the ore; PROVIDED that the lessor may take out samples of the ore sold, despatched or beneficiated and get the same analysed through a recognised ANALYST in case such ANALYST discloses a more favourable quality for the lessor, adopt such quality for computation of the said royalty and in addition, if such analysis report discloses a difference of one per cent or more in the quality of high grade ore, or two percent or more in the case of low grade ore the cost of such analysis by the lessor shall also be recoverable from the lessee.

3. Should any rent, royalty or other sums due to the State Government under the terms and conditions of these presents be not paid by the lessees within the prescribed time, the same may be recovered on a certificate of such officer as may be specified by the State Government by general or special order, in the same manner as an arrear of land revenue.

PART VI

THE COVENANTS OF THE LESSEES

1. The lessees shall pay the rent, water rate and royalties reserved by this lease at such times and in

as provided in Parts V and VI of these presents and shall ANNEX [illegible] and discharge all taxes, rates, assessments and impositions whatsoever being in the nature of public demands which shall from time to time be charged, assessed or imposed by the authority of the Central and State Governments upon or in respect of the premises and works of the lessee in common with other premises and works of a like nature except demands for land revenues.

Lessee to pay rents, royalties, taxes etc.

2. The lessees shall at their own expense erect and at all times maintain and keep in repair boundary marks and pillars according to the demarcation to be shown in the plan annexed to this lease. Such marks and pillars shall be sufficiently clear of the shrubs and other obstructions as to allow easy identification.

To maintain and keep boundary marks in good order.

3. Unless the State Government for good cause permits otherwise, the lessees shall commence operation within one year from the date of execution of the leases and shall thereafter at all times during the continuance of this lease search for, win, work and develop the said minerals without voluntary intermission in a skilful and workmanlike manner and as prescribed under clause 12 hereinafter without doing or permitting to be done any unnecessary or avoidable damage to the surface of the said lands on the crops, buildings, structures or other property thereon. For the purposes of this clause operations shall include the erection of machinery laying of a tramway or construction of a road in connection with the mine.

To commence operations within a year and work in a workmanlike manner.

4. The lessees shall make and pay such reasonable satisfaction and compensation as may be assessed by lawful authority in accordance with the law in force on the subject for all damage, injury or disturbance which may be done by them in exercise of the powers granted by this lease and shall indemnify [illegible]

To indemnify Government against all claims.

[illegible] all claims which may be made by any person [illegible] in respect of any such damage, injury or

ANNEX 7

disturbance and all costs and expenses in connection therewith.

To secure and keep good condition pits, shafts etc.

5. The lessees shall during the subsistence of this lease well and sufficiently secure and keep open with timber or other durable means all pits, shafts and workings that may be made or used in the said lands and make and maintain sufficient fences to the satisfaction of the State Government round every such pit, shaft or working whether the same is abandoned or not and shall during the same period keep all workings in the said lands except such as may be abandoned accessible free from water and foul air as far as possible.

To strengthen & support the mine to necessary extent.

6. The lessees shall strengthen and support to the satisfaction of the Railway Administration concerned or the State Government, as the case may be any part of the mine which in its opinion requires such strengthening or support for the safety of any railway, reservoir, canal, road and any other public works or structures.

To allow inspection of workings.

7. The lessees shall allow any officer authorised by the Central Government or the State Government in that behalf to enter upon the premises including any building, excavation or land comprised in the lease for the purpose of inspecting, examining, surveying, prospecting and making plans thereof sampling and collecting any data and the lessees shall with proper person employed by the lessees and acquainted with the mines and work effectually assist such officer, agents, servants and workmen in conducting every such inspection and shall afford them all facilities, information connected

with the working of the mines which they may

ANNEX-7

...l and State Governments as the result of such inspection or otherwise may from time to time see fit to impose.

To report accident.

8. The lessees shall without delay send to the Collector a report of any accident causing death or serious bodily injury or serious injury to property or seriously affecting or endangering life or property which may occur in the course of the operations under this lease.

To report discovery of other minerals.

9. The lessees shall report to the State Governmen the discovery in the leased area of any mineral not specified in the lease within sixty days of such dis-covery along with full particulars of the nature and position of each such find. If any mineral not specified in the lease is discovered in the leased area, the lessees shall not win and dispose of such mineral unless such mineral is included in the lease or a separate lease is obtained therefor.

To keep records & accounts regarding production & employees etc.

10. The lessees shall at all times during the said term keep or cause to be kept at an office to be situated upon or near the said lands correct and intelligible books of accounts which shall contain accurate entries showing from time to time -

(1) Quantity and quality of the said mineral realised from the said lands.

(2) Quantity of the various qualities of ores beneficiated or converted (for example coal converted into coke).

(3) Quantities of the various qualities of the said mineral sold and exported separately.

(4) Quantities of the various qualities of the said mineral otherwise disposed of and the manner and purpose of such disposal.

(5) The prices and all other particulars of all sales of said mineral.

nationality, qualifications and pay of the technical personnel.

(7) Such other facts, particulars and circumstances as the Central or the State Government may from time to time require and shall also furnish free of charge to such officers and at such times as the Central and State Governments may appoint true and correct abstract of all or any such books of accounts and such information and returns to all or any of the matters aforesaid as the State Government may prescribe and shall at all reasonable times allow such officers as the Central Government or State Government shall in that behalf appoint to enter into and have free access to the said officers for the purpose of examining and inspecting the said books of accounts, plans and records and to make copies thereof and make extracts therefrom.

11. The lessees shall at all times during the said term maintain at the mine office correct intelligible up-to-date and complete plans and sections of the mines in the said lands. They shall show all the operations, and workings and all the trenches, pits and drillings made by them in the course of operations carried on by them under the lease, faults and other disturbances encountered and geological data and all such plans and sections shall be amended and filled up by and from actual surveys to be made for that purpose at the end of twelve months or any period specified from time to time and the lessees shall furnish free of charge to the Central and State Governments

(ii) Any mineral encountered.

(v) Any ANNEX [illegible] of interest and all data required by the Central and State Governments from time to time.

The lessees shall allow any officer of the Central or the State Government, authorised in this behalf by the Central Government, to inspect the same at all reasonable times. They shall also supply when asked for by the State Government/ the Coal Controller/ the Director, Geological Survey of India/ the Director, Indian Bureau of Mines, a composite plan of the area showing thickness, dip, inclination etc., of all the seams as also the quantity of reserves quality-wise.

12. The lessees shall be bound by such rules as may be issued from time to time by the Government of India under section 18 of the Mines and Minerals (Regulation and Development) Act, 1957 (Act 67 of 1957), and shall not carry on mining or other operations under the said lease in any way other than as prescribed under these rules.

13. Unless specifically exempted by the State Government the lessees shall provide and at all times keep at or near the pit head or each of the pit heads at which the said minerals shall be brought to bank a properly constructed and efficient weighing machine and shall weigh or cause to be weighed thereon all the said minerals from time to time brought to bank sold, exported and converted and also the converted products and shall at the close of each day cause the total weights ascertained by such means of the said minerals, ores processed sold, exported and converted during the previous twenty-four hours

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...in the aforesaid books of account

... as shall ANNEX ... the State Government at all

times during the said term to employ any

person or persons to be present at the weighing

of the said minerals as aforesaid and to keep

accounts thereof and to check the accounts kept

by the lessees. The lessees shall give seven days

previous notice in writing to the ~~Deputy Commissioner~~

Collector of every such measuring or weighing in

order that he or some officer on his behalf may

be present thereat.

11. The lessees shall allow any person or persons appointed in that behalf by the State Government at any time or times during the said term to examine and test every weighing machine to be provided and kept as aforesaid and the weights used therewith in order to ascertain whether the same respectively are correct and in good repair and order and if upon any such examination or testing any such weighing machine or weights shall be found incorrect or out of repair or order the State Government may require that the same be adjusted, repaired and put in order by and at the expense of the lessees and if such requisition be not complied with within fourteen days after the same shall have been made, the State Government may cause such weighing machine or weights to be adjusted, repaired, and put in order and the expense of so doing shall be paid by the lessees to the State Government on demand and if upon any such examination or testing as aforesaid any error shall be discovered in any weighing machine or weights to the prejudice of the State Government such error shall be regarded as having existed

[illegible] such occasion shall be within such period three months the said rent and royalty shall be paid and accounted for accordingly.

To pay compensation for injury of third parties.

15. The lessees shall make and pay reasonable satisfaction and compensation for all damage, injury or disturbance of person or property which may be done by or on the part of lessees in exercise of the liberties and power granted by these presents and shall at all times save harmless and keep indemnified the State Government from and against all suits claims and demands which may be brought or made by any person or persons in respect of any such damage, injury or disturbance.

Not to obstruct working of other minerals.

16. The lessees will exercise the liberties and powers hereby granted in such a manner as to offer no unnecessary or reasonably avoidable obstruction or interruption to the development and working within the said lands of any minerals not included in this lease and shall at all times afford to the Central and State Government and to the holders of prospecting licenses or mining leases in respect of any such minerals or any minerals within any land adjacent to the said lands as the case may be reasonable means of access and safe and convenient passage upon and across the said lands to such minerals for the purpose of getting, working, developing and carrying away the same provided that the lessees shall receive reasonable compensation for any damage or injury which they may sustain by reason or in consequence of the use of such passage by such lessees or holders of prospecting licenses.

Transfer of lease.

17.(1) The lessees shall not, without the previous consent in writing of the State Government, which in the case of a mining lease in respect of approval of the Central Government :-

ANNEX

(a) assign, sublet, mortgage, or in any other manner transfer the mining lease, or any right, title or interest therein, or

(b) enter into or make any arrangement, contract or understanding whereby the lessees will or may be directly or indirectly financed to a substantial extent by, or under which the lessee's operations or undertakings will or may be substantially controlled by, any person or body of persons other than the lessees.

(2) Without prejudice to the above provisions, the lessees may, subject to the conditions specified in the proviso to rule 35 of said Rules transfer this lease or any right, title or interest therein, to a person holding a certificate of approval and an income-tax clearance certificate from the Income-tax Officer concerned, on payment of a fee of rupees one hundred to the State Government.

Provided that the lessees shall make available to the transferee the original or certified copies of all plans of abandoned workings in the area and in a belt 65 metres wide surrounding it.

(3) The State Government may, by order in writing determine the lease at any time if the lessees have in the opinion of the State Government, committed a breach of any of the above provisions or have transferred the lease or any right, title or interest therein otherwise than in accordance with clause (2).

Provided that no such order shall be made without giving the lessees a reasonable opportunity of stating their case.

12. The lease shall not be controlled and the

[illegible] with the written consent of the Central Government. ANNEX 7 [illegible] lessees shall not enter into or make any arrangement compact or understanding whereby the lessees will or may be directly or indirectly financed by or under which the lessees, operations or undertakings will or may be carried on directed or indirectly by or for the benefit of or subject to the control of any Trust, Syndicate, Corporation, firm or person unless with the written sanction given prior to such arrangement compact or understanding being entered into or made of the Central Government and any or every such arrangement compact or understanding as aforesaid (entered into or made with such sanction as aforesaid) shall only be entered into or made and shall always be subject to an express condition binding upon the other party or parties thereto that on the occasion of a state or emergency of which the President of India in his discretion shall be the sole judge it shall be terminable if so required in writing by the State Government and shall in the event of any such requisition being made be forthwith thereafter determined by the lessees accordingly.

[illegible]ot to be financed or controlled by a trust [illegible]rporation firm or person.

19. Whenever the security deposit of Rs. 1000/500 or any part thereof or any further sum hereafter deposited with the State Government in replenishment thereof shall be forfeited or applied by the Central or State Government pursuant to the power hereinafter declared in that behalf the lessees shall deposit with the State Government such further sum as may be sufficient with the unappropriated part thereof to bring the amount in deposit with the State Government upto the sum of Rs. 1000/500.

[illegible]see shall [illegible]

20. The lessees shall at the expiration or sooner determination of the said term or any renewal thereof

Page 114

and other works now existing or hereafter to be sunk or made on or under the said lands except such as have been abandoned with the sanction of the State Government and in any ordinary and fair course of working all engines, machinery, plant, buildings, structures, other works and conveniences which at the commencement of the said term were upon or under the said lands and all such machinery set up by the lessees below ground which cannot be removed without causing injury to the mines or works under the said lands (except such of the same as may with the sanction of the State Government have become disused) and all buildings and structures of bricks or stone erected by the lessees above ground level is good repair order and condition and fit in all respects for further working of the said mines and the said minerals.

Right of pre-emption.

21.(a) The State Government shall from time to time and all times during the said term have the right (to be exercised by notice in writing to the lessees) of pre-emption of the said minerals (and all products thereof) lying in or upon the said lands hereby demised or elsewhere under the control of the lessees and the lessees shall with all possible expedition deliver all minerals or products on minerals purchased by the State Government under the power conferred by this provision in the quantities at the times in the manner and at the place specified in the notice exercising the said right.

(b) Should the right of pre-emption conferred by this present provision be exercised and a vessel chartered to carry the minerals or products thereof procured on behalf of the State Government or the Central Government be detained on demurrage at the port of loading the lessees shall pay the amount

Government shall be satisfied that the delay is due to causes beyond ANNEX the control of the lessees.

(c) The price to be paid for all minerals or products of minerals taken in pre-emption by the State Government in exercise of the right hereby conferred shall be the fair market price prevailing at the time of pre-emption PROVIDED THAT in order to assist in arriving at the said fair market price the lessees shall if so required furnish to the State Government for the confidential information of the Government particulars of the quantities descriptions and prices of the said minerals or products thereof sold to other customers and of charters entered into for freight for carriage of the same and shall produce to such officer or officers as may be directed by the State Government original or authenticated copies of contracts and charter parties entered into for the sale or freightage of such minerals or products.

(d) In the event of the existence of a state of war or emergency (of which existence the President of India shall be the sole judge and a notification to this effect in the Gazette of India shall be conclusive proof), the State Government with the consent of the Central Government from time to time and all times during the said term have the right (to be exercised by a notice in writing to the lessees) forthwith take possession and control of the works, plant, machinery and premises of the lessees on or in connection with the said lands or operations under this lease and during such possession or control the lessees shall conform to and obey all directions given by or on behalf of the Central Government or State Government regarding the use or employment of such work plants premises and minerals PROVIDED THAT fair determined by the State Government shall be paid to the lessees for all loss or damage sustained by them by reason or in consequence of the exercise of the powers conferred by this clause and PROVIDED ALSO that the exercise of such powers shall not determine the said term hereby granted, or affect the terms and provisions of these presents further than may be necessary to give effect to the provisions of this clause.

Employment of foreign national.

22. The lessees shall not employ, in connection with the mining operations any person who is not an Indian National except with the previous approval of the Central Government.

Recovery of expenses incurred by the State Government.

23. If any of the works or matters which in accordance with the covenants in that behalf hereinbefore contained are to be carried out or performed by the lessees be not so carried out or performed within the time specified in that behalf, the State Government may cause the same to be carried out or performed and the lessees shall pay the State Government on demand all expenses which shall be incurred in such carrying out or performance of the same and the decision of the State Government as to such expenses shall be final.

Furnishing of geophysical data.

24. The lessees shall furnish -

(a) all geophysical data relating to mining fields or engineering and ground water surveys, such as anomaly maps, sections, plans, structures, contour maps, logging, collected by them during the course of mining operations to the Director, Geological Survey of India, Calcutta.

(b) all information pertaining to investigations of radio active minerals collected by them during course of mining operations to the Secretary, Department of Atomic Energy, New Delhi.

commencement of the period of the mining lease.

PART VIII

ANNEX-7

THE COVENANTS OF THE STATE GOVERNMENT

Lessees may hold and enjoy rights quietly.

1. The lessees paying the rents, water-rate and royalties hereby reserved and observing and performing all the covenants and agreements herein contained and on the part of the lessees to be observed and performed shall and may quietly hold and enjoy the rights and premises hereby demised for and during the term hereby granted without any unlawful interruption from or by the State Government, or any person rightfully claiming under it.

Acquisition of land of third parties and compensation thereof.

2. If in accordance with the provision of clause 4 of Part VII of this Schedule the lessees shall offer to pay to an occupier of the surface of any part of the said lands compensation for any damage or injury which may arise from the proposed operations of the lessees and the said occupier shall refuse his consent to the exercise of the right and powers reserved to the State Government and demised to the lessees by these presents and the lessees shall report the matter to the State Government and shall deposit with it the amount offered as compensation and if the Central/State Government are satisfied that the amount of compensation offered is fair and reasonable or if it is not so satisfied that the lessees shall have deposited with it such further amount as the State and the Central Governments shall consider fair and reasonable the State Government shall order the occupier to allow the lessees to enter the land and to carry out such operations as may be necessary for the purpose of this lease. In assessing the amount of such compensation the State Government shall be guided by the principles of the Land Acquisition Act.

3. Where the mining lease relates to any

mineral/ore specified in [illegible]

The lease shall be renewable for one period
ANNEX-37
not exceeding the period specified in sub-section (2)
of section 8, at the option of the lessees.

Provided that the State Government may for reasons to be recorded in writing reduce the area applied for.

If the lease is in respect of minerals specified in the First Schedule to the Act, renewal will be subject to the prior approval of the Central Government.

If the lessees be desirous of taking a renewed lease of the premises hereby demised or of any part or parts of them for a further term from the expiration of the term hereby granted and is otherwise eligible, they shall prior to the expiration of the last mentioned term give to the State Government six calendar months previous notice in writing and shall pay the rents, rates and royalties hereby reserved and shall observe and perform the several covenants and agreements herein contained and on the part of the lessees to be observed and performed upto the expiration of the term hereby granted. The State Government on receipt of application for renewal, shall consider it in accordance with rule 28 of the said rules and shall pass orders as it deems fit. If renewal is granted, the State Government will at the expense of the lessees and upon their executing and delivering to the State Government if required a counterpart thereof execute and deliver to the lessees a renewed lease of the said premises or part thereof for the further term of 30 years at such rents, rates and royalties and on such terms

and subject to such rents, rates and royalties and

and agreements, including this present covenant to
renew as shall ANNEX-7 in accordance with the Mineral
Concession Rules, 1960, applicable to Iron (name of
minerals) on the day next following the expiration
of the term hereby granted.

Liberty to determine the lease.

4. The lessee may at any time determine this lease by giving not less than 12 calendar months notice in writing to the State Government or to such officer, or authority as the State Government may specify in this behalf and upon the expiration render and pay all rents, water rates, royalties, compensation for damages and other moneys which may then be due and payable under these presents to the Lessor or any other person or persons and shall deliver these presents to the State Government then this lease and the said term and the liberties, powers and privileges hereby granted shall absolutely cease and determine but without prejudice to any right or remedy of the lessor in respect of any breach of any of the covenants or agreement contained in this presents.

4A. The State Government may on an application made by the lessee permit him to surrender one or more minerals from his lease which is for a group of minerals on the ground that deposits of that mineral have since exhausted or depleted to such an extent that it is not longer possible to work the mineral economically, subject to the condition that the lessee:-

(a) make an application for such surrender of mineral at least six months before the intended date of surrender; and

(b) give Page 120 rtaking that he will not cause any hinderance in the working of

ANNEX 7

Refund of security deposits.

8. On such date as the State Government may elect within 12 calendar months after the determination of this lease or of any renewal thereof, the amount of the security deposit paid in respect of this lease and then remaining in deposit with the State Government and not required to be applied to any of the purposes mentioned in this lease shall be refunded to the lessees. No interest shall run on the security deposit.

PART IX

GENERAL PROVISIONS

Obstructions to inspection.

1. In case the lessees or their transferee/assignee do not allow entry or inspection by the officer authorised by the Central or State Government under clauses (i), (j) or (l) of sub-rule (1) of rule 27 of the said rules, the State Government shall give notice in writing to the lessees requiring them to show cause within such time as may be specified in the notice why the lease should not be determined and their security deposit forfeited; and if the ~~lessee~~/lessees fail to show cause within the aforesaid time to the satisfaction of the State Government, the State Government may determine the lease and forfeit the whole or part of the security deposit.

Penalty in case of default in payment of royalty and breach of covenants.

2. If the lessees or their transferee or assignee make any default in payment of rent or water-rate, or royalty as required by section 9 of the Act or commits a breach of any of the conditions and covenants other than those referred to in clause (1) above, the State Government shall give notice to the lessees requiring them to pay the rent, water-rate, royalty or remedy the breach, as the case may be, within sixty days from the date of receipt of the notice and if the rent,

ment may without prejudice to any proceedings that may be taken against them, determine the lease and forfeit the whole or part of the security deposit.

ANNEX 17

Penalty for repeated breaches of covenants.

3. In cases of repeated breaches of covenant and agreements by the lessees for which notice has been given by the State Government in accordance with clauses (1) and (2) aforementioned on earlier occasion, the State Government without giving any further notice, may impose such penalty not exceeding twice the amount of annual dead rent specified in clause 2, Part V.

Failure to fulfil the terms of leases due to Force Majeure.

4. Failure on the part of the lessees to fulfil any of the terms and condition of this lease shall not give the Central or State Government any claim against the lessees or be deemed a breach of this lease, in so far as such failure is considered by the said Government to arise from force majeure, and if through force majeure the fulfilment by the lessees of any of the terms and conditions of this lease be delayed, the period of such delay shall be added to the period fixed by this lease. In this clause the expression 'Force Majeure' means Act of God, war, insurrection, riot, civil commotion, strike, earthquake, tide storm, tidal wave, flood, lightning, explosion, fire, earthquake and any other happening which the lessees could not reasonably prevent or control.

Lessees to remove their properties on the expiry of lease.

5. The lessees having first paid and discharged rents, rates and royalties payable by virtue of these presents may at the expiration or sooner determination of the said term or within six calendar months thereafter (unless the lease shall be determined under clauses 1 and 2 of this part and in that case at any time not less than three calendar months and not more than six calendar

4

ANNEX 7

months after such determination take down and remove for their own benefit all or any engines machinery plant, buildings, structures, tramways, railways and other works erections and conveniences which may have been erected set up or placed by the lessees in or upon the said lands and which the lessees are not bound to deliver to the State Government under clause 20 of Part VII of this Schedule and which the State Government shall not desire to purchase.

Forfeiture of property left more than six months after determination of lease.

6. If at the end of six calendar months after the expiration or sooner determination of the said term under the provision contained in clause 4 of part VIII of this schedule become effective there shall remain in or upon the said land any engines, machinery plant, buildings, structures, tramway, railways and other work erections and conveniences or other property which are not required by the lessees in connection with operations in any other lands held by them under prospecting licence or mining lease the same shall if not removed by the lessees within one calendar month after notice in writing requiring their removal has been given to the lessees by the State Government be deemed to become the property of the State Government and may be sold or disposed of in such manner as the State Government shall deem fit without liability to pay any compensation or to account to the lessees in respect thereof.

Notices.

7. Every notice by these presents required to be given to the lessees shall be given in writing to such person resident on the said lands as the lessees may appoint for the purpose of receiving such notices and if there shall have been no such appointment then every such notice shall be

or at such other address in India as the lessees may from time to time in writing to the State Government for the receipt of notices and every such service shall be deemed to be proper and valid service upon the lessees and shall not be questioned or challenged by them.

Immunity of State Government from liberty to pay compensation.

8. If in any event the orders of the State Government are revised, reviewed or cancelled by the Central Government in pursuance of proceedings under chapter VII of the Mineral Concession Rules, 1960, the lessees shall not be entitled to compensation for any loss sustained by the lessees in exercise of the powers and privileges conferred upon them by these presents.

9. For the purpose of stamp duty the anticipation royalty from the demised land

ANNEX 7

IN WITNESS WHEREOF these presents have been executed in the manner hereunder appearing the day and year first above written.

Signed by

for and on behalf of the

Governor

In the presence of

(1) [illegible]
Deputy Collector
21.5.63

(2) Raghunath Brahma
21.5.63

Collector, Keonjhar

In the case of limited Company, in case the lease is executed under the seal of the Company.

"The common seal of

Company has been hereunto affixed pursuant to a resolution of the Directors passed at a meeting of the Board of Directors held on the day of in the presence of (names only) who have executed these presents.

Signed by

Signed by

In the presence of -

Managing Director
For Orissa Mining Corporation Ltd.

If the lease is executed by the constituted attorney of the Company

"Signed by
the name of the company by their constituted (here insert attorney) name of the constituted attorney
in the presence of.

1. [illegible]
21.5.63

2. P. Vairy
21.5.63

Typed by P. Vairy

ANNEX - 8

(2) 12

FORM - "D"

Memo No. 1491 /Mines Dt. 11-5-92

RECEIPT OF APPLICATION FOR RENEWAL OF MINING LEASE
GOVERNMENT OF ORISSA.

Sl. NO. 558.

Date- 6.4.92.

Received the application with following enclosures for Renewal of Mining Lease of M/s O.M.C. Ltd., OMC House, Post Box No. 34, At/Po Bhubaneswar 751001 District- Puri on 6.4.92 over an area of 618.576 hectares in Village- Gandhamardan Block-A (Guakati, Daonra and Gandhamardan Pahar) under Sadar Sub-division of Keonjhar district for Iron Ore.

Enclosures:-

1) Application Form 'J' - 6 Copies.
2) T.C. Bank Scroll No. 5 dt. 4.4.92 for Rs. 500/- in original towards application fee.
3) Affidavit of Income Tax up-to-date returns - 6 Cop.
4) Income Tax Clearance Certificate - 6 Copies.
5) List of M.L. areas held by OMC, M.L. areas applied but not granted and applied simultaneously - 6 Copies.
6) Power of Attorney - 6 copies.
7) Boundary description - 6 Copies.
8) Land Schedule - 6 Copies.
9) Plan of the referred area in 1:4,000 scale & 1:50,000 scale - 6 Copies.

Addl. Collector, Keonjhar
23.4.92

ANNEX. - 8

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FORM-J
(To be submitted in duplicate)
GOVERNMENT OF ORISSA
MODEL FORM
Application for Renewal of Mining Lease
Under Rule-24 A(1)

Dated day of 19

Received________________

At________________ (Place)

On________________ (Date)

Initial of

Receiving Officer

To

The Principal Secretary to Government,
Department of Steel and Mines,
Orissa,Bhubaneswar.

Through the Collector,Keonjhar.

Sir,

I/We request for renewal of my/our mining lease under the Mineral Concession Rules,1960.

A sum of (Rs.500/-) being the application fee payable under sub-rule (3)(I)(a) of Rule-22 of the said rules has been deposited (No.MII-152(37)/62, dated 22.7.63) vide Treasury Challan No.5 dtd.4.4.92.

3. The required particulars are given below:-

(i) Name of the applicant with complete address. — M/s.Orissa Mining Corpn.Ltd. A Govt.of Orissa U.T. OMC House, Post Box No.34, At/PO:Bhubaneswar-751001

(ii) Is the applicant a private individual/private company/public company/firm or association ? Public Sector Undertaking.

(iii) In case applicant is :

(a) an individual,his nationality . Case does not arise

(b) a private company, the nationality of all members of the company alongwith place of registration ; Case does not arise

(c) a public company, the nationality of directors, the percentage of share capital held by Indian nationals alongwith place of incorporation. Indian 100% Share held by Govt.of Orissa.

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	(d) a firm or association, the nationality of all the partners of the firm or members of the association.	Case does not arise
(iv)	Profession or nature of business of applicant.	Exploration, exploitation and marketing of ore/minerals.
(v)	2 (x x x x)	
(vi)	2 (x x x x).	
3(vii)	an affidavit, that upto date Income Tax returns, as prescribed under the Income Tax Act, 1961, have been filed, and the tax due, including the tax on account of self-assessment has been paid.)	Affidavit is enclosed.
(vii-a)	No. and date of income tax clearance certificate from the Income tax Officer(attached).	I.T.C.C.No.41/91-92 attached.
viii)	(a) Particulars of the mining lease of which renewal is desired.	Gandhamardan Iron Mining lease(Block-A)
	(b) Details of previous renewal granted, if any.	Nil
ix)	Period for which renewal of mining lease is required.	20(twenty) years.
x)	Whether renewal is applied for the whole or part of the lease hold ?	Renewal is applied for the whole of leasehold 018.576 Hects.
	(a) the area applied for renewal.	
	(b) description of the area applied for renewal(description should be adequate for the purpose of demarcating the plot).	Boundary description of the area applied for renewal is enclosed
	(c) particulars of map of the lease hold with area applied for renewal clearly marked on it (attached).	Attached
	(d) particulars of existing or created dumps of ore, if any(No.MII-169(44)/61 dated 7.9.61)	No such

3. 3

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(x-A)	(a) Does the applicant continue to have surface rights over the area of the land for which he requires renewal of the mining lease.	Yes
	(b) If not, has he obtained the consent of the owner and occupier for undertaking mining operations. If so, the consent of the owner and occupier of the land obtained in writing be filed.	Does not arise
(x-B)	Particulars of the areas mineral-wise in each State duly supported by affidavit for which the applicant or any person joint in interest with him,	Affidavit is enclosed
	(a) already holds under mining lease ;	
	(b) has already applied for but not granted, or	
	(c) being applied for simultaneously;	
(x-C)	A mining plan which shall include :-	
	(a) the plan of the area showing the nature and extent of the mineral body, spot or spots where the excavation is to be done in the first year and its extent, a detailed cross-sections and detailed plan of spot (s) of excavation based on prospecting data gathered by the applicant, a tentative scheme of mining for the period of the lease.	Approved Mining Plan by IBM will be submitted.
	(b) the details of geology and lithology of the area, the extent of manual mining and through machines ;	
	(c) annual programme and plan for excavation from year to year ; &	

...4

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ANNEX. - 8

(d) the plan of the area showing natural water courses, limit of reserved and other forest area and density of trees, assessment of impact of mining activity on Forest, Land surface and Environment including air and water pollution, and details of the scheme for restoration of the area by afforestation, land reclamation, use of pollution control devices.

(xi) means by which the mineral is to be raised i.e. by hand labour or mechanical or electric power. — By hand labour as well as by Semi mechanical means

(xii) Manner in which the mineral raised is to be utilised:

(a) for manufacture in India. — For internal consumption

(b) exports to foreign countries. — For export through MMTC.

(c) In former other case the industries in connection with which it is required, should be specified. In the latter case, the countries to which the mineral will be exported and whether the mineral is to be exported after processing or in raw form should be stated. — The ore/minerals will be supplied to the Steel Plants, Sponge Iron Plants in the Country & may be exported to China, Japan, South Korea etc. through MMTC.

(xiii) Details of output during the last three years and phased programme for production during the next three years along with a layout plan for development, if any.

1989-90 –	71,000 MT
1990-91 –	74,000 MT
1991-92 –	1,00,000 MT
1992-93 –	2,00,000 MT
1993-94 –	2,00,000 MT
1994-95 –	2,00,000 MT

(xiv) In case of coal, details of existing railway transport facility available and additional transport facility, if any, required. — Case does not arise.

(xv) Any other particulars which the applicant wishes to furnish. — Will be submitted on demand

I/We do hereby declare that the particulars furnished above are correct and am/are ready to furnish any other details, including accurate plans as required by you before the grant or renewal of the lease.

Date :
Place: Bhubaneswar

Yours faithfully,

Signature of General Manager of
ORISSA MINING CORPORATION LTD.,
BHUBANESWAR.

N.B.:- If the application is signed by an authorised agent of the applicant, Power of Attorney should be attached.

SM (Geo) - III
15/05/12

ANNEX. - 9
FORM'D'

No. 1002 /Mines, Dt. 1 - 05 -12

RECEIPT OF APPLICATION FOR R.M.L.
(See Rule 10(4) and 23(4))
GOVERNMENT OF ORISSA

Sl.No. 1746

Date. 01.05.2012

Received the application with the following enclosures for R.M. L. of M/s O.M.C Ltd.,Post Box No 34, Bhubaneswar., Odisha Over an area of 618.576 hects in village – Suakati,Daunia and Gandhamardan Pahar in Sadar Sub –Division of Keonjhar District for Iron ore.

Enclosures:

1. Application in form 'J' for R.M.L in 6 copies.
2. Original Treasury Challan for Rs.2500 /- vide SBI,HOD, Branch Bhubaneswar Scroll No. 31 Dt. 23.04.12.
3. Cerficate of Incorporation & M.O.A.
4. Copy of Letter no 8102/MG from F.A. cum under Secretary to Govt. for exemption of MDCC.
5. Applied area map in scale -1:4000 & key plan 1:50,000-6 copies.
6. Affidavit regarding filing of up to date Income Tax Assessment.
7. Copy of Boundary Description.
8. Copy of Land schedule.
9. Copy of Power of attorney, undertaking for obtaining the consent of private tenants, Surface right permission, Consent to operate, Letter of IBM for mining closure plan & list of Tech. Persons etc.

1/5/12
For Collector, Keonjhar

Sri Rana, AM (Adm) /
Mrs Mohanty, SA.

Pl. keep in and RML file. Gandhamardan 'A'

16.5.12.

d)	A firm or association, the nationality of all the partners of the firm or members of the association	Indian, 100% share held by Govt. of Odisha
(iv)	Profession or nature of business of applicant	Exploration, exploitation and marketing of ore/minerals.
(v)	Omitted	
(vi)	Omitted	
(vi-a)	No. and date of valid clearance certificate of payment of Mining dues	Copy of exemption letter no. 8102 dated 19.06.1979 is enclosed.
(vii)	an affidavit, that uptodate income tax returns, as prescribed under the Income Tax Act,1961, have been filed and the tax due, including the tax on account of self-assessment has been paid)	Copy of the affidavit is enclosed
(vii-a)	No and date of income tax clearance certificate from the Income Tax Officer	Copy of affidavit in lieu of ITCC is enclosed.
(viii)(a)	Particulars of the Mining Lease of which renewal is desired	2nd renewal is required over an area of 618.576 H. for iron ore in village Suakati, Daunla etc. Gandhamardan Block- A in Keonjhar district.
(b)	Details of previous renewal granted if any.	1st renewal was applied vide application issued on 4.4. 92 and received on dated 6.4.92. The State Govt. is yet to grant the same.
(ix)	Period for which renewal of mining lease is required	20 (twenty) years
(x)	Whether renewal is applied for the whole or part of the lease hold?	Whole lease hold area over an area of 618.576 hects. Copy of the 16": 1 mile scale village plan, land schedule and boundary description enclosed.
(x-A)	(a) Does the applicant continue to have surface rights over the area of the land for which he requires renewal of the mining lease.	Yes, over part area of 1094.54 Acres of the above RML applied area (copy enclosed).
	(b) If not, has he obtained the consent of the owner and occupier for undertaking mining operations. If so, the consent of the owner and occupier of the land obtained in writing be filed.	Necessary undertaking in this respect is enclosed.
(x-B)	Particulars of the areas mineral wise in each State duly supported by affidavit for which the Applicant or any person joint in interest with him	Copy of the affidavit enclosed.
	(a) already holds under mining lease	-do-

	(b)has already applied for but not granted or	-do-
	(c) being applied for simultaneously	-do-
(x-C)	A mining plan which shall include:-	Will be prepared soon.
	(a) the plan of the area showing the nature and extent of the mineral body, spot or spots where the excavation is to be done in the first year and its extent, a detailed cross- sections and detailed plan of spot(s) of excavation based on prospecting date gathered by the applicant a tentative scheme of mining for the period of the lease.	Upto date mining scheme has been approved for a period of 5 years. Copy of the approval letter no. 314(3)/ 2010-MCCM(CZ)/MS-56/705 dated 20.05.2011. (enclosed).
	(b) the details of geology and lithology of the area, the extent of manual mining and through machines.	Given in the Mining Plan/ Scheme
	(c) annual programme and plan for excavation from year to year	As per mining plan & scheme
	(d) the plan of the area showing natural water courses, limit of reserved and other forest areas and density of trees, assessment of impact of mining activity on forest, Land surface and Environment including air and water pollution and details of the scheme for restoration of the same by afforestation land reclamation use of pollution control devices.	-do-
(x-D)	Is the mineral going to be used in his own industry? If so, give full details. (For own Industry Explanation under Rule-24 B)	---
(xi)	In case the renewal applied for is only part of the lease hold,	Case does not arise.
	(a) the area applied for renewal	---
	(b) description of the area applied for renewal (description should be adequate for the purpose of demarcating the plot	

	(c) particulars of map of the lease hold with area applied for renewal clearly marked on it (attached)	
	(d) particulars of existing or created dumps of ore if any	—
(xii)	Means by which the mineral is to be raised i.e. by hand labour or mechanical or electric power	By Semi-mechanised method. Copy of the list of Technical Persons to supervise the mines is enclosed.
(xiii)	Manner in which the mineral raised is to be utilized:	
	(a) for manufacture in India	For internal consumption and export.
	(b) exports to foreign countries	
	(c) in form either case the industries in connection with which it is required, should be specified. In the latter case, the countries to which the mineral will be exported and whether the mineral is to be exported after processing or in raw form should be stated	In raw form, / minerals will be supplied to the Steel Plants, Sponge Iron Plants in the Country and may be exported to different countries of the World.
(xiv)	Details of output during the last three years and phased programme for production during the next three years alongwith a layout plan for development, if any	2009-10- Nil 2010-11- Nil 2011-12- Nil 2012-13: 351848 MT 2013-14: 351904 MT 2014-15: 354900 MT
(xv)	In case of coal, details of existing railway transport facility, available and additional transport facility, if any, required	Case does not arise
(xvi)	Any other particulars which the applicant wishes to furnish	Will be furnished on demand.

I/We do hereby declare that the particulars furnished above are correct and am/are ready to furni any other details, including accurate plan as required by you before the grant of 2nd renewal of the lease.

Date: 27.04-12

Place: Bhubaneswar

Yours faithfully,

DY.GENERAL MANAGER (GEO)

N.B. If the application is signed by an authorized agent of the applicant Power of Attorney should be attached- copy enclosed.

ANNEX. - 10

Tel: 06766 233064. Fax: 06766 233085

OMC

The Odisha Mining Corporation Ltd.

(A GOLD CATEGORY STATE PSU)

(A Government of Odisha Undertaking).

REGIONAL OFFICE: GANDHAMARDAN,

PO:- SUAKATI, DIST-KEONJHAR - 18

No. 2532 /OMC/ROG/12 Date. 08.08.2012

To

The Manager (F&E),
Odisha Mining Corporation Ltd.,
Bhubaneswar..

Sub:- Verification of land schedule over 618.576 hact coming within Gandhamardan-A mining lease of OMC Ltd.

Ref:- This Office L.Memo No.1426 dtd.15.05.2012

Sir,

With reference to the subject and letter cited above we are sending herewith the certify copy of the Land schedule of village Suakati and Dania over 618.5760 ha coming within Gandhamardan - A Mining Lease of OMC Ltd after verification and signed by Tahasildar Banspal for diversion proposal..

Yours faithfully,

Regional Manager.

Encl: As above.

OFFICE OF THE TAHASILDAR : BANSPAL

No. 1252 /Dt. 7-8-12

Mod Chief

To

The Regional Manager,
Odisha Mining Corporation,
Gandhamardan Iron Ore Mines,
Suakati, Keonjhar

Sub- Return of Land schedule over 618.5760 Ha. Coming within Gandhamardan-A Mining lease of O.M.C. Ltd.

Ref. Your Letter No. 1425/OMC/GIOM/12, Dt. 15.05.2012

Sir,

With reference to the letter on the subject cited above, I am to sending herewith the Land schedule of village Suakati and Danla after verification with reference to Hal ROR over 618.5760 Ha. Coming within Gandhamardan-A Mining lease of O.M.C. Ltd.

Encl: 3 Sets.

Yours faithfully,

7.8.12

TAHASILDAR, BANSPAL
TAHASILDAR
BANSPAL

Received
8.8.12

..edule of Gandhmarda Iron Ore Mines, Block-A, over an are of 618.5750 Hectares in villages Suakati, Danala & Gandhamardan PRF in Keonjhar District.

Village :- Suakati
P.S :- Sadar, Tahsil : Keonjhar
Dist :- Keonjhar

Plot No.	Khata No.	Name of the Tenant	Kissam	Total Area of Plot (Ha.)	Area within OMC ML (Ha.)		Remarks
(1)	(2)	(3)	(4)	(5)	(6)		(7)
1	114	Rakhita	Gochar	14.5600	10.3632	Part	
2	114	Rakhita	Sarbasadharan Jogya	0.3500	0.1600	Part	Reserve for dead animals and production of leather.
3	114	Rakhita	Rasta	0.4900	0.2720	Part	
4	116	Abad Jogya Anabadi	Jungle	1.0900	1.0900		Reserved by Suakati G.P.
5	114	Rakhita	Sarbasadharan Jogya	0.7500	0.7500		Reserve for Graveyard.
6	116	Abad Jogya Anabadi	Jungle	0.6400	0.6400		
7	116	Abad Jogya Anabadi	Talla	0.6300	0.6300		
8	115	Abad Jogya Anabadi	Talla	0.3550	0.3550		
9	116	Abad Jogya Anabadi	Talla	0.4100	0.4000	Part	
10	116	Abad Jogya Anabadi	Talla	0.6650	0.2400	Part	
14	116	Abad Jogya Anabadi	Talla	0.4900	0.0224	Part	
140	116	Abad Jogya Anabadi	Talla	0.7800	0.0628	Part	
141	96	Laxmi Munda & Others	Talla	0.1850	0.0448	Part	
202	116	Abad Jogya Anabadi	Jungle	11.0400	3.5400	Part	
320	95	Laxmi Munda & Others	Bajephasal-2	0.5360	0.0236	Part	
321	12	Kalra Munda	Gharabari	0.1350	0.0168	Part	
323	35	Jugal Kisor Barik	Talla	0.0620	0.1500	Part	
323/088	113/74	Maheli Das	Talla	0.1080			
324	67	Lakhu Barik	Bajephasal-2	0.4950	0.4900	Part	
325	72	Baijnath Nath Naik & others	Bajephasal-2	0.5300	0.5300		
326	84	Mursumu Munda	Bajephasal-2	0.2000	0.2000		
327	116	Abad Jogya Anabadi	Talla	0.3500	0.0928	Part	
329	116	Abad Jogya Anabadi	Talla	0.4400	0.3858	Part	
330	85	Raya Munda	Talla	0.5650	0.4010	Part	
331	116	Abad Jogya Anabadi	Talla	0.1350	0.1350		
332	116	Abad Jogya Anabadi	Talla	0.1500	0.1500		
333	116	Abad Jogya Anabadi	Talla	0.2000	0.2000		
334	61	Baguju Barik & Others	Talla	0.3000	0.3000		
335	114	Rakhita	Road	0.7350	0.2175	Part	Protected by Odisha Mining Department.
336	116	Abad Jogya Anabadi	Patita	1.0800	1.0800		
337	114	Rakhita	Road	0.2250	0.2250		Protected by Odisha Mining Department.
338	105	Syama Barik	Bajephasal-2	0.2400	0.2400		
339	116	Abad Jogya Anabadi	Talla	0.2050	0.2050		
340	1	Arjun Mohata	Talla	0.2750	0.2750		
341	116	Abad Jogya Anabadi	Talla	0.1000	0.1000		
342	115	Abad Jogya Anabadi	Talla	0.2350	0.2350		
343	110	Sudarshana Barik	Talla	0.4900	0.4900		
344	116	Abad Jogya Anabadi	Bajephasal-2	0.5050	0.5050		
345	116	Abad Jogya Anabadi	Talla	0.1500	0.1500		

346	116	Abad Jogya Anabadi	Taila	0.4150	0.4150		
347	116	Abad Jogya Anabadi	Patila	0.2250	0.1656	Part	
348	116	Abad Jogya Anabadi	Taila	0.1500	0.1500		
349	116	Abad Jogya Anabadi	Taila	0.3450	0.1600	Part	
350	54	Pancab Munda & Others	Gharabari	0.3500	0.0600	Part	
362	20	Kalia Barik	Bajaphasal-2	0.0260	0.0050	Part	
363	116	Abad Jogya Anabadi	Bajaphasal-2	0.1500	0.0400	Part	
446	114	Rakhita	Mahala	0.1300	0.0050	Part	
447	116	Abad Jogya Anabadi	Gharabari	0.0240	0.0240		
448	116	Abad Jogya Anabadi	Patila	0.1000	0.0100		
449	116	Abad Jogya Anabadi	Patila	0.0950	0.0600	Part	
450	115	Sarbasadharan	Rasta	0.8450	0.5450	Part	
451	113/6	Benga Sethy	Taila	0.2300	0.1900	Part	
452	113/3	Balaram Sahu & Others	Taila	0.1500	0.1500		
453	116	Abad Jogya Anabadi	Panam Bagayat-2	0.1250	0.1250		
454	113/8	Ajay Kumar Mishra	Taila	0.2600	0.1600	Part	
455	29	Gauranga Barik	Taila	0.2400	0.1920	Part	
456	113/8	Ajay Kumar Mishra	Taila	0.2300	0.1856	Part	
457	105	Sayam Barik	Taila	0.3550	0.1600	Part	
458	43	Dura Munda	Gharabari	0.1600	0.1600		
459	34	Mursum Munda	Gharabari	0.3200	0.3200		
460	28	Gopal Munda	Gharabari	0.3900	0.3900		
461	116	Abad Jogya Anabadi	Taila	0.1900	0.1900		
462	113/74	Narayan Sahoo	Taila	0.1900	0.1900		
463	113/7	Indra Prasad Sharma	Taila	0.1500	0.1600		
464/984	113/4	Sahadeb Mohanta	Taila	0.0200	0.0200		
464	29	Gouranga Barik	Taila	0.0500	0.0500		
465	105	Syama Barik	Taila	0.1950	0.1950		
466	116	Abad Jogya Anabadi	Taila	0.1900	0.1900		
467	113/3	Balaram Sahu	Taila	0.1800	0.1800		
468	113/14	Sudhansu Sekhar Sahu	Taila	0.2400	0.2400		
469	113/14	Sudhansu Sekhar Sahu	Taila	0.2200	0.2200		
470	117	Abad Jogya Anabadi	Nala	0.1560	0.1550		
471	37	Dhu Ch. Naik	Taila	0.3002	0.3000		
472	114	Sarbasadharan	Kaccha Rasta	0.5100	0.5100		Maintained by Odisha Mining Department.
473	116	Abad Jogya Anabadi	Patila	2.5600	2.5600		
474	116	Abad Jogya Anabadi	Patila	10.5600	10.5600		
475	116	Abad Jogya Anabadi	Patila	13.4080	13.4400		
475/815	113/78	Mina Kumari Naik	Gharabari	0.0320			
476	116	Abad Jogya Anabadi	Jungle	14.5600	4.5600	Part	
480	114	Rakhita	Rasta	1.4600	0.0624	Part	Maintained by Sarakati G.P.
723	116	Abad Jogya Anabadi	Patila	3.4832	0.0750	Part	
724	114	Rakhita	Rasta	0.1100	0.1000		
725	116	Abad Jogya Anabadi	Patila	0.6000	0.6000		
726	114	Rakhita	Rasta	0.4000	0.1200		Maintained by Sarakati G.P.
436/840	116	Abad Jogya Anabadi	Taila	0.2700	0.2700		
450/941	116	Abad Jogya Anabadi	Taila	0.5600	0.5600		
					64.7280		

4

ANNEX. - 10

Schedule of Gandhmarda Iron Ore Mines, Block-A, over an are of 618.5760 Hectares in villages Suakati, Danala & Gandhamardan PRF in Keonjhar District.

Village :- DANALA

P.S :- Sadar. Tahsil :- Keonjhar

Dist :- Keonjhar

Plot No.	Khata No.	Name of the Tenant	Kissam	Total Area of Plot (Ha)	Area within OMC ML (Ha)	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)
890	50	Jamal Naik & others	Taila	0.9830	0.0118	Part
891	174	Harsu Behera	Talia	0.1200	0.1000	Part
892	64	Duburu Behera	Taila	0.0500	0.0350	Part
893	180	Abad Jogya Anabadi	Jungle-1	3.5200	3.3632	Part
901	8	Indramani Behera & others	Sarad-3	0.2400	0.1050	Part
902	25	Kirtan Behera	Sarad-3	0.1600	0.1600	
903	180	Abad Jogya Anabadi	Palila	0.1700	0.1220	Part
904	8	Indramani Behera & others	Sarad-3	0.1100	0.0048	Part
906	8	Indramani Behera & others	Sarad-2	0.3500	0.0048	Part
908	180	Abad Jogya Anabadi	Palila	0.0600	0.0200	Part
909	106	Bakuli Behera	Sarad-3	0.1800	0.1156	Part
910	122	Benu Behera & others	Sarad-3	0.0300	0.0300	
911	174	Harsu Behera	Sarad-3	0.0300	0.0300	
912	25	Kirtan Behera	Sarad-3	0.0500	0.0500	
913	23	Kalia Behera	Sarad-3	0.0400	0.0400	
914	112	Braja Behera	Sarad-3	0.0450	0.0450	
915	171	Sura Behera	Biali	0.0200	0.0200	
916	174	Hrasu Behera	Biali	0.0500	0.0500	
917	112	Braja Behera	Sarad-2	0.1400	0.1400	
918	122	Benu Behera & others	Sarad-2	0.1300	0.1300	
919	171	Sura Behera	Sarad-2	0.3000	0.3000	
920	83	Pabitra Naik	Biali	0.0900	0.0900	
921	50	Jamal Naik & others	Sarad-3	0.1100	0.1100	
922	180	Abad Jogya Anabadi	Jungle-2	0.4200	0.4200	
923	174	Harsu Behera	Biali	0.3200	0.3200	
924	180	Abad Jogya Anabadi	Jungle-2	0.3300	0.3300	
925	54	Tanguru Dehuri	Sarad-3	0.3000	0.3000	
926	23	Kalia Behera	Biali	0.1100	0.1100	
927	106	Bakuli Behera	Biali	0.1100	0.1100	
928	174	Harsu Behera	Sarad-3	0.0800	0.0800	
929	180	Abad Jogya Anabadi	Palila	0.0500	0.0500	
930	23	Kalia Behera	Biali	0.1900	0.1900	
931	86	Nister Behera	Sarad-3	0.1200	0.1200	
932	174	Harsu Behera	Biali	0.1000	0.1000	

933	174	Suka Behera	Sarad-3	0.1600	0.1500		
934	174	Haru Behera	Sarad-3	0.2000	0.2000		
935	180	Abad Jogya Anabadi	Palita	0.0200	0.0100	Part	
936	135	Bakuli Behera	Sarad-2	0.0700	0.0080	Part	
937	106	Bakuli Behera	Taila	0.1900	0.1000	Part	
938	150	Abad Jogya Anabadi	Palita	0.0600	0.0600		
939	55	Tanguru Behera	Sarad-2	0.2800	0.2800		
940	23	Kalia Behera	Sarad-2	0.2200	0.2300		
941	64	Duburu Behera	Sarad-2	0.1600	0.4600		
942	23	Kalia Behera	Sarad-3	0.0900	0.0900		
943	181	Abad Ajogya Anabadi	Parbat-1	8.8000	1.0872	Part	
983	181	Abad Ajogya Anabadi	Parbat-1	10.9600	5.5680	Part	
988	181	Abad Ajogya Anabadi	Parbat-1	16.8020	10.6550	Part	
989	181	Abad Ajogya Anabadi	Parbat-1	17.0800	13.5920	Part	
990	181	Abad Ajogya Anabadi	Parbat-1	15.1200	15.1200		
991	181	Abad Ajogya Anabadi	Parbat-1	16.0000	16.0000		
992	181	Abad Ajogya Anabadi	Parbat-1	17.2600	17.2600		
993	181	Abad Ajogya Anabadi	Parbat-1	17.2800	17.2800		
994	181	Abad Ajogya Anabadi	Parbat-1	3.0000	3.0000		
995	180	Abad Jogya Anabadi	Palita	10.5760	10.5760		
996	73	Dasarathi Naik & others	Taila	0.2300	0.2300		
997	150	Abad Jogya Anabadi	Palita	0.7400	0.7400		
998	155	Rama Behera	Taila	0.4000	0.3568	Part	
999	73	Dasarathi Nayak & others	Taila	0.4000	0.4000		
1000	174	Harsu Behera	Taila	0.4100	0.3900	Part	
1001	88	Nistar Behera	Taila	0.7300	0.1240	Part	
1007	174	Harsu Behera	Taila	0.1000	0.0400	Part	
1008	174	Harsu Behera	Taila	0.1100	0.0060	Part	
1022	178	Rakhita	Development Plan	3.1100	3.8488	Part	Reserve for School & Play ground
1023	157	Laxman Dehuri	Taila	0.2500	0.1000	Part	
1024	127	Bhakta Dehuri	Bajeprasal-2	0.8700	0.5000	Part	
1026	178	Rakhita	Basti Jogya	6.5272	3.0000	Part	Reserve for extension of Basti in future
1028	178	Rakhita	Gramya Jungle	16.8500	13.0662	Part	
1029	181	Abad Ajogya Anabadi	Parbat-1	16.3200	16.3200		
1030	180	Abad Jogya Anabadi	Jungle-1	14.4000	0.6948	Part	
1025/1578	127	Bhakta Dehuri	Bari	0.5753	0.0040	Part	
1579/1075	177/52	Susanta Ku. Pattnaik & others	Gharabari	0.4047			
958/1537	121	Bonu Behera	Sarad-3	0.0400	0.0400		
1022/1508	34	Gangadhar Naik	Taila	0.2600	0.1400	Part	
1022/1580	110	Balaram Padhan	Taila	0.2300	0.2200	Part	
					165.2500		

Land Schedule of PRF under section 4(1) under Orissa Forest Act, 1972 vide Govt. of Orissa Revenue Department Notification 74607/R, dt. 13.11.1978 in village Danala No. 82, P.S. Kanjipani, Telkoi in Keonjhar District.

Plot No.	Khata No.	Name of the Tenant	Kisam	Total Area of Plot (Ha.)	Area within OMC ML (Ha.)	Remarks
1	2	3	4	5	6	7
986	181	Abad Ajogya Anabadi	Parbat-1	16.8600	5.5580	Part
988	181	Abad Ajogya Anabadi	Parbat-1	16.8000	10.2441	Part
989	181	Abad Ajogya Anabadi	Parbat-1	17.0500	8.8587	Part
990	181	Abad Ajogya Anabadi	Parbat-1	15.1200	15.1200	
991	181	Abad Ajogya Anabadi	Parbat-1	16.0000	16.0000	
992	181	Abad Ajogya Anabadi	Parbat-1	17.2900	17.2900	
993	181	Abad Ajogya Anabadi	Parbat-1	17.2800	7.8599	
994	181	Abad Ajogya Anabadi	Parbat-1	3.0000	0.5829	
1029	181	Abad Jogya Anabadi	Parbat-1	16.3200	16.1824	
					97.5360	

ABSTRACT OF GANDHAMARDAN IRON ORE MINES BLOCK - A OVER AN AREA OF 618.5760 H IN VILLAGE DANALA, SUAKATI & GANDHAMARDAN PRF IN KEONJHAR DIST.

Sl No.	Name of the Village	Forest Land (Ha)		Total Forest	Non Forest		Total Land (Ha)
		P.R.F.	V.F.		Govt. Land (Ha)	Tenanted land (Ha)	
1	Danala	97.5360	23.8832	121.4192	37.3060	6.5246	165.2500
2	Suakati		9.7300	9.7300	48.2712	6.7268	64.7280
3	Gandhamardan P.R.F.	388.5980		388.5980			388.5980
	GRAND TOTAL =	486.1340	33.6132	519.7472	85.5772	13.2516	618.5760

Verified with the ROR

GRAND TOTAL 618.5760 hectores.

18.5.12
Record Keeper
Bansipal Tahasil

Tahasildar
Bansipal
TAHASILDAR
BANSPAL

41

ANNEX - 11

No. J-11015/1038/2007-IA.II (M)

Government of India

Ministry of Environment & Forests

Paryavaran Bhavan,
C.G.O. Complex, Lodi Road,
New Delhi-110 003.

532
03/02/09

Dated the 16th January, 2009

To

M/s Orissa Mining Corporation Limited
OMC House, P.O. Box-34,
Bhubaneshwar,
Orissa-751 001
E-mail: dkpattanaik60@gmail.com

Subject: Expansion of Gandhamardan-A Iron Ore Mining Project of M/s Orissa Mining Corporation Limited, located in Village(s) Dadhra and Suakati, Tehsil Telkoi, District Keonjhar, Orissa- environmental clearance regarding.

Sir,

This has reference to your letter No. 10608/ OMC/F&E/2007 dated 15.05.2007 and subsequent letters dated 04.10.2007, 15.11.2007, 15.03.2008, 28.03.2008 and 08.08.2008 on the subject mentioned above. The proposal is for enhancement of production of iron ore from 2,50,000tonnes per annum(TPA)(0.25 million TPA) to 0.35 million TPA. The total mine lease area of the project is 618.576ha, out of which 11.55ha is an agricultural land, 519.7472ha is forestland (Gandhamardan RF), 73.002ha is wasteland, 10.3632ha is grazing land, 1.7ha is settlements and 2.212ha is roads. Area proposed for mining is 150.2407ha, an area of 6.7ha is kept for temporary storage of the existing over burden, 8.476ha for green belt, 38.6204ha for infrastructure (township, roads, magazine building and other infrastructure) and 414.5389ha is others (undisturbed area). An area of 6.7ha earmarked for existing dumps will be re-handled into the quarried void within first five years and afforested. The Chamda Nallah is flowing in the buffer zone of the mine at a distance of 0.8km from the mine lease boundary. In addition, the Baitarani River and the Bamni Nadi are also flowing in the buffer zone of the mine at distance of 5km each from the mine lease boundary. Pre-mining surface drainage pattern has been submitted and three, fourth order seasonal streams, namely Id1, Id2 and Id3 emanating from the mine lease will be affected during the expansion phase in the Hill Top quarries. The initial stretch of Id1 and Id2 fourth order channels of 70m and 30m respectively will be affected after the 10th year of expansion phase, whereas, the Id3, the fourth order seasonal channel of 400m length has already been cut and a diversion channel has been planned for the same. A part of the quarry will be backfilled and the flow of the channel will be restored over backfilled area. No national park/wildlife sanctuary/biosphere reserve/tiger reserve/elephant reserve etc. is reported to be located in the core and buffer zone of the mine and that the area does not report to form corridor for Schedule-I fauna. In support of this, a map duly authenticated by the DFO cum Wildlife Warden, Keonjhar ...

...2/-

ANNEX. - 11

Division has been provided showing that no National Park / Sanctuary and no Wildlife Corridor exist within 10km of the mine lease. Twelve Reserve Forests are in the buffer zone of the mine. The mine working will be opencast by mechanized method involving drilling and blasting. The Targeted production capacity of the mine is 3,50,000TPA of iron ore and the life of mine is 18years. The mineral will be transported through the road and about 100additional trucks will ply to carry the ore from the mine. The topography of the area is hilly at an elevation ranging from 570m-1009m AMSL. The existing ground level for the hill top quarry is 975m AMSL and the ultimate working depth will be 928m AMSL. For the float quarry, the existing ground levels are 770m AMSL and 704m AMSL and the ultimate working depths will be 764m AMSL and 698m AMSL. The ground water table is reported at 643m AMSL. The mine working will not intersect the ground water table. A detailed hydro-geological report has been provided concluding that the mining will not have any impact on the ground water or the steams oozing out from the contact zones and forming major streams. The peak water requirement of the project is estimated as 329m^{3}per day, which will be obtained from the Chamda nallah traversing near the lease hold. There is no population in the core zone, therefore, displacement of population and R&R is not involved. It is estimated that 5.6million m^3 of waste will be generated during the life of the mine. The existing over burden dump occupy about 0.3 million m^3 of over burden, which will be used for backfilling the quarry void till 2011. The entire quantity of the over burden will be re-handled and backfilled and there will be no external over burden dump. Backfilling will commence from the year 2010 onwards. Out of the total 150.2407ha excavated area, an area of 35.54 ha will be backfilled and an area of 114.7007 ha will be left as void, in which bench plantation will be carried out. Plantation will be raised in an area of 165.417 ha at the end of the mine life. The Consent to Establish from the State Pollution Control Board, Orissa was obtained on 04.07.2007 for enhancement of production of iron ore from 0.25MTPA to 0.35MTPA involving lease area of 618.576ha.The public hearing of the project was held on 09.03.2007, as per the EIA Notification,2006 for enhancement of production of iron ore upto 3.5lakhs TPA over an area of 618.576ha. The Indian Bureau of Mines had approved scheme of mining including progressive mine closure plan of the project on 01.08.2006 for lease area of 618.576ha. The capital cost of the project is Rs.25.94Crores and the capital cost for the environmental protection measures is proposed as Rs.108.96Lakhs. The annual recurring cost towards environmental protection measures is proposed as Rs.31Lakhs.

2. The Ministry of Environment and Forests has examined the application in accordance with the Section 12 of the EIA Notification, 2006 read with para 1.2 of the Circular No. J-11013/41/2006-IA.II(I) dated 13.10.2006 and hereby accords environmental clearance under the provisions thereof to the above mentioned Gandhamardan-A Iron Ore Mining Project of M/s Orissa Mining Corporation Limited for an annual production capacity of 3,50,000tonnes(0.35 million tonnes) of iron ore by opencast mechanized method involving total mining lease area of 618.576ha, subject to implementation of the following conditions and environmental safeguards.

...3/-

A. Specific conditions

(i) All the conditions stipulated by the State Pollution Control Board, Orissa in their Consent to Establish shall be effectively implemented.

(ii) Environmental clearance is subject to grant of forestry clearance. Necessary forestry clearance under the Forest (Conservation) Act, 1980 for an area of 519.7472ha forestland involved in the project shall be obtained before starting mining operation in that area. No mining shall be undertaken in the forest area without obtaining requisite prior forestry clearance.

(iii) The environmental clearance is subject to approval of the State Landuse Department, Government of Orissa for diversion of agricultural land for non-agricultural use.

(iv) The project proponent shall develop fodder plots in the non-mineralised area in lieu of the use of the grazing land.

(v) The project proponent shall effectively address the concerns raised by the locals in the public hearing as well as during consideration of this project, while implementing this project

(vi) The mining operations shall be restricted to above ground water table and it should not intersect the groundwater table. In case of working below the ground water table, prior approval of the Ministry of Environment and Forests and the Central Ground Water Authority shall be obtained, for which a detailed hydro-geological study shall be carried out.

(vii) The project proponent shall ensure that no natural watercourse and/or water resources are obstructed due to any mining operations. Adequate measures shall be taken while diverting all the three, fourth order seasonal streams, namely Id1, Id2 and Id3 emanating from the mine lease, during the course of mining operation.

(viii) The top soil, if any, shall temporarily be stored at earmarked site(s) only and it should not be kept unutilized for long. The topsoil shall be used for land reclamation and plantation.

(ix) The existing over burden (OB) and the likely to be generated over burden during the course of mining shall be re-handled and backfilled. Backfilling shall start from the year 2010 and the entire quantity of the waste to be generated shall be backfilled. There shall be no external over burden dumps. Out of the total 150.2407ha excavated area, an area of 35.54 ha shall be backfilled and an area of 114.7007 ha shall be left as void, in which bench plantation should be carried out. The backfilled area shall be afforested. Monitoring and management of rehabilitated areas should continue until the vegetation becomes self-sustaining. Compliance status shall be submitted to the Ministry of Environment & Forests and its Regional Office located at Bhubaneswar on six monthly basis.

3/4/-

(x) Catch drains and siltation ponds of appropriate size shall be constructed around the mine working, mineral and temporary OB dumps to prevent run off of water and flow of sediments directly into the Chamda Nallah, the Baitarni River, the Bamni Nadi and other water bodies. The water so collected shall be utilized for watering the mine area, roads, green belt development etc. The drains shall be regularly desilted, particularly after the monsoon, and maintained properly.

Garland drains, settling tanks and check dams of appropriate size, gradient and length shall be constructed around the mine pit, topsoil dump, temporary over burden dumps and mineral dumps to prevent run off of water and flow of sediments directly into the Chamda Nallah, the Baitarni River, the Bamni Nadi and other water bodies and sump capacity shall be designed keeping 50% safety margin over and above peak sudden rainfall (based on 50 years data) and maximum discharge in the area adjoining the mine site. Sump capacity shall also provide adequate retention period to allow proper settling of silt material. Sedimentation pits shall be constructed at the corners of the garland drains and desilted at regular intervals.

(xi) Dimension of the retaining wall at the toe of temporary OB dumps and the over burden benches within the mine to check run-off and siltation shall be based on the rain fall data.

(xii) Plantation shall be raised in an area of 165.417ha including a 7.5m wide green belt in the safety zone around the mining lease, backfilled and reclaimed area, quarry benches, around crusher, roads etc. by planting the native species in consultation with the local DFO/Agriculture Department. The density of the trees should be around 2500 plants per ha.

(xiii) Regular water sprinkling shall be carried out in critical areas prone to air pollution and having high levels of SPM and RSPM such as around crushing and screening plant, loading and unloading point and all transfer points. Extensive water sprinkling shall be carried out on haul roads. It shall be ensured that the Ambient Air Quality parameters conform to the norms prescribed by the Central Pollution Control Board in this regard.

(xiv) Regular monitoring of the flow rate of the springs and the perennial nallahs shall be carried out and records maintained.

(xv) Regular monitoring of water quality upstream and downstream of the Chamda Nallah shall be carried out and record of monitored data should be maintained and submitted to the Ministry of Environment and Forests, its Regional Office, Bhubneswar, the Central Groundwater Authority, the Regional Director, Central Ground Water Board, the State Pollution Control Board and the Central Pollution Control Board.

5/-

(xvi) The project authority shall implement suitable conservation measures to augment ground water resources in the area in consultation with the Regional Director, Central Ground Water Board.

(xvii) Regular monitoring of ground water level and quality shall be carried out in and around the mine lease by establishing a network of existing wells and constructing new piezometers during the mining operation. The monitoring should be carried out four times in a year – pre-monsoon (April-May), monsoon (August), post-monsoon (November) and winter (January) and the data thus collected shall be sent regularly to the Ministry of Environment and Forests and its Regional Office, Bhubaneswar, the Central Ground Water Authority and the Regional Director, Central Ground Water Board. If at any stage, it is observed that the groundwater table is getting depleted due to the mining activity, necessary corrective measures shall be carried out.

(xviii) Appropriate mitigative measures shall be taken to prevent pollution of the Baitarni River and the Bamni Nadi in consultation with the State Pollution Control Board.

(xix) The project proponent shall obtain necessary prior permission of the competent authorities for drawl of requisite quantity of water (surface water and ground water, if any) required for the project.

(xx) Suitable rainwater harvesting measures on long term basis shall be planned and implemented in consultation with the Regional Director, Central Ground Water Board.

(xxi) Vehicular emissions shall be kept under control and regularly monitored. Measures shall be taken for maintenance of vehicles used in mining operations and in transportation of mineral. The mineral transportation shall be carried out through the covered trucks only and the vehicles carrying the mineral shall not be overloaded. No transportation of ore outside the mine lease area shall be carried out after the sunset.

(xxii) No blasting shall be carried out after the sunset. Blasting operation shall be carried out only during the daytime. Controlled blasting shall be practiced. The mitigative measures for control of ground vibrations and to arrest fly rocks and boulders should be implemented.

(xxiii) Drills shall either be operated with dust extractors or equipped with water injection system.

(xxiv) Mineral handling area shall be provided with adequate number of high efficiency dust extraction system. Loading and unloading areas including all the transfer points should also have efficient dust control arrangements. These should be properly maintained and operated.

...6/-

(xxv) Consent to operate shall be obtained from the State Pollution Control Board prior to start of enhanced production from the mine.

(xxvi) Sewage treatment plant shall be installed for the colony. ETP shall also be provided for the workshop and wastewater generated during the mining operation.

(xxvii) Digital processing of the entire lease area using remote sensing technique shall be carried out regularly once in three years for monitoring land use pattern and report submitted to the Ministry of Environment and Forests and its Regional Office, Bhubaneswar.

(xxviii) Land oustees and land losers/affected people, if any, shall be compensated and rehabilitated as per the National Policy on Resettlement and Rehabilitation of Project Affected Families.

(xxix) Pre-placement medical examination and periodical medical examination of the workers engaged in the project shall be carried out and records maintained. For the purpose, schedule of health examination of the workers should be drawn and followed accordingly.

(xxx) Provision shall be made for the housing of construction labour within the site with all necessary infrastructure and facilities such as fuel for cooking, mobile toilets, mobile STP, safe drinking water, medical health care, crèche etc. The housing may be in the form of temporary structures to be removed after the completion of the project.

(xxxi) The project proponent shall take all precautionary measures during mining operation for conservation and protection of endangered fauna namely elephant etc. spotted in the study area. Action plan for conservation of flora and fauna shall be prepared and implemented in consultation with the State Forest and Wildlife Department. Necessary allocation of funds for implementation of the conservation plan shall be made and the funds so allocated shall be included in the project cost. All the safeguard measures brought out in the Wildlife Conservation Pan so prepared specific to the project site shall be effectively implemented. A copy of action plan shall be submitted to the Ministry of Environment and Forests and its Regional Office, Bhubaneswar.

(xxxii) A Final Mine Closure Plan along with details of Corpus Fund shall be submitted to the Ministry of Environment & Forests 5 years in advance of final mine closure for approval.

B. General conditions

(i) No change in mining technology and scope of working should be made without prior approval of the Ministry of Environment & Forests. ..7/-

(ii) No change in the calendar plan including excavation, quantum of mineral iron ore and waste should be made.

(iii) Atleast four ambient air quality-monitoring stations should be established in the core zone as well as in the buffer zone for RSPM, SPM, SO_2 & NOx monitoring. Location of the stations should be decided based on the meteorological data, topographical features and environmentally and ecologically sensitive targets and frequency of monitoring should be undertaken in consultation with the State Pollution Control Board.

(iv) Data on ambient air quality (RSPM, SPM, SO_2 & NOX) should be regularly submitted to the Ministry of Environment and Forests including its Regional office located at Bhubaneswar and the State Pollution Control Board / Central Pollution Control Board once in six months.

(v) Fugitive dust emissions from all the sources should be controlled regularly. Water spraying arrangement on haul roads, loading and unloading and at transfer points should be provided and properly maintained.

(vi) Measures should be taken for control of noise levels below 85 dBA in the work environment. Workers engaged in operations of HEMM, etc. should be provided with ear plugs / muffs.

(vii) Industrial waste water (workshop and waste water from the mine) should be properly collected, treated so as to conform to the standards prescribed under GSR 422 (E) dated 19th May, 1993 and 31st December, 1993 or as amended from time to time. Oil and grease trap should be installed before discharge of workshop effluents.

(viii) Personnel working in dusty areas should wear protective respiratory devices and they should also be provided with adequate training and information on safety and health aspects.

Occupational health surveillance program of the workers should be undertaken periodically to observe any contractions due to exposure to dust and take corrective measures, if needed.

(ix) A separate environmental management cell with suitable qualified personnel should be set-up under the control of a Senior Executive, who will report directly to the Head of the Organization.

(x) The funds earmarked for environmental protection measures should be kept in separate account and should not be diverted for other purpose. Year wise expenditure should be reported to the Ministry of Environment and Forests and its Regional Office located at Bhubaneswar.

...8/-

(xi) The project authorities should inform to the Regional Office located at Bhubaneswar regarding date of financial closures and final approval of the project by the concerned authorities and the date of start of land development work.

(xii) The Regional Office of this Ministry located at Bhubaneswar shall monitor compliance of the stipulated conditions. The project authorities should extend full cooperation to the officer (s) of the Regional Office by furnishing the requisite data / information / monitoring reports.

(xiii) The project proponent shall submit six monthly report on the status of the implementation of the stipulated environmental safeguards to the Ministry of Environment and Forests, its Regional Office, Bhubaneswar, Central Pollution Control Board and State Pollution Control Board.

(xiv) A copy of clearance letter shall be marked to concerned Panchayat / local NGO, if any, from whom suggestion / representation has been received while processing the proposal.

(xv) The State Pollution Control Board should display a copy of the clearance letter at the Regional office, District Industry Centre and the Collector's office/ Tehsildar's Office for 30 days.

(xvi) The project authorities should advertise at least in two local newspapers widely circulated, one of which shall be in the vernacular language of the locality concerned, within 7days of the issue of the clearance letter informing that the project has been accorded environmental clearance and a copy of the clearance letter is available with the State Pollution Control Board and also at web site of the Ministry of Environment and Forests at **http://envfor.nic.in** and a copy of the same should be forwarded to the Regional Office of this Ministry located at Bhubaneswar.

3. The Ministry or any other competent authority may alter/modify the above conditions or stipulate any further condition in the interest of environment protection.

4. Failure to comply with any of the conditions mentioned above may result in withdrawal of this clearance and attract action under the provisions of the Environment (Protection) Act, 1986.

5. The above conditions will be enforced inter-alia, under the provisions of the Water (Prevention & Control of Pollution) Act, 1974, the Air (Prevention & Control of Pollution) Act, 1981, the Environment (Protection) Act, 1986 and the Public Liability Insurance Act, 1991 along with their amendments and rules made thereunder and also any other orders passed by the Hon'ble Supreme Court of India/ High Court of Orissa and any other Court of Law relating to the subject matter.

..9/-

6. Any appeal against this environmental clearance shall lie with the National Environment Appellate Authority, if preferred within a period of 30 days as prescribed under Section 11 of the National Environment Appellate Authority Act, 1997.

(SATISH C. GARKOTI)
Additional Director (S)

Copy to:

(i) The Secretary, Ministry of Mines, Government of India, Shastri Bhawan, New Delhi.

(ii) The Secretary, Department of Environment, Government of Orissa, Secretariat, Bhubaneswar.

(iii) The Secretary, Department of Mines and Geology, Government of Orissa, Secretariat, Bhubaneswar.

(iv) The Secretary, Department of Forests, Government of Orissa, Secretariat, Bhubaneswar.

(v) The Chief Wildlife Warden, Government of Orissa, Bhubaneswar.

(vi) The Chairman, Central Pollution Control Board, Parivesh Bhawan, CBD-cum-Office Complex, East Arjun Nagar, Delhi-110032.

(vii) The Chief Conservator of Forests, Regional Office (EZ), Ministry of Environment and Forests, A-3 Chandrashekharpur, Bhubaneshwar-751023.

(viii) The Chairman, Orissa State Pollution Control Board, Parivesh Bhawan, A/118 Nilakantha Nagar, Unit-VIII, Bhubaneshwar-751012.

(ix) The Member Secretary, Central Ground Water Authority, A2, W3 Curzon Road Barracks, K.G. Marg, New Delhi-110001.

(x) The District Collector, Keonjahr District, Government of Orissa.

(xi) EI Division, Ministry of Environment & Forests, EI Division, New Delhi.

(xii) Monitoring File.

(xiii) Guard File.

(xiv) Record File.

Annexure - 12 A

Balance Geological Reserves/Resources of Hilltop Deposit at 45% Fe cut-off

Feb 07, 2013

Surpac Minex Group

Block Model Report

Constraints Used

a. INSIDE CONSTRAINT ../bal_geological_reserve_hltp_quarry_gndmn_a
b. NOT < BLOCK fe 45

Keep blocks partially in the constraint : True

Z	Volume	Tonnes	Fe %	SiO2 %	Al2O3 %
850.0 -> 860.0	4000	15280	64.97	2.54	2.33
860.0 -> 870.0	62000	241260	64.98	3.03	1.93
870.0 -> 880.0	108000	422080	63.82	2.89	1.98
880.0 -> 890.0	152000	595600	64.52	1.83	2.07
890.0 -> 900.0	164000	642300	64.95	1.39	2.09
900.0 -> 910.0	196000	778780	65.28	1.90	1.72
910.0 -> 920.0	268000	1057040	65.32	1.88	1.47
920.0 -> 930.0	426000	1683540	64.98	2.05	1.82
930.0 -> 940.0	798000	3188200	64.30	2.49	1.93
940.0 -> 950.0	1446320	5748837	63.87	2.91	2.06
950.0 -> 960.0	1803645	6950253	63.23	3.19	2.21
960.0 -> 970.0	1689871	6802530	63.14	3.45	2.39
970.0 -> 980.0	1424660	5557263	62.72	3.44	1.80
980.0 -> 990.0	722789	2910900	63.35	3.14	2.48
990.0 -> 1000.0	310621	1215333	62.74	4.27	2.65
1000.0 -> 1010.0	81332	321318	62.56	4.87	2.40
Grand Total	**9657238**	**38130514**	**63.56**	**3.05**	**2.12**

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Annexure - 12 A

Balance Geological Reserves/Resources of Flank Deposit at 45% Fe cut-off

Feb 07, 2013

Surpac Minex Group

Block Model Report

Constraints Used

a. INSIDE CONSTRAINT ../bal_geological_reserve_flank_quarry_gndmn_a
b. NOT < BLOCK fe 45

Keep blocks partially in the constraint : True

Z	Volume	Tonnes	Fe%	SiO2%	Al2O3%
800.0 -> 805.0	42883	184396	62.30	2.22	6.58
805.0 -> 810.0	67992	280994	62.12	2.26	6.77
810.0 -> 815.0	58824	238830	62.19	2.18	6.79
815.0 -> 820.0	81469	350316	62.03	2.16	7.05
820.0 -> 825.0	96816	416311	62.46	2.27	6.28
825.0 -> 830.0	86352	371312	62.90	2.24	5.68
830.0 -> 835.0	82539	354918	63.69	2.18	4.81
835.0 -> 840.0	76598	329370	64.44	2.04	3.95
840.0 -> 845.0	68836	295995	64.62	2.28	3.13
845.0 -> 850.0	51324	220694	65.10	2.01	2.72
850.0 -> 855.0	32738	140775	65.26	2.03	2.58
855.0 -> 860.0	23988	103150	64.78	2.35	2.74
860.0 -> 865.0	17109	73570	64.61	2.54	2.75
865.0 -> 870.0	13648	58688	61.30	4.17	3.94
870.0 -> 875.0	10059	43252	58.14	4.97	5.58
875.0 -> 880.0	5270	22659	60.22	4.44	4.46
880.0 -> 885.0	2594	11153	58.11	4.98	5.60
885.0 -> 890.0	4289	18443	60.25	4.43	4.44
890.0 -> 895.0	2668	11472	58.13	4.98	5.59
905.0 -> 910.0	12125	52138	60.32	4.42	4.40
910.0 -> 915.0	23281	100109	56.65	5.61	6.32
915.0 -> 920.0	22902	98480	60.32	4.42	4.40
920.0 -> 925.0	34684	149139	60.32	4.42	4.40
925.0 -> 930.0	37039	159268	60.32	4.42	4.40
930.0 -> 935.0	73738	317075	60.32	4.42	4.40
935.0 -> 940.0	87762	377375	60.31	4.42	4.40
940.0 -> 945.0	88781	381759	56.65	5.61	6.32
945.0 -> 950.0	86023	369901	66.34	1.41	2.18
950.0 -> 955.0	33453	143848	66.84	1.18	2.15
955.0 -> 960.0	32660	140439	66.84	1.18	2.15
960.0 -> 965.0	13184	56689	66.84	1.18	2.15
Grand Total	1371629	5872517	62.48	2.87	4.73

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Annexure - 12 A

Balance Geological Reserves/Resources of Float Deposit at 45% Fe cut-off

Surpac Minex Group

Feb 07, 2013

Block Model Report

Constraints Used

a. INSIDE CONSTRAINT ../bal_geological_reserve_float_quarry_gndmn_a
b. NOT < BLOCK fe 45

Keep blocks partially in the constraint : True

Z	Volume	Tonnes	Fe %	SiO2%	Al2O3 %
625.0 -> 630.0	16000	48000	45.61	10.32	14.25
630.0 -> 635.0	24000	72000	57.60	4.85	6.77
635.0 -> 640.0	18400	55200	56.27	5.45	7.60
640.0 -> 645.0	21600	64800	58.73	4.33	6.06
645.0 -> 650.0	14400	43200	61.96	2.86	4.05
650.0 -> 655.0	9600	28800	61.96	2.86	4.05
655.0 -> 660.0	6400	19200	61.96	2.86	4.05
660.0 -> 665.0	11200	33600	61.96	2.86	4.05
665.0 -> 670.0	17600	52752	61.58	3.08	4.19
670.0 -> 675.0	28000	83760	60.53	3.88	4.89
675.0 -> 680.0	74400	194480	55.46	6.64	7.88
680.0 -> 685.0	96800	239184	54.27	7.48	8.36
685.0 -> 690.0	93600	239160	54.73	7.18	8.35
690.0 -> 695.0	123200	307112	54.38	7.26	8.27
695.0 -> 700.0	112000	298728	55.58	6.92	7.71
700.0 -> 705.0	100800	278752	56.21	6.99	7.72
705.0 -> 710.0	72800	197656	56.29	6.58	7.11
710.0 -> 715.0	43200	128344	59.80	4.10	5.02
715.0 -> 720.0	56000	159856	59.13	5.23	6.60
720.0 -> 725.0	78400	216680	59.10	4.25	6.43
725.0 -> 730.0	100000	272584	58.87	4.02	6.11
730.0 -> 735.0	105600	288904	58.17	4.57	6.15
735.0 -> 740.0	106400	302240	59.02	4.21	5.47
740.0 -> 745.0	110400	318096	59.16	3.98	5.33
745.0 -> 750.0	110400	327600	59.81	3.68	4.88
750.0 -> 755.0	116800	326240	58.35	4.52	5.64
755.0 -> 760.0	74400	206480	57.59	4.88	6.13
760.0 -> 765.0	92800	231064	55.03	6.74	7.25
765.0 -> 770.0	72800	176760	54.36	7.48	7.47

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Annexure - 12 A

Balance Geological Reserves/Resources of Float Deposit at 45% Fe cut-off

Surpac Minex Group

Feb 07, 2013

Z	Volume	Tonnes	Fe %	SiO2%	Al2O3 %
770.0 -> 775.0	98400	234072	52.54	7.76	8.95
775.0 -> 780.0	88000	220232	53.57	7.47	8.58
780.0 -> 785.0	64000	172232	55.21	6.94	7.66
785.0 -> 790.0	48000	130920	54.52	6.91	7.91
790.0 -> 795.0	32000	84176	52.61	7.17	9.31
795.0 -> 800.0	20800	54016	53.02	6.47	9.01
800.0 -> 805.0	7200	22448	52.30	6.14	10.83
805.0 -> 810.0	7200	22448	52.53	5.97	10.87
815.0 -> 820.0	6400	19008	51.47	7.76	10.00
820.0 -> 825.0	6400	19008	53.48	8.48	7.41
825.0 -> 830.0	6400	19008	52.36	9.88	7.65
830.0 -> 835.0	6400	19008	52.36	9.88	7.65
835.0 -> 840.0	3200	9504	52.36	9.88	7.65
Grand Total	2302400	6237312	56.66	5.77	6.96

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Annexure – 12B

Calculation of Production of Ore, Waste & Subgrade from Hilltop Quarry for the FY – 2014-15

Feb 07, 2013

Surpac Minex Group

Block Model Report

Constraints Used

a. INSIDE CONSTRAINT production_yr1_hltp_quarry_for_rep_final

Keep blocks partially in the constraint : True

Material	Z	Volume	Tonnes	Fe%	SiO_2%	Al_2O_3%
Ore	970.0 -> 980.0	42066	141969	65.83	1.58	0.72
	980.0 -> 990.0	13184	46844	66.30	1.36	0.62
Sub Total		**55250**	**188814**	**65.94**	**1.53**	**0.69**
Waste	970.0 -> 980.0	4086	8172	0	-	0
	980.0 -> 990.0	2750	5500	11.87	2.63	6.06
Sub Total		**6836**	**13672**	**4.78**	**1.06**	**2.44**
Grand Total		**62086**	**202486**	**61.17**	**0.59**	**-0.00**

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Annexure – 12B

Calculation of Production of Ore, Waste & Subgrade from Hilltop Quarry for the FY – 2015-16

Surpac Minex Group

Feb 07, 2013

Block Model Report

Constraints Used

a. INSIDE CONSTRAINT ../../pit design_gndmn_a/hltp/yr2_pit_hltp_revised/production_yr2_hltp_quarry_for_rep_final

Keep blocks partially in the constraint : True

Material	Z	Volume	Tonnes	Fe%	SiO2%	Al2O3%
Ore	970.0 -> 980.0	11504	49328	64.74	1.80	1.34
	980.0 -> 990.0	15367	57043	64.74	1.84	1.44
Sub Total		**26871**	**106371**	**64.74**	**1.82**	**1.39**
Subgrado	970.0 -> 980.0	2000	7980	53.53	11.91	2.50
Sub Total		**2000**	**7980**	**53.53**	**11.91**	**2.50**
Waste	970.0 -> 980.0	9926	19852	8.32	1.80	4.02
	980.0 -> 990.0	3387	6773	19.23	5.43	11.82
Sub Total		**13313**	**26625**	**11.10**	**2.72**	**6.01**
Grand Total		**42184**	**140976**	**53.98**	**2.56**	**2.33**

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Annexure – 12B

Calculation of Production of Ore, Waste & Subgrade from Hilltop Quarry for the FY – 2016-17

Feb 07, 2013

Surpac Minex Group

Block Model Report

Constraints Used

a. INSIDE CONSTRAINT ../../pit design_gndmn_a/hltp/yr3_pit_hltp_revised/production_yr3_hltp_quarry_for_rep_final

Keep blocks partially in the constraint : True

Material	Z	Volume	Tonnes	Fe%	SiO2%	Al2O3%
Ore	970.0 -> 980.0	33891	140824	65.05	1.76	1.24
	980.0 -> 990.0	19039	75210	64.32	1.97	1.66
Sub Total		**52930**	**216033**	**64.80**	**1.83**	**1.39**
Waste	970.0 -> 980.0	9828	19656	11.09	2.31	5.12
	980.0 -> 990.0	0	0	0.00	0.00	0.00
Sub Total		**9828**	**19656**	**11.09**	**2.31**	**5.12**
Grand Total		**62758**	**235689**	**60.32**	**1.87**	**1.70**

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Annexure – 12B

Calculation of Production of Ore, Waste & Subgrade from Hilltop Quarry for the FY – 2017-18

Surpac Minex Group

Feb 07, 2013

Block Model Report

Constraints Used

a. INSIDE CONSTRAINT ../../pit design_gndmn_a/hltp/yr4_pit_hltp_revised/production_yr4_hltp_quarry_for_rep_final

Keep blocks partially in the constraint : True

Material	Z	Volume	Tonnes	Fe%	SiO2%	Al2O3%
Ore	970.0 -> 980.0	68328	278106	62.70	3.98	1.73
	980.0 -> 990.0	16473	70835	64.39	2.21	1.65
Sub Total		**84801**	**348941**	**63.04**	**3.62**	**1.71**
Subgrade	970.0 -> 980.0	4000	15960	53.42	12.35	2.61
	980.0 -> 990.0	512	2042	53.45	6.77	2.15
Sub Total		**4512**	**18002**	**53.43**	**11.71**	**2.55**
Waste	970.0 -> 980.0	16715	33430	8.35	0	0.90
	980.0 -> 990.0	3852	7703	23.84	6.57	13.51
Sub Total		**20566**	**41133**	**11.26**	**0**	**3.26**
Grand Total		**109879**	**408076**	**57.40**	**3.49**	**1.91**

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Annex . 12C

Feb 07, 2013

Surpac Minex Group

Calculation of Production of Ore, Waste & Subgrade from Float Quarry for the FY – 2014-15

Constraints Used

a. INSIDE CONSTRAINT ../../pit design_gndmn_a/float_quarry/yr1_pit_revised/production_yr1_float_quarry_for_rep

Keep blocks partially in the constraint : True

Material	Z	Volume	Tonnes	Fe	SiO2	Al2o3
Ore	745.0 -> 750.0	15200	45600	62.38	2.69	3.51
	750.0 -> 755.0	23200	69600	62.43	2.68	3.51
	755.0 -> 760.0	12000	36000	62.48	2.66	3.51
	760.0 -> 765.0	4000	12000	62.46	2.67	3.51
Sub Total		54400	163200	62.43	2.68	3.51
Waste	745.0 -> 750.0	13200	26400	-	-	-
	750.0 -> 755.0	18000	36000	-	-	-
	755.0 -> 760.0	22800	45600	-	-	-
	760.0 -> 765.0	18000	36000	-	-	-
	765.0 -> 770.0	7200	14400	-	-	-
Sub Total		79200	158400	-	-	-

1/1

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Annexure – 12C

Calculation of Production of Ore, Waste & Subgrade from Float Quarry for the FY – 2015-16

Surpac Minex Group

Feb 07, 2013

Block Model Report

Constraints Used

a. INSIDE CONSTRAINT ../../pit design_gndmn_a/float_quarry/yr2_pit_revised/production_yr2_float_quarry_for_rep_revised

Keep blocks partially in the constraint : True

Material	Z	Volume	Tonnes	Fe %	SiO2 %	Al2O3 %
Ore	725.0 -> 730.0	22400	67200	62.07	2.82	3.77
	730.0 -> 735.0	17600	52800	62.10	2.81	3.74
	735.0 -> 740.0	13600	40800	62.28	2.73	3.55
	740.0 -> 745.0	14400	43200	62.26	2.73	3.52
	745.0 -> 750.0	10400	31200	62.34	2.70	3.52
	750.0 -> 755.0	1600	4800	62.35	2.70	3.52
	755.0 -> 760.0	800	2400	62.53	2.65	3.51
Sub Total		**80800**	**242400**	**62.19**	**2.77**	**3.64**
Subgrade	730.0 -> 735.0	9600	19200	49.79	9.34	10.22
	735.0 -> 740.0	6400	12800	49.38	9.63	10.42
	740.0 -> 745.0	5600	11200	48.91	9.76	11.05
	745.0 -> 750.0	1600	3200	49.70	9.35	10.43
Sub Total		**23200**	**46400**	**49.46**	**9.52**	**10.49**
Waste	725.0 -> 730.0	1200	2400	0.00	0.00	0.00
	730.0 -> 735.0	12000	24000	0.00	0.00	0.00
	735.0 -> 740.0	38400	76800	0.00	0.00	0.00
	740.0 -> 745.0	21600	43200	0.00	0.00	0.00
	745.0 -> 750.0	7200	14400	0.00	0.00	0.00
	750.0 -> 755.0	1200	2400	0.00	0.00	0.00
	760.0 -> 765.0	1200	2400	0.00	0.00	0.00
	765.0 -> 770.0	1200	2400	0.00	0.00	0.00
Sub Total		**84000**	**168000**	**0.00**	**0.00**	**0.00**
Grand Total		**188000**	**456800**	**38.03**	**2.43**	**3.00**

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Annexure – 12C

Calculation of Production of Ore, Waste & Subgrade from Float Quarry for the FY – 2016-17

Feb 07, 2013

Surpac Minex Group

Block Model Report

Constraints Used

a. INSIDE CONSTRAINT ../../pit design_gndmn_a/float_quarry/yr3_pit_revised/production_yr3_float_quarry_for_rep_revised

Keep blocks partially in the constraint : True

Material	Z	Volume	Tonnes	Fe %	SiO2 %	Al2O3 %
Ore	705.0 -> 710.0	4800	14328	59.76	3.88	4.29
	710.0 -> 715.0	8800	26328	61.02	3.31	3.94
	715.0 -> 720.0	10400	31200	62.49	2.67	3.54
	720.0 -> 725.0	12800	38400	62.20	2.77	3.70
	725.0 -> 730.0	7200	21600	62.08	2.82	3.77
	730.0 -> 735.0	800	2400	61.95	2.87	3.84
Sub Total		44800	134256	61.75	2.98	3.78
Waste	705.0 -> 710.0	2400	4800	0.00	0.00	0.00
	710.0 -> 715.0	6000	12000	0.00	0.00	0.00
	715.0 -> 720.0	8400	16800	0.00	0.00	0.00
	720.0 -> 725.0	8400	16800	0.00	0.00	0.00
	725.0 -> 730.0	19200	38400	0.00	0.00	0.00
	730.0 -> 735.0	21600	43200	0.00	0.00	0.00
	735.0 -> 740.0	1200	2400	0.00	0.00	0.00
	755.0 -> 760.0	1200	2400	0.00	0.00	0.00
	760.0 -> 765.0	2400	4800	0.00	0.00	0.00
	765.0 -> 770.0	2400	4800	0.00	0.00	0.00
Sub Total		73200	146400	0.00	0.00	0.00
Grand Total		118000	280656	29.54	1.43	1.81

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Gandhamardan - A

ANNEX. - 13

F. No. 8-105/2006-FC
Government of India
Ministry of Environment and Forests
(F.C. Division)

13 MAR 2009

Paryavaran Bhawan,
CGO Complex, Lodhi Road,
New Delhi - 110 003.
Dated: 17th February, 2009.

To

The Principal Secretary (Forests),
Government of Orissa,
Bhubaneshwar.

Stage I Approval Order

JS(M)

Sub: Diversion of 117.9648 ha of forest land (fresh area 76.7206 ha and broken up forest land 41.2442 ha) (out of 216.3617 ha of forest land proposed) in Gandhamardan Block-A in favour of Orissa Mining Corporation in Keonjhar district of Orissa for first renewal of Mining Lease:

Sir,

I am directed to refer to the State Government's letter No. 10F(Cons)53/2006/13872/F&E dated 16.08.2006 on the above mentioned subject, wherein prior approval of the Central Government for the diversion of 117.9648 ha of forest land (fresh area 76.7206 ha and broken up forest land 41.2442 ha) (out of 216.3617 ha of forest land proposed) in Gandhamardan Block-A in favour of Orissa Mining Corporation in Keonjhar district of Orissa for first renewal of Mining Lease, was sought, in accordance with Section 2 of the Forest (Conservation) Act, 1980. The said proposal has been examined by the Forest Advisory Committee constituted by the Central Government under Section 3 of the aforesaid Act.

2. After careful consideration of the proposal of the State Government of Orissa and on the basis of the recommendations of the Forest Advisory Committee, the Central Government hereby agrees in-principle for the diversion of diversion of 117.9648 ha of forest land (fresh area 76.7206 ha and broken up forest land 41.2442 ha) (out of 216.3617 ha of forest land proposed) in Gandhamardan Block-A in favour of Orissa Mining Corporation in Keonjhar district of Orissa for first renewal of Mining Lease, subject to the fulfillment of the following conditions:-

1. (i) The UA shall transfer and mutate 117.9648 ha of non-forest land in favour of the State Forest Department and shall pay the cost of the Compensatory Afforestation as per the scheme to be prepared as per latest wage rate and approved by the competent authority.
   (ii) The User Agency shall transfer the cost of Compensatory Afforestation including maintenance for 5 years to the State Forest Department.
   (iii) The non-forest land identified for raising Compensatory Afforestation shall be notified by the State Government as RF under Section-4 or PF under Section-29 of the Indian Forest Act, 1927 or under the relevant Section(s) of the local Forest Act, as the case may be, within a period of six months. The Nodal Officer (Forest Conservation) shall report

compliance in this regard.

(iv) Additional amount of the NPV of the diverted forest land, if any, becoming due after finalization of the same by the Hon'ble Supreme Court of India, shall be charged by the State Government from the User Agency. The User Agency shall furnish an undertaking to this effect.

2. Fencing, protection and regeneration of the safety zone area (7.5 metre strip all along the outer boundary of the mining lease area) shall be done at the project cost. Besides this, Afforestation on degraded forest land, to be selected elsewhere, measuring one and a half times the area under safety zone, shall also be done at the project cost.
3. The State Government shall charge the Net Present Value of the forest area diverted under this proposal from the User Agency as per the orders of the Hon'ble Supreme Court of India dated 30.10.2002, 01.08.2003, 28.03.2008, 25.04.2008 and 09.05.2008 in IA No. 566 in WP(C) No. 202/1995 and as per the guidelines issued by this Ministry vide letters No. 5-1/1998-FC (Pt.II) dated 18.09.2003, as well as letter No. 5-2/2006-FC dated 03.10.2006 in this regard.
4. At the time of payment of the Net Present Value (NPV) at the present rate, the User Agency shall furnish an undertaking to pay the additional NPV, if so determined as per the final decision of Hon'ble Supreme Court of India.
5. Wildlife Institute of India shall prepare a Wildlife Management Plan for the area which shall be implemented at the project cost. The diversion of forest land for mining shall be considered only if with appropriate remedial measures the adverse impact of mining on wildlife conservation and protection is found to be containable within reasonable limits.
6. The Approval under the F.C. Act is restricted to 117.9648 ha of forest area. The possession of the balance forest area shall be taken over by the Forest Department. Before grant of the formal approval under the F.C. Act, the mining lease granted under the MMRD shall be revised so that the total forest area included in the mining lease and the forest area approved under the F.C. Act are identical.
7. Compensatory Afforestation charges shall be payable for the entire forest area after deducting the forest area legally broken up during the validity of the mining lease.
8. For carrying out the mining operations between 1993 to 1997 in violation of the F.C. Act, an amount equal to the NPV payable in the present case shall be imposed as a penalty on the user agency.
9. The approval under the F.C. Act shall be granted only after the environmental clearance for the project is accorded.
10. Wherever possible and technically feasible, the User Agency shall undertake by involving local community, the Afforestation measures in the blanks within the lease area, as well as along the roads outside the lease area diverted under this approval, in consultation with the State Forest Department at the project cost.
11. Wherever possible and technically feasible, the User Agency shall undertake by involving local community in Afforestation measures having suitable species during reclamation and overburden management plan.

12. The User Agency shall start mining in phased manner after exhausting earlier diverted forest area and due care shall be taken for reclaiming earlier mined area. Concurrent reclamation plan shall be executed by the User Agency from the very first year, and an annual report shall be sent to the Nodal Officer and the Regional CCF, Bhubaneswar. If it is found from the Annual Report that the annual programme mentioned in Concurrent Reclamation Plan is not being adhered to by the User Agency, the mining activities shall remain suspended till such time the annual programme is completed for that year.
13. All the funds received from the User Agency under the project shall be transferred to in Account No. 344901010070128 of Union Bank of India, Sunder Nagar, New Delhi-110003.
14. The period of diversion under this approval shall be twenty (20) years subject to possession of valid lease by the User Agency under the MMDR Act, 1957.
15. The User Agency will bear the proportionate cost of comprehensive wildlife management plan to be prepared in consultation with state forest department at the user agency's cost.
16. After receipt of the compliance report on fulfilment of the conditions mentioned above, the proposal shall be considered for final approval under Section-2 of the Forest (Conservation) Act, 1980.
17. All other conditions including standard conditions applicable to the proposals under Forest (Conservation) Act, 1980 and under different rules, regulations and guidelines including environmental clearance shall be complied with before transfer of forest land.
18. The user agency shall comply to all other conditions imposed by the Hon'ble Supreme Court in its decision dated 03.10.2008.

3. After receipt of the compliance report on the fulfilment of the above mentioned conditions contained in Para 2 above, from the State Government of Orissa, formal approval will be issued in this regard under Section-2 of the Forest (Conservation) Act, 1980. The transfer of forest land to the User Agency shall not be affected by the State Government till formal orders approving the diversion of forest land are issued by the Central Government.

Yours faithfully,

(B.K. Singh)
Sr. Assistant Inspector General of Forests

Copy to:
1. The PCCF, Government of Orissa, Bhubaneshwar.
2. The Nodal Officer, O/o PCCF, Government of Orissa, Bhubaneshwar.
3. The Chief Conservator of Forests (Central), Regional Office, Bhubaneshwar.
4. The User Agency.
5. The Monitoring Cell, FC Division, MoEF, New Delhi.
6. Guard File.

(B.K. Singh)
Sr. Assistant Inspector General of Forests

ANNEX. - 14

OFFICE OF THE MINING OFFICER; KEONJHAR CIRCLE; KEONJHAR

No. 2282, /Mines, dt. 14.11.12

From

The Mining Officer,
Keonjhar.

RECEIVED

Gandhamardan Iron Ore Mines
M/S O.M.C. Ltd.
Dy. No. 1220
Dated 16/11/12

To

The Regional Manager,
Gandhamardan Iron Ore Mines of
M/s OMC Ltd.

Sub: Transportation of Iron Ore of Gandhamardan Block – B of M/s OMC Ltd. stacked at GAndhamardan Block – A.

Ref: Letter No. 7795/ dt. 12.11.2012 of D.F.O, Keonjhar.

Sir,

With reference to the subject cited above, I am to intimate you that, the D.F.O., Keonjhar gives consent on behalf of Forest Department for transportation of Iron Ore stacked at Gandhamardan Iron ore Mines Block-A within three years w.e.f 12.11.12 or the time to be taken for actual removal which ever is earlier.

This is for your information and necessary action.

Yours faithfully,

14/11/12

Mining Officer, Keonjhar.

Memo No 2283 Date 14.11.12

Copy forwarded to the Director of Mines, Odisha, Bhubaneswar for favour of information with reference to the letter No 11812 dated 30.10.12.

14/11/12

Mining Officer, Keonjhar.

Memo No 2284 Date 14.11.12

Copy to the concerned Inspector of Mines for information and necessary action.

14/11/12

Mining Officer, Keonjhar.

ANNEX. - 15

CONSENT ORDER Page 1

BY REGD. POST WITH AD

STATE POLLUTION CONTROL BOARD, ORISSA

A/118, Nilakantha Nagar, Unit-VIII, Bhubaneswar-751012
Phone-2561909, Fax: 2562822, 2560955

CONSENT ORDER

No. 5999 /IND-I-CON-6050 Dt. 7.4.11

CONSENT ORDER NO. 2539

Sub : Consent for discharge of sewage and trade effluent under section 25/26 of Water (PCP) Act, 1974 and for existing / new operation of the plant under section 21 of Air (PCP) Act, 1981.

Ref : Your application No. 4994/OMC/ROG/10, Dt. 8/12/2010

Consent to operate is hereby granted under section 25/26 of Water (Prevention & Control of Pollution) Act, 1974 and under section 21 of Air (Prevention & Control of Pollution) Act, 1981 and rules framed thereunder to

Name of the Industry Gandhamardan Iron Ore Mines (Block - A), OMC Ltd

Name of the Occupier & Designation Bijaya Ku. Behera, Regional Manager

Address At/Po – Suakati, Dist – Keonjhar

This consent order is valid for the period up to 31.03.2016

This consent order is valid for the product quantity, specified outlets, discharge quantity and quality, specified chimney/stack, emission quantity and quality of emissions as specified below. This consent is granted subject to the general and special conditions stipulated therein.

A. Details of Products Manufactured

Sl. No.	Product	Quantity
1.	*Iron Ore*	*0.35 MTPA*

P.T.O

B. Discharge permitted through the following outlet subject to the standard

Outlet No.	Description of outlet	Point of discharge	Quantity of discharge KLD or KL/hr	Pre-scribed Standard			
				pH	TSS (mg/l)	Oil & Grease (mg/l)	BOD (mg/l)
01.	Domestic effluent	Septic tank and soak pit	--	5.5 to 9.0	200	--	100
02.	Mine drainage water / surface run off/ other waste water	Nearby land / inland surface water	--	5.5 to 9.0	100 (Rainy day) / 50 (Non rainy day)	10	--

C. Emission permitted through the following stack subject to the prescribed standard

Chimney Stack No.	Description of Stack	Stack height (m)	Quantity of emission	Prescribed Standard			
				PM	SO_2	NO_x	

D. Disposal of solid waste permitted in the following manner

Sl. No.	Type of Solid waste	Quantity generated (TPD)	Quantity to be reused on site(TPD)	Quantity to be reused off site(TPD)	Quantity disposed off (TPD)	Description of disposal site.
01.	Top Soil / Overburden	As per approved mining plan	--	--	--	As per approved mining plan

P.T.O

ANNEX. - 15

26) Failure to comply with any of the conditions mentioned above may result in withdrawal of this clearance and other action as deemed fit.

To,

Sri Bijaya Ku. Behera, Regional Manager,
Gandhamardan Iron Ore Mines, (Block -A),
M/s. OMC Ltd., At/Po - Suakati,
Dist - Keonjhar - 758 016

MEMBER SECRETARY
STATE POLLUTION CONTROL BOARD, ORISSA

Memo No.______________________/Dt.

Copy forwarded to :

i) Regional Officer, State Pollution Control Board, Keonjhar
ii) District Collector Keonjhar
iii) D.F.O Keonjhar
iv) District Mining Officer, Keonjhar
(For Mines and Minerals Processing Unit only)
V) Cess Section (Head Office)
VI) Consent Register

ENV. SCIENTIST
STATE POLLUTION CONTROL BOARD, ORISSA

P.T.O

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Annexure – 16

(For The Year 2012-13)

Gandhamardan Iron Ore Mines (Block-A)

a) Air Data :

Station No.	Seasons Summer/ Winter/Monsoon/ Post Monsoon	PM_{10}	Pb	SO_2	NO_X	CO	Free Silica	$PM_{2.5}$	Rate of dust fall	Remarks
Suakati School	Winter	69	---	5.8	12.0	0.4	---	29	---	
Guest House	Winter	59	---	5.2	11.5	0.2	---	26	---	
OMC Medical	Winter	75	---	6.0	12.1	0.4	---	33	---	
Suakati College	Winter	72	---	5.0	10.6	0.2	---	34	---	
Maintenance Area	Winter	39	---	4.9	10.0	---	---	19	---	
Daunra Village	Winter	73	---	4.5	9.8	---	---	39	---	

Station No.	Seasons Summer/ Winter/Monsoon/ Post Monsoon	PM_{10}	Pb	SO_2	NO_X	CO	Free Silica	$PM_{2.5}$	Rate of dust fall	Remarks
Suakati School	Summer	87	---	6.2	13.2	0.4	---	43	---	
Guest House	Summer	72	---	5.9	12.5	0.2	---	32	---	
OMC Medical	Summer	89	---	6.5	13.0	0.4	---	46	---	
Suakati College	Summer	78	---	5.9	12.1	0.2	---	37	---	
Workshop Maintenance Area	Summer	69	---	5.1	11.7	0.2	---	32	---	
Daunra Village	Summer	85	---	4.8	10.2	---	---	40	---	

b) Noise Data :

Station No.	Station Name	Season	Type of Area (Industrial/commertial/ residencial/silence zone)	Day Time	Night Time	Remarks
1	Suakati School	Winter	Commertial	51.9	45.2	
2	Guest House	Winter	residencial	52.2	42.4	
3	OMC Medical	Winter	silence zone	46.9	38.8	
4	Suakati College	Winter	silence zone	46.6	37.3	
5	Maintenance Area	Winter	Industrial	43.9	34.7	
6	Daunra Village	Winter	residencial	50.2	38.5	

Station No.	Station Name	Season	Type of Area (Industrial/commertial/ residencial/silence zone)	Day Time	Night Time	Remarks
1	Suakati School	Summer	Commercial	52.5	44.1	
2	Guest House	Summer	residencial	48.5	42.7	
3	OMC Medical	Summer	silence zone	49.6	39.4	
4	Suakati College	Summer	silence zone	48.7	38.5	
5	Maintenance Area	Summer	Industrial	45.8	34.5	
6	Daunra Village	Summer	residencial	48.8	38.7	

c) Water Data -NA

i)Discharge Place (Agriculture)		
Land/Forest Land/Wasteland/Nullah/River		

ii)Water Management in abandoned quarries – NA

Year	Quarry Pit ID	Reservoir Yes/No	Quarry Size	Capacity Min.	Capacity Max.	Period Capacity Min.	Period Capacity min.	Water utilization	Remarks

d) Water data details : (*Details are in Annexure-V)*

Year	*Station No.*	*Station Name*	*Station type(Colony,pit, river,downstream)*	*Season*	*Element Drinking /Effluent)*	*Resuls*
2012/13	*SW1*	*Near Magazine*	*downstream*	*Winter*	----	***Details to follow***
2012/13	*SW2*	*Near Suakati Nala*	*downstream*	*Winter*	-----	
2012/13	*SW3*	*Near Guest House*	*downstream*	*Winter*	—	
2012/13	*SW4*	*Near Nunghara Nala*	*downstream*	*Winter*	----	

e) Vibration Data : (Not Applicable)

Station No.	Station Name	Season(Summer/Winter/ Monsoon/Post Monsoon)	Peak Particle Velocity	Air Over Pressure	Frequency	Remarks

ANNEXURE – V

ANNEX. - 16

Table No. 4.7 (B): Results of Surface Water Analysis

Sl. No.	Parameters	SW1 22.01.2013	SW2 22.01.2013	SW3 22.01.2013	SW4 22.01.2013
1	Colour, Hazen Units	Colourless	Colourless	Colourless	Colourless
2	Turbidity, NTU, max.	7	10	4	8
3	pH value	7.1	6.9	7.3	6.7
4	Total Hardness (as $CaCO_3$), mg/l, max.	52	56	48	50
5	Iron (as Fe), mg/l, max.	1.28	0.62	0.66	0.46
6	Chloride (as Cl), mg/l, max.	11	10	13	15
7	Fluoride (as F), mg/l, max.	0.16	0.24	0.14	0.17
8	Total Dissolved Solids, mg/l, max.	73	78	68	74
9	Calcium (as Ca), mg/l, max.	13	17	9	11
10	Magnesium (as Mg), mg/l, max.	5.4	5.7	4.8	5.2
11	Copper (as Cu), mg/l, max.	BDL	BDL	BDL	BDL
12	Manganese (as Mn), mg/l, max.	0.056	0.076	0.047	0.053
13	Sulphate (as SO_4), mg/l, max.	7	9	8	5
14	Nitrate (as NO_3), mg/l, max.	0.16	0.10	0.07	0.11
15	Phenolic compounds (as C_6H_5OH), mg/l, max.	BDL	BDL	BDL	BDL
16	Mercury (as Hg), mg/l, max.	BDL	BDL	BDL	BDL
17	Cadmium (as Cd), mg/l, max.	BDL	BDL	BDL	BDL
18	Selenium (as Se), mg/l, max.	BDL	BDL	BDL	BDL
19	Arsenic (as As), mg/l, max.	BDL	BDL	BDL	BDL
20	Cyanide (as CN), mg/l, max.	BDL	BDL	BDL	BDL
21	Lead (as Pb), mg/l, max.	BDL	BDL	BDL	BDL
22	Zinc (as Zn), mg/l, max.	BDL	BDL	BDL	BDL
23	Anionic Detergent as MBAS	BDL	BDL	BDL	BDL
24	Alkalinity (as $CaCO_3$), mg/l	42	38	46	34
25	Free Ammonia (N), mg/l, max.	0.08	0.04	0.08	0.02
26	Boron (as B), mg/l	BDL	BDL	BDL	BDL
27	Coliform Organism MPN/100ml, max	174	166	112	117
28	Sodium Absorption Ratio, max	0.43	0.41	0.57	0.48
29	Dissolved Oxygen as O_2, mg/l	6.8	6.7	5.6	6.4
30	BOD, 3 days at 27°C, mg/l	1.3	1.6	1.4	1.2
31	COD, mg/l	6.1	6.5	5.6	6.0
32	Electrical Conductivity (EC), µmhos/cm, max.	128	138	114	126
33	Phosphate, mg/l	0.21	0.28	0.26	0.23
34	CO_2, mg/l	3.4	3.9	4.7	4.3

N.B :

* SW1 = Near Magazine
  SW2 = Near Sidkali Nala
  SW3 = Near guest house
  SW4 = Near Ghunghar Nala..

Ecological Development Consultancy Pvt. Ltd. BBSR.

FEASIBILITY REPORT

1.0 General Mine Description

Gandhamardan Iron Ore deposit of M/s OMC Limited consist of two adjoining mining leases namely Gandhamardan Block – A & Gandhamardan Block - B in the district of Keonjhar, Orissa. Gandhamardan Block-A is located at 15 km distance from the district headquarter of Keonjhar.

Gandhamardan – A iron ore mining lease was executed on 21.05.1963 over an area of 618.5760 Ha. in favour of M/s OMC Limited for a period of 30 years. The mining operations have been commenced w.e.f. the year 1964.

2.0 Exploration

2.1 Previous Exploration Work

The details of the exploration work already carried out at Gandhamardan-A block are given below:-

- **Hill top Deposit**

i. Geological Mapping

Regional geological mapping covering the Gandhamardan region of 42 km² on 1: 15000 scale for delineating the ore deposit and different litho units was done by OMC. An area of 4.5 sq. km was also mapped in greater details on 1:5000 scale demarcating the ore waste contacts & different ore types. Topographical map of Gandhamardan –A lease has been prepared at 10 m contour interval.

ii. Pitting

A total of 11 Nos. Of deep & shallow pits at 200 m grid were sunk to delineate the waste contact zones, identification of overburden and different ore types in Gandhamardan –A Block.

iii. Core Drilling

Hilltop ore body has been explored by GSI at 100 m grid interval. A total of 12 nos. of exploratory boreholes with a total meterage of 358.4 m has been drilled at Hilltop.

A summary of the exploration carried out for G1 areas indicating mapping, pitting, drilling (No./ spacing), sample drawn/ analyzed etc, existing pit data, grade variation, thickness for Hill top area is given in the table below:-

Gandhamardan-A (Hill top area)	Borehole data				
	No. & spacing	Depth From/ to	Grade From/ to	Samples drawn and analyzed	Level of exploration
Core drilling	13 Nos. (100 x 100m grid)	0.15/ 132.9 m	4.97/ 68.2% Fe	374 Nos.	G1

Gandhamardan-A (Hill top area)	Pit data or trenching/pitting (m^3)		
	Dimensions & Area	Samples drawn and analyzed	Level of exploration
Shallow / Deep pits	Shallow pit, 4 x 4m Deep pit, 6 x 4m Total – 11 pits at a grid of 200 x 200m	Approx. 1400 m^3 of samples drawn	G1

- **Flank Ore Deposits**

In general, OMC has explored the deposit up to 40m depth. The details of exploration carried out in Block-A flank ore deposits and float ore bodies are given below:

(a) Geological mapping

Flank Ore Deposit such as Daonra deposit has been mapped geologically on a scale of 1:1000. The ore/waste boundaries and other surface geological & structural features such as dip & strike of beds have been demarcated on the geological map.

(b) Core drilling :

The exploration wing of M/s Orissa Mining Corporation have explored the Daonra deposit with the help of only two bore holes DNR/1 & DNR/2. The formations encountered in the bore holes are BHJ, hard massive iron ore and shale. The location of bore holes has been marked on the geological plan & sections.

A summary of the exploration carried out for G1 areas indicating mapping, pitting, drilling (No./ spacing), sample drawn/ analyzed etc, existing pit data, grade variation, thickness for Flank area is given in the table below:-

Gandhamardan-A (Flank area)	Borehole data				
	No. & spacing	Depth From/ to	Grade From/ to	Samples drawn and analyzed	Level of exploration
Core drilling	2 Nos. (100 x 100m grid)	0.6/ 30m	6.75/ 68.85% Fe	39 Nos.	G1

- **Float Ore Deposits**

Float ore deposit has been explored by 25 nos. of DTH boreholes covering a total meterage of 849 m. Besides, A number of float quarries have been developed to the west of Daonra flank deposit in western side of the lease area. Of these quarry VD is under active operation. The ore body in this region has been proved up to the base rock which is 5m from surface level in an average.

A summary of the exploration carried out for G2 areas indicating mapping, pitting, drilling (No./ spacing), sample drawn/ analyzed etc, existing pit data, grade variation, thickness for float area is given in the table below:-

Gandhamardan-A (Float area)	Borehole data				
	No. & spacing	Depth From/ to	Grade From/ to	Samples drawn and Analyzed	Level of exploration
DTH drilling	13 Nos. (100 x 100m grid)	3/ 35m	11.15/ 63.28% Fe	125 Nos.	G1

Gandhamardan-A (Float area)	Borehole data				
	No. & spacing	Depth From/ to	Grade From/ to	Samples drawn and Analyzed	Level of exploration
DTH drilling	11 Nos. (200 x 200m grid)	1/ 48m	11.39/ 61.24	123 Nos.	G2

- **Bulk Density Test**

Twenty-one (21) experiments were conducted for determination of bulk densities for different ore types and eleven (11) experiments conducted for determination of bulk densities of non-ores. The main bulk density of each ore type has been averaged for evaluating insitu bulk density of the deposit for calculation of ore reserve. A summary of ore type-wise bulk density experiments with sample location is given in table 2.1

(Table 2.1) Bulk Density of Ores and Non-ores

S. No.	Ore types	Location	Bulk density	Avg.
1.	Lateritic and Goethitic Ore.	TB No. III	2.90	
		GN/4	2.50	
		GN/2	2.65	2.65
		GN/74	2.15	
		1200N/100W	3.07	
2.	Soft laminated Ore	TB.No. II	3.90	
		GN/ 52	3.32	
		GN/1	3.50	3.45
		TB NO. II	3.30	
		GS/ 9	3.25	
		GS/18	3.40	
3.	Hard laminated Ore	TB No. I	3.53	
		TB No. I	3.76	3.63
		GN/ 54	3.60	
4.	Hard massive ore	TB No. IV	3.75	3.75
5.	Blue dust and powdery ore	GN/ 10	2.62	
		GN/ 15	2.42	
		GS/ 2	2.50	
		GS/ 18	2.55	2.52
		GS/ 39	2.60	
		GS/35	2.45	
6.	Laterite (Ore type)	500N/100W	3.40	
		0 / 0	2.40	2.53
		900S/300E	1.80	
7.	Laterite (non ore type)	100N/300W	1.80	
		400N/300w	1.80	1.81
		200W/500W	1.70	
		1200N/100w	1.95	
8.	B.H.J	0 / 0	1.90	
		0 / 100E	1.90	1.86
		0 / 100W	1.85	
		0 / 100S	1.80	

The average specific gravity & bulk density of different ore types is given in table 2.2

(Table 2.2) Average Specific Gravity & Bulk Density of Different Ore Types

Sl. No.	Ore Type	Avg. Bulk Density, t/m^3	Avg. Specific Gravity
1.	Laterite/OB	2.53	2.83
2.	Lateritic Ore	2.65	2.97
3.	Soft Laminated Ore	3.45	3.99
4.	Hard Laminated Ore	3.63	4.34
5.	Blue Dust/Powdery Ore/Friable Ore	2.52	3.82
6	Hard Massive Ore	3.57	4.30

2.2 **Exploration to be carried out**

In order to ascertain the availability of ores in the float zone in the western & eastern side of the lease 15 nos. of boreholes have been proposed to be carried out in two phases in year 2014-15 & 2015-16 respectively. The location of proposed boreholes is shown in geological map in plate no. MEC/Q6ZJ/11/16/4. The details of the same are given in table 2.3.

(Table 2.3) Details of additional exploration program

BHID	Northing	Easting	Approx. Depth, m
Phase-1 (2014-15)			
MEC/1	-2200	-1200	30
MEC/2	-2600	-1400	30
MEC/3	-3400	-600	30
MEC/4	-2800	0	30
MEC/5	-1200	600	30
MEC/6	-1400	-400	30
MEC/7	-1800	0	30
Total Meterage			210
Phase-2 (2015-16)			
MEC/8	-2000	-500	30
MEC/9	-2000	-200	30
MEC/10	-2000	200	30
MEC/11	-2200	0	30
MEC/12	-2200	400	30
MEC/13	-2400	-200	30
MEC/14	-2400	200	30
MEC/15	-2600	-200	30
MEC/16	-3850	-1650	30
MEC/17	-3850	-1575	30
Total Meterage			300

3.0 **Reserves assessment**

MECON has re-assessed the quarry-wise reserves for Hilltop main ore body, flank deposit and float deposit based on 3-dimensional resource model prepared on the basis of above the exploration data using "SURPAC".

On basis of the above geological works carried out, the hill top area of Gandhamardan-A deposit and part of the Daunra Flank deposit can be considered under G1 category of the geological axis as per the UNFC classification of reserves where as the Float deposit and a part of the Daunra Flank deposit, can be considered under G2 category of the UNFC system.

The details of the reserves/ resources established at 45% Fe cut off for Gandhamardan-A deposit as on 01.04.2013 is given in table 3.1. The detailed calculation of the quarry-wise reserves/ resources established at 45% Fe cut off for Gandhamardan-A deposit as on 1.4.2013 is given in Annexure 12A. If the lease is amalgamated in future an additional quantity of 25.33 Mt of ore reserves can be recovered for its suitable blending with the underlying low grade ore beneath the present UPL, to increase the mine life.

Resources type	Total tonnage cut-off (+45% Fe) (In Tons)		
	Hill top	Flank	Float
Measured mineral resources (331)	38130514	3526296	3194840
Indicated mineral resources (332)	0	2346221	3042472
Total	**38130514**	**5872517**	**6237312**

Resources type	Saleable grade (+58% Fe) (in Tons)		
	Hill top	Flank	Float
Measured mineral resources (331)	37185807	3526296	2469336
Indicated mineral resources (332)	0	2346221	1901488
Total	**37185807**	**5872517**	**4370824**

Resources type	Non saleable grade (+45-58% Fe) (in Tons)		
	Hill top	Flank	Float
Measured mineral resources (331)	944707	0	725504
Indicated mineral resources (332)	0	0	1140984
Total	**944707**	**0**	**1866488**

The Measured / Indicated resources under different classes of land are given below:

Resources type	Block	Total tonnage	Non Forest land	Forest land: Already Diverted	Forest land: All remaining forest land applied for diversion
		(In Tons)			
Measured mineral resources (331)	Hill top	38130514	0	0	38130514
	Flank	3526296	0	0	3526296
	Float	3194840	3194840	0	0
	Total	**44851650**	**3194840**	**0**	**41656810**
Indicated mineral resources (332)	Hill top	0	0	0	0
	Flank	2346221	0	0	2346221
	Float	3042472	0	0	3042472
	Total	**5388693**	**0**	**0**	**5388693**

The Measured / Indicated resources under mineable and non-mineable portions are:-

Resources type	Block	Total tonnage	Mineable	Blocked/Non-mineable					
				Low grade part	UPL		Non forest land	Stat. barr-ier	Total
					Already diverted forest land	All rem. forest land applied for diversion			
		(in Tons)							
Measured mineral resources (331)	Hill top	38130514	30259267	865067	0	7006180	0	0	7871247
	Flank	3526296	3252086	0	0	274210	0	0	274210
	Float	3194840	2359200	701504	0	0	134136	0	835640
	Total	44851650	35870553	1566571	0	7280390	134136	0	8981097
Indicated mineral resources (332)	Hill top	0	0	0	0	0	0	0	0
	Flank	2346221	2260473	0	0	85748	0	0	85748
	Float	3042472	1643592	759768	0	623112	0	16000	1398880
	Total	5388693	3904065	759768	0	708860	0	16000	1484628

4.0 Production schedule

Year-wise production plan from FY 2013 – 14 to FY 2017-18 is shown in Table 4.1.

(Table 4.1) Overall target for Ore production

Year	Quarry	Ore				Subgrade	Waste	Stripping Ratio
		Qty, Tonnes	Fe%	SiO_2%	Al_2O_3%	Tonnes	Cu. m	cu.m/tonne
2013-14	Hilltop Quarry	-	-	-	-	-	-	-
	Float Quarry	0	0	0	0	0	0	0
	Total	0	0.00	0.00	0.00	0	0	0.00
2014-15	Hilltop Quarry	188814	65.94	1.53	0.69	0	6836	0.04
	Float Quarry	163200	62.43	2.68	3.51	0	79200	0.49
	Total	**352014**	**64.31**	2.06	2.00	0	**86036**	**0.24**
2015-16	Hilltop Quarry	106371	64.74	1.82	1.39	7980	13313	0.12
	Float Quarry	242400	62.19	2.77	3.64	46400	84000	0.29
	Total	**348771**	**62.97**	**2.48**	**2.95**	**54380**	**97313**	**0.24**
2016-17	Hilltop Quarry	216033	64.8	1.83	1.39	0	9828	0.05
	Float Quarry	134256	61.75	2.98	3.78	0	73200	0.55
	Total	350289	63.63	**2.27**	**2.31**	0	**83028**	**0.24**
2017-18	Hilltop Quarry	348941	63.04	3.62	1.71	18002	20566	0.06

5.0 **Mining method**

The Gandhamardan-A block comes under Category-A (Fully Mechanized category) as per the IBM guidelines. The deposit is worked by opencast mining method with formation of benches by drilling and blasting. The proposed height of bench at hilltop quarry is 10 m with 10 m width at the ultimate stage. Whereas, in the float quarry, height of the bench has been considered as 5 m with 5 m width at the ultimate stage. Bank slope angle for both the quarries has been considered as 75^0. Ultimate pit slope for hill top quarry & float quarry are 35^0 and 38^0 respectively.

The conventional mining method using 115 mm diameter drilling and blasting with low density (LD) explosives in combination with 20 t dumper/ tipper with matching capacity hydraulic excavators/ loaders for drilling, loading and transportation of ore to crusher and transportation of waste/ sub grade materials to their respective dumps as envisaged in this scheme of mining. The minimum working width of the benches will be 20 m.

2.5- 4.0 cu.m bucket capacity hydraulic excavators (diesel powered) will be put to use in conjunction with 20 t struck capacity dumpers. The ROM will be transported to a mobile screening plant for segregating the CLO (10-40mm), fines (-10mm) & the oversize (+40mm). The ROM will be fed to a screening plant using 2.5- 4.0 cu.m hydraulic excavators. Waste & sub grade materials generated will be transported to respective dumping/ stacking locations. Front end loader of 1.5- 2.0 cu.m bucket capacity will be deployed to load & haul the oversize of the screen to a crusher located nearby. The oversize will then be fed to a crusher using 1.5 – 2.0 cu.m hydraulic excavators. The CLO & fines generated after screening the crushed product will be loaded by loader of 2.5- 4.0 cu.m capacity & transported through 20 t tippers/ dumpers to the respective stockyard at the foothill.

Adequate capacity of screening & crushing plant will be installed at the hilltop quarry/ float workings. The screening & crushing plants will be located within the broken area of the quarry.

Only float quarry V-D & V-D1 located on the western side of the lease and hill top quarry will be operated w.e.f 2014-15, after acquiring the stage-II forestry clearance. Besides, sub-grade dump stacked at hilltop quarry – 1A & float quarry-4D has also been planned to be evacuated in a phased manner within 3 years of the plan period as per the order made by the Mining officer, Keonjhar (Copy of the letter of mining officer for the same is enclosed as Annexure -14.

6.0 **Beneficiation**

No beneficiation is required on the ore from Gandhamardan-A iron ore mine. Only crushing & screening has been envisaged to produce the desire d product i.e calibrated lump ore (+10-40mm) size & fines ore (-10mm).

7.0 **Marketing**

The mine is supposed to produce calibrated lump ore (+10-40mm) size fraction & fines ore (-10mm) size fraction for its dispatch to different sponge iron plants/ steel plants having an Fe% in the range of 63 – 64%. Long term agreement are in the process to be signed with a number of large integrated steel plant units in Orissa, apart from the sponge iron units too located in Orissa.

8.0 **Infrastructure**

Basic infrastructure is available in the mine to facilitate the workings. They are mine offices, workshop, garage, explosives magazine, rest shelter, first aid station, fire fighting stations, site store, V.T. centre, Time office, Canteen, laboratory, welfare centre, Post office, Public Transport services etc. The infrastructure facilities is common for Gandhamardan –A & Gandhamardan – B lease. Since a mega iron ore project has been envisaged in Gandhamardan –B lease, power requirement will be met from the sources developed for Gandhamardan – B lease.

Electric Supply

The power supply for the proposed project shall be made available at 132 kV from the nearest 132 kV of Odisha Grid Corporation Ltd. which is approximately 15km from the proposed site. Power shall be received through single 132kV feeder drawn over single circuit tower.

Power Distribution Scheme:-

The power required for the proposed project shall be received to MRS at 132KV near Ichinda Quarry which shall be stepped down to 6.6kV through 132/6.9kV transformer. This power shall be fed to switchboard near Ichinda Quarry. Two nos. of 6.6kV feeders shall be taken from Ichinda quarry 6.6kV switchboard to feed 6.6kV switchboard near Jharna Quarry.

Power stepped down to 6.6kV level at MRS near Ichinda quarry is the primary distribution voltage level of the plant. All the HT motors of rated 100 kW and above shall be fed from this switchboard. LT power requirement shall be met at 415V level by stepping down the power from 6.6kV to 415V as per requirement of different LT load centers.

Employment potential

For smooth running of any Industrial unit, both the men and machinery constitute two vital elements. Estimation for manpower and equipment required, deserve equal emphasis. It has been assumed that the major requirement of non-executive manpower will be met through engagement of local people. Also general transportation will be outsourced, which will generate indirect employment to the local peoples.

The organisation chart has been prepared taking into account various departments/ sections to be formed to operate and service the different facilities envisaged in the mining project. Provision for adequate numbers of officials under statutory requirement as per Mines Act, MMDR Act and the rules & regulations made there under.

9.0 Environmental requirements

Mine out land:

The overburden waste generated from the hill top quarry, float quarry & flank quarry will be has been proposed be backfilled into the mined out void in the conceptual stage. The detailed scheme of movement of waste materials for backfilling upto the conceptual stage is given in table 9.1.

(Table 9.1) Backfilling schedule of mine wastes

Year	Backfill Destination	Backfill Location	Area (Hect.)	Quantity, M cu. m
2013-14	0	0	0	0
2014-15	Backfill 1	Quarry -VC1	2.92	0
2015-16	Backfill 1	Quarry -VC1	0	0.08
2016-17	Backfill 1	Quarry -VC1	0	0.09
	Backfill 2	Quarry -VD	0.8	0.02
2017-18	Backfill 2	Quarry -VD	0	0.02
2018 - Conceptual	Backfill 1	Quarry -VD	13.34	3.04
	Backfill 2	Float Quarry VB & VD	7.94	1.94
	Backfill 3	Hill top	13.86	5.59
Total			**38.86**	**10.78**

Water Quality Management:

Depending upon the drainage pattern of the area where the dump / backfill area is located, retaining walls, garland drain with settling tanks will be provided. The quantum of work envisaged for construction of drains, retaining walls and settling tanks are given in table 9.2.

(Table 9.2) Steps for water quality management

Period	Garland drain		Retaining wall		Settling tank	
	Name/ No.	Length,m	Name/ No.	Length,m	Name/ No.	Nos.
2012-13	-	-	R4 to R8	682	-	-
2014-15	-	-	R9	279	S2	1
2015-16	D1	120	R1	405	S1	1

The measures as envisaged above will be strictly implemented alongwith continued monitoring of environmental parameter as per the statutes.

Air quality management:

Following measures were proposed for management of air quality:-

- Water sprinkling on haul roads.
- Dense plantation along the safety zone.
- No overloading of tippers/ Dumpers.
- Provision of dust extractors with the drill machines/ wet drilling practices.
- Water spraying/ fogging in the dump hopper of crusher.
- All the conveyors will be completely covered.
- Provisions of dust masks to the persons exposed to dust.

Apart from the above, regular monitoring of the ambient air quality as per the statutes will be strictly followed.

Waste Management:

The overburden waste generated from the hill top quarry & float quarry has been proposed be backfilled into the mined out void during the proposed scheme period. The scheme of movement of waste material from the hill top mine to the respective mined out void for backfill is given in Table 9.3.

(Table 9.3) Handling of mine waste from Hill top mine

Year	Waste Generation, cu. m	Backfill Destination	Backfill Location	Backfilled Quantity, cu. m
2013-14	-	-	-	-
2014-15	6836	Backfill 1	Quarry -VC1	6836
2015-16	13313	Backfill 1	Quarry -VC1	13313
2016-17	9828	Backfill 1	Quarry -VC1	9828
2017-18	20566	Backfill 2	Quarry -VD	20566
Total	50543			50543

The scheme of movement of waste material from the Float quarry to the respective mined out void for backfill is given in Table 9.4.

(Table 9.4) Handling of mine waste from Float quarry

Year	Waste Generation, cu. m	Backfill Destination	Backfill Location	Backfilled Quantity, cu. m
2013-14	-	-	-	-
2014-15	79200	Backfill 1	Quarry -VC1	79200
2015-16	84000	Backfill 1	Quarry -VC1	84000
2016-17	73200	Backfill 1	Quarry -VC1	46860
		Backfill 2	Quarry -VD	26340
2017-18	-	-	-	-
Total	236400			236400

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Top soil management:
The quantity of top soil generated upto the conceptual period will be 308900 cu. m. Out of above quantity, 11000 cu. m of top soil will be generated during the scheme period. Due to low shelf life of the top soil; it shall be used for concurrent reclamation/ rehabilitation of the backfilled voids & also for avenue plantation due to very low shelf life of the lateritic soils. Year-wise generation of topsoil is given in table 9.5

(Table 9.5) Top soil generation

Year	Top Soil Generation, cu. m
2013-14	0
2014-15	3560
2015-16	2522
2016-17	4918
2017-18	0
Total	11000

10.0 Others like legal factors like tribal issues, national parks etc.

The area is not close to any national parks and do not have any tribal issues. No specific conditions were imposed on the lessee while executing the lease deed. Gandhamardan -A lease is owned by Odisha Mining Corporation Limited (OMC Ltd.), A Govt. of Odisha Undertaking. The lease deed has been executed on 21.05.1963 for a period of 30 years (copy enclosed as Annexure - 7. Application for further renewal of the lease for a period of 20 years w.e.f. 21.05.1993 was made on 06.04.1992 and is under deemed to be renewed stage (copy of receipt of 1st lease renewal application is enclosed as Annexure – 8). Application for 2nd renewal of the lease for a further period of 20 years has been made on 01.05.2012 (copy of receipt of 2nd lease renewal application is enclosed as Annexure – 9). A copy of the environment clearance received from MoEF is enclosed as Annexure- 11. The copy of the stage – I forestry clearance is also enclosed as Annexure-13. A copy of the permission received from the Mining officer for lifting of accumulated fines & sub-grade fines from the lease is enclosed as Annexure-14.

11.0 Economic evaluation

11.1 Capital Cost

No massive injection of capital cost has been envisaged for development of Gandhamardan-A iron ore lease, exclusive of the figures quoted for parapet walls, garland drains & settling tanks for environment management. The capital cost envisaged for the environmental protection measures will be Rs. 6436300/-

11.2 Production Cost

The cost of production will be Rs. 510 per tonne.

11.3 Economic analysis

Net sales realization of saleable iron ore lumps Rs 4414 / t & Rs 2362 / t for iron ore fines. Considering the capital cost and operating cost as elaborated in the preceding chapters and net sales realization, the pay back period is less than a year.

12.0 Conclusion

On the basis of the above analysis, UNFC categorization of reserves for Gandhamardan-A lease of M/s OMC Limited is given in table 12.1

(Table 12.1) UNFC categorization of reserves as on 01.04.2013

Sl. No	Reserve Category (UNFC Classification)	Mine	Qty. in Tonnes	Grade (Fe%)
1	Proved Mineral Reserves (111)	Float	2359200	60.64
		Total	2359200	60.64
	Proved Mineral Reserves (111)	Hill top	30259267	63.84
		Flank	3252086	63.3
		Total	33511353	63.79
	Probable Mineral Reserves (122)	Flank	2260473	61.46
		Float	1643592	59.17
		Total	3904065	60.50
3	Feasibility Mineral Resource (211)	Float	835640	51.56 %
		Hill top	7871247	62.26 %
		Flank	274210	63.16 %
		Total	8145467.	61.29 %
	Feasibility Mineral Resource (222)	Flank	85748	61.46 %
		Float	1398880	53.85 %
		Total	1484628	54.29 %
4	Remaining measured resource (331)	All areas	NIL	NA
5	Indicated Resource (332)	All areas	NIL	NA
6	Inferred Resource (333)	All areas	NIL	NA
7	Reconnaissance Resource (334)	All areas	NIL	NA

Annexure - 16

Borehole Logs

BHID	samp_id	depth_from	depth_to	Fe	Sio2	al2o3	loi	core_recovery	Lithology
GS/32	GS/32/1	0	1.5	0	0	0	0	0	Soil
GS/32	GS/32/2	1.5	2.5	48.64	11.84	11.76	8.58	90	Laterite
GS/32	GS/32/3	2.5	3.5	57.88	6.84	8.35	4.08	90	Lateritic Ore
GS/32	GS/32/4	3.5	4.5	57.88	7.32	6	3.96	90	Lateritic Ore
GS/32	GS/32/5	4.5	5.5	56.82	8.12	6.4	3.96	90	Lateritic Ore
GS/32	GS/32/6	5.5	6.5	60.49	6.44	4.42	2.4	90	Lateritic Ore
GS/32	GS/32/7	6.5	7.5	63.62	4.84	2.03	2	90	Powdery Ore
GS/32	GS/32/8	7.6	8.5	64.18	4.02	2.07	1.98	90	Powdery Ore
GS/32	GS/32/9	8.5	9.5	62.48	5.9	2.48	2.1	90	Powdery Ore
GS/32	GS/32/10	9.5	10.5	59.37	7.8	3.58	3.46	90	Powdery Ore
GS/32	GS/32/11	10.5	11.5	58.24	8.8	4.18	3.5	90	Powdery Ore
GS/32	GS/32/12	11.5	12	62.48	4.24	3.74	2.4	90	Powdery Ore
GS/32	GS/32/13	12	13	63.04	2.72	2.78	4.1	90	Powdery Ore
GS/32	GS/32/14	13	13.6	63.9	2.72	1.21	4.44	90	Powdery Ore
GS/32	GS/32/15	13.5	14.5	60.21	7.04	3.66	0	90	Powdery Ore
GS/32	GS/32/16	14.5	15	64.24	1.64	0.73	6.28	38	Hard Laminated Ore
GS/32	GS/32/17	15	16	61.35	4.66	3.38	3.96	90	Powdery Ore
GS/32	GS/32/18	16	17	59.65	6.06	6.43	2.98	90	Powdery Ore
GS/32	GS/32/20	17	17.5	61.35	4.88	3.04	4.08	90	Powdery Ore
GS/32	GS/32/21	17.5	18	64.74	2.72	1.81	2.72	50	Hard Laminated Ore
GS/32	GS/32/22	18	19	63.9	4.5	1.99	1.98	90	Powdery Ore
GS/32	GS/32/23	19	20	63.68	4.36	2.5	1.94	90	Powdery Ore
GS/32	GS/32/24	20	21	66.48	2.78	1.57	0.48	90	Powdery Ore
GS/32	GS/32/25	21	22	64.64	3.7	1.7	0.56	90	Powdery Ore
GS/32	GS/32/26	22	23	66.21	3.08	1.58	0.5	90	Powdery Ore
GS/32	GS/32/27	23	23.5	66.46	2.7	1.87	0.24	90	Powdery Ore
GS/32	GS/32/28	23.5	24	62.84	1	3.18	6.72	60	Hard Laminated Ore
GS/32	GS/32/29	24	25	61.72	3.92	6.51	2.18	90	Powdery Ore
GS/32	GS/32/30	25	26	61.72	3.78	5.62	2.18	90	Powdery Ore
GS/32	GS/32/31	26	26.5	63.13	0.98	2.57	6.02	90	Powdery Ore
GS/32	GS/32/32	26.5	27	63.4	4.1	2.96	2.12	40	Hard Laminated Ore
GS/32	GS/32/33	27	28	64.52	2.54	2.49	2.58	90	Powdery Ore
GS/32	GS/32/34	28	29	63.88	2.3	2.8	3.68	90	Powdery Ore
GS/32	GS/32/35	29	30	64.22	3.02	1.17	3.84	22	Hard Laminated Ore
GS/32	GS/32/36	30	31	61.72	4.58	2.98	4.06	90	Powdery Ore
GS/32	GS/32/37	31	31.5	60.6	6.24	2.6	0	90	Powdery Ore
GS/32	GS/32/38	31.5	32.5	60.6	6.16	3.12	3.9	90	Powdery Ore
GS/32	GS/32/39	32.5	33	32.4	30.08	21.8	1.6	50	Banded Hematite Chert
GS/45	GS/45/1	0	1	50.49	3.92	13.18	10.24	90	Friable Laterite
GS/45	GS/45/2	1	2	61.72	1.46	4.56	5.56	42	Hard Laminated Ore
GS/45	GS/45/3	2	3	62.84	2.68	1.86	5.36	29	Hard Laminated Ore
GS/45	GS/45/4	3	4	63.39	1.3	2.79	6.12	29	Hard Laminated Ore
GS/45	GS/45/5	4	5	63.39	1.7	3.55	3.94	24	Hard Laminated Ore
GS/45	GS/45/6	5	6	60.59	2.02	6.32	6.88	24	Hard Laminated Ore
GS/45	GS/45/7	6	7	54.98	5.4	11.37	4.18	24	Hard Laminated Ore
GS/45	GS/45/8	7	8	62.27	0.84	7.54	2.42	24	Hard Laminated Ore
GS/45	GS/45/9	8	9	62.84	0.86	4.7	4.38	24	Hard Laminated Ore
GS/45	GS/45/10	9	9.5	58.81	1.34	9.68	4.38	24	Hard Laminated Ore
GS/45	GS/45/11	9.5	10.5	68.21	1.2	0.9	0	24	Hard Laminated Ore
GS/45	GS/45/12	10.5	11.4	61.72	0.56	9.17	7.84	90	Soft Laminated Ore
GS/45	GS/45/13	11.4	12.5	67.34	0.58	1.03	1.94	45	Hard Laminated Ore
GS/45	GS/45/14	12.5	13	66.16	0.7	0.67	3.86	45	Hard Laminated Ore
GS/45	GS/45/16	13	13.75	68.16	1.3	0.26	3.88	45	Hard Laminated Ore
GS/45	GS/45/16	13.75	14.25	68.31	0.74	0.2	4.12	45	Hard Laminated Ore
GS/45	GS/45/17	14.25	15.5	65.66	1.88	0.7	4.36	45	Hard Laminated Ore
GS/45	GS/45/18	15.5	16	66.18	0.84	0.2	4.2	45	Hard Laminated Ore
GS/45	GS/45/19	16	17	64.76	0.82	0.55	5.86	45	Hard Laminated Ore
GS/45	GS/45/20	17	18	60.81	2.98	3.15	6.74	45	Hard Laminated Ore
GS/45	GS/45/21	18	18.5	65.65	1.12	0.31	4.54	45	Hard Laminated Ore
GS/45	GS/45/22	18.5	19	64.43	3.08	0.41	4.28	24	Hard Laminated Ore
GS/45	GS/45/23	19	20	65.33	0.18	1.27	4.98	24	Hard Laminated Ore

GS/45	GS/45/24	20	21	59.13	7.12	1	7.18	24	Hard Laminated Ore
GS/45	GS/45/25	21	22	65	2.08	0.73	4.08	14	Hard Laminated Ore
GS/45	GS/45/26	22	23	65.6	2.14	1.72	2.08	14	Hard Laminated Ore
GS/45	GS/45/27	23	25	64.49	3.6	1.83	0	90	Soft Laminated Ore
GS/45	GS/45/28	25	27	64.59	3.8	1.83	0	90	Soft Laminated Ore
GS/45	GS/45/29	27	28	63.06	5.3	0.48	3.9	90	Soft Laminated Ore
GS/45	GS/45/30	28	29	66.51	1.42	0.44	2.88	90	Soft Laminated Ore
GS/45	GS/45/31	29	30	66.67	1	0.34	3.18	90	Soft Laminated Ore
GS/45	GS/45/32	30	31	63.36	3.5	2.32	3.42	8	Soft Laminated Ore
GS/45	GS/45/33	31	32	64.86	2.86	1.22	3.38	8	Soft Laminated Ore
GS/45	GS/45/34	32	33	65.07	2.02	0.67	4.1	8	Hard Laminated Ore
GS/45	GS/45/35	33	34	66.07	0.86	0.22	5.74	20	Hard Laminated Ore
GS/45	GS/45/36	34	35	65.34	1.04	0.35	5	20	Hard Laminated Ore
GS/45	GS/45/37	35	36	64.24	1.28	1.9	4.8	20	Hard Laminated Ore
GS/45	GS/45/38	36	37	64.77	0.8	0.94	5.48	20	Hard Laminated Ore
GS/45	GS/45/39	37	38	65.07	1.8	1	0	5	Powdery Ore
GS/45	GS/45/40	38	39	65.63	1.2	0.8	3.98	5	Powdery Ore
GS/45	GS/45/41	39	40	65.34	1.28	1.09	4.02	5	Powdery Ore
GS/45	GS/45/42	40	41	65.91	1.38	0.55	3.66	90	Powdery Ore
GS/45	GS/45/43	41	42	65.91	1.58	0.46	3.56	90	Powdery Ore
GS/45	GS/45/44	42	43	65.91	1.2	0.83	3.56	90	Powdery Ore
GS/45	GS/45/45	43	44	66.19	1.4	0.93	2.84	90	Powdery Ore
GS/45	GS/45/46	44	45	66.19	1.33	1.35	2.5	18	Powdery Ore
GS/45	GS/45/47	45	46	65.63	1.1	1.88	0	90	Hard Laminated Ore
GS/45	GS/45/48	46	47	65.63	1.14	1.88	3.68	90	Powdery Ore
GS/45	GS/45/49	47	48	66.19	0.9	0.66	3.64	90	Powdery Ore
GS/45	GS/45/50	48	49	67.32	1.2	0.51	1.9	90	Powdery Ore
GS/45	GS/45/51	49	50	67.32	1.04	0.52	2.04	90	Powdery Ore
GS/45	GS/45/52	50	51	66.78	0.78	0.27	3.34	90	Powdery Ore
GS/45	GS/45/53	51	52	66.76	1.88	0.45	2.08	90	Powdery Ore
GS/45	GS/45/54	52	53	66.76	1.34	0.5	2.56	90	Powdery Ore
GS/45	GS/45/55	53	54	66.19	1.48	6.3	3.44	90	Powdery Ore
GS/45	GS/45/56	54	55	65.09	2.06	1.24	3.46	90	Powdery Ore
GS/45	GS/45/57	55	56	65.37	2.64	0.48	3.26	90	Powdery Ore
GS/45	GS/45/58	56	57	65.64	2.26	0.55	3.16	90	Powdery Ore
GS/45	GS/45/59	57	58	66.21	1.02	1.42	2.72	90	Powdery Ore
GS/45	GS/45/60	58	59	66.78	0.92	1.16	2.3	90	Powdery Ore
GS/45	GS/45/61	59	60	66.78	1.26	0.8	2.34	90	Powdery Ore
GS/45	GS/45/62	60	61	66.21	2.08	0.76	2.32	90	Powdery Ore
GS/45	GS/45/63	61	62	66.76	1.6	0.56	2.22	90	Powdery Ore
GS/45	GS/45/64	62	63	65.64	1.5	1.11	3.36	90	Powdery Ore
GS/45	GS/45/65	63	64	65.64	2.1	0.53	3.34	90	Powdery Ore
GS/45	GS/45/66	64	65	65.64	2.48	0.74	2.76	90	Powdery Ore
GS/45	GS/45/67	65	66	65.64	2.5	0.47	0	90	Powdery Ore
GS/45	GS/45/68	66	67	66.21	1.84	0.3	3.04	90	Powdery Ore
GS/45	GS/45/69	67	68	65.64	2.04	2.2	3.72	90	Powdery Ore
GS/45	GS/45/70	68	69	64.06	2.13	1.39	3.72	90	Powdery Ore
GS/45	GS/45/71	69	70	64.8	2.56	1.13	3.6	90	Powdery Ore
GS/45	GS/45/72	70	71	64.8	2.4	1.08	3.7	90	Powdery Ore
GS/45	GS/45/73	71	72	63.39	3.72	1.37	4.1	90	Powdery Ore
GS/45	GS/45/74	72	73	64.51	3.12	0.71	3.78	90	Powdery Ore
GS/45	GS/45/75	73	74	65.63	2.06	0.93	3	90	Powdery Ore
GS/45	GS/45/76	74	75	65.07	2.28	1.26	3.26	90	Powdery Ore
GS/45	GS/45/77	75	76.5	40.57	38.14	1.56	2.02	12	Banded Hematite Chert
GS/21	GS/21/1	0	0.15	0	0	0	0	0	Soil
GS/21	GS/21/2	0.15	1	60.88	3.88	4.8	4.04	48	Lateritic Ore.
GS/21	GS/21/3	1	2	65.36	2.08	1.58	2.72	48	Hard Laminated Ore
GS/21	GS/21/4	2	3	64.52	2.62	1.15	3.82	48	Hard Laminated Ore
GS/21	GS/21/5	3	4	64.6	2	0.7	4.8	48	Hard Laminated Ore
GS/21	GS/21/6	4	4.5	65.5	2	0.7	3.7	48	Hard Laminated Ore
GS/21	GS/21/7	4.5	5	66.21	1.6	0.55	3	25	Friable Ore
GS/21	GS/21/8	5	6	66	1.8	0.68	3.7	25	Hard Laminated Ore
GS/21	GS/21/9	6	7	65.5	0.8	0.5	4.1	25	Hard Laminated Ore
GS/21	GS/21/10	7	8	66.21	1.4	0.35	3.4	25	Hard Laminated Ore

GS/21	GS/21/11	8	9	65.6	2	0.84	4.4	25	Hard Laminated Ore
GS/21	GS/21/12	9	10	66.52	1	0.64	0	25	Hard Laminated Ore
GS/21	GS/21/13	10	11	67.9	0.8	0.25	1.9	12	Soft Laminated Ore
GS/21	GS/21/14	11	12	64.7	2.08	0.5	4.8	12	Hard Laminated Ore
GS/21	GS/21/15	12	13.5	67.8	0.8	0.2	2	12	Hard Laminated Ore
GS/21	GS/21/16	13.5	14.5	68.2	1	0.23	1.1	12	Soft Laminated Ore
GS/21	GS/21/17	14.5	15.7	65.7	1.2	0.58	3.7	12	Hard Laminated Ore
GS/21	GS/21/18	15.7	16.7	66	1.2	0.51	2.9	100	Soft Laminated Ore
GS/21	GS/21/19	16.7	17.7	67.9	0.6	0.2	1.9	90	Soft Laminated Ore
GS/21	GS/21/20	17.7	18.7	67.5	1	0.33	2	90	Soft Laminated Ore
GS/21	GS/21/21	18.7	19.5	65	2.8	1.4	2.7	20	Hard Laminated Ore
GS/21	GS/21/22	19.5	20.6	64.8	3.3	0.9	3	20	Hard Laminated Ore
GS/21	GS/21/23	20.6	21.5	66.9	1.26	0.93	2	20	Hard Laminated Ore
GS/21	GS/21/24	21.5	22.5	64.6	1.62	0.46	5.4	22	Hard Laminated Ore
GS/21	GS/21/25	22.5	23.5	63.13	1.66	2.06	5.86	22	Hard Laminated Ore
GS/21	GS/21/26	23.5	24.5	63.68	1.82	2.71	0	22	Hard Laminated Ore
GS/21	GS/21/27	24.5	25.5	58.09	7.58	4.94	4.24	90	Hard Laminated Ore
GS/21	GS/21/28	25.5	26.5	65.82	1.52	1.03	2.12	90	Hard Laminated Ore
GS/21	GS/21/29	26.5	27.5	65.36	0.64	3.29	2.44	90	Hard Laminated Ore
GS/21	GS/21/30	27.5	28.5	65.38	1.7	2.88	1.78	90	Hard Laminated Ore
GS/21	GS/21/31	28.5	29.5	65.92	2.78	0.83	1.88	90	Hard Laminated Ore
GS/21	GS/21/32	29.5	30.5	65.92	1.94	0.75	1.9	90	Hard Laminated Ore
GS/21	GS/21/33	30.5	31.5	67.59	1.38	0.56	1.22	90	Soft Laminated Ore
GS/21	GS/21/34	31.5	32.5	67.59	1.76	1.09	0.32	90	Soft Laminated Ore
GS/21	GS/21/35	32.5	35	65.92	4.06	1.4	0.14	90	Soft Laminated Ore
GS/21	GS/21/36	35	37	30.16	50.94	5.8	0.02	45	Banded Hematite Chert
GS/38	GS/38/1	0	0.3	0	0	0	0	0	Soil
GS/38	GS/38/2	0.3	0.4	40.55	33.42	6.7	1.7	90	Banded Hematite Jasper
GS/38	GS/38/3	0.4	0.8	47.87	22.76	2.82	6.7	90	Banded Hematite Jasper
GS/38	GS/38/4	0.8	1.8	47.32	25.6	2.7	3.74	100	Banded Hematite Jasper
GS/38	GS/38/5	1.8	3	50.41	20.9	4.6	2.44	100	Laterite
GS/38	GS/38/6	3	4	45.91	26	5.68	2.42	100	Laterite
GS/38	GS/38/7	4	5	46.47	20.2	7.76	5.28	100	Laterite
GS/38	GS/38/8	5	6	56.89	8.9	5.3	4.2	100	Lateritic Ore
GS/38	GS/38/9	6	7	63.61	6.28	0.65	2.04	100	Soft Laminated Ore
GS/38	GS/38/10	7	7.5	45.5	20.3	6.92	6	90	Laterite
GS/38	GS/38/11	7.5	8	56	12.1	2.02	2.7	80	Lateritic Ore
GS/38	GS/38/12	8	8.5	58.3	12	4.04	3.2	90	Lateritic Ore
GS/38	GS/38/13	8.5	9	46.8	19.2	6.12	5.5	80	Banded Hematite Chert
GS/38	GS/38/14	9	10	37.8	45.8	4.24	0.6	70	Banded Hematite Chert
GS/25	GS/25/1	0	1	0	0	0	0	0	Soil
GS/25	GS/25/2	1	2	64.77	1.42	2.34	3.46	56	Hard Laminated Ore
GS/25	GS/25/3	2	3	50.13	5.08	15.1	7.86	90	Friable Laterite
GS/25	GS/25/4	3	4	55.2	8.92	7.71	6.18	90	Friable Laterite
GS/25	GS/25/5	4	4.5	66.29	5.3	5.6	5.46	70	Lateritic Ore
GS/25	GS/25/6	4.5	5.3	66.26	0.58	0.51	4	62	Hard Laminated Ore
GS/25	GS/25/7	5.3	6	59.41	5.86	4.13	4.78	90	Soft Laminated Ore
GS/25	GS/25/8A	6	7	0	0	0	0		Soft Laminated Ore
GS/25	GS/25/8	7	8	64.26	0.94	0.4	6.64	72.5	Hard Laminated Ore
GS/25	GS/25/9	8	9.1	64.77	1.1	1.32	4.8	96	Hard Laminated Ore
GS/25	GS/25/10	9.1	9.5	53.51	7.96	8.89	6.54	90	Powdery Ore
GS/25	GS/25/11	9.5	10.5	58.01	1.26	10.61	5.38	40	Powdery Ore
GS/25	GS/25/12	10.5	11	63.77	4.38	0.3	4	33	Hard Laminated Ore
GS/25	GS/25/13	11	12	64.77	1.76	1.15	4.3	33	Hard Laminated Ore
GS/25	GS/25/14	12	13	59.7	4.32	5.57	4.48	90	Soft Laminated Ore
GS/25	GS/25/15	13	13.5	65.08	1.84	1.14	3.84	60	Hard Laminated Ore
GS/25	GS/25/16	13.5	14.5	63.23	5.42	0.64	3.38	50	Hard Laminated Ore
GS/25	GS/25/17	14.5	15.5	58.57	0.84	0.8	5.28	90	Soft Laminated Ore
GS/25	GS/25/18	15.5	16	50.69	17.22	5.6	4.44	90	Soft Laminated Ore
GS/25	GS/25/19	16	17	60.97	18.28	2.61	5.98	90	Soft Laminated Ore
GS/25	GS/26/20	17	18	51.25	17.56	2.62	5.28	90	Soft Laminated Ore
GS/25	GS/26/21	18	19	46.76	21.28	4.72	6.86	90	Soft Laminated Ore
GS/25	GS/25/22	19	19.5	60.69	16.76	4.44	6.04	100	Soft Laminated Ore
GS/25	GS/25/23	19.5	20	61.39	4.88	1.31	5.78	100	Soft Laminated Ore

GS/25	GS/25/24	20	21	68.02	1.08	0.35	4.04	100	Soft Laminated Ore
GS/25	GS/25/25	21	22	68.69	1.08	0.41	3.14	100	Soft Laminated Ore
GS/25	GS/25/26	22	23	65.34	1.62	0.8	3.86	100	Soft Laminated Ore
GS/25	GS/25/27	23	24	64.21	2.96	0.88	4.2	100	Soft Laminated Ore
GS/25	GS/25/28	24	24.5	66.06	2.08	0.33	2.98	100	Soft Laminated Ore
GS/25	GS/25/29	24.5	25.4	66.06	2.08	0.33	2.98	100	Soft Laminated Ore
GS/25	GS/25/30	25.4	26	54.65	12.68	3.73	5.2	100	Shale
GS/25	GS/25/31	26	26.4	60.82	4.48	3.58	4.8	100	Soft Laminated Ore
GS/25	GS/25/32	26.4	26.7	59.7	5.48	2.6	6.38	100	Soft Laminated Ore
GS/25	GS/25/33	26.7	27	63.93	1.86	2.1	4.48	100	Soft Laminated Ore
GS/25	GS/25/34	27	27.1	63.36	3.58	1	4.7	100	Soft Laminated Ore
GS/25	GS/25/35	27.1	27.4	65.69	1.28	0.41	4.24	100	Soft Laminated Ore
GS/25	GS/25/36	27.4	27.6	63.65	2.1	1.8	5.82	100	Soft Laminated Ore
GS/25	GS/25/37	27.6	28	65.46	2.58	0.25	3.44	100	Soft Laminated Ore
GS/25	GS/25/38	28	28.2	65.89	2.04	0.65	3.36	100	Soft Laminated Ore
GS/25	GS/25/39	28.2	29.2	65.09	2.9	0.22	3.68	100	Soft Laminated Ore
GS/25	GS/25/40	29.2	30	63.38	4.64	1.71	2.9	100	Soft Laminated Ore
GS/25	GS/25/41	30	30.5	63.36	4.4	1.73	3.12	100	Soft Laminated Ore
GS/25	GS/25/42	30.5	30.7	65.65	3.83	1.08	2.98	100	Soft Laminated Ore
GS/25	GS/25/43	30.7	31	61.95	5.34	2.22	3.64	100	Soft Laminated Ore
GS/25	GS/25/44	31	31.5	61.39	2.38	7	2.58	100	Soft Laminated Ore
GS/26	GS/26/45	31.6	32.5	57.01	12.54	0.4	5.38	100	Soft Laminated Ore
GS/25	GS/25/46	32.5	32.7	63.81	3.22	1.02	4.36	100	Soft Laminated Ore
GS/25	GS/25/47	32.7	33	60.27	9.08	1.35	3.22	100	Soft Laminated Ore
GS/26	GS/25/48	33	33.5	49.57	18.94	3.59	6.3	100	Shale
GS/25	GS/26/49	33.6	34.5	60.62	6.02	1.64	5.22	100	Lateritic Ore
GS/25	GS/25/50	34.5	35	60.27	6.6	1.84	6.22	100	Lateritic Ore
GS/25	GS/25/51	35	35.5	63.93	2.34	0.43	6.88	100	Lateritic Ore
GS/25	GS/25/52	35.5	35.8	63.86	2.78	1.63	4.02	100	Lateritic Ore
GS/25	GS/25/53	35.8	36	64.34	1.48	0.7	6.06	100	Lateritic Ore
GS/26	GS/25/54	36	36.5	62.88	3.58	0.45	6.06	100	Lateritic Ore
GS/25	GS/25/55	36.5	36.7	60.28	5.88	1.29	5.72	100	Lateritic Ore
GS/25	GS/25/56	36.7	37	63.36	3.02	0.37	5.86	100	Lateritic Ore
GS/25	GS/25/57	37	38	61.39	2.84	2.75	6.36	100	Lateritic Ore
GS/25	GS/25/58	38	38.6	66.05	2.88	0.22	3.96	100	Soft Laminated Ore
GS/25	GS/25/59	38.6	39.25	63.08	2.5	2.81	4.24	100	Soft Laminated Ore
GS/25	GS/25/60	39.25	40.25	66.82	1.62	0.68	2.86	61	Hard Laminated Ore
GS/25	GS/25/61	40.25	41.25	66.79	1.88	0.27	2.4	61	Hard Laminated Ore
GS/25	GS/25/62	41.25	42.26	67.46	0.98	0.32	2.08	61	Hard Laminated Ore
GS/25	GS/25/63	42.25	43.25	61.95	5.06	1.13	5.04	61	Hard Laminated Ore
GS/25	GS/25/64	43.25	44.25	65.66	1.9	0.41	3.64	48.06	Hard Laminated Ore
GS/25	GS/25/65	44.25	45.25	68.22	1.22	0.7	3.26	48.06	Hard Laminated Ore
GS/25	GS/25/66	46.25	45.5	67.16	9.84	3.9	4.26	100	Friable Ore
GS/25	GS/25/67	45.5	46.75	52.94	11.8	6.93	8.3	80	Hard Laminated Ore
GS/25	GS/25/68	45.75	46.6	61.1	6.74	1.02	4.72	90	Friable Ore
GS/25	GS/25/69	46.5	47	47.03	18.96	6.34	7.16	30	Banded Hematite Jasper
GS/25	GS/25/70	47	47.5	58.7	8.1	1.85	4.32	90	Friable Ore
GS/25	GS/25/71	47.5	47.95	53.2	13.62	2.12	8.18	42.2	Shale
GS/25	GS/25/72	47.95	57.75	0	0	0	0	100	Shale
GS/24	GS/24/1	0	1	63.93	0.91	3.24	3.24	50.03	Hard Laminated Ore
GS/24	GS/24/2	1	2	65.75	0.94	2.01	2.69	50.03	Hard Laminated Ore
GS/24	GS/24/3	2	3	64.91	0.84	3.03	3.04	50.03	Hard Laminated Ore
GS/24	GS/24/4	3	4	66.3	1.15	2.01	1.56	50.03	Hard Laminated Ore
GS/24	GS/24/5	4	5	65.33	0.91	3.3	2.44	50.03	Hard Laminated Ore
GS/24	GS/24/6	5	6	60.73	1.02	8.52	4.64	50.03	Hard Laminated Ore
GS/24	GS/24/7	6	7	63.65	1.22	3.9	2.86	50.03	Hard Laminated Ore
GS/24	GS/24/8	7	8	65.81	1.5	2.22	2.06	90	Hard Laminated Ore
GS/24	GS/24/9	8	9	64.21	1.2	3.25	3.2	90	Soft Laminated Ore
GS/24	GS/24/10	9	9.5	59.74	2.34	7.01	4.5	90	Lateritic Ore
GS/24	GS/24/11	9.5	10.5	60.32	2.12	10.14	2.55	90	Lateritic Ore
GS/24	GS/24/12	10.5	11	63.62	1.8	4.09	2.1	90	Soft Laminated Ore
GS/24	GS/24/13	11	12	63.15	1.2	3.21	2.4	90	Soft Laminated Ore
GS/24	GS/24/14	12	12.5	65.61	1.42	2.98	1.6	10	Hard Laminated Ore
GS/24	GS/24/15	12.5	13.6	66.18	0.82	2.8	1.14	90	Soft Laminated Ore

GS/24	GS/24/16	13.5	13.8	64.94	1.9	3.24	1.62	90	Soft Laminated Ore
GS/24	GS/24/17	13.8	14	40.14	0	0	0	90	Laterite
GS/24	GS/24/18	14	15	63.65	1.82	4.2	2.08	90	Soft Laminated Ore
GS/24	GS/24/19	15	16	64.49	2.6	3.02	1.75	90	Friable Ore
GS/24	GS/24/20	16	16.5	64.58	2.78	3.02	1.5	90	Soft Laminated Ore
GS/24	GS/24/21	16.5	17.5	65.21	2.26	2.08	2.12	90	Soft Laminated Ore
GS/24	GS/24/22	17.5	18.5	66.03	2.41	1.04	1.42	90	Soft Laminated Ore
GS/24	GS/24/23	18.5	19.5	67.67	1.02	1.05	1.14	90	Soft Laminated Ore
GS/24	GS/24/24	19.5	20	68.2	0.82	0.63	0.87	90	Soft Laminated Ore
GS/24	GS/24/25	20	21	66.58	2.16	1.47	1.12	90	Soft Laminated Ore
GS/24	GS/24/26	21	21.4	65.78	2.58	1.88	1.42	90	Soft Laminated Ore
GS/24	GS/24/27	21.4	21.75	64.93	3.06	1.04	1.84	100	Soft Laminated Ore
GS/24	GS/24/28	21.75	22.15	60.55	5.46	2.67	2.68	100	Soft Laminated Ore
GS/24	GS/24/29	22.15	22.4	62.88	0	0	0	100	Lateritic Ore
GS/24	GS/24/30	22.4	22.9	43.29	0	0	0	100	Banded Hematite Jasper
GS/24	GS/24/31	22.9	23	30.31	0	0	0	33	Banded Hematite Jasper
GS/74	GS/74/1	0	1.5	0	0	0	0	0	Soil
GS/74	GS/74/2	1.5	2.5	47.53	0	0	0	90	Friable Laterite
GS/74	GS/74/3	2.5	3	48.82	0	0	0	90	Friable Laterite
GS/74	GS/74/4	3	3.5	49.2	0	0	0	90	Friable Laterite
GS/74	GS/74/5	3.5	4.5	49.48	0	0	0	90	Friable Laterite
GS/74	GS/74/6	4.5	5.5	48.14	0	0	0	90	Friable Laterite
GS/74	GS/74/7	5.5	6.5	44.75	0	0	0	90	Friable Laterite
GS/74	GS/74/8	6.5	7.5	46.7	0	0	0	80	Friable Laterite
GS/74	GS/74/9	7.5	8.5	48.94	0	0	0	90	Friable Laterite
GS/74	GS/74/10	8.5	9.5	48.65	0	0	0	90	Friable Laterite
GS/74	GS/74/11	9.5	10.5	50.48	0	0	0	90	Friable Laterite
GS/74	GS/74/12	10.5	11.5	48.53	0	0	0	90	Friable Laterite
GS/74	GS/74/13	11.5	12	49.5	0	0	0	90	Friable Laterite
GS/74	GS/74/14	12	13	39.21	0	0	0	92	Ferrugineous Shale
GS/74	GS/74/15	13	14	38.66	0	0	0	92	Ferrugineous Shale
GS/74	GS/74/16	14	15	37.22	0	0	0	92	Ferrugineous Shale
GS/74	GS/74/17	15	25	0	0	0	0	84.5	Ferrugineous Shale
GS/12	GS/12/1	0	0.2	0	0	0	0	0	Soil
GS/12	GS/12/2	0.2	1	59.98	4.87	5.01	0	90	Soft Laminated Ore
GS/12	GS/12/3	1	2	61.66	3.85	3.16	4.18	90	Soft Laminated Ore
GS/12	GS/12/4	2	3	61.8	3.82	3.25	3.4	90	Soft Laminated Ore
GS/12	GS/12/5	3	4	65.91	1.8	1.92	1.2	90	Soft Laminated Ore
GS/12	GS/12/6	4	5	65.61	1.5	2.06	2	90	Soft Laminated Ore
GS/12	GS/12/7	5	6	65.04	1.65	2.42	2.5	90	Soft Laminated Ore
GS/12	GS/12/8	6	7	65.8	1.8	1.98	1.8	90	Soft Laminated Ore
GS/12	GS/12/9	7	8	64.53	1.8	1.67	2.3	90	Soft Laminated Ore
GS/12	GS/12/10	8	9	65.03	1.82	2.19	1.9	90	Soft Laminated Ore
GS/12	GS/12/11	9	9.45	64.65	3.78	1.56	0	90	Soft Laminated Ore
GS/12	GS/12/12	9.45	10.45	36.48	64.85	0.28	0.1	48	Banded Hematite Chert
GS/6	GS/6/1	0	0.5	0	0	0	0	0	Soil
GS/6	GS/6/2	0.5	1.5	33.38	15.85	19.11	14.33	79	Laterite
GS/6	GS/6/3	1.5	2	28.65	4.2	30.74	19.85	90	Laterite
GS/6	GS/6/4	2	3	26.14	13.8	26.53	17.6	90	Laterite
GS/6	GS/6/5	3	3.5	20.32	6.9	37.54	21.5	90	Laterite
GS/6	GS/6/6	3.5	4.5	4.97	0	0	0	90	Altered Tuff
GS/6	GS/6/7	4.5	5	34.77	10.26	22.39	14.95	90	Laterite
GS/6	GS/6/8	5	6	34.9	12.03	25.33	11.88	90	Laterite
GS/6	GS/6/9	6	7	24.78	0	0	0	90	Laterite
GS/6	GS/6/10	7	8	25.03	0	0	0	90	Laterite
GS/6	GS/6/11	8	9	13.63	0	0	0	30	Altered Tuff
GS/6	GS/6/12	9	10	30.87	0	0	0	15	Altered Tuff
GS/6	GS/6/13	10	15	0	0	0	0	100	Altered Tuff
GS/6	GS/6/14	15	19.5	0	0	0	0	100	Altered Tuff
GS/6	GS/6/15	19.5	20.5	34.77	0	0	0	20	Lateritised Tuff
GS/6	GS/6/16	20.5	21	29.77	0	0	0	20	Lateritised Tuff
GS/6	GS/6/17	21	21.5	60.84	5.2	4.08	3.22	23	Powdery Ore
GS/6	GS/6/18	21.5	22.5	54.24	3.45	10.34	6	23	Laterite
GS/6	GS/6/19	22.5	23.5	57.82	5.55	5.43	3.65	23	Lateritic Ore

GS/6	GS/6/20	23.5	24.5	63.96	1.8	2.5	3.1	23	Soft Laminated Ore
GS/6	GS/6/21	24.5	25.8	63.26	1.5	2.26	4.7	23	Hard Laminated Ore
GS/6	GS/6/22	25.5	26.5	65.85	1.68	1.83	2.14	90	Soft Laminated Ore
GS/6	GS/6/23	26.5	27	65.36	1.82	1.43	2.3	90	Soft Laminated Ore
GS/6	GS/6/24	27	28	68.18	0.82	0.78	0.8	90	Soft Laminated Ore
GS/6	GS/6/25	28	28.5	66.19	1.58	1.39	0	90	Soft Laminated Ore
GS/6	GS/6/26	28.5	29.5	66.48	1.22	1.08	1.4	90	Soft Laminated Ore
GS/6	GS/6/27	29.5	30.5	66.28	1.41	1.1	1.9	90	Soft Laminated Ore
GS/6	GS/6/28	30.5	31	66.19	1.18	1.25	2.1	90	Soft Laminated Ore
GS/6	GS/6/29	31	32	67.25	1.54	0.83	1.2	90	Soft Laminated Ore
GS/6	GS/6/30	32	33	66.56	1.62	0.98	1.25	90	Soft Laminated Ore
GS/6	GS/6/31	33	34	67.29	1.41	1.02	0.9	90	Soft Laminated Ore
GS/6	GS/6/32	34	35	64.84	3.81	1.47	1.26	90	Soft Laminated Ore
GS/6	GS/6/33	35	36	63.45	4.14	2.82	0.85	90	Soft Laminated Ore
GS/6	GS/6/34	36	37	62.64	4.82	1.25	2.26	90	Soft Laminated Ore
GS/6	GS/6/35	37	38	62.05	5.62	1.21	3.8	90	Soft Laminated Ore
GS/6	GS/6/36	38	39	60.95	6.52	1.33	4.02	90	Soft Laminated Ore
GS/6	GS/6/37	39	40	64.66	1.36	0.86	4.47	90	Soft Laminated Ore
GS/6	GS/6/38	40	40.2	41.02	37.45	1	1.25	50	Banded Hematite Chert
GS/75	GS/75/1	0	0.2	0	0	0	0	100	Soil
GS/75	GS/75/2	0.2	3	0	0	0	0	94.6	Soft Laminated Ore
GS/75	GS/75/3	3	3.3	57.16	13.48	2.16	2.74	100	Soft Laminated Ore
GS/75	GS/75/4	3.3	5	31.54	46.48	7.65	0.48	55	Banded Hematite Jasper /Chert
GS/37	GS/37/1	0	0.2	0	0	0	0	0	Soil
GS/37	GS/37/2	0.2	1	38.4	22.1	13.58	11.8	90	Laterite
GS/37	GS/37/3	1	2	36.7	20.4	15.44	11.4	90	Laterite
GS/37	GS/37/4	2	3	54.6	5.8	9.37	6.5	90	Friable Laterite
GS/37	GS/37/5	3	4	50.4	8.2	10.7	8.8	90	Friable Laterite
GS/37	GS/37/6	4	5	44	12	14.18	10.6	90	Friable Laterite
GS/37	GS/37/7	5	6	47.3	9.5	12.38	10.2	90	Friable Laterite
GS/37	GS/37/8	6	7	62.9	6.3	9.89	7.9	90	Friable Laterite
GS/37	GS/37/9	7	8	52.6	6.9	9.13	8	90	Friable Laterite
GS/37	GS/37/10	8	9	54.9	5.8	8.93	7.1	90	Friable Laterite
GS/37	GS/37/11	9	10	48.4	9.7	11.3	8.9	90	Friable Laterite
GS/37	GS/37/12	10	11	49	9.8	11.23	8.8	90	Friable Laterite
GS/37	GS/37/13	11	12	49.6	9.5	10.2	9	90	Friable Laterite
GS/37	GS/37/14	12	13	42.8	37.4	1.02	0.4	50	Banded Hematite Jasper /Chert
DTH/1	DTH/1/1	0	1	52.34	7.48	9.8	0		Laterite/Soil
DTH/1	DTH/1/2	1	2	61.56	3.37	3.84	0		Lateritic Ore
DTH/1	DTH/1/3	2	3	59.95	5.37	4.27	0		Lateritic Ore
DTH/1	DTH/1/4	3	4	55.13	8.19	6.07	0		Lateritic Ore
DTH/1	DTH/1/5	4	5	40.11	12.38	18.15	0		Laterite
DTH/1	DTH/1/6	5	6	42.47	13.28	14.96	0		Laterite
DTH/1	DTH/1/7	6	7	18.3	18.27	43.36	0		Ferrugineous Shale
DTH/1	DTH/1/8	7	8	0	0	0	0		Shale
DTH/1	DTH/1/9	8	9	0	0	0	0		Shale
DTH/1	DTH/1/10	9	10	0	0	0	0		Shale
DTH/1	DTH/1/11	10	11	0	0	0	0		Shale
DTH/1	DTH/1/12	11	12	0	0	0	0		Shale
DTH/1	DTH/1/13	12	13	0	0	0	0		Shale
DTH/1	DTH/1/14	13	14	0	0	0	0		Shale
DTH/1	DTH/1/15	14	15	0	0	0	0		Shale
DTH/1	DTH/1/16	15	16	0	0	0	0		Shale
DTH/1	DTH/1/17	16	17	0	0	0	0		Shale
DTH/1	DTH/1/18	17	18	0	0	0	0		Shale
DTH/1	DTH/1/19	18	19	0	0	0	0		Shale
DTH/1	DTH/1/20	19	20	0	0	0	0		Shale
DTH/1	DTH/1/21	20	21	0	0	0	0		Shale
DTH/1	DTH/1/22	21	22	0	0	0	0		Shale
DTH/1	DTH/1/23	22	23	0	0	0	0		Shale
DTH/1	DTH/1/24	23	24	0	0	0	0		Shale
DTH/1	DTH/1/25	24	25	0	0	0	0		Shale
DTH/2	DTH/2/1	0	1	43.54	12.92	14.04	0		Laterite
DTH/2	DTH/2/2	1	2	63.41	8.82	6.97	0		Laterite

DTH/2	DTH/2/3	2	3	51,27	7.41	9.43	0		Laterite
DTH/2	DTH/2/4	3	4	52.79	12.06	16	0		Ferruginous Shale
DTH/2	DTH/2/5	4	5	0	0	0	0		Shale
DTH/2	DTH/2/6	5	6	0	0	0	0		Shale
DTH/2	DTH/2/7	6	7	0	0	0	0		Shale
DTH/2	DTH/2/8	7	8	0	0	0	0		Shale
DTH/2	DTH/2/9	8	9	0	0	0	0		Shale
DTH/2	DTH/2/10	9	10	0	0	0	0		Shale
DTH/2	DTH/2/11	10	11	0	0	0	0		Shale
DTH/2	DTH/2/12	11	12	0	0	0	0		Shale
DTH/2	DTH/2/13	12	13	0	0	0	0		Shale
DTH/2	DTH/2/14	13	14	0	0	0	0		Shale
DTH/2	DTH/2/15	14	15	0	0	0	0		Shale
DTH/2	DTH/2/16	15	16	0	0	0	0		Shale
DTH/2	DTH/2/17	16	17	0	0	0	0		Shale
DTH/2	DTH/2/18	17	18	0	0	0	0		Shale
DTH/2	DTH/2/19	18	19	0	0	0	0		Shale
DTH/2	DTH/2/20	19	20	0	0	0	0		Shale
DTH/2	DTH/2/21	20	21	0	0	0	0		Shale
DTH/2	DTH/2/22	21	22	0	0	0	0		Shale
DTH/2	DTH/2/23	22	23	0	0	0	0		Shale
DTH/2	DTH/2/24	23	24	0	0	0	0		Shale
DTH/2	DTH/2/25	24	25	0	0	0	0		Shale
DTH/3	DTH/3/1	0	1	53,95	7.2	8.66	0	0	Laterite
DTH/3	DTH/3/2	1	2	53.84	6.46	9.08	0	0	Laterite
DTH/3	DTH/3/3	2	3	49.12	8.06	13.18	0	0	Laterite
DTH/3	DTH/3/4	3	4	18.87	18.31	40.63	0	0	Ferruginous Shale
DTH/3	DTH/3/5	4	5	0	0	0	0	0	Shale
DTH/3	DTH/3/6	5	6	0	0	0	0	0	Shale
DTH/3	DTH/3/7	6	7	0	0	0	0	0	Shale
DTH/3	DTH/3/8	7	8	0	0	0	0	0	Shale
DTH/3	DTH/3/9	8	9	0	0	0	0	0	Shale
DTH/3	DTH/3/10	9	10	0	0	0	0	0	Shale
DTH/3	DTH/3/11	10	11	0	0	0	0	0	Shale
DTH/3	DTH/3/12	11	12	0	0	0	0	0	Shale
DTH/3	DTH/3/13	12	13	0	0	0	0	0	Shale
DTH/3	DTH/3/14	13	14	0	0	0	0	0	Shale
DTH/3	DTH/3/15	14	15	0	0	0	0	0	Shale
DTH/3	DTH/3/16	15	16	0	0	0	0	0	Shale
DTH/3	DTH/3/17	16	17	0	0	0	0	0	Shale
DTH/3	DTH/3/18	17	18	0	0	0	0	0	Shale
DTH/3	DTH/3/19	18	19	0	0	0	0	0	Shale
DTH/3	DTH/3/20	19	20	0	0	0	0	0	Shale
DTH/3	DTH/3/21	20	21	0	0	0	0	0	Shale
DTH/3	DTH/3/22	21	22	0	0	0	0	0	Shale
DTH/3	DTH/3/23	22	23	0	0	0	0	0	Shale
DTH/3	DTH/3/24	23	24	0	0	0	0	0	Shale
DTH/3	DTH/3/25	24	25	0	0	0	0	0	Shale
DTH/4	DTH/4/1	0	1	47.4	5,24	16.92	0		Laterite
DTH/4	DTH/4/2	1	2	44.62	6.92	21.1	0		Laterite
DTH/4	DTH/4/3	2	3	53.9	7.88	7.96	0		Laterite
DTH/4	DTH/4/4	3	4	57,91	7.91	9.04	0		Lateritic Ore
DTH/4	DTH/4/5	4	5	52,87	6.78	11.34	0		Laterite
DTH/4	DTH/4/6	5	6	49.33	5.08	15.78	0		Laterite
DTH/4	DTH/4/7	6	7	46.87	5.83	20.38	0		Laterite
DTH/4	DTH/4/8	7	8	48.12	7.4	16.78	0		Laterite
DTH/4	DTH/4/9	8	9	0	0	0	0		Ferruginous Shale
DTH/4	DTH/4/10	9	10	0	0	0	0		Shale
DTH/4	DTH/4/11	10	11	0	0	0	0		Shale
DTH/4	DTH/4/12	11	12	0	0	0	0		Shale
DTH/4	DTH/4/13	12	13	0	0	0	0		Shale
DTH/4	DTH/4/14	13	14	0	0	0	0		Shale
DTH/4	DTH/4/15	14	15	0	0	0	0		Shale
DTH/4	DTH/4/16	15	16	0	0	0	0		Shale

DTH/4	DTH/4/17	16	17	0	0	0	0		
DTH/4	DTH/4/18	17	18	0	0	0	0		Shale
DTH/4	DTH/4/19	18	19	0	0	0	0		Shale
DTH/4	DTH/4/20	19	20	0	0	0	0		Shale
DTH/4	DTH/4/21	20	21	0	0	0	0		Shale
DTH/4	DTH/4/22	21	22	0	0	0	0		Shale
DTH/4	DTH/4/23	22	23	0	0	0	0		Shale
DTH/4	DTH/4/24	23	24	0	0	0	0		Shale
DTH/4	DTH/4/25	24	25	0	0	0	0		Shale
DTH/4	DTH/4/26	25	26	0	0	0	0		Shale
DTH/4	DTH/4/27	26	27	0	0	0	0		Shale
DTH/4	DTH/4/28	27	28	0	0	0	0		Shale
DTH/5	DTH/5/1	0	1	54.48	6.89	8.1	0		Shale
DTH/5	DTH/5/2	1	2	46.22	6.95	15.96	0		Laterite/Soil
DTH/5	DTH/5/3	2	3	31.85	13.3	28.38	0		Laterite
DTH/5	DTH/5/4	3	4	25.95	16.87	31.48	0		Laterite
DTH/5	DTH/5/5	4	5	24.66	17.74	33.17	0		Laterite
DTH/5	DTH/5/6	5	6	26.17	18.93	29.64	0		Laterite
DTH/5	DTH/5/7	6	7	16.83	15.43	48.13	0		Laterite
DTH/5	DTH/5/8	7	8	15.65	20.06	43.76	0		Laterite
DTH/5	DTH/5/9	8	9	14.8	17.95	46.06	0		Laterite
DTH/5	DTH/5/10	9	10	0	0	0	0		Laterite
DTH/5	DTH/5/11	10	11	0	0	0	0		Volcanics
DTH/5	DTH/5/12	11	12	0	0	0	0		Volcanics
DTH/5	DTH/5/13	12	13	0	0	0	0		Volcanics
DTH/5	DTH/5/14	13	14	0	0	0	0		Volcanics
DTH/5	DTH/5/15	14	15	0	0	0	0		Volcanics
DTH/5	DTH/5/16	15	16	0	0	0	0		Volcanics
DTH/5	DTH/5/17	16	17	0	0	0	0		Volcanics
DTH/5	DTH/5/18	17	18	0	0	0	0		Volcanics
DTH/5	DTH/5/19	18	19	0	0	0	0		Volcanics
DTH/5	DTH/5/20	19	20	0	0	0	0		Volcanics
DTH/5	DTH/5/21	20	21	0	0	0	0		Volcanics
DTH/5	DTH/5/22	21	22	0	0	0	0		Volcanics
DTH/5	DTH/5/23	22	23	0	0	0	0		Volcanics
DTH/5	DTH/5/24	23	24	0	0	0	0		Volcanics
DTH/5	DTH/5/25	24	25	0	0	0	0		Volcanics
DTH/6	DTH/6/1	0	1	52.87	7.07	9.76	0		Volcanics
DTH/6	DTH/6/2	1	2	43.33	11.79	16.98	0		Laterite
DTH/6	DTH/6/3	2	3	48.28	9.68	12.28	0		Laterite
DTH/6	DTH/6/4	3	4	48.37	8.95	13.06	0		Laterite
DTH/6	DTH/6/5	4	5	50.62	9.25	8.63	0		Laterite
DTH/6	DTH/6/6	5	6	49.01	9.91	10.04	0		Laterite
DTH/6	DTH/6/7	6	7	40.22	11.21	18.58	0		Laterite
DTH/6	DTH/6/8	7	8	0	0	0	0		Ferruginoous Shale
DTH/6	DTH/6/9	8	9	0	0	0	0		Shale
DTH/6	DTH/6/10	9	10	0	0	0	0		Shale
DTH/6	DTH/6/11	10	11	0	0	0	0		Shale
DTH/6	DTH/6/12	11	12	0	0	0	0		Shale
DTH/6	DTH/6/13	12	13	0	0	0	0		Shale
DTH/6	DTH/6/14	13	14	0	0	0	0		Shale
DTH/6	DTH/6/15	14	15	0	0	0	0		Shale
DTH/6	DTH/6/16	15	16	0	0	0	0		Shale
DTH/6	DTH/6/17	16	17	0	0	0	0		Shale
DTH/6	DTH/6/18	17	18	0	0	0	0		Shale
DTH/6	DTH/6/19	18	19	0	0	0	0		Shale
DTH/6	DTH/6/20	19	20	0	0	0	0		Shale
DTH/6	DTH/6/21	20	21	0	0	0	0		Shale
DTH/6	DTH/6/22	21	22	0	0	0	0		Shale
DTH/6	DTH/6/23	22	23	0	0	0	0		Shale
DTH/6	DTH/6/24	23	24	0	0	0	0		Shale
DTH/6	DTH/6/25	24	25	0	0	0	0		Shale
DTH/6	DTH/6/26	25	26	0	0	0	0		Shale
DTH/6	DTH/6/27	26	27	0	0	0	0		Shale
									Shale

DTH/6	DTH/6/28	27	28	0	0	0	0		Shale
DTH/6	DTH/6/29	28	29	0	0	0	0		Shale
DTH/6	DTH/6/30	29	30	0	0	0	0		Shale
DTH/6	DTH/6/31	30	31	0	0	0	0		Shale
DTH/6	DTH/6/32	31	32	0	0	0	0		Shale
DTH/6	DTH/6/33	32	33	0	0	0	0		Shale
DTH/6	DTH/6/34	33	34	0	0	0	0		Shale
DTH/6	DTH/6/35	34	35	0	0	0	0		Shale
DTH/7	DTH/7/1	0	1	35.28	12.38	24.42	0		Laterite
DTH/7	DTH/7/2	1	2	30.78	14.84	27.7	0		Laterite
DTH/7	DTH/7/3	2	3	26.38	18.53	30.17	0		Laterite
DTH/7	DTH/7/4	3	4	13.51	18.78	45.37	0		Laterite
DTH/7	DTH/7/5	4	5	14.37	20.07	42.94	0		Laterite
DTH/7	DTH/7/6	5	6	12.85	18.47	50.18	0		Laterite
DTH/7	DTH/7/7	6	7	11.15	21.88	49.37	0		Laterite
DTH/7	DTH/7/8	7	8	0	0	0	0		Ferruginous Shale
DTH/7	DTH/7/9	8	9	0	0	0	0		Shale
DTH/7	DTH/7/10	9	10	0	0	0	0		Shale
DTH/7	DTH/7/11	10	11	0	0	0	0		Shale
DTH/7	DTH/7/12	11	12	0	0	0	0		Shale
DTH/7	DTH/7/13	12	13	0	0	0	0		Shale
DTH/7	DTH/7/14	13	14	0	0	0	0		Shale
DTH/7	DTH/7/15	14	15	0	0	0	0		Shale
DTH/7	DTH/7/16	15	16	0	0	0	0		Shale
DTH/7	DTH/7/17	16	17	0	0	0	0		Shale
DTH/7	DTH/7/18	17	18	0	0	0	0		Shale
DTH/7	DTH/7/19	18	19	0	0	0	0		Shale
DTH/7	DTH/7/20	19	20	0	0	0	0		Shale
DTH/7	DTH/7/21	20	21	0.	0	0	0		Shale
DTH/7	DTH/7/22	21	22	0	0	0	0		Shale
DTH/7	DTH/7/23	22	23	0	0	0	0		Shale
DTH/7	DTH/7/24	23	24	0	0	0	0		Shale
DTH/7	DTH/7/25	24	25	0	0	0	0		Shale
DTH/7	DTH/7/26	25	26	0	0	0	0		Shale
DTH/7	DTH/7/27	26	27	0	0	0	0		Shale
DTH/7	DTH/7/28	27	28	0	0	0	0		Shale
DTH/7	DTH/7/29	28	29	0	0	0	0		Shale
DTH/7	DTH/7/30	29	30	0	0	0	0		Shale
DTH/8	DTH/8/1	0	1	44.83	10.47	14.41	0		Laterite
DTH/8	DTH/8/2	1	2	49.33	9.43	10.55	0		Laterite
DTH/8	DTH/8/3	2	3	62.77	7.45	8.38	0		Laterite
DTH/8	DTH/8/4	3	4	58.56	4.49	5.14	0		Lateritic Ore
DTH/8	DTH/8/5	4	5	52.98	6.77	7.84	0		Laterite
DTH/8	DTH/8/6	5	6	52.02	6.62	8.04	0		Laterite
DTH/8	DTH/8/7	6	7	35.81	12.94	23.76	0		Ferruginous Shale
DTH/8	DTH/8/8	7	8	0	0	0	0		Shale
DTH/8	DTH/8/9	8	9	0	0	0	0		Shale
DTH/8	DTH/8/10	9	10	0	0	0	0		Shale
DTH/8	DTH/8/11	10	11	0	0	0	0		Shale
DTH/8	DTH/8/12	11	12	0	0	0	0		Shale
DTH/8	DTH/8/13	12	13	0	0	0	0		Shale
DTH/8	DTH/8/14	13	14	0	0	0	0		Shale
DTH/8	DTH/8/15	14	15	0	0	0	0		Shale
DTH/8	DTH/8/16	15	16	0	0	0	0		Shale
DTH/8	DTH/8/17	16	17	0	0	0	0		Shale
DTH/8	DTH/8/18	17	18	0	0	0	0		Shale
DTH/8	DTH/8/19	18	19	0	0	0	0		Shale
DTH/8	DTH/8/20	19	20	0	0	0	0		Shale
DTH/8	DTH/8/21	20	21	0	0	0	0		Volcanics
DTH/8	DTH/8/22	21	22	0	0	0	0		Volcanics
DTH/8	DTH/8/23	22	23	0	0	0	0		Volcanics
DTH/8	DTH/8/24	23	24	0	0	0	0		Volcanics
DTH/8	DTH/8/25	24	25	0	0	0	0		Volcanics
DTH/8	DTH/8/26	25	26	0	0	0	0		Volcanics

DTH/8	DTH/8/27	26	27	0	0	0	0		Volcanics
DTH/8	DTH/8/28	27	28	0	0	0	0		Volcanics
DTH/8	DTH/8/29	28	29	0	0	0	0		Volcanics
DTH/8	DTH/8/30	29	30	0	0	0	0		Volcanics
DTH/8	DTH/8/31	30	31	0	0	0	0		Volcanics
DTH/8	DTH/8/32	31	32	0	0	0	0		Volcanics
DTH/9	DTH/9/1	0	1	20.69	19.65	37.08	0		Ferruginous Shale
DTH/9	DTH/9/2	1	2	19.73	21.47	36.88	0		Ferruginous Shale
DTH/9	DTH/9/3	2	3	13.51	20.44	44.33	0		Ferruginous Shale
DTH/9	DTH/9/4	3	4	0	0	0	0		Shale
DTH/9	DTH/9/5	4	5	0	0	0	0		Shale
DTH/9	DTH/9/6	5	6	0	0	0	0		Shale
DTH/9	DTH/9/7	6	7	0	0	0	0		Shale
DTH/9	DTH/9/8	7	8	0	0	0	0		Shale
DTH/9	DTH/9/9	8	9	0	0	0	0		Shale
DTH/9	DTH/9/10	9	10	0	0	0	0		Shale
DTH/9	DTH/9/11	10	11	0	0	0	0		Shale
DTH/9	DTH/9/12	11	12	0	0	0	0		Shale
DTH/9	DTH/9/13	12	13	0	0	0	0		Shale
DTH/9	DTH/9/14	13	14	0	0	0	0		Shale
DTH/9	DTH/9/15	14	15	0	0	0	0		Shale
DTH/9	DTH/9/16	15	16	0	0	0	0		Shale
DTH/9	DTH/9/17	16	17	0	0	0	0		Shale
DTH/9	DTH/9/18	17	18	0	0	0	0		Shale
DTH/9	DTH/9/19	18	19	0	0	0	0		Shale
DTH/9	DTH/9/20	19	20	0	0	0	0		Shale
DTH/9	DTH/9/21	20	21	0	0	0	0		Shale
DTH/9	DTH/9/22	21	22	0	0	0	0		Shale
DTH/9	DTH/9/23	22	23	0	0	0	0		Shale
DTH/9	DTH/9/24	23	24	0	0	0	0		Shale
DTH/9	DTH/9/25	24	25	0	0	0	0		Shale
DTH/10	DTH/10/1	0	1	55.13	7.57	5.9	0		Lateritic Ore
DTH/10	DTH/10/2	1	2	52.98	8.04	7.2	0		Laterite
DTH/10	DTH/10/3	2	3	55.98	5.17	6.08	0		Lateritic Ore
DTH/10	DTH/10/4	3	4	56.56	4.06	4.7	0		Lateritic Ore
DTH/10	DTH/10/5	4	5	57.27	4.49	5.1	0		Lateritic Ore
DTH/10	DTH/10/6	5	6	56.01	6.72	4.48	0		Lateritic Ore
DTH/10	DTH/10/7	6	7	54.8	5.94	7	0		Laterite
DTH/10	DTH/10/8	7	8	54.05	6.25	7.64	0		Laterite
DTH/10	DTH/10/9	8	9	56.52	4.82	6.42	0		Lateritic Ore
DTH/10	DTH/10/10	9	10	58.88	4.02	5.7	0		Lateritic Ore
DTH/10	DTH/10/11	10	11	36.79	11.5	22.86	0		Laterite/Soil
DTH/10	DTH/10/12	11	12	27.88	18.17	27.67	0		Laterite/Soil
DTH/10	DTH/10/13	12	13	44.51	8.38	16.46	0		Laterite/Soil
DTH/10	DTH/10/14	13	14	58.77	4.3	4.58	0		Lateritic Ore
DTH/10	DTH/10/15	14	15	63.28	2.21	3.05	0		Soft Laminated Ore
DTH/10	DTH/10/16	15	16	59.74	4.03	4.2	0		Lateritic Ore
DTH/10	DTH/10/17	16	17	58.45	5.04	5.28	0		Lateritic Ore
DTH/10	DTH/10/18	17	18	58.34	5.78	4.95	0		Lateritic Ore
DTH/10	DTH/10/19	18	19	59.52	4.18	4.7	0		Lateritic Ore
DTH/10	DTH/10/20	19	20	18.01	25.32	34.78	0		Laterite/Soil
DTH/10	DTH/10/21	20	21	0	0	0	0		Shale
DTH/10	DTH/10/22	21	22	0	0	0	0		Shale
DTH/10	DTH/10/23	22	23	0	0	0	0		Shale
DTH/10	DTH/10/24	23	24	0	0	0	0		Shale
DTH/10	DTH/10/25	24	25	0	0	0	0		Shale
DTH/10	DTH/10/26	25	26	0	0	0	0		Shale
DTH/10	DTH/10/27	26	27	0	0	0	0		Shale
DTH/11	DTH/11/27	26	27	0	0	0	0		Shale
DTH/11	DTH/11/28	27	28	0	0	0	0		Shale
DTH/11	DTH/11/29	28	29	0	0	0	0		Shale
DTH/11	DTH/11/30	29	30	0	0	0	0		Shale
DTH/13	DTH/13/10	9	10	37.54	12.54	19.63	0		Ferruginous Shale
DTH/13	DTH/13/11	10	11	33.89	11.08	24.77	0		Ferruginous Shale

DTH/13	DTH/13/12	11	12	37.11	14.58	18.43	0		Ferrugineous Shale
DTH/13	DTH/13/13	12	13	37.64	13.01	19.12	0		Ferrugineous Shale
DTH/13	DTH/13/14	13	14	51.91	6.87	9.34	0		Ferrugineous Shale
DTH/13	DTH/13/15	14	15	49.44	7.03	10.18	0		Ferrugineous Shale
DTH/13	DTH/13/16	15	16	0	0	0	0		Shale
DTH/13	DTH/13/17	16	17	0	0	0	0		Shale
DTH/13	DTH/13/18	17	18	0	0	0	0		Shale
DTH/13	DTH/13/19	18	19	0	0	0	0		Shale
DTH/13	DTH/13/20	19	20	0	0	0	0		Shale
DTH/13	DTH/13/21	20	21	0	0	0	0		Shale
DTH/13	DTH/13/22	21	22	0	0	0	0		Shale
DTH/13	DTH/13/23	22	23	0	0	0	0		Shale
DTH/13	DTH/13/24	23	24	0	0	0	0		Shale
DTH/13	DTH/13/25	24	25	0	0	0	0		Shale
DTH/13	DTH/13/26	25	26	0	0	0	0		Shale
DTH/13	DTH/13/27	26	27	0	0	0	0		Shale
DTH/13	DTH/13/28	27	28	0	0	0	0		Shale
DTH/13	DTH/13/29	28	29	0	0	0	0		Shale
DTH/13	DTH/13/30	29	30	0	0	0	0		Shale
DTH/14	DTH/14/1	0	1	41.18	11.98	15.31	0		Laterite/Soil
DTH/14	DTH/14/2	1	2	36.81	13.58	17.18	0		Laterite
DTH/14	DTH/14/3	2	3	29.17	15.53	27.68	0		Laterite
DTH/14	DTH/14/4	3	4	0	0	0	0		Shale
DTH/14	DTH/14/5	4	5	0	0	0	0		Shale
DTH/14	DTH/14/6	5	6	0	0	0	0		Shale
DTH/14	DTH/14/7	6	7	0	0	0	0		Shale
DTH/30	DTH/30/13	12	13	0	0	0	0		Shale
DTH/30	DTH/30/14	13	14	0	0	0	0		Shale
DTH/30	DTH/30/15	14	15	0	0	0	0		Shale
DTH/30	DTH/30/16	15	16	0	0	0	0		Shale
DTH/30	DTH/30/17	16	17	0	0	0	0		Shale
DTH/30	DTH/30/18	17	18	0	0	0	0		Shale
DTH/30	DTH/30/19	18	19	0	0	0	0		Shale
DTH/30	DTH/30/20	19	20	0	0	0	0		Shale
DTH/30	DTH/30/21	20	21	0	0	0	0		Shale
DTH/30	DTH/30/22	21	22	0	0	0	0		Shale
DTH/30	DTH/30/23	22	23	0	0	0	0		Shale
DTH/30	DTH/30/24	23	24	0	0	0	0		Shale
DTH/30	DTH/30/25	24	25	0	0	0	0		Shale
DTH/30	DTH/30/26	25	26	0	0	0	0		Shale
DTH/30	DTH/30/27	26	27	0	0	0	0		Shale
DTH/30	DTH/30/28	27	28	0	0	0	0		Shale
DTH/30	DTH/30/29	28	29	0	0	0	0		Shale
DTH/30	DTH/30/30	29	30	0	0	0	0		Shale
DTH/30	DTH/30/31	30	31	0	0	0	0		Shale
DTH/30	DTH/30/32	31	32	0	0	0	0		Shale
DTH/30	DTH/30/33	32	33	0	0	0	0		Shale
DTH/30	DTH/30/34	33	34	0	0	0	0		Shale
DTH/30	DTH/30/35	34	35	0	0	0	0		Shale
DTH/30	DTH/30/36	35	36	0	0	0	0		Shale
DTH/30	DTH/30/37	36	37	0	0	0	0		Shale
DTH/30	DTH/30/38	37	38	0	0	0	0		Shale
DTH/30	DTH/30/39	38	39	0	0	0	0		Shale
DTH/30	DTH/30/40	39	40	0	0	0	0		Shale
DTH/31	DTH/31/1	0	1	34.47	17.91	18.04	0		Laterite
DTH/31	DTH/31/2	1	2	37.47	17.01	15.73	0		Laterite
DTH/31	DTH/31/3	2	3	35.87	17.88	14.92	0		Laterite
DTH/31	DTH/31/4	3	4	36.4	18.49	14.3	0		Laterite
DTH/31	DTH/31/5	4	5	0	0	0	0		Shale
DTH/31	DTH/31/6	5	6	0	0	0	0		Shale
DTH/31	DTH/31/7	6	7	0	0	0	0		Shale
DTH/31	DTH/31/8	7	8	0	0	0	0		Shale
DTH/31	DTH/31/9	8	9	0	0	0	0		Shale
DTH/31	DTH/31/10	9	10	0	0	0	0		Shale

DTH/31	DTH/31/11	10	11	0	0	0	0		Shale
DTH/31	DTH/31/12	11	12	0	0	0	0		Shale
DTH/31	DTH/31/13	12	13	0	0	0	0		Shale
DTH/31	DTH/31/14	13	14	0	0	0	0		Shale
DTH/31	DTH/31/15	14	15	0	0	0	0		Shale
DTH/31	DTH/31/16	15	16	0	0	0	0		Shale
DTH/31	DTH/31/17	16	17	0	0	0	0		Shale
DTH/31	DTH/31/18	17	18	0	0	0	0		Shale
DTH/31	DTH/31/19	18	19	0	0	0	0		Shale
DTH/31	DTH/31/20	19	20	0	0	0	0		Shale
DTH/31	DTH/31/21	20	21	0	0	0	0		Shale
DTH/31	DTH/31/22	21	22	0	0	0	0		Shale
DTH/31	DTH/31/23	22	23	0	0	0	0		Shale
DTH/31	DTH/31/24	23	24	0	0	0	0		Shale
DTH/31	DTH/31/25	24	25	0	0	0	0		Shale
DTH/31	DTH/31/26	25	26	0	0	0	0		Shale
DTH/31	DTH/31/27	26	27	0	0	0	0		Shale
DTH/31	DTH/31/28	27	28	0	0	0	0		Shale
DTH/10	DTH/10/28	27	28	0	0	0	0		Shale
DTH/10	DTH/10/29	28	29	0	0	0	0		Shale
DTH/10	DTH/10/30	29	30	0	0	0	0		Shale
DTH/11	DTH/11/1	0	1	49.76	8.36	11.34	0		Laterite
DTH/11	DTH/11/2	1	2	55.23	4.97	8.02	0		Lateritic Ore
DTH/11	DTH/11/3	2	3	64.69	5.34	7.84	0		Laterite
DTH/11	DTH/11/4	3	4	49.56	8.86	10.8	0		Laterite
DTH/11	DTH/11/5	4	5	0	0	0	0		Laterite/Soil
DTH/11	DTH/11/6	5	6	0	0	0	0		Laterite/Soil
DTH/11	DTH/11/7	6	7	0	0	0	0		Laterite/Soil
DTH/11	DTH/11/8	7	8	0	0	0	0		Shale
DTH/11	DTH/11/9	8	9	0	0	0	0		Shale
DTH/11	DTH/11/10	9	10	0	0	0	0		Shale
DTH/11	DTH/11/11	10	11	0	0	0	0		Shale
DTH/11	DTH/11/12	11	12	0	0	0	0		Shale
DTH/11	DTH/11/13	12	13	0	0	0	0		Shale
DTH/11	DTH/11/14	13	14	0	0	0	0		Shale
DTH/11	DTH/11/15	14	15	0	0	0	0		Shale
DTH/11	DTH/11/16	15	16	0	0	0	0		Shale
DTH/11	DTH/11/17	16	17	0	0	0	0		Shale
DTH/11	DTH/11/18	17	18	0	0	0	0		Shale
DTH/11	DTH/11/19	18	19	0	0	0	0		Shale
DTH/11	DTH/11/20	19	20	0	0	0	0		Shale
DTH/11	DTH/11/21	20	21	0	0	0	0		Shale
DTH/11	DTH/11/22	21	22	0	0	0	0		Shale
DTH/11	DTH/11/23	22	23	0	0	0	0		Shale
DTH/11	DTH/11/24	23	24	0	0	0	0		Shale
DTH/11	DTH/11/25	24	25	0	0	0	0		Shale
DTH/11	DTH/11/26	25	26	0	0	0	0		Shale
DTH/12	DTH/12/23	22	23	55.88	5.07	5.95	0		Lateritic Ore
DTH/12	DTH/12/24	23	24	57.38	4.64	5.63	0		Lateritic Ore
DTH/12	DTH/12/25	24	25	58.02	4.13	6.2	0		Lateritic Ore
DTH/12	DTH/12/26	25	26	55.34	6.86	6.07	0		Lateritic Ore
DTH/12	DTH/12/27	26	27	0	0	0	0		Shale
DTH/12	DTH/12/28	27	28	0	0	0	0		Shale
DTH/12	DTH/12/29	28	29	0	0	0	0		Shale
DTH/12	DTH/12/30	29	30	0	0	0	0		Shale
DTH/12	DTH/12/31	30	31	0	0	0	0		Shale
DTH/12	DTH/12/32	31	32	0	0	0	0		Shale
DTH/12	DTH/12/33	32	33	0	0	0	0		Shale
DTH/12	DTH/12/34	33	34	0	0	0	0		Shale
DTH/12	DTH/12/35	34	35	0	0	0	0		Shale
DTH/12	DTH/12/36	36	36	0	0	0	0		Shale
DTH/12	DTH/12/37	36	37	0	0	0	0		Shale
DTH/12	DTH/12/38	37	38	0	0	0	0		Shale
DTH/12	DTH/12/39	38	39	0	0	0	0		Shale

DTH/12	DTH/12/40	39	40	0	0	0	0		Shale
DTH/12	DTH/12/41	40	41	0	0	0	0		Shale
DTH/12	DTH/12/42	41	42	0	0	0	0		Shale
DTH/12	DTH/12/43	42	43	0	0	0	0		Shale
DTH/12	DTH/12/44	43	44	0	0	0	0		Shale
DTH/12	DTH/12/45	44	45	0	0	0	0		Shale
DTH/13	DTH/13/1	0	1	40.86	11.5	16.78	0		Lateritic/Soil
DTH/13	DTH/13/2	1	2	47.73	8.64	12.47	0		Laterite
DTH/13	DTH/13/3	2	3	44.62	10.77	13.18	0		Laterite
DTH/13	DTH/13/4	3	4	45.9	10.37	11.47	0		Laterite
DTH/13	DTH/13/5	4	5	34.98	13.61	21.87	0		Laterite
DTH/13	DTH/13/6	5	6	31.74	16.31	23.14	0		Ferrugineous Shale
DNR/2	DNR/2/6	4.2	5.4	33.4	8	34.8	0		Ferrugineous Shale
DNR/2	DNR/2/7	5.4	18.8	0	0	0	0		Ferrugineous Shale
DNR/2	DNR/2/8	18.8	20.1	11.8	9.7	64.4	0		Ferrugineous Shale
DNR/2	DNR/2/9	20.1	21.35	6.75	10.6	74.2	0		Volcanics
DNR/2	DNR/2/10	21.35	24.35	7.5	5.22	76.6	0		Volcanics
DNR/2	DNR/2/11	24.35	26	11.7	8.9	65.75	0		Volcanics
098GND01	98GND011	0	6	0	0	0	0		Laterite
098GND01	98GND011	6	9	0	0	0	0		Lateritic Ore
098GND01	98GND011	9	12	0	0	0	0		Laterite
098GND01	98GND011	12	19	0	0	0	0		Lateritic Ore
098GND01	98GND011	19	73	0	0	0	0		Limonitic Ore
098GND01	98GND011	73	79	0	0	0	0		Soft Laminated Ore
098GND01	98GND011	79	83	0	0	0	0		Hard Laminated Ore
098GND01	98GND011	83	86	0	0	0	0		Soft Laminated Ore
098GND01	98GND011	86	89	0	0	0	0		Hard Laminated Ore
098GND01	98GND011/	89	103	0	0	0	0		Shale
098GND01	98GND011/	103	113	0	0	0	0		Friable Ore
098GND01	98GND011/	113	119	0	0	0	0		Blue Dust
098GND01	98GND011/	119	127	0	0	0	0		Goethitic Ore
098GND01	98GND011/	127	132.9	0	0	0	0		Hard Massive Ore
DTH/54	DTH/54/1	0	1	26.62	24.67	17.98	0		Laterite
DTH/54	DTH/54/2	1	2	0	0	0	0		Shale
DTH/54	DTH/54/3	2	3	0	0	0	0		Shale
DTH/54	DTH/54/4	3	4	0	0	0	0		Shale
DTH/54	DTH/54/5	4	5	0	0	0	0		Shale
DTH/54	DTH/54/35	34	35	0	0	0	0		Volcanics
DTH/54	DTH/54/36	35	36	0	0	0	0		Volcanics
DTH/31	DTH/31/29	28	29	0	0	0	0		Shale
DTH/31	DTH/31/30	29	30	0	0	0	0		Shale
DTH/31	DTH/31/31	30	31	0	0	0	0		Shale
DTH/31	DTH/31/32	31	32	0	0	0	0		Shale
DTH/12	DTH/12/1	0	1	47.94	8.95	14.2	0		Laterite
DTH/12	DTH/12/2	1	2	54.27	6.56	7.18	0		Laterite
DTH/12	DTH/12/3	2	3	55.13	4.6	7.47	0		Lateritic Ore
DTH/12	DTH/12/4	3	4	51.8	8.7	8.14	0		Laterite
DTH/12	DTH/12/5	4	5	53.3	6.83	8.34	0		Laterite
DTH/12	DTH/12/6	5	6	58.13	5.08	5.75	0		Lateritic Ore
DTH/12	DTH/12/7	6	7	57.38	5.43	5.38	0		Lateritic Ore
DTH/12	DTH/12/8	7	8	54.16	6.03	7.55	0		Laterite
DTH/12	DTH/12/9	8	9	54.05	5.78	7.18	0		Laterite
DTH/12	DTH/12/10	9	10	54.27	4.98	8.34	0		Laterite
DTH/12	DTH/12/11	10	11	51.05	8.43	8.95	0		Laterite
DTH/12	DTH/12/12	11	12	54.48	6.12	7.04	0		Laterite
DTH/12	DTH/12/13	12	13	53.63	5.94	8.25	0		Laterite
DTH/12	DTH/12/14	13	14	54.1	6.73	7.04	0		Laterite
DTH/12	DTH/12/15	14	15	52.98	4.76	9.87	0		Laterite
DTH/12	DTH/12/16	15	16	50.84	6.8	10.07	0		Laterite
DTH/12	DTH/12/17	16	17	53.95	5.14	8.18	0		Laterite
DTH/12	DTH/12/18	17	18	52.77	6.07	8.76	0		Laterite
DTH/12	DTH/12/19	18	19	54.7	5.03	7.75	0		Laterite
DTH/12	DTH/12/20	19	20	50.94	6.47	9.65	0		Laterite
DTH/12	DTH/12/21	20	21	53.84	6.11	7.4	0		Laterite

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DTH/12	DTH/12/22	21	22	52.45	8.35	6.7	0		Laterite
DTH/13	DTH/13/7	6	7	31.31	18.01	21.84	0		Ferrugineous Shale
DTH/13	DTH/13/8	7	8	29.81	14.15	28.13	0		Ferrugineous Shale
DTH/13	DTH/13/9	8	9	30.05	15.23	26.42	0		Ferrugineous Shale
DTH/14	DTH/14/8	7	8	0	0	0	0		Shale
DTH/14	DTH/14/9	8	9	0	0	0	0		Shale
DTH/14	DTH/14/10	9	10	0	0	0	0		Shale
DTH/14	DTH/14/11	10	11	0	0	0	0		Shale
DTH/14	DTH/14/12	11	12	0	0	0	0		Shale
DTH/14	DTH/14/13	12	13	0	0	0	0		Shale
DTH/14	DTH/14/14	13	14	0	0	0	0		Shale
DTH/14	DTH/14/15	14	15	0	0	0	0		Shale
DTH/14	DTH/14/16	15	16	0	0	0	0		Shale
DTH/14	DTH/14/17	16	17	0	0	0	0		Shale
DTH/14	DTH/14/18	17	18	0	0	0	0		Shale
DTH/14	DTH/14/19	18	19	0	0	0	0		Shale
DTH/14	DTH/14/20	19	20	0	0	0	0		Shale
DTH/14	DTH/14/21	20	21	0	0	0	0		Shale
DTH/14	DTH/14/22	21	22	0	0	0	0		Shale
DTH/14	DTH/14/23	22	23	0	0	0	0		Shale
DTH/14	DTH/14/24	23	24	0	0	0	0		Shale
DTH/14	DTH/14/25	24	25	0	0	0	0		Shale
DTH/30	DTH/30/1	0	1	46.26	8.8	9.36	0		Laterite
DTH/30	DTH/30/2	1	2	57.27	7.91	8.43	0		Lateritic Ore
DTH/30	DTH/30/3	2	3	54.48	5.4	7.09	0		Laterite
DTH/30	DTH/30/4	3	4	49.33	8.44	10.88	0		Laterite
DTH/30	DTH/30/5	4	5	47.4	9.7	11.34	0		Laterite
DTH/30	DTH/30/6	5	6	44.11	13.4	12.38	0		Laterite
DTH/30	DTH/30/7	6	7	37.69	18.37	14.4	0		Laterite
DTH/30	DTH/30/8	7	8	0	0	0	0		Shale
DTH/30	DTH/30/9	8	9	0	0	0	0		Shale
DTH/30	DTH/30/10	9	10	0	0	0	0		Shale
DTH/30	DTH/30/11	10	11	0	0	0	0		Shale
DTH/30	DTH/30/12	11	12	0	0	0	0		Shale
DTH/54	DTH/54/13	12	13	0	0	0	0		Volcanics
DTH/54	DTH/54/14	13	14	0	0	0	0		Volcanics
DTH/54	DTH/54/15	14	15	0	0	0	0		Volcanics
DTH/54	DTH/54/16	15	16	0	0	0	0		Volcanics
DTH/54	DTH/54/17	16	17	0	0	0	0		Volcanics
DTH/54	DTH/54/18	17	18	0	0	0	0		Volcanics
DTH/54	DTH/54/19	18	19	0	0	0	0		Volcanics
DTH/54	DTH/54/20	19	20	0	0	0	0		Volcanics
DTH/54	DTH/54/21	20	21	0	0	0	0		Volcanics
DTH/54	DTH/54/22	21	22	0	0	0	0		Volcanics
DTH/54	DTH/54/23	22	23	0	0	0	0		Volcanics
DTH/54	DTH/54/24	23	24	0	0	0	0		Volcanics
DTH/54	DTH/54/25	24	25	0	0	0	0		Volcanics
DTH/54	DTH/54/26	25	26	0	0	0	0		Volcanics
DTH/54	DTH/54/27	26	27	0	0	0	0		Volcanics
DTH/54	DTH/54/28	27	28	0	0	0	0		Volcanics
DTH/54	DTH/54/29	28	29	0	0	0	0		Volcanics
DTH/54	DTH/54/30	29	30	0	0	0	0		Volcanics
DTH/54	DTH/54/31	30	31	0	0	0	0		Volcanics
DTH/54	DTH/54/32	31	32	0	0	0	0		Volcanics
DTH/54	DTH/54/33	32	33	0	0	0	0		Volcanics
DTH/54	DTH/54/34	33	34	0	0	0	0		Volcanics
GS/56	GS/56/1	0	0.5						Soil Cover
GS/56	GS/56/2	0.5	1	56.8	6.7	4.14		100	Soft Laminated Ore
GS/56	GS/56/3	1	1.5	56.3	3.9	4.29		100	Soft Laminated Ore
GS/56	GS/56/4	1.5	2	61.52	3.9	2.81		90	Soft Laminated Ore
GS/56	GS/56/5	2	3	61.8	1.74	2.73		90	Soft Laminated Ore
GS/56	GS/56/33	25	26	63.87	2.68	2.53		90	Soft Laminated Ore
GS/56	GS/56/34	26	26.5	64.08	5.52	2.00		90	Powdery Ore
GS/56	GS/56/35	26.5	27	63.79	3.27	2.17		90	Soft Laminated Ore

GS/56	GS/56/36	27	27.5	24.36	57.5			50	Banded Hematite Jasper/Chert
DTH/32	DTH/32/1	0	1	0	0	0	0		Laterite
DTH/32	DTH/32/2	1	2	0	0	0	0		Quartzite
DTH/32	DTH/32/3	2	3	0	0	0	0		Quartzite
DTH/32	DTH/32/4	3	4	0	0	0	0		Quartzite
DTH/32	DTH/32/5	4	5	0	0	0	0		Quartzite
DTH/32	DTH/32/6	5	6	0	0	0	0		Quartzite
DTH/32	DTH/32/7	6	7	0	0	0	0		Quartzite
DTH/32	DTH/32/8	7	8	0	0	0	0		Quartzite
DTH/32	DTH/32/9	8	9	0	0	0	0		Quartzite
DTH/32	DTH/32/10	9	10	0	0	0	0		Quartzite
DTH/32	DTH/32/11	10	11	0	0	0	0		Quartzite
DTH/32	DTH/32/12	11	12	0	0	0	0		Quartzite
DTH/32	DTH/32/13	12	13	0	0	0	0		Quartzite
DTH/32	DTH/32/14	13	14	0	0	0	0		Quartzite
DTH/32	DTH/32/15	14	15	0	0	0	0		Quartzite
DTH/32	DTH/32/16	15	16	0	0	0	0		Quartzite
DTH/32	DTH/32/17	16	17	0	0	0	0		Quartzite
DTH/32	DTH/32/18	17	18	0	0	0	0		Quartzite
DTH/32	DTH/32/19	18	19	0	0	0	0		Quartzite
DTH/32	DTH/32/20	19	20	0	0	0	0		Quartzite
DTH/32	DTH/32/21	20	21	0	0	0	0		Quartzite
DTH/32	DTH/32/22	21	22	0	0	0	0		Quartzite
DTH/32	DTH/32/23	22	23	0	0	0	0		Quartzite
DTH/32	DTH/32/24	23	24	0	0	0	0		Quartzite
DTH/32	DTH/32/25	24	25	0	0	0	0		Quartzite
DTH/32	DTH/32/26	25	26	0	0	0	0		Quartzite
DTH/32	DTH/32/27	26	27	0	0	0	0		Quartzite
DTH/32	DTH/32/28	27	28	0	0	0	0		Quartzite
DTH/32	DTH/32/29	28	29	0	0	0	0		Quartzite
DTH/32	DTH/32/30	29	30	0	0	0	0		Quartzite
DTH/32	DTH/32/31	30	31	0	0	0	0		Quartzite
DTH/32	DTH/32/32	31	32	0	0	0	0		Quartzite
DTH/33	DTH/33/1	0	1	50.32	11.43	5.98	0		Laterite
DTH/33	DTH/33/2	1	2	42.4	15.12	12.78	0		Laterite
DTH/33	DTH/33/3	2	3	39.4	15.45	14.96	0		Laterite
DTH/33	DTH/33/4	3	4	48.61	12.34	9.14	0		Laterite
DTH/33	DTH/33/5	4	5	48.82	12.51	8.4	0		Laterite
DTH/33	DTH/33/6	5	6	46.47	14.11	9.64	0		Laterite
DTH/33	DTH/33/7	6	7	56.1	5.70	8.38	0		Laterite
DTH/33	DTH/33/8	7	8	47.54	12	10.84	0		Laterite
DTH/33	DTH/33/9	8	9	46.79	13.27	11.08	0		Laterite
DTH/33	DTH/33/10	9	10	44.54	13.53	13.03	0		Laterite
DTH/33	DTH/33/11	10	11	36.4	18.45	15.66	0		Laterite
DTH/33	DTH/33/12	11	12	0	0	0	0		Shale
DTH/33	DTH/33/13	12	13	0	0	0	0		Shale
DTH/33	DTH/33/14	13	14	0	0	0	0		Shale
DTH/33	DTH/33/15	14	15	0	0	0	0		Shale
DTH/33	DTH/33/16	15	16	0	0	0	0		Shale
DTH/33	DTH/33/17	16	17	0	0	0	0		Shale
DTH/33	DTH/33/18	17	18	0	0	0	0		Shale
DTH/33	DTH/33/19	18	19	0	0	0	0		Shale
DTH/33	DTH/33/20	19	20	0	0	0	0		Shale
DTH/33	DTH/33/21	20	21	0	0	0	0		Shale
DTH/33	DTH/33/22	21	22	0	0	0	0		Shale
DTH/33	DTH/33/23	22	23	0	0	0	0		Shale
DTH/33	DTH/33/24	23	24	0	0	0	0		Shale
DTH/33	DTH/33/25	24	25	0	0	0	0		Shale
DTH/33	DTH/33/26	25	26	0	0	0	0		Shale
DTH/33	DTH/33/27	26	27	0	0	0	0		Shale
DTH/33	DTH/33/28	27	28	0	0	0	0		Shale
DTH/33	DTH/33/29	28	29	0	0	0	0		Shale
DTH/33	DTH/33/30	29	30	0	0	0	0		Shale
DTH/33	DTH/33/31	30	31	0	0	0	0		Shale

DTH/33	DTH/33/32	31	32	0	0	0	0		Shale
DTH/33	DTH/33/33	32	33	0	0	0	0		Shale
DTH/33	DTH/33/34	33	34	0	0	0	0		Shale
DTH/33	DTH/33/35	34	35	0	0	0	0		Shale
DTH/33	DTH/33/36	35	36	0	0	0	0		Shale
DTH/33	DTH/33/37	36	37	0	0	0	0		Shale
DTH/34	DTH/34/1	0	1	39.83	13.04	17.63	0		Soil
DTH/34	DTH/34/2	1	2	53.96	5.58	5.48	0		Banded Hematite Jasper
DTH/34.	DTH/34/3	2	3	53.75	7.26	8.14	0		Banded Hematite Jasper
DTH/34	DTH/34/4	3	4	0.	0	0	0		Shale
DTH/34	DTH/34/5	4	5	0	0	0	0		Shale
DTH/34	DTH/34/6	5	6	0	0	0	0		Shale
DTH/34	DTH/34/7	6	7	0	0	0	0		Shale
DTH/34	DTH/34/8	7	8	0	0	0	0		Shale
DTH/34	DTH/34/9	8	9	0	0	0	0		Shale
DTH/34	DTH/34/10	9	10	0	0	0	0		Shale
DTH/34	DTH/34/11	10	11	0	0	0	0		Shale
DTH/34	DTH/34/12	11	12	0	0	0	0		Shale
DTH/34	DTH/34/13	12	13	0	0	0	0		Shale
DTH/34	DTH/34/14	13	14	0	0	0	0		Shale
DTH/34	DTH/34/15	14	15	0	0	0	0		Shale
DTH/34	DTH/34/16	15	16	0	0	0	0		Shale
DTH/34	DTH/34/17	16	17	0	0	0	0		Shale
DTH/34	DTH/34/18	17	18	0	0	0	0		Shale
DTH/34	DTH/34/19	18	19	0	0	0	0		Shale
DTH/34	DTH/34/20	19	20	0	0	0	0		Shale
DTH/34	DTH/34/21	20	21	0	0	0	0		Shale
DTH/34	DTH/34/22	21	22	0	0	0	0		Shale
DTH/34	DTH/34/23	22	23	0	0	0	0		Shale
DTH/34	DTH/34/24	23	24	0	0	0	0		Shale
DTH/34	DTH/34/25	24	25	0	0	0	0		Shale
DTH/34	DTH/34/26	25	26	0	0	0	0		Shale
DTH/34	DTH/34/27	26	27	0	0	0	0		Shale
DTH/34	DTH/34/28	27	28	0	0	0	0		Shale
DTH/34	DTH/34/29	28	29	0	0	0	0		Shale
DTH/34	DTH/34/30	29	30	0	0	0	0		Shale
DTH/34	DTH/34/31	30	31	0	0	0	0		Shale
DTH/34	DTH/34/32	31	32	0	0	0	0		Shale
DTH/34	DTH/34/33	32	33	0	0	0	0		Shale
DTH/34	DTH/34/34	33	34	0	0	0	0		Shale
DTH/34	DTH/34/35	34	35	0	0	0	0		Shale
DTH/34	DTH/34/36	35	36	0	0	0	0		Shale
DTH/34	DTH/34/37	36	37	0	0	0	0		Shale
DTH/34	DTH/34/38	37	38	0	0	0	0		Shale
DTH/34	DTH/34/39	38	39	0	0	0	0		Shale
DTH/34	DTH/34/40	39	40	0	0	0	0		Shale
DTH/35	DTH/35/1	0	1	67.8	4.61	6.12	0		Lateritic Ore
DTH/35	DTH/35/2	1	2	57.5	6.59	11.42	0		Lateritic Ore
DTH/35	DTH/35/3	2	3	53	8	7.16	0		Laterite
DTH/35	DTH/35/4	3	4	50	10.48	8.28	0		Laterite
DTH/35	DTH/35/5	4	5	52.04	6.45	10.36	0		Laterite
DTH/35	DTH/35/6	5	6	47.75	7.96	13.3	0		Laterite
DTH/35	DTH/35/7	6	7	41.11	9.07	18.41	0		Laterite
DTH/35	DTH/35/8	7	8	38.54	10.3	20.14	0		Laterite
DTH/35	DTH/35/9	8	9	36.63	11.79	21.75	0		Quartzite
DTH/35	DTH/35/10	9	10	30.19	15.72	25.1	0		Quartzite
DTH/35	DTH/35/11	10	11	34.58	12.36	22.42	0		Quartzite
DTH/35	DTH/35/12	11	12	25.05	17.04	31.44	0		Quartzite
DTH/35	DTH/35/13	12	13	28.33	15.63	27.38	0		Quartzite
DTH/35	DTH/35/14	13	14	17.98	20.66	43.14	0		Quartzite
DTH/35	DTH/35/15	14	15	24.2	13.6	33.8	0		Quartzite
DTH/35	DTH/35/16	15	16	22.27	18.69	32.16	0		Quartzite
DTH/35	DTH/35/17	16	17	23.55	14.17	34.08	0		Quartzite
DTH/35	DTH/35/18	17	18	0	0	0	0		Quartzite

DTH/35	DTH/35/19	18	19	0	0	0	0		Quartzite
DTH/35	DTH/35/20	19	20	0	0	0	0		Shale
DTH/35	DTH/35/21	20	21	0	0	0	0		Shale
DTH/35	DTH/35/22	21	22	0	0	0	0		Shale
DTH/35	DTH/35/23	22	23	0	0	0	0		Shale
DTH/35	DTH/35/24	23	24	0	0	0	0		Shale
DTH/35	DTH/35/25	24	25	0	0	0	0		Shale
DTH/35	DTH/35/26	25	26	0	0	0	0		Shale
DTH/35	DTH/35/27	26	27	0	0	0	0		Shale
DTH/35	DTH/35/28	27	28	0	0	0	0		Shale
DTH/35	DTH/35/29	28	29	0	0	0	0		Shale
DTH/35	DTH/35/30	29	30	0	0	0	0		Shale
DTH/35	DTH/35/31	30	31	0	0	0	0		Shale
DTH/35	DTH/35/32	31	32	0	0	0	0		Shale
DTH/35	DTH/35/33	32	33	0	0	0	0		Shale
DTH/35	DTH/35/34	33	34	0	0	0	0		Shale
DTH/35	DTH/35/35	34	35	0	0	0	0		Shale
DTH/35	DTH/35/36	35	36	0	0	0	0		Shale
DTH/35	DTH/35/37	36	37	0	0	0	0		Shale
DTH/35	DTH/35/38	37	38	0	0	0	0		Shale
DTH/35	DTH/35/39	38	39	0	0	0	0		Shale
DTH/35	DTH/35/40	39	40	0	0	0	0		Shale
DTH/35	DTH/35/41	40	41	0	0	0	0		Shale
DTH/35	DTH/35/42	41	42	0	0	0	0		Shale
DTH/35	DTH/35/43	42	43	0	0	0	0		Shale
DTH/35	DTH/35/44	43	44	0	0	0	0		Shale
DTH/35	DTH/35/45	44	45	0	0	0	0		Shale
DTH/35	DTH/35/46	45	46	0	0	0	0		Shale
DTH/36	DTH/36/1	0	1	54.82	7.18	5.59	0	0	Laterite
DTH/36	DTH/36/2	1	2	48.47	13.71	9.04	0	0	Laterite
DTH/36	DTH/36/3	2	3	48.68	11.84	9.9	0	0	Laterite
DTH/36	DTH/36/4	3	4	40.04	12.18	17.48	0	0	Laterite
DTH/36	DTH/36/5	4	5	36.51	14.02	20.04	0	0	Laterite
DTH/36	DTH/36/6	5	6	52.68	8.51	8.75	0	0	Laterite
DTH/36	DTH/36/7	6	7	41.86	11.97	14.38	0	0	Laterite
DTH/36	DTH/36/8	7	8	11.39	9.43	11.39	0	0	Laterite
DTH/36	DTH/36/9	8	9	52.79	5.92	7.95	0	0	Laterite
DTH/36	DTH/36/10	9	10	53.96	7.89	5.85	0	0	Laterite
DTH/36	DTH/36/11	10	11	46.57	9.9	12.66	0	0	Laterite
DTH/36	DTH/36/12	11	12	42.18	11.16	10.83	0	0	Laterite
DTH/36	DTH/36/13	12	13	41.11	12.08	18.48	0	0	Laterite
DTH/36	DTH/36/14	13	14	56.32	5.42	8.7	0	0	Lateritic Ore
DTH/36	DTH/36/15	14	15	55.89	6.01	6.89	0	0	Lateritic Ore
DTH/36	DTH/36/16	15	16	59.85	3.66	4.68	0	0	Lateritic Ore
DTH/36	DTH/36/17	16	17	59.75	3.95	4.38	0	0	Lateritic Ore
DTH/36	DTH/36/18	17	18	57.82	5.08	5.48	0	0	Lateritic Ore
DTH/36	DTH/36/19	18	19	52.81	8.04	4.78	0	0	Laterite
DTH/36	DTH/36/20	19	20	55.46	4.21	6.74	0	0	Lateritic Ore
DTH/36	DTH/36/21	20	21	56.96	5.07	6.48	0	0	Lateritic Ore
DTH/36	DTH/36/22	21	22	54.93	6.81	7.07	0	0	Laterite
DTH/36	DTH/36/23	22	23	50.64	9.26	8.24	0	0	Laterite
DTH/36	DTH/36/24	23	24	50.75	8.65	10.53	0	0	Laterite
DTH/36	DTH/36/25	24	25	0	0	0	0	0	Shale
DTH/36	DTH/36/26	25	26	0	0	0	0	0	Shale
DTH/36	DTH/36/27	26	27	0	0	0	0	0	Shale
DTH/36	DTH/36/28	27	28	0	0	0	0	0	Shale
DTH/36	DTH/36/29	28	29	0	0	0	0	0	Shale
DTH/36	DTH/36/30	29	30	0	0	0	0	0	Shale
DTH/36	DTH/36/31	30	31	0	0	0	0	0	Shale
DTH/36	DTH/36/32	31	32	0	0	0	0	0	Shale
DTH/36	DTH/36/33	32	33	0	0	0	0	0	Shale
DTH/36	DTH/36/34	33	34	0	0	0	0	0	Shale
DTH/36	DTH/36/35	34	35	0	0	0	0	0	Shale
DTH/36	DTH/36/36	35	36	0	0	0	0	0	Shale

DTH/36	DTH/36/37	36	37	0	0	0	0	0	Shale
DTH/36	DTH/36/38	37	38	0	0	0	0	0	Shale
DTH/36	DTH/36/39	38	39	0	0	0	0	0	Shale
DTH/36	DTH/36/40	39	40	0	0	0	0	0	Shale
DTH/37	DTH/37/1	0	1	60.28	5.47	3.38	0		Lateritic Ore
DTH/37	DTH/37/2	1	2	60.71	5.83	2.95	0		Lateritic Ore
DTH/37	DTH/37/3	2	3	66.32	8.03	4.75	0		Lateritic Ore
DTH/37	DTH/37/4	3	4	58.78	6.4	3.9	0		Lateritic Ore
DTH/37	DTH/37/5	4	5	60.6	5.04	3.12	0		Lateritic Ore
DTH/37	DTH/37/6	5	6	57.6	7.78	4.08	0		Lateritic Ore
DTH/37	DTH/37/7	6	7	54.01	9.68	5.85	0		Laterite
DTH/37	DTH/37/8	7	8	58.46	7.02	3.81	0		Lateritic Ore
DTH/37	DTH/37/9	8	9	51.5	11.66	7.14	0		Laterite
DTH/37	DTH/37/10	9	10	51.61	12.35	6.8	0		Laterite
DTH/37	DTH/37/11	10	11	54.82	9.1	5.06	0		Laterite
DTH/37	DTH/37/12	11	12	55.25	8.97	4.35	0		Lateritic Ore
DTH/37	DTH/37/13	12	13	54.28	9.6	6.08	0		Laterite
DTH/37	DTH/37/14	13	14	46.47	14.06	9.3	0		Laterite
DTH/37	DTH/37/15	14	15	40.9	17.41	13.4	0		Laterite
DTH/37	DTH/37/16	15	16	26.87	22.29	24.84	0		Laterite
DTH/37	DTH/37/17	16	17	48.82	12.26	8.09	0		Laterite
DTH/37	DTH/37/18	17	18	37.79	17.86	14.76	0		Laterite
DTH/37	DTH/37/19	18	19	43.04	16.52	11.34	0		Laterite
DTH/37	DTH/37/20	19	20	48.93	10.82	8.7	0		Laterite
DTH/37	DTH/37/21	20	21	38.76	17.06	13.66	0		Laterite
DTH/37	DTH/37/22	21	22	28.05	26.37	16.14	0		Laterite
DTH/37	DTH/37/23	22	23	0	0	0	0		Laterite
DTH/37	DTH/37/24	23	24	0	0	0	0		Shale
DTH/37	DTH/37/25	24	25	0	0	0	0		Shale
DTH/37	DTH/37/26	25	26	0	0	0	0		Shale
DTH/37	DTH/37/27	26	27	0	0	0	0		Shale
DTH/37	DTH/37/28	27	28	0	0	0	0		Shale
DTH/37	DTH/37/29	28	29	0	0	0	0		Shale
DTH/37	DTH/37/30	29	30	0	0	0	0		Shale
DTH/37	DTH/37/31	30	31	0	0	0	0		Shale
DTH/37	DTH/37/32	31	32	0	0	0	0		Shale
DTH/37	DTH/37/33	32	33	0	0	0	0		Shale
DTH/37	DTH/37/34	33	34	0	0	0	0		Shale
DTH/37	DTH/37/35	34	35	0	0	0	0		Shale
DTH/37	DTH/37/36	35	36	0	0	0	0		Shale
DTH/37	DTH/37/37	36	37	0	0	0	0		Shale
DTH/37	DTH/37/38	37	38	0	0	0	0		Shale
DTH/37	DTH/37/39	38	39	0	0	0	0		Shale
DTH/37	DTH/37/40	39	40	0	0	0	0		Shale
DTH/37	DTH/37/41	40	41	0	0	0	0		Shale
DTH/37	DTH/37/42	41	42	0	0	0	0		Shale
DTH/37	DTH/37/43	42	43	0	0	0	0		Shale
DTH/37	DTH/37/44	43	44	0	0	0	0		Shale
DTH/37	DTH/37/45	44	45	0	0	0	0		Shale
DTH/37	DTH/37/46	45	46	0	0	0	0		Shale
DTH/37	DTH/37/47	46	47	0	0	0	0		Shale
DTH/37	DTH/37/48	47	48	0	0	0	0		Shale
DTH/38	DTH/38/1	0	1	53.43	6.68	9.08	0		Laterite/Soil
DTH/38	DTH/38/2	1	2	61.24	4.35	2.53	0		Lateritic Ore
DTH/38	DTH/38/3	2	3	50	10.33	8.8	0		Laterite
DTH/38	DTH/38/4	3	4	42.4	11.94	15.95	0		Laterite
DTH/38	DTH/38/5	4	5	37.88	19.11	12.75	0		Laterite
DTH/38	DTH/38/6	5	6	52.25	6.93	10.15	0		Laterite
DTH/38	DTH/38/7	6	7	51.82	7.25	9.45	0		Laterite
DTH/38	DTH/38/8	7	8	54.18	8.67	6.48	0		Laterite
DTH/38	DTH/38/9	8	9	60.17	5.09	3.17	0		Lateritic Ore
DTH/38	DTH/38/10	9	10	42.18	13.18	14.7	0		Laterite
DTH/38	DTH/38/11	10	11	56.98	6.94	4.45	0		Lateritic Ore
DTH/38	DTH/38/12	11	12	55.03	6.81	5.13	0		Lateritic Ore

DTH/38	DTH/38/13	12	13	55.89	8.02	4.85	0		Lateritic Ore
DTH/38	DTH/38/14	13	14	57.07	6.91	4.18	0		Lateritic Ore
DTH/38	DTH/38/15	14	15	60.82	3.78	3	0		Lateritic Ore
DTH/38	DTH/38/16	15	16	0	0	0	0		Shale
DTH/38	DTH/38/17	16	17	0	0	0	0		Shale
DTH/38	DTH/38/18	17	18	0	0	0	0		Shale
DTH/38	DTH/38/19	18	19	0	0	0	0		Shale
DTH/38	DTH/38/20	19	20	0	0	0	0		Shale
DTH/38	DTH/38/21	20	21	0	0	0	0		Shale
DTH/38	DTH/38/22	21	22	0	0	0	0		Shale
DTH/38	DTH/38/23	22	23	0	0	0	0		Shale
DTH/38	DTH/38/24	23	24	0	0	0	0		Shale
DTH/38	DTH/38/25	24	25	0	0	0	0		Shale
DTH/38	DTH/38/26	25	26	0	0	0	0		Shale
DTH/38	DTH/38/27	26	27	0	0	0	0		Shale
DTH/38	DTH/38/28	27	28	0	0	0	0		Shale
DTH/38	DTH/38/29	28	29	0	0	0	0		Shale
DTH/38	DTH/38/30	29	30	0	0	0	0		Shale
DTH/38	DTH/38/31	30	31	0	0	0	0		Shale
DTH/38	DTH/38/32	31	32	0	0	0	0		Shale
DTH/38	DTH/38/33	32	33	0	0	0	0		Shale
DTH/38	DTH/38/34	33	34	0	0	0	0		Shale
DTH/38	DTH/38/35	34	35	0	0	0	0		Shale
DTH/38	DTH/38/36	35	36	0	0	0	0		Shale
DTH/38	DTH/38/37	36	37	0	0	0	0		Shale
DTH/38	DTH/38/38	37	38	0	0	0	0		Shale
DTH/38	DTH/38/39	38	39	0	0	0	0		Shale
DTH/38	DTH/38/40	39	40	0	0	0	0		Shale
DTH/38	DTH/38/41	40	41	0	0	0	0		Shale
DTH/38	DTH/38/42	41	42	0	0	0	0		Shale
DTH/38	DTH/38/43	42	43	0	0	0	0		Shale
DTH/38	DTH/38/44	43	44	0	0	0	0		Shale
DTH/38	DTH/38/45	44	45	0	0	0	0		Shale
DTH/38	DTH/38/46	45	46	0	0	0	0		Shale
DTH/43	DTH/43/1	0	1	57.93	5.07	5.7	0		Lateritic Ore
DTH/43	DTH/43/2	1	2	43.68	11.48	13.71	0		Laterite
DTH/43	DTH/43/3	2	3	56.32	6.57	5.11	0		Lateritic Ore
DTH/43	DTH/43/4	3	4	52.57	9.1	7.83	0		Laterite
DTH/43	DTH/43/5	4	5	53.75	8.52	7.17	0		Laterite
DTH/43	DTH/43/6	5	6	48.89	10.57	9.44	0		Laterite
DTH/43	DTH/43/7	6	7	52.68	9.88	8.95	0		Laterite
DTH/43	DTH/43/8	7	8	56.53	6.74	4.78	0		Lateritic Ore
DTH/43	DTH/43/9	8	9	50.64	10.98	9.31	0		Laterite
DTH/43	DTH/43/10	9	10	51.29	10.84	8.78	0		Laterite
DTH/43	DTH/43/11	10	11	53.11	9.41	7.75	0		Laterite
DTH/43	DTH/43/12	11	12	60.39	4.67	3.18	0		Lateritic Ore
DTH/43	DTH/43/13	12	13	59.86	4.97	2.98	0		Lateritic Ore
DTH/43	DTH/43/14	13	14	51.82	10.45	8.15	0		Laterite
DTH/43	DTH/43/15	14	15	35.78	15.72	16.7	0		Laterite
DTH/43	DTH/43/16	15	16	30.51	21.95	18.34	0		Laterite
DTH/43	DTH/43/17	16	17	31.48	20.88	17.86	0		Laterite
DTH/43	DTH/43/18	17	18	38.76	16.48	13.19	0		Laterite
DTH/43	DTH/43/19	18	19	48.61	19.7	10.08	0		Laterite
DTH/43	DTH/43/20	19	20	62.25	9.18	7.78	0		Laterite
DTH/43	DTH/43/21	20	21	0	0	0	0		Shale
DTH/43	DTH/43/22	21	22	0	0	0	0		Shale
DTH/43	DTH/43/23	22	23	0	0	0	0		Shale
DTH/43	DTH/43/24	23	24	0	0	0	0		Shale
DTH/43	DTH/43/25	24	25	0	0	0	0		Shale
DTH/43	DTH/43/26	25	26	0	0	0	0		Shale
DTH/43	DTH/43/27	26	27	0	0	0	0		Shale
DTH/43	DTH/43/28	27	28	0	0	0	0		Shale
DTH/43	DTH/43/29	28	29	0	0	0	0		Shale
DTH/43	DTH/43/30	29	30	0	0	0	0		Shale

DTH/43	DTH/43/31	30	31	0	0	0	0		Shale
DTH/43	DTH/43/32	31	32	0	0	0	0		Shale
DTH/43	DTH/43/33	32	33	0	0	0	0		Shale
DTH/43	DTH/43/34	33	34	0	0	0	0		Shale
DTH/43	DTH/43/35	34	35	0	0	0	0		Shale
DTH/43	DTH/43/36	35	36	0	0	0	0		Shale
DTH/43	DTH/43/37	36	37	0	0	0	0		Shale
DTH/43	DTH/43/38	37	38	0	0	0	0		Shale
DTH/43	DTH/43/39	38	39	0	0	0	0		Shale
DTH/43	DTH/43/40	39	40	0	0	0	0		Shale
DTH/43	DTH/43/41	40	41	0	0	0	0		Shale
DTH/43	DTH/43/42	41	42	0	0	0	0		Shale
DNR/2	DNR/2/1	0	1.15	0	0	0	0		Soil
DNR/2	DNR/2/2	1.15	1.7	61.75	1.1	6.7	0		Hard Massive Ore
DNR/2	DNR/2/3	1.7	2.6	60.1	3.2	6.5	0		Hard Massive Ore
DNR/2	DNR/2/4	2.6	3.3	62.85	1.2	7.4	0		Hard Massive Ore
DNR/2	DNR/2/5	3.3	4.2	55.7	5	12.1	0		Lateritic Ore
DTH/54	DTH/54/6	5	6	0	0	0	0		Shale
DTH/54	DTH/54/7	6	7	0	0	0	0		Shale
DTH/54	DTH/54/8	7	8	0	0	0	0		Shale
DTH/54	DTH/54/9	8	9	0	0	0	0		Shale
DTH/54	DTH/54/10	9	10	0	0	0	0		Shale
DTH/54	DTH/54/11	10	11	0	0	0	0		Shale
DTH/54	DTH/54/12	11	12	0	0	0	0		Shale
GS/56	GS/56/6	3	4	61.52	5.12	3.55		90	Friable Ore
GS/56	GS/56/7	4	5	59.21	8.46	4.58		90	Friable Ore
GS/56	GS/56/8	5	6	60.64	2.7	3.94		90	Friable Ore
GS/56	GS/56/9	6	7	64.47	4.02	2.24		90	Friable Ore
GS/56	GS/56/10	7	8	65.17	3.02	1.93		90	Friable Ore
GS/56	GS/56/11	8	9	64.39	2.88	2.27		90	Friable Ore
GS/56	GS/56/12	9	10	68	0.74	0.67		90	Friable Ore
GS/56	GS/56/13	10	11	66.84	2.08	1.19		90	Friable Ore
GS/56	GS/56/14	11	11.8	66	3.08	1.56		90	Friable Ore
GS/56	GS/56/15	11.8	12	62.95	3.02	2.41		100	Soft Laminated Ore
GS/56	GS/56/16	12	13	62.95	2.4	2.99		96	Powdery Ore
GS/56	GS/56/17	13	13.5	66.08	2	1.43		96	Powdery Ore
GS/56	GS/56/18	13.5	14	61.8	7.8	3.68		98	Powdery Ore
GS/56	GS/56/19	14	15	65.95	4.66	1.5		98.6	Powdery Ore
GS/56	GS/56/20	15	16	66.28	2.5	1.33		98	Powdery Ore
GS/56	GS/56/21	16	16.5	66.98	2.34	0.98		98	Powdery Ore
GS/56	GS/56/22	16.5	17	66.56	2.06	1.19		98	Powdery Ore
GS/56	GS/56/23	17	18	65.9	3.52	1.52		98	Powdery Ore
GS/56	GS/56/24	18	19	64.06	2.58	2.44		98	Powdery Ore
GS/56	GS/56/25	19	19.5	64.62	2.78	2.16		97.2	Powdery Ore
GS/56	GS/56/26	19.5	20	61.32	4.16	3.8		97.2	Powdery Ore
GS/56	GS/56/27	20	21	59.13	7.86	4.9		97.2	Powdery Ore
GS/56	GS/56/28	21	22	65.15	2.48	1.78		100	Soft Laminated Ore
GS/56	GS/56/29	22	22.5	62.96	5.74	2.99		100	Powdery Ore
GS/56	GS/56/30	22.5	23.5	63.52	5.36	2.71		100	Powdery Ore
GS/56	GS/56/31	23.5	24.5	64.62	2.44	2.16		100	Powdery Ore
GS/56	GS/56/32	24.5	25	64.12	2.56	2.41		90	Powdery Ore
DNR/1	DNR/1/1	0	0.6	8.8	0	0	0	0	Soil Cover
DNR/1	DNR/1/2	0.6	1.5	55.15	6.26	7.08	4.86	0	Hard Massive Ore
DNR/1	DNR/1/3	1.5	1.9	65.41	2.87	2.46	0.71	0	Hard Massive Ore
DNR/1	DNR/1/4	1.9	2.5	57.78	4.28	5.39	3.89	0	Hard Massive Ore
DNR/1	DNR/1/5	2.5	3.3	68.14	0.96	1.03	0.92	0	Hard Massive Ore
DNR/1	DNR/1/6	3.3	4.1	53.29	10.44	5.98	3.46	0	Hard Massive Ore
DNR/1	DNR/1/7	4.1	5.6	66.77	1.62	2.04	0.8	0	Hard Massive Ore
DNR/1	DNR/1/8	5.5	6.6	67.65	1.073	1.42	0.5	0	Hard Massive Ore
DNR/1	DNR/1/9	6.5	7.5	66.99	1.42	2.02	0.8	0	Hard Massive Ore
DNR/1	DNR/1/10	7.5	8.5	68.13	0.72	1.12	0.6	0	Hard Massive Ore
DNR/1	DNR/1/11	8.5	9.5	68.45	0.85	0.96	0.52	0	Hard Massive Ore
DNR/1	DNR/1/12	9.5	10.5	66.12	1.48	2.85	1	0	Hard Massive Ore
DNR/1	DNR/1/13	10.5	12.1	65.12	1.27	3.7	0.95	0	Hard Massive Ore

ANNEX:-18

DNR/1	DNR/1/14	12.1	13	67.54	0.85	2.05	0	0	Hard Massive Ore
DNR/1	DNR/1/15	13	14	68.35	0.75	0.02	0.65	0	Hard Massive Ore
DNR/1	DNR/1/16	14	15	66.12	2.52	1.75	0.98	0	Hard Massive Ore
DNR/1	DNR/1/17	15	16	68.25	0.72	0.63	0.5	0	Hard Massive Ore
DNR/1	DNR/1/18	16	17	68.85	0.22	0.82	0.5	0	Hard Massive Ore
DNR/1	DNR/1/19	17	18	68.25	0.48	0.96	0.5	0	Hard Massive Ore
DNR/1	DNR/1/20	18	19	67.14	0.08	2.1	0.6	0	Hard Massive Ore
DNR/1	DNR/1/21	19	20	67.26	0.7	2.2	0.6	0	Hard Massive Ore
DNR/1	DNR/1/22	20	21	68.12	1.76	3.05	0.6	0	Hard Massive Ore
DNR/1	DNR/1/23	21	22	68.5	1.2	2.6	1	0	Hard Massive Ore
DNR/1	DNR/1/24	22	23	64.12	3.8	2.55	1.4	0	Hard Massive Ore
DNR/1	DNR/1/25	23	24	66.07	1.91	2.98	1.2	0	Hard Massive Ore
DNR/1	DNR/1/26	24	25	62.68	2.62	5.32	1.4	0	Hard Massive Ore
DNR/1	DNR/1/27	25	26	60.81	4.42	5.16	2.5	0	Goethitic Ore
DNR/1	DNR/1/28	26	27	62.92	2.75	5.43	1.8	0	Goethitic Ore
DNR/1	DNR/1/29	27	28	64.35	2.85	3.56	1.5	0	Hard Massive Ore
DNR/1	DNR/1/30	28	29	62.06	1.97	6.43	1.42	0	Hard Massive Ore
DNR/1	DNR/1/31	29	30	0	0	0	0	0	Cavity

ANNEX.-19

GOVERNMENT OF INDIA
MINISTRY OF MINES
INDIAN BUREAU OF MINES
MCCM CENTRAL ZONE

Diary Section 17 JUN 2011

REGD POST

4733

No. 314(3)/2010-MCCM(CZ)/MS-56 / 1705

6th Floor, "D" Block, Indira Bhawan
Civil Lines, Nagpur – 440102
Email : com.cz@ibm.gov.in
Telephone & Fax : (0712) 2565603
Dated 20th May 2011

To,

The Orissa Mining Corporation Ltd,
OMC House, BHUBANESWAR –751 001
Orissa

Sub: Approval of Scheme of mining including Progressive Mine Closure Plan of Gandhamardan (Block-A) Iron Ore mines of The Orissa Mining Corporation Ltd over an area of 618.576 hectares, in Keonjhar district of Orissa, submitted under rule 12 of MCDR, 1988.

Ref: (1) Your Letter No. 4052/OMC/F&E/11 dated 28.01.2011.
(2) This Office letter of even No. dated 08.04.2011.
(3) Your letter No. 7738/OMC/F&E/11 dated 27.04.2011.

अनुमोदित
APPROVED

Sir,

In exercise of the powers conferred by sub rule (4) of rule 12 of Mineral Conservation and Development Rules 1988, I hereby **APPROVE** the Scheme of Mining including Progressive Mine Closure Plan of Gandhamardan (Block-A) Iron Ore mines of The Orissa Mining Corporation Ltd over an area of 618.576 hectares, in Keonjhar district of Orissa, submitted under rule 12 of MCDR, 1988.

This approval is subject to the following conditions :-

i) This Scheme of Mining is approved without prejudice to any other laws applicable to the mine/area from time to time whether made by the Central Government, State Government or any other authority.

ii) It is clarified that this approval of the Scheme of Mining does not in any way imply the approval of the Government in terms of any other provisions of the Mines and Minerals (Development & Regulation) Act, 1957 or the Mineral Concession Rule, 1960 and any other laws including the Forest (Conservation) Act, 1980, Environment (protection) Act 1986 and the rules made there under.

iii) It is further clarified that this approval of the Scheme of Mining is subject to the provision of Forest (Conservation) Act 1980, Forest Conservation Rule 1981 and other relevant statutes, order and guidelines as may be applicable to the lease area from time to time.

iv) It is further clarified that the approval of Scheme of Mining is subject to the provision of the Mines Act 1952 and Rules & Regulations made there under including submission of notice of opening, appointment of manager and other statutory officials as required by the Mines Act 1952.

v) The execution of Scheme of Mining shall be subjected to vacations of prohibitory orders / notices, if any.

vi) This approval for mining operations and associated activities is restricted to the mining lease area only. The mining lease area is as shown on the statutory plans under Rule 28 of Mineral Conservation and Development Rules 1988, by the Lessee/RQP/Applicant, and Indian Bureau of Mines has not undertaken verification of the mining lease boundary on the ground.

vii) If anything is found to be concealed as required by the Mines Act in the content of the Scheme of mining and the proposals for rectification has not been made, the approval shall be deemed to have been withdrawn with immediate effect.

viii) The approval of scheme of mining is subject to the compliance of CCOM's Circular No. 2/2011 regarding Geo-referenced cadastral map within 6 months from the date of approval failing which the approval of the document shall be deemed to have been withdrawn with immediate effect.

(ix) This approval is given for the received proposals as applicable from this date.

(x) At any stage, if it is observed that the information furnished in the document are incorrect or misleading or wrong, the approval of the document shall be revoked with immediate effect.

xi) Yearly report as required under Rule 23E(2) of MCDR '88 setting forth the extent of protection and rehabilitation works carried out as envisaged in the approved progressive mine closure plan and if there is any deviations, reasons thereof shall be submitted before 1st July of every year to the Regional Office, IBM, Bhubneswar.

xii) The Scheme of Mining is approved without prejudice to any order or direction from the court of competent jurisdiction.

xiii) Your attention is invited to the Supreme Court interim order in W.P.(C) No.202 dated 12-12-96 for compliance. The approval of Scheme of Mining is, therefore, issued without prejudice to and is subject to the said directions of the Supreme Court as applicable.

xiv) The Financial Assurance submitted by you for Rs. 3159550/- which is valid upto 31.03.2016 and next Financial Assurance shall be submitted on or before 31.03.2016.

xv) The Scheme of Mining will be due for submission on 01.12.2015.

xvi) Copy Environment Impact Assessment-Environment Management Plan (EIA-EMP) as approved by MOEF (Ministry of Environment & Forest) shall be submitted to IBM immediately after approval by MOEF.

(xvii) The Environmental Monitoring Cell established by the company shall continue monitoring ambient air quality, dust-fall rate, water quality, soil sample analysis and noise level measurements at various stations established for the purpose both in the core zone and buffer zone as per requirement of Environment Guidelines and keeping in view IBM's circular No. 3/92 & 2/93 season-wise every year or by engaging the services of an Environmental Laboratory approved by MOEF/CPCB. The data so generated shall be maintained in a bound paged register kept for the purpose and the same shall be made available to the inspecting officer, on demand.

अनुमोदित

APPROVED

Yours faithfully,

Encl:- One copy of approved Scheme of Mining

20/5/11

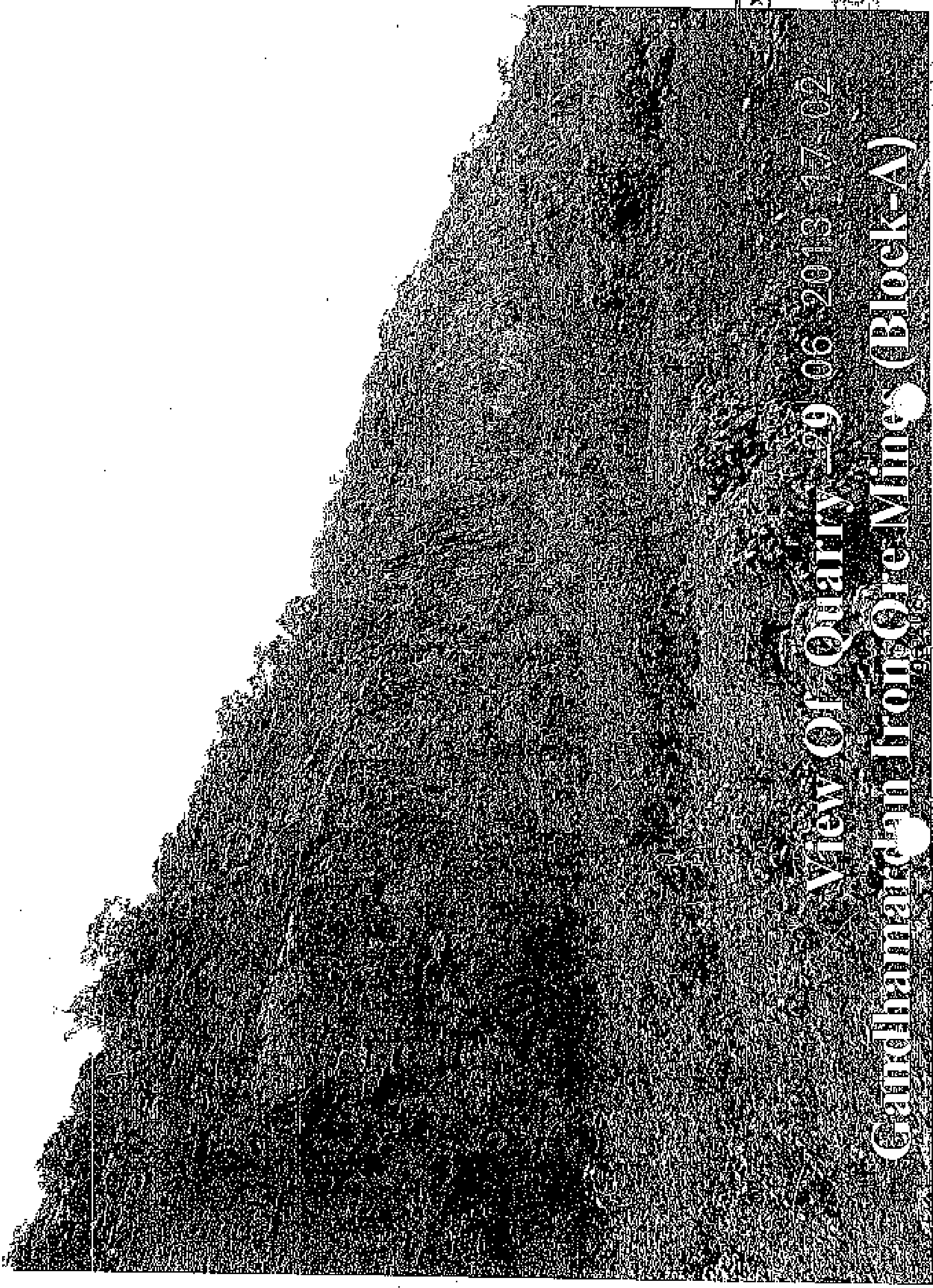
(Ranjan Sahai)
Controller of Mines (CZ)

Copy for information to :-

1. Shri Arindam Dash, RQP, Plot No. 290A (In front of Ekamra Talkies), Cuttack Road, Bomikhal, Bhubaneswar – 751 010.
2. The Director of Mines Safety, Directorate General of Mines Safety, Chaibasa Region, At & Post Chaibasa, District – Singhbhum West, Jharkhand 833 201 alongwith one copy of approved scheme of mining.
3. The Director of Mining, Directorate of Mining & Geology, Government of Orissa, Head of the Department Building, New Capital, Bhubaneswar 751 001 Orissa alongwith one copy of approved scheme of mining

(Ranjan Sahai)
Controller of Mines (CZ)

Annex. 20.



अनुमोदित
APPROVED

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451

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अनुमोदित
APPROVED

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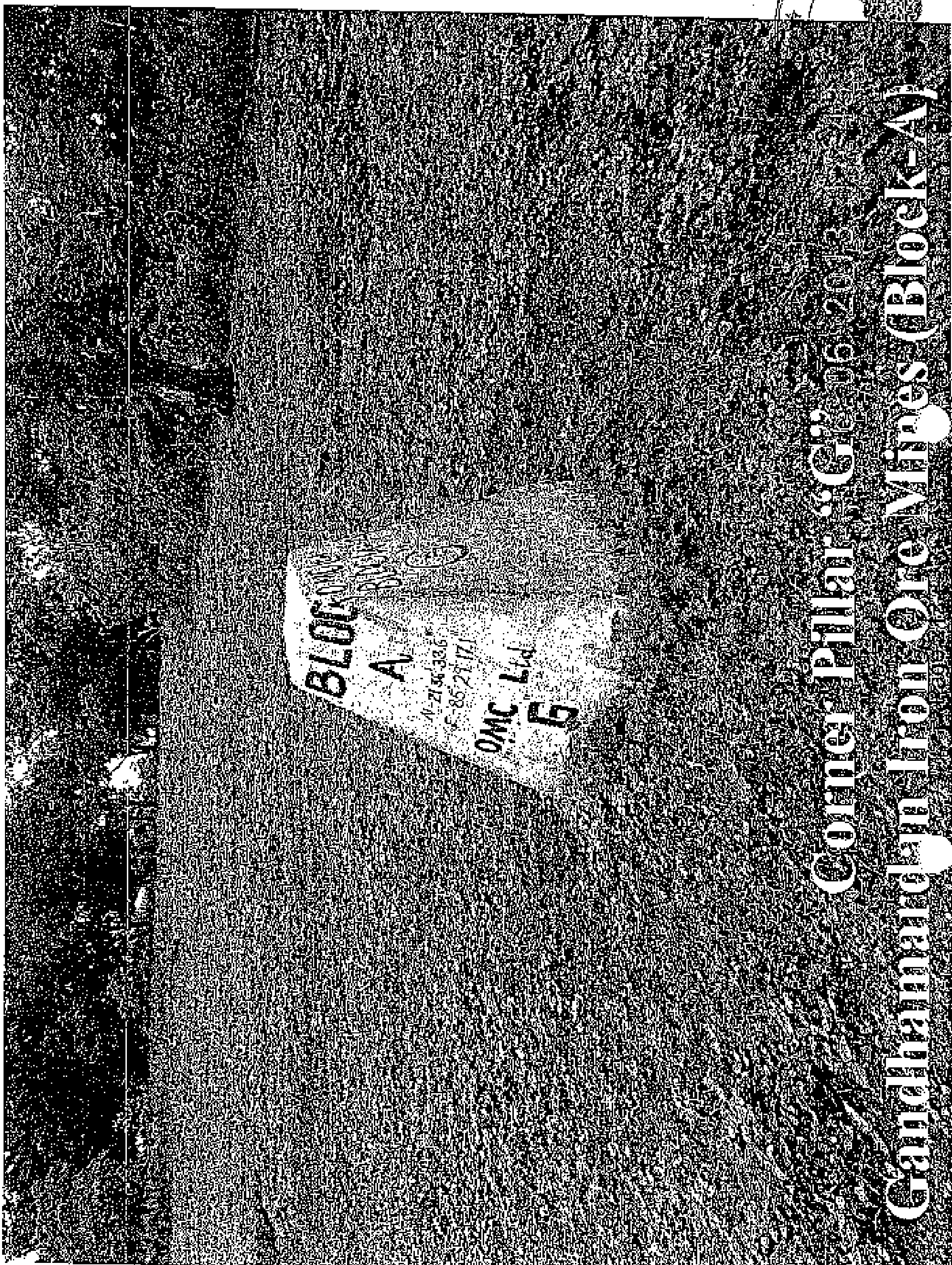
अनुमोदित
APPROVED

ANNEX -6

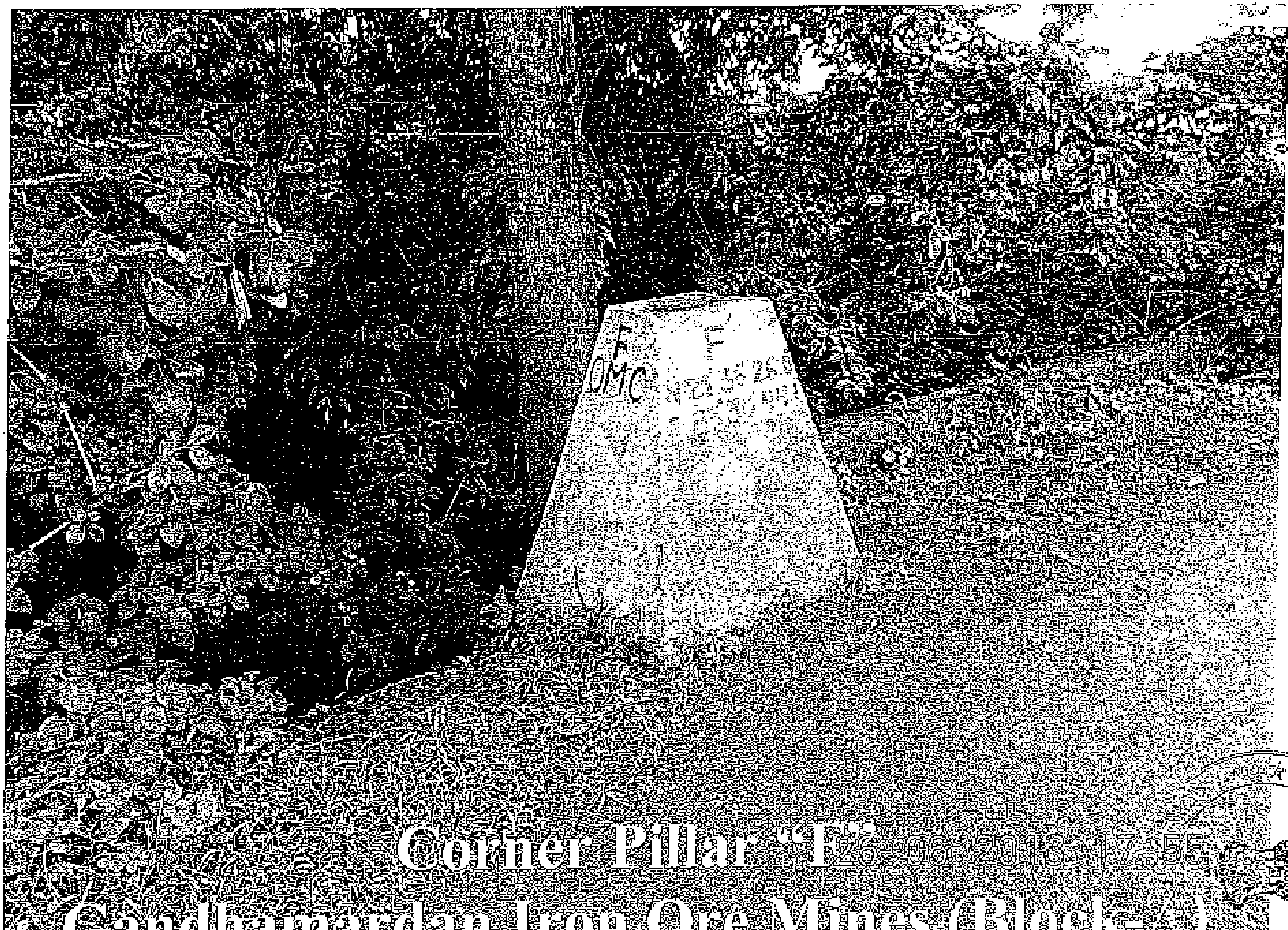
(211)

अनुमोदित
APPROVED



212

अनुमोदित
APPROVED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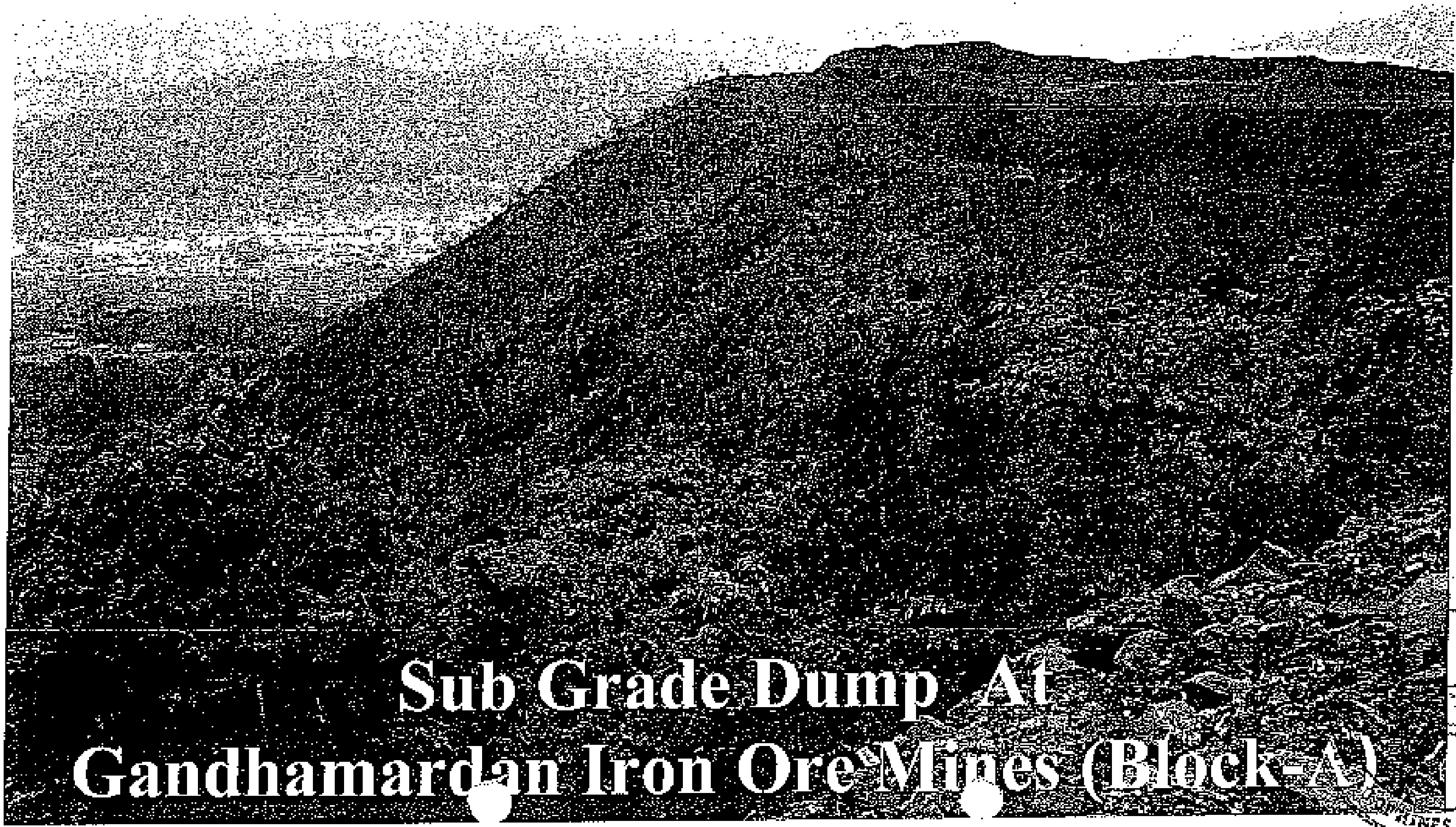
OMC
Corner Pillar "F"
Gandhamardan Iron Ore Mines (Block-
Page 213

(213)

ANNEX_D



अनुमोदित
APPROVED

(214)

ANNEX-21

The Odisha Mining Corporation Ltd.

(A Gold Category State PSU)
(A Government of Odisha Undertaking)
BHUBANESWAR - 751 001

No 8619 /OMC/P&T/2013-14

Dt 27.06.2013

To,

The Regional Controller of Mines
Indian Bureau of Mines
Office of Regional Controller of Mines
2nd floor Mahani Complex, 308, District centre,
Chandrasekharpur, Bhubaneswar-751016

Sub: Submission of Bank Guarantee in original for an additional amount of Rs.2814500/ (Rupees Twenty eight lakh fourteen thousand five hundred only) in respect of Mining Plan of Gandhmardan-Block A Iron Ore Mines over 618.576 Ha, with validity from date of issue till 31.03.2018.

अनुमोदि
APPROV

Respected Sir,

We are enclosing herewith the original Bank Guarantee bearing No.00481GFIN0012 dt 26.06.2013 drawn in Andhra Bank for Rs. 2814500/ (Rupees Twenty eight lakh fourteen thousand five hundred only) towards financial assurance in respect of Mining Plan of Gandhmardan-Block A Iron Ore Mines over 618.576 Ha, with validity till end of the first five year i.e. upto 31.03.2018.

The original BG may kindly be accepted & acknowledgement be issued for attaching the same in volumes of "Mining Plan of Gandhmardan-Block A Iron Ore Mines over 618.576 Ha" for final submission at IBM, Nagpur.

Thanking you

Encl: As above

RECEIVED
28/6/13
Contents not verified
INDIAN BUREAU OF MINES, BHUBANESWAR

Yours faithfully

Sudhansu Kumar Das
Sr.Manager (Geology) &
Power of Attorney holder
S. K. Das
Sr. Manager (Geo)
Power of Attornay Holder
Odisha Mining Corporation Ltd.
Bhubaneswar-751001

ANNEX-21

भारतीय गैर न्यायिक

एक सौ रुपये Rs. 100

रु. 100 ONE HUNDRED RUPEES

सत्यमेव जयते

भारत INDIA

INDIA NON JUDICIAL

उड़ीसा ORISSA

E 774693

Form No. ______________
The Regional Controller of Mines.
Indian Bureau of Mines.
Bhubaneswar,

अनुमोदित
APPROVED

Dear Sir,

Guarantee No 0048 14FIN 0612
Amount of Guarantee Rs.28, 14,500/-
Guarantee Period from 26-04-2013 to 31.03.2018
Last date for lodgment of claim: 31.03.2018

This Deed of guarantee executed on Day of 26th June/2013 by **Andhra Bank**, Bhubaneswar constituted under the **Banking companies (Acquisition & Transfer of Undertaking) Act, 1980** having its central office at **Hyderabad** and amongst other places, a branch at **Bhubaneswar** (hereinafter referred to as the bank) in favour of the Regional Controller of Mines, Indian Bureau of Mines, **Bhubaneswar** (hereinafter referred to as the Beneficiary) for an amount not exceeding **Rs.28, 14,500/-** (Rupees Twenty-eight lakhs Fourteen thousand Five hundred only) at the request of **M/s Odisha Mining Corporation Ltd** (hereinafter referred to as the Contractor/s).

This guarantee is issued subject to the condition that the liability of the bank under this guarantee is limited to maximum of **Rs. 28, 14,500/-** (Rupees Twenty-eight lakhs Fourteen thousand Five hundred only) and the guarantee shall remain in full force up to **31.03.2018** (date of expiry) and cannot be revoked on or before **31.03.2018** (last date of claim) by the Regional Controller of Mines, Indian Bureau of Mines, **Bhubaneswar** in writing.

SUBJECT TO AS AFORESAID
(Main guarantee matter may be typed hereafter)

For (Bank) Seal

Branch Manager
(______________ Branch)

कृते आन्ध्रा बैंक
For ANDHRA BANK

वरिष्ठ प्रबंधक/Senior Manager
भुबनेश्वर शाखा/Bhubaneswar Br

कृते आन्ध्रा बैंक
For ANDHRA BANK

सहायक महाप्रबंधक/Asst.General Manager
भुबनेश्वर/Bhubaneswar

D-44

ANNEX.-21

BANK GUARANTEE AND CO-ACCEPTANCE BOND

1. Agreement on production of a Bank guarantee for **Rs.28,14,500/-**(Rupees Twenty-eight lakhs Fourteen thousand Five hundred only) under rule 23F of MCDR,1988.

2. We **Andhra Bank** (bank name), at the request of **M/s Orissa Mining Corporation Ltd** (lessee) do hereby undertake to pay to the Regional Controller of Mines, Indian Bureau of Mines, **Bhubaneswar** or any other officer authority nominated by the Controller General, Indian Bureau of Mines an amount not exceeding **Rs.28, 14,500/-** (Rupees Twenty-eight lakhs Fourteen thousand Five hundred only) against any loss or damage caused to or suffered or would be caused to or suffered by the Government or towards non compliance of provisions of Rules 23A, B & 23E of MCDR, 1988 i.e. Mine closure plan, Progressive Mine Closure Plan approved in respect of the mining lease for **Gandhamardan (Block-A) Iron ore Mines, ML No-2081 dt.21.05.1963** over an area of **618.576** Hects. (S.I.T. No. 73G/10) granted by Steel & Mines Dept., Government of Odisha vide L.No.-III(A)M-11/63-2327/MG Bhubaneswar dtd. 01.03.1963 to M/s Odisha Mining Corporation Ltd.(lessee) situated in village-**Daonra,Suakati & Gandhamardan PRF, Bansapal Tahasil** in **Keonjhar District** of **Odisha State**, by reason of any breach of the said lessee or any of the terms or conditions contained in the Mine closure plan / Progressive Mine Closure Plan.

3. We, **Andhra Bank**, (bank) do hereby, undertake to pay the amount due and payable under this guarantee without any demure, to the authority merely on a demand other authorized by the Regional Controller of Mines, Indian Bureau of Mines, **Bhubaneswar** or any other authorized by the Controller General, Indian Bureau of Mines stating that the amount claimed is due by way of loss or loss of damage caused to or would be caused to or suffered by the government by reason of breach by the said lessee or any of the terms or conditions contained in the Mining Plan/Mining Scheme or by reason of lessee's failure to perform the said Mine Closure Plan/ Progressive Mine Closure Plan. Any such demand made on the bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding **Rs.28, 14,500/-** (Rupees Twenty-eight lakhs Fourteen thousand Five hundred only).

For (Bank) Seal

कृते आन्ध्रा बैंक
For ANDHRA BANK
सहायक महाप्रबंधक / Asst. General Manager
भुवनेश्वर / Bhubaneswar

Branch Manager
Branch)

कृते आन्ध्रा बैंक
For ANDHRA BANK
वरिष्ठ प्रबंधक / Senior Manager

APPRO

4. We undertake to pay to the authority on a demand from the Regional Controller of Mines, Indian Bureau of Mines, **Bhubaneswar** or any other officer authorized by the Controller General, Indian Bureau of Mines or Govt. of India any money so demanded notwithstanding any dispute or disputes raised by the lessee in any suit or proceedings pending before any court or tribunal relating thereto our liability under this present being absolute and unequivocal.

The payment so made by us under this bond shall be valid discharge of our liability for payment there under and lessee shall have no claim against us for making such payment.

5. We, **Andhra Bank** (bank name), further agree that the guarantee herein contained shall remain in full force and effect during the period up to the end of the **Mining plan/ Scheme of Mining** period of five years that would be taken for performance of the said Agreement and that shall continue to be enforceable till all the dues of the Govt. under or by virtue of the said agreement have been fully paid and its claims satisfied or discharged till Regional Controller of Mines, Indian Bureau of Mines, **Bhubaneswar** or any other officer authorized by the Controller General, Indian Bureau of Mines certifies that the terms and conditions of the said progressive mine closure plan/ final mine closure plan have been fully and properly carried out by the said lessee and accordingly discharge this guarantee. Unless a demand or claim under this guarantee is made on us in writing on or before **31.03.2018**, we shall be discharged from all liability under this guarantee thereafter.

अनुमोदित APPROVED

6. We further agree that Regional Controller of Mines, Indian Bureau of Mines, **Bhubaneswar** or any other officer authorized by the Controller General, Indian Bureau of Mines shall have fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said agreement or to extend time of performance by the said lessee from time to time or to postpone for any time or from time to time any power exercisable by Regional Controller of Mines, Indian Bureau of Mines, **Bhubaneswar** against the said Lessee and for forbear or enforce any of the terms and conditions relating to the said agreement, we, **Andhra Bank** (bank) shall not be relived from our liability by reason of any such variation or extension being granted to the said Lessee or for any forbearance, Act or omission on the part of Regional Controller of Mines, Indian Bureau of Mines, **Bhubaneswar** or any indulgence by Regional Controller of Mines, Indian Bureau of Mines, **Bhubaneswar** to the said lessee or any manner or thing whatsoever which under the law relating to sureties, would but this provision have effect of so relieving us.

कृते आन्ध्रा बैंक
For ANDHRA BANK
वरिष्ठ प्रबंधक/Senior Manager
भुवनेश्वर शाखा/Bhubaneswar Br

कृते आन्ध्रा बैंक
For ANDHRA BANK
सहायक महा प्रबंधक/Asst.General Manager
भुवनेश्वर/Bhubaneswar

(Bank) Seal

Branch Manager
_____________ Branch)

7. This guarantee will not be discharged due to change in constitution of the bank or lessee.

8. We, **Andhra Bank** (bank name), lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Regional Controller of Mines, Indian Bureau of Mines, **Bhubaneswar** in writing.

9. Not withstanding anything contained herein:

(a) Our liability under this Bank guarantee shall not exceed Rs.28, 14,500/- (Rupees Twenty-eight lakhs Fourteen thousand Five hundred only).

अनुमोदित
APPROVED

(b) The bank guarantee shall be valid up to **31.03.2018.**

(c) The period of bank guarantee submitted valid for the period of the proposals given in the mining plan/ Scheme of mining / PMCP etc. We are liable to pay the guarantee amount or any part thereof under this Bank guarantee and only if served upon us a written claim or demand on or before.

10. If the bank guarantee is to be en-cashed through the court, in that case the **Bhubaneswar** Court will have jurisdiction.

11. In witness whereof, the bank through its authorized officer has set its hand and stamp on this 24th Day of June 2013 at Bhubaneswar

कृते आन्ध्रा बैंक
For ANDHRA BANK
वरिष्ठ प्रबंधक/ Senior Manager
भुवनेश्वर शाखा/ Bhubaneswar Br

कृते आन्ध्रा बैंक
For ANDHRA BANK
सहायक महा प्रबंधक / Asst.General Manager
भुवनेश्वर / Bhubaneswar

(Bank) Seal

Branch Manager

Witness:

(1) B.K. Behera
Asst. manager
Andhra Bank
Bhubaneswar

(11) Arpita (Financial Analyst)

ANNEX. -22

Production/ dispatch during the last lease period & review of last scheme of mining

The year wise production and dispatch of minerals for the last lease period is given below:-

Year	Production, Tonnes	Dispatch, Tonnes
1993-94	41072.72	0
94-95	19288.06	106190.31
95-96	928	66223.94
96-97	0	76000.84
97-98	0	125575.78
98-99	0	79735.87
99-2000	0	93120.24
00-01	0	82684.67
01-01	0	137907.43
02-03	0	331193.7
03-04	0	446018.495
04-05	0	260151.35
05-06	252051.441	194883.75
06-07	217841.748	290826.84
07-08	358391.72	1032017.995
08-09	1995311.76	661237.845
09-10	468798.35	0
10-11	0	0
11-12	0	0
12-13	0	0

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Achievements against the proposal envisaged in the last approved mining scheme for the period and the justification thereof for deviations, if any, is mentioned below:

i) **Exploration:**

Year	Nos. of boreholes	
	Planned	Actual
2011-12	NIL	NIL
2012-13	NIL	NIL

ii) **Mine Development and Exploitation:**

The achievement position as against the target in respect of waste and ore handling is given below :-

Year	Ore, t		Total waste, cu.m	
	Planned	Actual	Planned	Actual
2011-12	301252	0	323068	0
2012-13	351848	0	209772	0

It is reflected from the above table that there has been no increase in the planned quantities of ore production and waste removal from Gandhamardan-B lease.

iii) **Afforestation:**

The achievement position as against the target in respect of afforestation is given below :-

Year	Afforestation, Nos	
	Planned	Actual
2011-12	5683	1020
2012-13	5734	2220

iv) **Control of dust, Noise and ground vibration:**

It was proposed to carry out sampling of air, water and noise periodically and take mitigation measures, to limit the pollution level of these parameters. The same has been duly complied with.

iii) **Land Reclamation and Rehabilitation:**

In the mining scheme period it was not proposed to reclaim & rehabilitate the mined out area of land. Obviously there is no deviation in this part.

iv) **Waste dump management:**

For the year 2011-12 & 2012-13 it was proposed to accommodate 323068 & 209772 m^3 of waste in external waste dumps by terracing along with construction of parapet walls/ retaining walls at the toe of dump and construction of settling tanks on the garland drain. No waste have been dumped actually during this period.

अनुमोदित
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