Book-A

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TEXT / VOLUME-I

# M/s GHANASHYAM MISRA & SONS PVT. LTD

MINING LESSEE
7, Waterloo Street, 2nd Floor, Kolkata-700069, West Bengal,
Phone: 033-22480602 / 22482623, Fax: 033-22482623,
E-mail: gmspl2011@gmail.com

# MINING PLAN

(Submitted Under Rule 16(1) of Minerals (Other than Atomic and Hydro Carbons Energy Minerals) Concession Rules, 2016)

## Along with

# PROGRESSIVE MINE CLOSURE PLAN

(Submitted Under Rule 23 of MCDR, 2017)

## In respect of

# GORUMAHISANI IRON ORE BLOCK

Over an area of 349.709 hectares (as per DGPS) / 349.50 hectares (as per ROR) in villages Kuleisila, Badamouda, Sanamouda, Sundhal, Balitangiri, Nodhabani and Gorumahisani R.F., Tahasil Rairangpur, Dist Mayurbhanj, Odisha.

Mine Code assigned by IBM: 30ORI10020 / Registration No. allotted by IBM: IBM/1235/2011

| Mine Category | Date of Grant | Period | Valid up to | As per DGPS | | | As per ROR | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Forest Land (ha) | Non-Forest Land (ha) | Total (ha) | Forest Land (ha) | Non-Forest Land (ha) | Total (ha) |
| A (FM) | 02.07.2020 | 50 years | 01.07.2070 | 90.50 | 259.209 | 349.709 | 90.50 | 259.00 | 349.50 |

## Prepared by

**S.C. Nayak, M. Tech (ISM)**
Mining Engineer and Qualified Person under Rule 15 of MCR, 2016
**M/s MINESKETCH Consultants (P) Ltd**
Flat No.205, Bhagwan Tower, Cuttack Road, Bhubaneswar-751006
Telephone: 0674-2573607 / 2950508, Mobile: 7978439350 / 9438471176
E-mail: mcpl762005@gmail.com / minesketch2005@gmail.com

**PREPARED FOR THE PERIOD OF FIVE (5) YEARS FROM FY 2020-21 TO 2024-25**

TEXT / VOLUME-I

# M/s GHANASHYAM MISRA & SONS PVT. LTD

MINING LESSEE
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| Mine Code assigned by IBM: 30ORI10020, Registration No. allotted by IBM : IBM/1235/2011 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Mine Category | Date of Grant | Period | Valid up to | As per DGPS | | | As per ROR | | |
| | | | | Forest Land | Non-Forest Land | Total | Forest Land | Non-Forest Land | Total |
| A (FM) | 02.07.2020 | 50 years | 01.07.2070 | 90.50 ha | 259.209 ha | 349.709 ha | 90.50 ha | 259.00 ha | 349.50 ha |

Prepared by

**S.C. NAYAK, M. Tech (ISM)**
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PREPARED FOR A PERIOD OF FIVE (5) YEARS FROM FY 2020-21 TO FY 2024-25

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(S.C. Nayak)
Qualified Person

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(S.C. Nayak)
Qualified Person

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Qualified Person

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(S.C. Nayak)
Qualified Person

| Mr. S.C. Nayak, Qualified Person<br>M/s MINESKETCH Consultants (P) Ltd | M/s Ghanashyam Misra & Sons Pvt. Ltd<br>Mining Lessee |
|---|---|

# INTRODUCTION

**Status of Mineral Concession:** Gorumahisani Iron Ore Block over an area of 349.709 hectares (as per DGPS) / 349.50 hectares (as per ROR) in villages Kuleisila, Badamouda, Sanamouda, Sundhal, Balitangiri, Nodhabani and Gorumahisani R.F, Tahasil Rairangpur, District Mayurbhanj, Odisha has been intended by the Government of Odisha for grant of mining lease for a period of fifty (50) years in favor of M/s Ghanashyam Misra & Sons Pvt. Ltd (herein after referred to as GMSPL / Mining Lease Applicant), At / PO: Gorumahisani, District: Mayurbhanj, Odisha, PIN-757042 through auction as per the Letter of Intent (LOI) No.3019/S&M, Bhubaneswar dated 18.03.2020 subject to fulfillment of the conditions such as (1) compliance of all the terms & conditions of the eligibility, (2) payment of the entire upfront payment, (3) furnishing performance security, (4) satisfying the conditions specified on clause (b) of sub-section (2) Section (5) of the MMDR Act, 1957 with respect to a Mining Plan and signing of the Mine Development of Production Agreement (ref: Annexure-19).

अनुमोदित
APPROVED
29/11/21
क्षेत्रीय खान नियंत्रक
REGIONAL CONTROLLER OF MINES
भारतीय खान ब्यूरो
INDIAN BUREAU OF MINES
भुवनेश्वर/BHUBANESWAR

**Statutory Clearances:** Nodal Officer of Odisha State nominated under Rule-9A(1) of the Mineral (Other than Atomic and Hydro Carbons Energy Minerals) Concession Rules, 2016 pursuant to the permission of Rule-9A(2) of MCR, 2016 order that all the valid rights, approvals clearances, licenses and like vested with the previous Lessee in respect of the mining block are deemed to have been vested in favour of the holder of the Letter of Intent (LOI) on the same terms & conditions of every rights, approvals, clearances, licenses and like vested with the previous Lessee for a period of two years from the date of execution of lease deed or till the date of getting fresh approvals, clearances, licenses, permits and the like whichever is earlier vide his letter No.4517/SM-III(A)/SM-11/2020 dated 04.06.2020 (ref: Annexure-11). However, all the clearances, licenses etc. vested with the previous Lessee are as follows:



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| Approvals / Clearances | Authority | Details of Approval / Clearances |
|---|---|---|
| Mining Plan, Review of Mining Plan and Modification of Mining Plan | Indian Bureau of Mines (IBM) | Last Modification of Mining Plan prepared by Shri Chandrabhanu Das, M/s Geo Consultants Pvt. Ltd, Bhubaneswar-751006 under Rule 17(3) of Minerals (Other than Atomic and Hydro Carbons Energy Minerals) Concession Rules, 2016 was approved for a period of two (2) years of 2018-19 & 2019-20 vide letter No.MPM/OTFM/09-ORI/BHU/2018-19/738 dated 04.07.2018 |
| Geo-referenced DGPS survey map | Odisha Space Applications Centre (ORSAC) | M.L Applicant / Project Proponent have obtained Geo-coordinated / referenced DGPS survey map of applied M.L area (a) prepared by Odisha Space Applications Centre (ORSAC), Department of Science & Technology, Govt. of Odisha, Bhubaneswar and (b) authenticated by the Chief Surveyor, Directorate of Mines, Odisha, Bhubaneswar (ref: Plate-I) where latitude, longitude and UTM values of boundary pillars have been incorporated. |
| Forest Clearance | Ministry of Environment & Forest (MoEF) | M.L area over 349.50 hectares consists of 90.50 hectares forest land and 259 hectares non-forest Land. Forest Clearance was obtained to . Lessee / User agency vide F.No.8-41/2003-FC dated 13.09.2006 for diversion of 81 hectares for mining purpose and 9.50 hectares as safety zone. |
| Environmental Clearance | Ministry of Environment & Forest and Climate Change (MoEF & CC) | Environmental Clearance was obtained to the Applicant by the Ministry of Environment and Forest (MoEF) for production of iron ore @750,000 t / annum as per the provision of EIA Notification, 2006 vide letter No.J-11015/426/2006-IA.II(M) dated 29.01.2008 (ref : Annexure-26). |
| Consent to Operate | State Pollution Control Board (SPCB), Odisha | Consent to Operate order has been granted by the State Pollution Control Board (SPCB), Odisha vide Consent Order No.212 dated 19.03.2016 for production of iron ore @0.75MTPA valid up to 31.03.2020 (ref: Annexure-28). |
| Surface Right Order | Collector / District Magistrate | Permission for surface right operation for 2658.19 acres / 1075.75 hectares out of the original lease area over 3226.91 acres / 1305.886 hectares (ref: Annexure-24) was accorded by the Collector and District Magistrate, Mayurbhanj in favour of Applicant. Applied M.L. area over 863.614 acres / 349.50 hectares comes within already granted surface right area. The details of the phase-wise permitted area for surface operation have been tabulated as follows: |



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| Sl.No. | Date | Permitted area | |
|---|---|---|---|
| | | In acres | In hectares |
| 1 | 06.02.1970 | 348.21 | 140.92 |
| 2 | 24.07.1970 | 363.91 | 147.268 |
| 3 | 29.09.1970 | 460.87 | 186.500 |
| 4 | 06.09.1972 | 130.45 | 52.800 |
| 5 | 16.03.1978 | 1354.75 | 568.260 |
| **Total** | --- | **2658.19** | **1095.748** |

As per the above conditions, Director of Mines, Odisha, requested GMSPL for payment of 1st installment of Rs.1,54,18,804/- vide his letter No.1649/DM dated 22.02.2020 and GMSPL paid the said amount of Rs.1,54,18,804/- vide e-challan reference ID: 2E9E535280 dated 24.02.2020. However, the details of the 1st installment (10%) of upfront amount is paid as follows:

| Auction Details | | | | Details of 1st Installment of Upfront Amount | | | | |
|---|---|---|---|---|---|---|---|---|
| Date of Invitation of Bid | Forward e-Auction Held on | Accepted Highest FPO/Bid by Govt. | Date of Declaration of Preferred Bidder for Grant of ML | DoM's Demand Note No. | Date | Transaction Amt. In Rs. | E-Challan No. | Dated |
| 06.12.2019 | 10.02.2020 | **115%** | 22.02.2020 | MX-III(b)-28/2020/1649/DM | 22.02.2020 | **15418804** | 2E9E535280 | 24.02.2020 |

Divisional Forest Officer (DFO), Rairangpur Division, District Mayurbhanj requested GMSPL to deposit the amount of Rs.6,78,75,000/- @Rs.7.50 Lakhs / ha in to the account of CAMPA towards Net Present Value (NPV) over 90.50 ha of total forest land involved within Gorumahisani Mining Lease area over 349.50 hectares.

| Details of Demand Note | | | Details of UTR /Transaction Details | |
|---|---|---|---|---|
| Div. Name | Letter No. & Dt. | NPV Amt. in Rs. | UTR No. | Dated |
| Rairangpur FD | Memo No.1733/3F,Dt 09.04.2020 | 67875000 | UTIBR52020062000350183 | 20 June 2020 |

Govt. of Odisha extended the period of execution of the lease deed for a period of 15 days vide his letter No.4998/SM, Bhubaneswar dated 12.06.2020 (ref: Annexure-21).



(S.C. Nayak)
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ICICI Bank issued the Bank Guarantee of Rs.15,41,88,038/- in favour of the Governor of Odisha on behalf of GMSPL on 23.06.2020. District Mining Officer, Baripada said GMSPL to pay an amount of Rs.15,81,64,258/- towards Stamp Duty & Registration fee for execution of lease deed in respect of auctioned Gorumahisani auctioned mining lease vide his letter No.1691/Mines dated 26.06.2020 (ref: Annexure-12) and Sub-Register, Bamanghaty, Rairangpur intimated GMSPL to deposit the amount of Rs.15,81,64,258/- as Stamp Duty and Registration fee within the stipulated time period scheduled by the Govt. of Odisha, vide his letter No.377 dated 30.06.2020.

**2nd Installment of Upfront Amt. and Performance Security**

| **Details of 2nd Installment of Upfront Amount** | | | **Performance Security in the form of BG As per Rule-12 of the Mineral [Auction] Rules, 2015** | | | | **Confirmation Letter Dated on issuance of BG from the concerned Bank** |
|---|---|---|---|---|---|---|---|
| Transaction Amt. in Rs. | E-Challan No. | Dated | BG No. | Dated | Amended BG Dated | Amount in Rs. | |
| 15418804 | 2EB6790DB64 | 29.06.2020 | 0006NDDG00029421 | 23.06.2020 | - | 154188038 | 23.06.2020 |

Govt. of Odisha declared GMSPL as Successful Bidder for Gorumahisani Iron Ore Mining Lease vide letter No.5639/SM dated 01.07.2020 (ref: Annexure-15). The Director of Mines, Odisha, Bhubaneswar accordingly requested GMSPL to sign Mine Development of Production Agreement (MDPA) with the district Collector, Mayurbhanj, make the payment of Rs.12,33,55,430/- and report compliance for consideration of grant order of the mining lease in a GMSPL vide his letter No,4567/DM dated 01.07.2020. However, the details regarding MDPA Signing & 3rd (80%) Instalment of Upfront Amount are as follows:

| Letter from DoM to GMSPL for signing of **MDPA** and payment of 3rd Installment (80%) | | | **Details of 3RD Installment of Upfront Amount** | | |
|---|---|---|---|---|---|
| DoM's Letter No. | Date | Execution of MDPA | Transaction Amt. In Rs. | E-Challan No. | Dated |
| MX-III(b)-28/2020/4567/DM | 01.07.2020 | 01.07.2020 | 123350430 | 0853/131 | 1.07.2020 |

Lessee paid stamp duty and registration fee on 02.07.2020. The details of regarding grand order and payment of stamp duty and registration fee are as follows:



**(S.C. Nayak)**
Qualified Person

| Mr. S.C. Nayak, Qualified Person<br>M/s MINESKETCH Consultants (P) Ltd | M/s Ghanashyam Misra & Sons Pvt. Ltd<br>Mining Lessee |
|---|---|

| Lease Grant Order by S&M Deptt. | | Details of Demand @ Stamp Duty & Reg. Fees | | | |
|---|---|---|---|---|---|
| Memo No. [GMSPL] | Date | Demand Letter No. | Date | Stamp Duty in Rs. | Reg. Fees in Rs. |
| MX-III(b)-28/2020/4633/DM | 02.07.2020 | 1691/MINES | 26.06.2020 | 113078160 | 45231264 |

The details of the payment made so far to the State Govt. by the Applicant are as follows:

| Upfront Payment | Date of Payment | Amount of Payment (Rs.) |
|---|---|---|
| 1st installment (10%) | 24.02.2020 | 15418804 |
| 2nd installment (10%) | 29.06.2020 | 15418804 |
| 3rd installment (80%) | 1.07.2020 | 123350430 |
| NPV | 20.06.2020 | 67875000 |
| Stamp duty & registration fee | 02.07.2020 | 158164258 |
| **Total** | --- | **38,02,27,296** |

Govt. of Odisha granted mining lease under Rule-10(5) of Mineral (Auction) Rules, 2015 vide letter No.5707/SM dated 02.07.2020 (ref: Annexure-20) for a period of 50 years as per Section 8A(2) of the Mines and Mineral Development and Regulation Act, 1957 (67 of 1957) and Director of Mines, Odisha requested the Collector, Mayurbhanj to ensure execution of mining lease deed within the stipulated time period vide his letter No.4633/DM dated 02.07.2020. Finally, deed for Grant of Mining Lease is executed between the Governor of Odisha acting through the District Collector, Mayurbhanj and M/s Ghanashyam Misra and Sons Private Limited at 7, Waterloo Street, 2nd Floor, Kolkata-700069 and executed lease deed is registered on 03.07.2020.

**Preparation of Mining Plan:** Keeping in view conditions imposed in the LOI as indicated above, this Mining Plan has been submitted under Rule 16(1) of MCR, 2016 along with Progressive Mine Closure Plan (PMCP) under Rule 23 of MCDR, 2017 for a period of five (5) years from 2020-21 to 2024-25 by Shri S.C. Nayak, Qualified Person under Rule 15 of MCR, 2016 with his correspondence address at M/s MINESKETCH Consultants (P) Ltd, Flat No.205, Bhagwan Tower, Cuttack Road, Bhubaneswar-751006.



**(S.C. Nayak)**
Qualified Person

**Proposed Rate of Production and Utilization of Minerals:** Keeping in view the available reserve, ROM iron ore is proposed to be produced in the mine @0.75MTPA and these iron ores will be used in the 0.24 MTPA capacity steel & sponge iron plants of Lessee as below:

| Sl. No. | Name of the plant | Name of Units | Production capacity | |
|---|---|---|---|---|
| | | | Present | Expansion proposed |
| 1 | Bhagabati Power and Steel Ltd, Raipur, Chhattisgarh | Sponge Iron Unit | 66,000TPA | 66,000TPA |
| | | Steel Melting Shop | 66,000TPA | 66,000TPA |
| | | Steel Rolling Mill | 30,000TPA | 1,00,000TPA |
| | | Captive Power Plant | 10 MW | 10 MW |
| 2 | Amalgam Steel Pvt. Ltd, Kandra, Jamshedpur, Jharkhand. | Pellets Plant | 1.2 MTPA | 1.2 MTPA |
| 3 | Mayur Electro Ceramics Pvt. Ltd | Sponge Iron (tunnel kiln) | 7056 TPA | |
| | | High Grade Pure Nugget | 25000 TPA | |

Since the State Govt. has not specified the end use of the mineral in the block, surplus iron ore will be dispatched / sold to the other steel & sponge iron plants.

**Present Status of Statutory Clearances:** Lessee has requested the Member Secretary, SPCB, Odisha, Bhubaneswar for grant of Consent to Establish (CTE) vide his Ref. No.GMSPL/SPCB-BBSR/03/2020 dated 06.01.2021 and for grant of Consent to Operate (CTO) vide his Ref. No.GMSPL/SPCB-BBSR/01/2020 dated 11.12.2020 in respect of Gorumahisani Iron Ore Block. Lessee had submitted proposal online dated 03.11.2020 seeking prior approval of Central Govt. under Forest (Conservation) Act, 1980 dated 03.11.2020. Lessee has submitted proposal to the Ministry of Environment, Forest and Climate Change, Govt. of India for Environmental Clearance (EC) for which proposal for Terms of Reference (TOR) has been received vide proposal No.IA/OR/MIN/ 181490/2020 dated 31.10.2020 for approval of TOR.



**(S.C. Nayak)**
Qualified Person

# CHAPTER-1

## 1.0 GENERAL

### a) Name and Address of the Lessee / Applicant

M/s Ghanashyam Misra & Sons Pvt Ltd.

| Registered Office | Bhubaneswar Office | Address for Communication |
|---|---|---|
| 7, Waterloo Street<br>2nd Floor, Kolkata,<br>West Bengal-700069<br>Tel: 033-22480602 / 22482623<br>Fax: 033-22482623<br>E-mail: gmspl2011@gmail.com | IPICOL House, 3rd Floor, Annex Building, Janpath, Bhubaneswar-751022,<br>Phone: 0674-2540214,<br>Fax : 0674-2540217 | AT/PO: Gorumahisani, Via: Tatanagar (S.E.Rly)<br>Dist: Mayurbhanj, State: Odisha<br>E-mail: gmspl2011@gmail.com<br>Phone: 06794-274219 / 274204,<br>Fax: 06794-274380 |

Nominated Owner of the Company: Mr. Sourav Misra, Director
JBS Road, Silver Spring, Kolkata
Phone: 033-22480602

| | |
|---|---|
| Rule 45 registration No | IBM/1235/2011 |
| Mine Code | 30ORI10020 |

### b) Status of the Lessee / Applicant

Lessee, M/s Ghanashyam Misra & Sons Private Limited (GMSPL) is a Private Limited Company having more than 40 years of experience in mining and marketing of Iron ore in Gorumahisani Iron Ore Mine, district Mahyurbhanj, Odisha. Name and designation of the Board of Directors of Lessee are as follows (ref annexure-4):

| Sl. No. | Name | Father's Name | Contact No. | Residential Address | Date of Birth | PAN No. |
|---|---|---|---|---|---|---|
| 1 | Susil Kumar Misra | Late Ghanashyam Misra | 033-22480602 | Dalharmahala, Mouja-Kalna, J.L No.164, Bardwan-713409 | 18/06/1952 | ADMPM4806F |

| | | | | | | |
|---|---|---|---|---|---|---|
| 2 | Binod Kumar Misra | Late Ghanashyam Misra | 033-22480602 | 33, 2nd Floor, Sarat Bose Road, Kolkata-700020 | 11/01/1961 | ADQPM9640M |
| 3 | Sourav Misra | Jagadish Misra | 033-22480602 | JBS Road, Silver Spring, Kolkata | 07/07/1979 | ALJPM3437F |

Misra Group of companies formed by the Directors of Lessee, GMSPL have played a key role in core sectors of Ceramic & Sponge Iron manufactures, International Trade, Infrastructure, Agriculture & Cold Storage facilities, Automobile, Media & Entertainment as well as Health & Education in the following manner:

**Ceramics & Sponge Iron manufacturing (DRI):** Mayur Electro Ceramics Pvt. Ltd is one of the leading manufactures & exports of porcelain insulators & Tiles. The company use the entire production of Iron ore produced at the mines for manufacturing sponge iron and further production billets.

**International Trade:** Steer Overseas Pvt. Ltd is the export and import unit of the group with all the international trade negotiations and agreement related to mining, warehousing, procurement and processing of minerals and agro commodities being carried under the same banner.

**Infrastructure:** Misra Construction Pvt. Ltd has earned itself domestic repute in construction of bridges, dams & roads in the eastern regions of India. The group has developed various infrastructure projects at the rural level as well as its efforts to upon the existing road networks. The group has large interests in Real Estate sector and has ventured into many profitable investments and developments in Kolkata & Odisha.

**Agriculture & Cold storage facilities:** The group has a strong presence in the cold storage business through its group companies Kalyan Stores Pvt. Ltd & Agrani Cold Storage Pvt. Ltd at Burdwan & Midnapur Districts of West Bengal. The cold storage facility for storing vegetables, fruits and other perishable commodities. The group aims to develop its storage facilities & initiate contract farming all across production centers of India and provide from farm to fork solution in the agricultural sector.



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Qualified Person

**Automobile:** In the lieu of the growth and upcoming possibilities in the Auto Industry in Indian & Asian Markets, One Auto Pvt. Ltd has established itself as the leading service provider for Sales & Services for Maruti Suzuki in the eastern region.

**Media & Entertainment:** TRICOLOUR PRODUCTIONS is a motion film production & media company. The company was incorporated as an effort to develop into the rich spiritual heritage of India and catering it to wider audience through the means of and the medium of media.

**Health & Education:** The group being totally committed towards the Society has ventured in the Education &Health sector. Acme Academy an English medium residential co-educational school located near Kolkata is affiliated to the ICSE Board, New Delhi. Charnock hospital is a 150 bed multi-specialty tertiarycare premier hospital in North Kolkata with modern technology and medical science.

Mr. Sourav Misra, Director of GMSPL is designated as the Nominated Owner as per the resolution of the Board of Directors (ref: Annexure-4) who has signed the consent letter etc. Photo ID and signature proof of the Nominated owner has been enclosed (ref: Annexure-5).

c) Mineral(s) which is / are included in the prospecting license (For Fresh grant)

Not Applicable

d) Mineral(s) which is / are included in the Letter of Intent / lease deed

Iron Ore is included in the Letter of Intent (LOI) dated 18.03.2020 as well as lease deed executed & registered on 03.07.2020 (ref: Annexure-9 & 21).

e) Mineral(s) which is the applicant / Lessee intends to mine

Lessee intends to mine iron ore which has been established in the M.L. area as per the Geological Report submitted under Rule 12(4A)(b) of MCDR, 2018 and provided by the State Government as required under clause (b) of Rule 5 of the Minerals (Evidence of Mineral Contents) Rules, 2015.

## f) Name, Qualification, Experience and Address of the Qualified Person Who Has Prepared Mining Plan

Name : Mr. S.C. Nayak

Qualification : Mining Engineer having AMIE (IE) and M. Tech (ISM) and more than 5 years field experience in supervisory capacity along with RQP Certificate valid up to 01.02.2021. Academic Qualification and experience certificate under Rule 15 of MCR, 2016 along with identity proof have been enclosed (ref : Annexure-2).

Address : MINESKETCH Consultants (P) Ltd
Flat No.205, Bhagwan Tower, Cuttack Road,
Bhubaneswar-751006
Telephone: 0674-2573607 / 2950508,
Mobile: 7978439350 / 9438471176
E-mail: mcpl762005@gmail.com /minesketch2005@gmail.com



**(S.C. Nayak)**
Qualified Person

# CHAPTER-2

## 2.0 LOCATION AND ACCESSIBILITY

### a) Lease Details

| | | |
|---|---|---|
| Name of the Mine | : | Gorumahisani Iron Ore Block |
| Address | : | M/s Ghanashyam Misra & Sons (P) Ltd.<br>AT / PO: Gorumahisani, Dist: Mayurbhanj, Odisha<br>Phone: 06794 –274219 / 274380,<br>Fax: 06794 – 274380,<br>E-mail: gmspl2011@mail.com |
| Total lease area | : | 349.709 hectares (as per DGPS) / 349.50 hectares (as per ROR) |
| Villages | : | Kuleisila, Badamouda, Sanamouda, Sundhal, Balitangiri, Nodhabani and Gorumahisani R.F |
| Tahasil | : | Rairangpur |
| District | : | Mayurbhanj |
| State | : | Odisha |

**Latitude and Longitude of boundary pillars:** Gorumahisani Iron Ore Block over an area of 349.709 hectares (as per DGPS) / 349.50 hectares (as per ROR) in villages Kuleisila, Badamouda, Sanamouda, Sundhal, Balitangiri, Nodhabani and Gorumahisani R.F, Tahasil Rairangpur, District Mayurbhanj, Odisha is a part of Survey of India toposheet No.73J/7 on 1:50,000 scale and is bounded by the latitudes from $22^0$18'12.05882" to $22^0$20'05.79198"N and longitudes from $84^0$14'40.74483" to $86^0$17'00.74824"E as per DGPS surveyed Geo-referenced Map prepared by Odisha Space Application Centre (ORSAC), Department of Science & Technology, Govt. of Odisha.(ref: Precise Area Map Vide Plate-I).

**Date of execution of lease, period of lease and date of expiry of lease:**

Deed for grant of mining lease is executed between the Governor of Odisha acting through the District Collector, Mayurbhanj and M/s Ghanashyam Misra and Sons Private Limited at 7, Waterloo Street, 2nd Floor, Kolkata-700069 and executed lease deed is registered on 03.07.2020 for a period of 50 years w.e.f 03.07.2020 to 02.07.2070.



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Qualified Person

| Mr. S.C. Nayak, Qualified Person<br>M/s MINESKETCH Consultants (P) Ltd | M/s Ghanashyam Misra & Sons Pvt. Ltd<br>Mining Lessee |
|---|---|

Name and Address of the Lessee / Applicant:
M/s Ghanashyam Misra & Sons Pvt Ltd.

| Registered Office | Bhubaneswar Office | Address for Communication |
|---|---|---|
| 7, Waterloo Street<br>2nd Floor, Kolkata,<br>West Bengal-700069<br>Tel: 033-22480602 / 22482623<br>Fax: 033-22482623<br>E-mail: gmspl2011@gmail.com | IPICOL House, 3rd Floor, Annex Building, Janpath, Bhubaneswar-751022,<br>Phone: 0674-2540214,<br>Fax : 0674-2540217 | AT/PO: Gorumahisani, Via: Tatanagar (S.E.Rly)<br>Dist: Mayurbhanj, State: Odisha<br>E-mail: gmspl2011@gmail.com<br>Phone: 06794-274219 / 274204,<br>Fax: 06794-274380 |

b) Details of applied /lease area with location map (fresh area /mine)

As per the land schedule, pre-operational land use pattern of Gorumahisani Iron Ore Block over an area of 349.709 hectares (as per DGPS) / 349.50 hectares (as per ROR) is as follows:

| Forest land | | Non-forest land | |
|---|---|---|---|
| **Type** | **Area (ha)** | **Type** | **Area (ha)** |
| Forest R.F | 90.50 | Govt. Land (Grazing land, waste land, Revenue land etc.) | 151.44 |
| | | Private Land (Gharbari, Agriculture etc.) | 107.56 |
| **Total** | **90.50** | **---** | **259.00** |

Total lease area / applied area: 349.709 hectares (as per DGPS) / 349.50 hectares (as per ROR).

District & State: Mayurbhanj & Odisha

Taluka: Rairangpur

Villages: Kuleisila, Badamouda, Sanamouda, Sundhal, Balitangiri, Nodhabani and Gorumahisani R.F

Whether the area falls under Coastal Regulation Zone (CRZ): No

If yes, details thereof: Not applicable.

Existence of public road / railway line (accessibility):

Road: Gorumahisani Iron Ore Block is accessible from Rairangpur, a municipal town covering a distance of 16 km. This ongoing Gorumahisani iron ore block project is connected with well-maintained metal road links to capital of Odisha, Bhubaneswar by road with a distance of 395 km.



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**Railway:** The nearest railway station is Gorumahisani established by SE RLY with siding facilities for transportation of iron ore through railway wagons.

**Toposheet No. and latitude & longitude of corner pillars:** Toposheet No. is 73J/7 and latitude & longitude of all boundary point/ pillars as per DGPS surveyed Geo-referenced Map are as follows (ref: Plate-II):

| Sl_No | Pillar_Id | Latitude | Longitude | Easting | Northing |
|---|---|---|---|---|---|
| 1 | ML-C1 | 22°19'10.84732" | 86°17'03.51705" | 426291.2476 | 2468386.5594 |
| 2 | ML-C2 | 22°19'01.11557" | 86°17'07.42079" | 426401.5137 | 2468086.7882 |
| 3 | ML-C3 | 22°18'57.89388" | 86°17'06.66365" | 426379.3825 | 2467987.8270 |
| 4 | ML-C4 | 22°18'54.87318" | 86°17'10.15547" | 426478.8446 | 2467894.4706 |
| 5 | ML-C5 | 22°18'51.55752" | 86°17'16.18595" | 426650.8967 | 2467791.7021 |
| 6 | ML-C6 | 22°18'48.01925" | 86°17'20.37819" | 426770.3259 | 2467682.3381 |
| 7 | ML-C7 | 22°18'42.71073" | 86°17'21.09611" | 426790.0971 | 2467519.0097 |
| 8 | ML-C8 | 22°18'40.97841" | 86°17'18.94995" | 426728.4424 | 2467466.0320 |
| 9 | ML-C9 | 22°18'39.79289" | 86°17'17.77762" | 426694.7291 | 2467429.7366 |
| 10 | ML-C10 | 22°18'44.00865" | 86°17'14.45995" | 426600.4189 | 2467559.8150 |
| 11 | ML-C11 | 22°18'50.67112" | 86°17'14.31202" | 426597.1542 | 2467764.6991 |
| 12 | ML-C12 | 22°18'47.33387" | 86°17'10.55275" | 426489.1141 | 2467662.5903 |
| 13 | ML-C13 | 22°18'46.54860" | 86°17'10.25706" | 426480.5402 | 2467638.4844 |
| 14 | ML-C14 | 22°18'40.80922" | 86°17'05.05889" | 426330.9802 | 2467462.7083 |
| 15 | ML-C15 | 22°18'39.62454" | 86°16'51.95155" | 425955.7920 | 2467428.0624 |
| 16 | ML-C16 | 22°18'38.21593" | 86°16'48.63042" | 425860.5640 | 2467385.2020 |
| 17 | ML-C17 | 22°18'42.84970" | 86°16'45.79128" | 425780.0131 | 2467528.0735 |
| 18 | ML-C18 | 22°18'43.99444" | 86°16'46.17475" | 425791.1527 | 2467563.2208 |
| 19 | ML-C19 | 22°18'44.56987" | 86°16'51.00577" | 425929.4568 | 2467580.2553 |
| 20 | ML-C20 | 22°18'45.77803" | 86°16'55.01171" | 426044.2468 | 2467616.8594 |
| 21 | ML-C21 | 22°18'40.91286" | 86°16'56.50416" | 426086.2355 | 2467467.0569 |
| 22 | ML-C22 | 22°18'41.58110" | 86°17'03.45738" | 426285.2721 | 2467486.6600 |
| 23 | ML-C23 | 22°18'45.89789" | 86°17'06.84642" | 426382.8644 | 2467618.9376 |
| 24 | ML-C24 | 22°18'50.35171" | 86°17'09.19279" | 426450.6441 | 2467755.5701 |
| 25 | ML-C25 | 22°18'53.83140" | 86°17'06.13571" | 426363.6863 | 2467862.9814 |
| 26 | ML-C26 | 22°18'50.20452" | 86°17'03.68564" | 426293.0601 | 2467751.7905 |
| 27 | ML-C27 | 22°18'52.23703" | 86°17'02.18574" | 426250.4437 | 2467814.4920 |
| 28 | ML-C28 | 22°18'51.15886" | **86°17'00.74824"** | 426209.1590 | 2467781.5344 |
| 29 | ML-C29 | 22°18'49.55395" | 86°16'58.61171" | 426147.7974 | 2467732.4755 |
| 30 | ML-C30 | 22°18'50.05983" | 86°16'57.37937" | 426112.6133 | 2467748.1982 |
| 31 | ML-C31 | 22°18'51.24452" | 86°16'58.02101" | 426131.1442 | 2467784.5392 |
| 32 | ML-C32 | 22°18'58.19021" | 86°16'57.89242" | 426128.4804 | 2467998.1297 |
| 33 | ML-C33 | 22°18'58.04200" | 86°16'55.34962" | 426055.7089 | 2467993.9184 |
| 34 | ML-C34 | 22°18'51.97111" | 86°16'44.09121" | 425732.7128 | 2467808.7804 |
| 35 | ML-C35 | 22°18'41.94197" | 86°16'40.22689" | 425620.6769 | 2467500.9227 |



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| Sl_No | Pillar_Id | Latitude | Longitude | Easting | Northing |
|---|---|---|---|---|---|
| 36 | ML-C36 | 22°18'36.25738" | 86°16'48.06768" | 425844.1761 | 2467325.0553 |
| 37 | ML-C37 | 22°18'32.32651" | 86°16'48.91562" | 425867.8602 | 2467204.0693 |
| 38 | ML-C38 | 22°18'29.70734" | 86°16'55.93661" | 426068.3588 | 2467122.5758 |
| 39 | ML-C39 | 22°18'21.70496" | 86°17'02.76754" | 426262.6359 | 2466875.5824 |
| 40 | ML-C40 | 22°18'22.57564" | 86°17'03.84291" | 426293.5314 | 2466902.2091 |
| 41 | ML-C41 | 22°18'22.20049" | 86°17'06.06511" | 426357.0585 | 2466890.3722 |
| 42 | ML-C42 | 22°18'24.41815" | 86°17'05.13974" | 426330.9051 | 2466958.6884 |
| 43 | ML-C43 | 22°18'29.96524" | 86°17'03.79577" | 426293.2602 | 2467129.4383 |
| 44 | ML-C44 | 22°18'28.87973" | 86°17'06.58800" | 426372.9923 | 2467095.6813 |
| 45 | ML-C45 | 22°18'35.50872" | 86°17'08.57638" | 426430.8479 | 2467299.2464 |
| 46 | ML-C46 | 22°18'39.31386" | 86°17'05.59712" | 426346.1616 | 2467416.6544 |
| 47 | ML-C47 | 22°18'41.32338" | 86°17'09.67003" | 426462.9845 | 2467477.8934 |
| 48 | ML-C48 | 22°18'36.17592" | 86°17'21.67794" | 426805.7976 | 2467317.9928 |
| 49 | ML-C49 | 22°18'32.97735" | 86°17'20.97618" | 426785.2561 | 2467219.7347 |
| 50 | ML-C50 | 22°18'24.61362" | 86°17'16.11437" | 426644.9391 | 2466963.2143 |
| 51 | ML-C51 | 22°18'23.27604" | 86°17'19.23483" | 426734.0277 | 2466921.6641 |
| 52 | ML-C52 | 22°18'16.47905" | 86°17'16.12544" | 426644.0758 | 2466713.0833 |
| 53 | ML-C53 | 22°18'14.80499" | 86°17'14.67403" | 426602.3044 | 2466661.8034 |
| 54 | ML-C54 | **22°18'12.05882"** | 86°17'11.24350" | 426503.7493 | 2466577.8253 |
| 55 | ML-C55 | 22°18'14.41300" | 86°17'05.35928" | 426335.7289 | 2466651.0107 |
| 56 | ML-C56 | 22°18'16.35196" | 86°17'03.92363" | 426294.9339 | 2466710.8263 |
| 57 | ML-C57 | 22°18'20.07793" | 86°16'59.93376" | 426181.3179 | 2466825.9377 |
| 58 | ML-C58 | 22°18'22.36717" | 86°16'59.68894" | 426174.6473 | 2466896.3626 |
| 59 | ML-C59 | 22°18'28.48572" | 86°16'54.43697" | 426025.2725 | 2467085.2162 |
| 60 | ML-C60 | 22°18'31.16882" | 86°16'47.39527" | 425824.1909 | 2467168.6789 |
| 61 | ML-C61 | 22°18'35.95934" | 86°16'46.20069" | 425790.7154 | 2467316.1457 |
| 62 | ML-C62 | 22°18'41.39314" | 86°16'37.18957" | 425533.6953 | 2467484.4628 |
| 63 | ML-C63 | 22°18'40.10883" | 86°16'34.40947" | 425453.9643 | 2467445.3530 |
| 64 | ML-C64 | 22°18'40.14616" | 86°16'32.56715" | 425401.2590 | 2467446.7535 |
| 65 | ML-C65 | 22°18'50.30829" | 86°16'29.67349" | 425319.9695 | 2467759.6269 |
| 66 | ML-C66 | 22°18'50.86152" | 86°16'30.56997" | 425345.7000 | 2467776.5152 |
| 67 | ML-C67 | 22°18'52.62924" | 86°16'34.09189" | 425446.7248 | 2467830.3871 |
| 68 | ML-C68 | 22°18'50.91937" | 86°16'39.28116" | 425594.9401 | 2467777.0987 |
| 69 | ML-C69 | 22°18'49.23067" | 86°16'40.00759" | 425615.4753 | 2467725.0734 |
| 70 | ML-C70 | 22°18'49.21760" | 86°16'40.89319" | 425640.8110 | 2467724.5502 |
| 71 | ML-C71 | 22°18'54.56033" | 86°16'42.41446" | 425685.1209 | 2467888.6258 |
| 72 | ML-C72 | 22°18'55.38225" | 86°16'47.56068" | 425832.4765 | 2467913.1956 |
| 73 | ML-C73 | 22°18'58.31057" | 86°16'51.58834" | 425948.1379 | 2468002.6890 |
| 74 | ML-C74 | 22°19'03.05938" | 86°16'50.10015" | 425906.2567 | 2468148.9133 |
| 75 | ML-C75 | 22°19'04.43906" | 86°16'45.69628" | 425780.4656 | 2468191.9384 |
| 76 | ML-C76 | 22°19'03.39457" | 86°16'44.79051" | 425754.3983 | 2468159.9452 |
| 77 | ML-C77 | 22°18'58.22510" | 86°16'48.03255" | 425846.3940 | 2468000.5461 |
| 78 | ML-C78 | 22°18'55.76891" | 86°16'46.12931" | 425791.5813 | 2467925.2807 |
| 79 | ML-C79 | 22°18'55.76573" | 86°16'42.13236" | 425677.2272 | 2467925.7292 |



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| Sl_No | Pillar_Id | Latitude | Longitude | Easting | Northing |
|---|---|---|---|---|---|
| 80 | ML-C80 | 22°19'03.25356" | 86°16'38.42733" | 425572.3283 | 2468156.4803 |
| 81 | ML-D1S | 22°19'51.24839" | 86°16'47.29406" | 425833.0504 | 2469631.0635 |
| 82 | ML-D2S | 22°19'50.20623" | 86°16'46.56598" | 425812.0691 | 2469599.1175 |
| 83 | ML-D3S | 22°19'46.45621" | 86°16'42.29115" | 425689.2265 | 2469484.3926 |
| 84 | ML-D4S | 22°19'52.32663" | 86°16'27.94941" | 425279.8157 | 2469666.8714 |
| 85 | ML-D5S | 22°19'55.55192" | 86°16'27.73029" | 425274.0246 | 2469766.0765 |
| 86 | ML-D6S | 22°19'55.95699" | 86°16'26.14390" | 425228.7028 | 2469778.7505 |
| 87 | ML-D7S | 22°19'57.77066" | 86°16'26.37001" | 425235.4397 | 2469834.4881 |
| 88 | ML-D8S | 22°19'58.16342" | 86°16'25.68207" | 425215.8182 | 2469846.6598 |
| 89 | ML-D9S | 22°19'58.97646" | 86°16'25.86207" | 425221.0877 | 2469871.6355 |
| 90 | ML-D10S | 22°20'01.21255" | 86°16'21.41414" | 425094.1790 | 2469941.0067 |
| 91 | ML-D11S | 22°20'00.64169" | 86°16'20.88957" | 425079.0881 | 2469923.5254 |
| 92 | ML-D12S | 22°20'02.60646" | 86°16'15.72962" | 424931.7718 | 2469984.6536 |
| 93 | ML-D13S | 22°19'55.66223" | 86°16'12.58458" | 424840.7695 | 2469771.5594 |
| 94 | ML-D14S | 22°19'53.39073" | 86°16'18.79944" | 425018.2201 | 2469700.8535 |
| 95 | ML-D15S | 22°19'46.27209" | 86°16'16.61417" | 424954.6481 | 2469482.2633 |
| 96 | ML-D16S | 22°19'44.62346" | 86°16'18.53858" | 425009.4559 | 2469431.3033 |
| 97 | ML-D17S | 22°19'37.37425" | 86°16'22.08428" | 425109.8144 | 2469207.9072 |
| 98 | ML-D18S | 22°19'36.41081" | 86°16'19.86417" | 425046.1590 | 2469178.5887 |
| 99 | ML-D19S | 22°19'28.37796" | 86°16'26.39538" | 425231.8144 | 2468930.6851 |
| 100 | ML-D20S | 22°19'27.63859" | 86°16'25.30055" | 425200.3834 | 2468908.1009 |
| 101 | ML-D21S | 22°19'30.12468" | 86°16'22.84090" | 425130.3854 | 2468984.8850 |
| 102 | ML-D22S | 22°19'32.94573" | 86°16'18.66062" | 425011.2132 | 2469072.2068 |
| 103 | ML-D23S | 22°19'29.11585" | 86°16'18.98749" | 425019.9959 | 2468954.3961 |
| 104 | ML-D24S | 22°19'29.18007" | 86°16'17.98542" | 424991.3380 | 2468956.5094 |
| 105 | ML-D25S | 22°19'31.82562" | 86°16'17.46615" | 424976.8753 | 2469037.9293 |
| 106 | ML-D26S | 22°19'33.89920" | 86°16'14.70053" | 424898.0641 | 2469102.0724 |
| 107 | ML-D27S | 22°19'37.40740" | 86°16'13.80737" | 424873.0344 | 2469210.0700 |
| 108 | ML-D28S | 22°19'36.09399" | 86°16'17.69776" | 424984.1353 | 2469169.1458 |
| 109 | ML-D29S | 22°19'39.21408" | 86°16'17.18929" | 424970.0525 | 2469265.1564 |
| 110 | ML-D30S | 22°19'41.60603" | 86°16'14.30864" | 424887.9992 | 2469339.1049 |
| 111 | ML-D31S | 22°19'42.99353" | 86°16'11.99654" | 424822.0619 | 2469382.0893 |
| 112 | ML-D32S | 22°19'48.21646" | 86°16'08.61192" | 424726.0145 | 2469543.1589 |
| 113 | ML-D33S | 22°19'45.84165" | 86°16'00.01373" | 424479.6882 | 2469471.3297 |
| 114 | ML-D34S | 22°19'42.71346" | 86°16'05.20517" | 424627.7352 | 2469374.4193 |
| 115 | ML-D35S | 22°19'40.11837" | 86°16'05.51262" | 424636.1434 | 2469294.5796 |
| 116 | ML-D36S | 22°19'37.15401" | 86°16'08.91398" | 424733.0070 | 2469202.9564 |
| 117 | ML-D37S | 22°19'33.32342" | 86°16'06.81778" | 424672.4678 | 2469085.4597 |
| 118 | ML-D38S | 22°19'27.72147" | 86°16'12.80388" | 424842.8856 | 2468912.3751 |
| 119 | ML-D39S | 22°19'26.11963" | 86°16'11.38360" | 424802.0152 | 2468863.3167 |
| 120 | ML-D40S | 22°19'27.38350" | 86°16'09.38111" | 424744.9150 | 2468902.4570 |
| 121 | ML-D40AS | 22°19'23.91604" | 86°16'07.21035" | 424682.2958 | 2468796.1367 |
| 122 | ML-D41S | 22°19'26.23750" | 86°16'04.79458" | 424613.5303 | 2468867.8547 |
| 123 | ML-D42S | 22°19'27.11371" | 86°16'02.11584" | 424537.0263 | 2468895.1694 |



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Qualified Person

| Sl_No | Pillar_Id | Latitude | Longitude | Easting | Northing |
|---|---|---|---|---|---|
| 124 | ML-D43S | 22°19'28.31408" | 86°16'02.28671" | 424542.0941 | 2468932.0561 |
| 125 | ML-D44S | 22°19'27.80439" | 86°16'04.49009" | 424605.0531 | 2468916.0774 |
| 126 | ML-D45S | 22°19'29.10965" | 86°16'04.89710" | 424616.8918 | 2468956.1566 |
| 127 | ML-D46S | 22°19'29.58790" | 86°16'03.11502" | 424565.9808 | 2468971.1098 |
| 128 | ML-D47S | 22°19'34.02079" | 86°16'04.80662" | 424615.0362 | 2469107.1823 |
| 129 | ML-D48S | 22°19'37.49203" | 86°16'03.91617" | 424590.0806 | 2469214.0437 |
| 130 | ML-D49S | 22°19'38.75834" | 86°16'02.89023" | 424560.9194 | 2469253.1243 |
| 131 | ML-D50S | 22°19'39.50895" | 86°16'02.99417" | 424564.0051 | 2469276.1905 |
| 132 | ML-D51S | 22°19'43.50255" | 86°15'55.21622" | 424342.0933 | 2469400.0725 |
| 133 | ML-D52S | 22°19'40.71752" | 86°15'50.09024" | 424195.0333 | 2469315.1504 |
| 134 | ML-D53S | 22°19'35.50117" | 86°15'47.91702" | 424132.0788 | 2469155.0554 |
| 135 | ML-D54S | 22°19'30.50751" | 86°15'43.39953" | 424002.0911 | 2469002.1363 |
| 136 | ML-D55 | 22°19'29.10176" | 86°15'42.42271" | 423973.9344 | 2468959.0475 |
| 137 | ML-D56S | 22°19'24.28807" | 86°15'40.44572" | 423916.6507 | 2468811.3075 |
| 138 | ML-D57S | 22°19'20.30974" | 86°15'39.20455" | 423880.5430 | 2468689.1511 |
| 139 | ML-D58S | 22°19'14.17900" | 86°15'39.67477" | 423893.0721 | 2468500.5702 |
| 140 | ML-D59S | 22°19'04.94438" | 86°15'35.29884" | 423766.4866 | 2468217.2273 |
| 141 | ML-D60S | 22°19'03.60850" | 86°15'39.76687" | 423894.1150 | 2468175.5236 |
| 142 | ML-D61S | 22°18'56.27282" | 86°15'39.26678" | 423878.7024 | 2467950.0278 |
| 143 | ML-D62S | 22°18'56.12720" | 86°15'35.38728" | 423767.6868 | 2467946.0942 |
| 144 | ML-D63S | 22°18'54.37635" | 86°15'34.40882" | 423739.4287 | 2467892.3947 |
| 145 | ML-D64S | 22°18'53.31336" | 86°15'32.19110" | 423675.8181 | 2467860.0201 |
| 146 | ML-D65S | 22°18'55.13552" | 86°15'28.86290" | 423580.8725 | 2467916.5176 |
| 147 | ML-D66S | 22°18'49.23041" | 86°15'20.31470" | 423335.4096 | 2467736.1454 |
| 148 | ML-D67S | 22°18'57.42957" | 86°15'16.56388" | 423229.3414 | 2467988.7923 |
| 149 | ML-D68S | 22°19'03.02291" | 86°15'11.12350" | 423074.5424 | 2468161.5525 |
| 150 | ML-D69S | 22°19'07.46454" | 86°15'11.02982" | 423072.5382 | 2468298.1421 |
| 151 | ML-D70S | 22°19'11.82388" | 86°14'57.28770" | 422680.0475 | 2468434.1399 |
| 152 | ML-D71S | 22°19'46.25372" | **86°14'40.74483"** | 422212.0670 | 2469495.1941 |
| 153 | ML-D72S | 22°19'47.36757" | 86°14'43.50023" | 422291.0634 | 2469529.0495 |
| 154 | ML-D73S | 22°19'50.75774" | 86°14'46.55682" | 422379.0258 | 2469632.8575 |
| 155 | ML-D74S | 22°20'00.02698" | 86°15'00.09885" | 422767.8438 | 2469915.9480 |
| 156 | ML-D75S | 22°19'47.01264" | 86°15'20.49771" | 423349.4125 | 2469512.8754 |
| 157 | ML-D76S | 22°19'41.41243" | 86°15'34.70482" | 423754.9958 | 2469338.6727 |
| 158 | ML-D77S | 22°19'35.76588" | 86°15'31.06924" | 423650.1367 | 2469165.5568 |
| 159 | ML-D78S | 22°19'31.92295" | 86°15'27.29616" | 423541.6145 | 2469047.9210 |
| 160 | ML-D79S | 22°19'23.85542" | 86°15'24.90154" | 423471.8863 | 2468800.1882 |
| 161 | ML-D80S | 22°19'20.03017" | 86°15'28.74511" | 423581.2676 | 2468682.0239 |
| 162 | ML-D81S | 22°19'17.66502" | 86°15'32.59842" | 423691.1495 | 2468608.7556 |
| 163 | ML-D82S | 22°19'39.43389" | 86°15'41.54694" | 423950.4356 | 2469276.8746 |
| 164 | ML-D83S | 22°19'41.20760" | 86°15'43.41406" | 424004.1165 | 2469331.1533 |
| 165 | ML-D84S | 22°19'41.31697" | 86°15'46.59193" | 424095.0447 | 2469334.0718 |
| 166 | ML-D85S | 22°19'47.57422" | 86°15'49.79438" | 424187.5987 | 2469526.0294 |
| 167 | ML-D86S | 22°19'49.00247" | 86°15'57.17651" | 424398.9958 | 2469568.9172 |



(S.C. Nayak)
Qualified Person

# PART-A
# CHAPTER-1

## 1.0 GEOLOGY AND EXPLORATION

a) Briefly describe the topography, drainage pattern, vegetation, climate, rainfall data of the area applied/mining lease area.

**Topography:** Eastern part of the M.L. area represents a rugged topography and consists of dissected steep hill range with elongated narrow to wide hill valleys in between. The altitudes ranges from 480m to 906m above mean sea level. Kochar hill of the block exhibits a prominent peak in the region having RL of 906m. Most of the area in this block has been degraded / utilized for quarrying, dumping, road etc arising out of mining and allied activities.

Western part of the area is mostly of plain land. Highest & lowest altitudes are at 350m & 290m above MSL. Most of the area on this block has been degraded / utilized for processing (crushing & screening) and stacking of iron ore.

**Drainage Pattern:** The drainage pattern of the area is of dendritic type. There is no perennial source in the M.L area. The seasonal water ways like gullies, streamlets and streams (nalas) drain the surface run-off water during rainy season.

**Vegetation:** Forest land diverted by the lessee is utilised for mining and allied activities. General character of the vegetation in the nearby forest is dry deciduous type Vegetation within the non-forest part of the M.L. area is sparse. The common flora as observed in the M.L. area and buffer zone (5km radius) are Sal (Shorea Robusta), Kusum (Schleichera oleosa), Kadamba (Neolanarckia cadamba), Palas (Butea monosperma) etc. The forests in the buffer zone are mainly dominated by the Sal (Shorea robusta).



(S.C. Nayak)
Qualified Person

**Climate and rainfall data:** The climate of the area is sub-tropical with abundant rainfall during monsoon. July is rainiest month of the year. More than 70% of the annual rainfall is received during June to September. Analysis of meteorological data over a period of 10 years shows that annual average rainfall is 1250mm. The range of temperature is found to vary between 90°C to 44.50°C. Relative humidity varies from 20% to 96%. Predominant wind direction is South East.

b) **Brief descriptions of Regional Geology with reference to location of lease/applied area**

Gorumahisani iron ore deposit forms a part of Precambrian sedimentary formations known as the iron ore series developed in southern extension of Singbhum in EW, but gradually changing over to NW-SE in the eastern part.

This part of Singhbhum is marked by a shear zone along which rocks have been thrust towards south and metamorphosed. The shear zone is characterized by intrusion of soda granophyres in which deposit of copper apatite & magnetite are associated. Towards north of the shear zone the rocks consists phyllites & tuffs with basic intrusive at the bottom which are overlain by ferruginous quartzites & phyllites. Above them a series of lava flows appear which is known as Dalmavolcanies and occupy a fairly broad half of the country.

The iron ore series consist mainly of banded hematite quartzite (BHQ) and shales with intercalations of lava flow and tuffs. Dunn (1942) believed that certain phyllites and shale in eastern and southern Singhbhum were originally volcanic and that they have been either silicified or replaced by iron to some extent, the later when in contact with banded ferruginous rocks. The iron ore series is overlain by the Kolhan series of presumably Cuddaph era (Algonkian as described by different workers) which consists of basal conglomerate and sandstone followed by limestone and shale. The whole succession of rocks are folded into a series of asymmetric or slightly overturned anticlines and synclines.



(S.C. Nayak)
Qualified Person

The general stratigraphical succession of this area is as under:

The regional Stratigraphy as postulated by Prof. Sarkar and Saha in 1982/1983 is mentioned below and is now being followed for the geo-chronology.

Singhbhum Granite (3000ma)
----------Iron ore orogeny----------
Epidiorite
Upper shales with sand stone &Volcanics
BHJ with iron ore
Lower shales, tuffs and acid volcanics
Mafic lavas and tuff
Sandstone and Conglomerates (local)
----------Unconformity----------
Older metamorphics
Tonalite gneiss (OMTG 3800 ma)
Older metamorphic orogeny
Older metamorphic group
Mafic intrusive, Calc-Magnesium
Metasediments, Quartzite etc.
Basements (3800ma)

c) **Detailed description of geology of the lease area such as shape and size of the mineral/ore deposit, disposition various litho-units indicating structural features if any etc.** (Applicable for Mining Plan for grant & renewal and not for Scheme of Mining/Modifications in the approved mining plan/scheme of Mining).

The rocks exposed in the topographically high hill ranges are dolerite, grunerite schist (sometimes banded with hematite or magnetite) banded hematite quartzite, quartzites and ochreous & kaolinous beds. Thickness of the rocks of the iron ore series covering the hill is about 300m. North-western portion of the Gorumahisani hill consists of granite from base to 250m height. Intrusion of dolerite occurs in granite and the rocks of the iron ore series. However, intensive secondary alterations have diffused the evidences of intrusions of dolerites and even granites in the iron ore bodies. Effect of thermal metamorphism caused the transformations of some siliceous and ferruginous rocks into grunerite schists with bands of hematite.



**(S.C. Nayak)**
Qualified Person

Leaching and replacement in the rocks including iron ore by meteoric water played important roles in the origin of iron ores. In tropical conditions, iron ore is mostly occurring in the peak, F. Level and other areas.

Soil, Laterite, different types of iron ore such as lateritic iron ore, float iron ore, soft & hard laminated ore, massive ore & blue dust, BMQ, BHQ, Quartzite and Shale occurs within the area.

**Laterite:** It is the uppermost litho unit which is brownish in color and occurs in a very thin layer. Laterite found in the area is the product of secondary alteration of country rocks. Laterite observed in the area is ferruginous in nature.

**Lateritic Iron ore (LTO):** It is lateralized product of Hard / Soft laminated iron ore and occurs as blankets over the BIF. Lateritic iron ore is found at the top or immediately below the laterite zone. It is generally with dull luster, rich in alumina, friable nature and lowest in grade.

**Float Iron Ore:** It is found at the foot of the mineralized hillock.

**Soft Laminated Ore (SLO):** It is observed to be associated and / or inter-layered with thin bands of ferruginous shale. It is higher in grade as compared to the lateritic iron ore. At places, it is soft in nature, characterized by the laminations and very much friable. Blue dust often occupies the lamina cavities.

**Hard Laminated Ore (HLO):** It is differentiated from SLO for its compactness and considered as the economic ore. It includes ore with more compactness among the lamina.

**Hard Massive Ore (HMO):** It is fine-grained, dense and compact in nature. Massive ore is dark brown to steel grey in colour and compact with high specific gravity. Due to presence of well marked joint planes, the ores generally break in to big blocks.

**Blue Dust:** It is natural occurring iron ore fines and metallic blue in color. It occurs as pockets laterally or vertically in iron ore zone. Occurrence of blue dusts is independent of topography and stratigraphic sequence.

| Mr. S.C. Nayak, Qualified Person<br>M/s MINESKETCH Consultants (P) Ltd | M/s Ghanashyam Misra & Sons Pvt. Ltd<br>Mining Lessee |
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|---|---|
| M/s National Drilling Co,<br>9, Rajendra Dev Road, Kolkata-700007<br>Email- nadco124@gmail.com | Tel: 033-22480602 / 22482623<br>Fax: 033-22482623 |
| M/S Gemco Kati Exploration P Ltd<br>Plot No.34, Postal Colony, Bapat Nagar, Chandrapur, Maharashtra 442401<br>Email:jijo@gemcokati.com | |

e) Details of prospecting/exploration already carried out:

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

There exist nine (9) pits / quarries indicating dimensions etc. as detailed in the table below:

| Sl. No. | Pit Name | Block Name | Length (m) | Width (m) | Area (m) |
|---|---|---|---|---|---|
| 1 | Kochar West | East Block | 156 | 125 | 19500 |
| 2 | Kochar | East Block | 444 | 339 | 150516 |
| 3 | Kochar Top | -do- | 188 | 174 | 32712 |
| 4 | 2550 | -do- | 347 | 165 | 57255 |
| 5 | Kisuntanki | -do- | 246 | 139 | 34194 |
| 6 | F-Level | -do- | 516 | 244 | 125904 |
| 7 | West Block | --- | 392 | 71 | 27832 |
| 8 | -do- | --- | 346 | 238 | 82348 |
| 9 | -do- | --- | 516 | 287 | 148092 |
| **Total** | --- | --- | --- | --- | **678,353** |

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

Till February 2019, a total of 416 vertical boreholes consists of 189 core drill holes (5840.55m) and 227 noncore drill holes (3725m) have been sunk within the lease area as follows:

| Year | Core drill holes | | Non-Core Drill holes | | Total Number of holes | Total Meterage of drilling (m) |
|---|---|---|---|---|---|---|
| | Nos. | (m) | Nos. | (m) | | |
| 2011-12 | --- | --- | 31 | 1223.00 | 31 | 1223.00 |
| 2013-14 | 32 | 1263.00 | --- | --- | 32 | 1263.00 |
| 2016-17 | 21 | 784.85 | --- | --- | 21 | 784.75 |
| 2017-18 | 95 | 1838.80 | 138 | 1201.00 | 233 | 3039.80 |
| 2018-19 | 41 | 1954.00 | 58 | 1301.00 | 99 | 3255.00 |
| **TOTAL** | **189** | **5840.55** | **227** | **3725.00** | **416** | **9565.55** |



**(S.C. Nayak)**
Qualified Person

| Mr. S.C. Nayak, Qualified Person<br>M/s MINESKETCH Consultants (P) Ltd | M/s Ghanashyam Misra & Sons Pvt. Ltd<br>Mining Lessee |
|---|---|

The details of exploration such as year, BH No., Co-ordinate, Nature of BH, drilling length, mineralized / non mineralized and grid spacing as per Geological Report are given below:

| YEAR | BH No | Location | | RL | Nature of BH (Core/DTH) | Drill Length (m) | Mineralized / non-Mineralized | Ore Body Intersection (From-To) (m) | Grid Spacing |
|---|---|---|---|---|---|---|---|---|---|
| | | NORTHING | EASTING | | | | | | |
| 2011 - 12 | NBH-94 | 2467148 | 426543 | 902 | DTH | 39.00 | Mineralized | 0..00-36.00 | (50m X 50m) |
| 2011 -12 | NBH-95 | 2467148 | 426493 | 902 | DTH | 40.00 | Mineralized | 5.00-32.00 | (50m X 50m) |
| 2011 - 12 | NBH-96 | 2467148 | 426443 | 900 | DTH | 40.00 | Mineralized | 8.00-30.00 | (50m X 50m) |
| 2011 -12 | NBH-97 | 2467198 | 426543 | 889 | DTH | 38.00 | Mineralized | 0.00-18.00 | (50m X 50m) |
| 2011 - 12 | NBH-98 | 2467198 | 426493 | 898 | DTH | 36.00 | Mineralized | 0.00-31.00 | (50m X 50m) |
| 2011 -12 | NBH-99 | 2467198 | 426443 | 896 | DTH | 40.00 | Mineralized | 2.00-15.00 | (50m X 50m) |
| 2011 - 12 | NBH-100 | 2467248 | 426593 | 883 | DTH | 39.00 | Mineralized | 0.00-31.00 | (50m X 50m) |
| 2011 -12 | NBH-101 | 2467248 | 426543 | 878 | DTH | 38.00 | Mineralized | 2.00-30.00 | (50m X 50m) |
| 2011 - 12 | NBH-102 | 2467248 | 426493 | 889 | DTH | 44.00 | Mineralized | 0.00-32.00 | (50m X 50m) |
| 2011 -12 | NBH-103 | 2467248 | 426443 | 889 | DTH | 50.00 | Mineralized | 0.00-19.00 | (50m X 50m) |
| 2011 - 12 | NBH-104 | 2467298 | 426493 | 878 | DTH | 40.00 | Mineralized | 4.00-29.00 | (50m X 50m) |
| 2011 - 12 | NBH-105 | 2467950 | 426372 | 711 | DTH | 60.00 | Mineralized | 0.00-60.00 | (50m X 50m) |
| 2011 -12 | NBH-106 | 2468000 | 426322 | 662 | DTH | 60.00 | Mineralized | 0.00-60.00 | (50m X 50m) |
| 2011 - 12 | NBH-107 | 2468000 | 426272 | 634 | DTH | 27.00 | Mineralized | 0.00-27.00 | (50m X 50m) |
| 2011 -12 | NBH-108 | 2468000 | 426222 | 630 | DTH | 15.00 | Mineralized | 0.00-15.00 | (50m X 50m) |
| 2011 - 12 | NBH-109 | 2468050 | 426372 | 687 | DTH | 41.00 | Mineralized | 0.00-17.00 | (50m X 50m) |
| 2011 - 12 | NBH-110 | 2468050 | 426322 | 662 | DTH | 40.00 | Mineralized | 0.00-40 | (50m X 50m) |
| 2011 -12 | NBH-111 | 2468050 | 426272 | 628 | DTH | 33.00 | Mineralized | 0.00-33.00 | (50m X 50m) |
| 2011 - 12 | NBH-112 | 2468050 | 426222 | 648 | DTH | 27.00 | Mineralized | 0.00-27.00 | (50m X 50m) |
| 2011 -12 | NBH-113 | 2468050 | 426172 | 657 | DTH | 32.00 | Mineralized | 0.00-32.00 | (50m X 50m) |
| 2011 - 12 | NBH-114 | 2468050 | 426122 | 650 | DTH | 13.00 | Mineralized | 0.00-13.00 | (50m X 50m) |
| 2011 -12 | NBH-115 | 2468100 | 426372 | 667 | DTH | 31.00 | Mineralized | 2.00-31.00 | (50m X 50m) |
| 2011 - 12 | NBH-116 | 2468100 | 426322 | 651 | DTH | 45.00 | Mineralized | 0.00-45.00 | (50m X 50m) |
| 2011 -12 | NBH-117 | 2468100 | 426272 | 633 | DTH | 36.00 | Mineralized | 0.00-36.00 | (50m X 50m) |
| 2011 - 12 | NBH-118 | 2468100 | 426222 | 657 | DTH | 51.00 | Mineralized | 0.00-51.00 | (50m X 50m) |
| 2011 -12 | NBH-119 | 2468100 | 426172 | 665 | DTH | 55.00 | Mineralized | 0.00-55.00 | (50m X 50m) |
| 2011 - 12 | NBH-120 | 2468150 | 426322 | 638 | DTH | 47.00 | Mineralized | 0.00-47.00 | (50m X 50m) |
| 2011 - 12 | NBH-121 | 2468150 | 426272 | 638 | DTH | 45.00 | Mineralized | 0.00-45.00 | (50m X 50m) |
| 2011 -12 | NBH-122 | 2468150 | 426222 | 657 | DTH | 47.00 | Mineralized | 0.00-47.00 | (50m X 50m) |
| 2011 - 12 | NBH-123 | 2468150 | 426172 | 665 | DTH | 46.00 | Mineralized | 0.00-46.00 | (50m X 50m) |
| 2011 -12 | NBH-124 | 2467973 | 425776 | 590 | DTH | 28.00 | Non-Mineralized | 0.00-21.00 | (50m X 50m) |
| 2013-14 | CBH-63 | 2466748 | 426592 | 750 | Core | 42.00 | Mineralized | 0.00-38.00 | (50m X 50m) |
| 2013-14 | CBH-63 A | 2466748 | 426542 | 757 | Core | 42.00 | Mineralized | 0.00-37.00 | (50m X 50m) |
| 2013-14 | CBH-64 | 2466748 | 426492 | 750 | Core | 38.00 | Mineralized | 0.00-34.00 | (50m X 50m) |
| 2013-14 | CBH-65 | 2466798 | 426592 | 773 | Core | 36.00 | Mineralized | 1.00-36.00 | (50m X 50m) |
| 2013-14 | CBH-66 | 2466798 | 426542 | 766 | Core | 46.00 | Mineralized | 0.00-46.00 | (50m X 50m) |
| 2013-14 | CBH-67 | 2466798 | 426492 | 760 | Core | 37.00 | Mineralized | 0.00-37.00 | (50m X 50m) |
| 2013-14 | CBH-68 | 2466798 | 426442 | 766 | Core | 40.00 | Mineralized | 0.00-35.00 | (50m X 50m) |
| 2013-14 | CBH-69 | 2466848 | 426592 | 812 | Core | 46.00 | Mineralized | 12.00-18.00 | (50m X 50m) |
| 2013-14 | CBH-70 | 2466848 | 426542 | 805 | Core | 45.00 | Mineralized | 29.00-45.00 | (50m X 50m) |
| 2013-14 | CBH-71 | 2466848 | 426492 | 789 | Core | 34.00 | Mineralized | 4.00-34.00 | (50m X 50m) |
| 2013-14 | CBH-72 | 2466848 | 426442 | 789 | Core | 31.00 | Mineralized | 1.00-31.00 | (50m X 50m) |
| 2013-14 | CBH-73 | 2466848 | 426392 | 789 | Core | 50.00 | Mineralized | 0.00-18.00 | (50m X 50m) |
| 2013-14 | CBH-74 | 2466848 | 426342 | 800 | Core | 50.00 | Mineralized | 0.00-22.00 | (50m X 50m) |
| 2013-14 | CBH-75 | 2466898 | 426592 | 835 | Core | 40.00 | Mineralized | 0.00-38.00 | (50m X 50m) |
| 2013-14 | CBH-76 | 2466898 | 426542 | 830 | Core | 40.00 | Mineralized | 0.00-31.00 | (50m X 50m) |
| 2013-14 | CBH-77 | 2466898 | 426492 | 819 | Core | 39.00 | Mineralized | 8.00-17.00 | (50m X 50m) |
| 2013-14 | CBH-78 | 2466898 | 426442 | 812 | Core | 50.00 | Mineralized | 0.00-5.00 | (50m X 50m) |
| 2013-14 | CBH-79 | 2466898 | 426392 | 805 | Core | 40.00 | Mineralized | 9.00-19.00 | (50m X 50m) |
| 2013-14 | CBH-80 | 2466948 | 426542 | 848 | Core | 45.00 | Mineralized | 0.00-44.00 | (50m X 50m) |
| 2013-14 | CBH-81 | 2466948 | 426492 | 835 | Core | 44.00 | Mineralized | 0.00-35.00 | (50m X 50m) |
| 2013-14 | CBH-82 | 2466948 | 426442 | 830 | Core | 42.00 | Mineralized | 0.00-29.00 | (50m X 50m) |
| 2013-14 | CBH-83 | 2466948 | 426392 | 824 | Core | 25.00 | Mineralized | 0.00-11.00 | (50m X 50m) |
| 2013-14 | CBH-84 | 2466998 | 426492 | 852 | Core | 52.00 | Mineralized | 0.00-45.00 | (50m X 50m) |
| 2013-14 | CBH-85 | 2466998 | 426442 | 848 | Core | 35.00 | Mineralized | 0.00-27.00 | (50m X 50m) |
| 2013-14 | CBH-86 | 2466998 | 426392 | 841 | Core | 28.00 | Mineralized | 11.00-28.00 | (50m X 50m) |



(S.C. Nayak)
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|---|---|---|---|---|---|---|---|---|---|
| 2013-14 | CBH-87 | 2466998 | 426392 | 843 | Core | 32.00 | Mineralized | 0.00-32.00 | (50m X 50m) |
| 2013-14 | CBH-88 | 2467048 | 426492 | 877 | Core | 40.00 | Mineralized | 0.00-35.00 | (50m X 50m) |
| 2013-14 | CBH-89 | 2467048 | 426442 | 871 | Core | 38.00 | Mineralized | 12.00-22.00 | (50m X 50m) |
| 2013-14 | CBH-90 | 2467048 | 426392 | 860 | Core | 40.00 | Mineralized | 9.00-19.00 | (50m X 50m) |
| 2013-14 | CBH-91 | 2467098 | 426542 | 902 | Core | 33.00 | Mineralized | 0.00-32.00 | (50m X 50m) |
| 2013-14 | CBH-92 | 2467098 | 426492 | 897 | Core | 28.00 | Mineralized | 0.00-24.00 | (50m X 50m) |
| 2013-14 | CBH-93 | 2467098 | 426442 | 880 | Core | 35.00 | Mineralized | 6.00-19.00 | (50m X 50m) |
| 2016-17 | CBH-23 | 2467560 | 425388 | 646 | Core | 32.50 | Non-Mineralized | -- | (50m X 50m) |
| 2016-17 | CBH-24 | 2467560 | 425515 | 650 | Core | 31.00 | Non-Mineralized | -- | (50m X 50m) |
| 2016-17 | CBH-31 | 2467973 | 425708 | 586 | Core | 26.00 | Non-Mineralized | -- | (50m X 50m) |
| 2016-17 | CBH-32 | 2468016 | 425800 | 588 | Core | 35.00 | Non-Mineralized | -- | (50m X 50m) |
| 2016-17 | CBH-267 | 2468100 | 426247 | 646 | Core | 50.00 | Non-Mineralized | -- | (50m X 50m) |
| 2016-17 | CBH-268 | 2468075 | 426222 | 650 | Core | 47.50 | Non-Mineralized | -- | (50m X 50m) |
| 2016-17 | CBH-269 | 2468075 | 426247 | 610 | Core | 48.00 | Mineralized | 20.80-46.40 | (50m X 50m) |
| 2016-17 | CBH-270 | 2468236 | 426141 | 609 | Core | 36.45 | Mineralized | 0.00-36.45 | (50m X 50m) |
| 2016-17 | CBH-271 | 2468024 | 426034 | 495 | Core | 30.50 | Non-Mineralized | -- | (50m X 50m) |
| 2016-17 | CBH-282 | 2467753 | 426574 | 794 | Core | 21.30 | Mineralized | 0.50-13.65 | (50m X 50m) |
| 2016-17 | CBH-291 | 2467073 | 426492 | 880 | Core | 31.20 | Non-Mineralized | -- | (50m X 50m) |
| 2016-17 | CBH-293 | 2467123 | 426442 | 899 | Core | 40.45 | Mineralized | 9.80-35.85 | (50m X 50m) |
| 2016-17 | CBH-294 | 2467123 | 426492 | 885 | Core | 40.55 | Mineralized | 2.10-18.00 | (50m X 50m) |
| 2016-17 | CBH-303 | 2467124 | 426471 | 885 | Core | 31.10 | Non-Mineralized | -- | (50m X 50m) |
| 2016-17 | CBH-306 | 2467471 | 425886 | 766 | Core | 40.15 | Mineralized | 0.00-18.75 | (50m X 50m) |
| 2016-17 | CBH-307 | 2467471 | 425936 | 879 | Core | 40.30 | Mineralized | 8.00-34.00 | (50m X 50m) |
| 2016-17 | CBH-308 | 2467521 | 425836 | 757 | Core | 40.50 | Non-Mineralized | -- | (50m X 50m) |
| 2016-17 | CBH-309 | 2467521 | 425886 | 766 | Core | 39.90 | Mineralized | 0.00-25.15 | (50m X 50m) |
| 2016-17 | CBH-310 | 2467521 | 425936 | 765 | Core | 41.35 | Mineralized | 0.00-37.90 | (50m X 50m) |
| 2016-17 | CBH-311 | 2467521 | 425986 | 770 | Core | 40.20 | Mineralized | 4.20-29.50 | (50m X 50m) |
| 2016-17 | CBH-315 | 2467557 | 425983 | 791 | Core | 40.80 | Mineralized | 23.10-24.15 | (50m X 50m) |
| 2017-18 | CBH - 01 | 2467240 | 426460 | 863 | Core | 31.00 | Mineralized | 0.00-3.00 | (50m X 50m) |
| 2017-18 | CBH - 02 | 2467234 | 426586 | 858 | Core | 43.00 | Mineralized | 2.00-12.00 | (50m X 50m) |
| 2017-18 | CBH - 03 | 2467191 | 426477 | 867 | Core | 19.20 | Non-Mineralized | -- | (50m X 50m) |
| 2017-18 | CBH - 04 | 2467056 | 426465 | 864 | Core | 42.00 | Mineralized | 1.00-2.00 | (50m X 50m) |
| 2017-18 | CBH - 05 | 2467111 | 426514 | 834 | Core | 36.00 | Non-Mineralized | -- | (50m X 50m) |
| 2017-18 | CBH - 06 | 2467059 | 426465 | 866 | Core | 43.00 | Mineralized | 1.00-3.00 | (50m X 50m) |
| 2017-18 | CBH - 07 | 2467090 | 426468 | 854 | Core | 37.00 | Mineralized | 1.20-4.00 | (50m X 50m) |
| 2017-18 | CBH - 08 | 2467022 | 426507 | 864 | Core | 30.00 | Mineralized | 0.60-6.00 | (50m X 50m) |
| 2017-18 | CBH - 09 | 2467006 | 426596 | 812 | Core | 27.00 | Mineralized | 9.00-10.50 | (50m X 50m) |
| 2017-18 | CBH - 10 | 2466986 | 426373 | 828 | Core | 42.00 | Mineralized | 0.00-2.00 | (50m X 50m) |
| 2017-18 | CBH - 11 | 2466924 | 426467 | 812 | Core | 30.00 | Non-Mineralized | -- | (50m X 50m) |
| 2017-18 | CBH - 12 | 2466875 | 426424 | 779 | Core | 35.50 | Mineralized | 0.00-6.00 | (50m X 50m) |
| 2017-18 | CBH - 13 | 2466816 | 426484 | 745 | Core | 8.50 | Mineralized | 3.00-8.50 | (50m X 50m) |
| 2017-18 | CBH - 14 | 2466804 | 426466 | 744 | Core | 30.70 | Mineralized | 0.00-10.90 | (50m X 50m) |
| 2017-18 | CBH - 15 | 2466924 | 426467 | 845 | Core | 27.60 | Non-Mineralized | -- | (50m X 50m) |
| 2017-18 | CBH - 16 | 2467547 | 426001 | 759 | Core | 33.00 | Mineralized | 0.00-4.00 | (50m X 50m) |
| 2017-18 | CBH - 17 | 2467517 | 425929 | 742 | Core | 33.10 | Mineralized | 0.00-16.20 | (50m X 50m) |
| 2017-18 | CBH - 18 | 2467511 | 425880 | 726 | Core | 32.40 | Non-Mineralized | -- | (50m X 50m) |
| 2017-18 | CBH - 19 | 2467197 | 426594 | 873 | Core | 30.00 | Mineralized | 3.00-13.00 | (50m X 50m) |
| 2017-18 | CBH - 20 | 2467197 | 426643 | 861 | Core | 31.00 | Mineralized | 3.00-9.00 | (50m X 50m) |
| 2017-18 | CBH - 21 | 2467196 | 426691 | 853 | Core | 37.00 | Mineralized | 7.00-14.00 | (50m X 50m) |
| 2017-18 | CBH - 22 | 2467148 | 426594 | 866 | Core | 39.00 | Mineralized | 5.00-31.00 | (50m X 50m) |
| 2017-18 | CBH - 23 | 2467147 | 426643 | 857 | Core | 40.00 | Mineralized | 6.00-30.00 | (50m X 50m) |
| 2017-18 | CBH - 24 | 2467147 | 426691 | 840 | Core | 33.00 | Mineralized | 3.00-30.00 | (50m X 50m) |



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Qualified Person

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| 2017-18 | CBH - 25 | 2467095 | 426594 | 857 | Core | 30.00 | Mineralized | 2.00-21.00 | (50m X 50m) |
| 2017-18 | CBH - 26 | 2467095 | 426642 | 845 | Core | 37.00 | Mineralized | 3.00-22.00 | (50m X 50m) |
| 2017-18 | CBH - 27 | 2467046 | 426542 | 851 | Core | 40.00 | Mineralized | 4.00-27.00 | (50m X 50m) |
| 2017-18 | CBH - 28 | 2467046 | 426593 | 839 | Core | 31.00 | Mineralized | 3.00-28.00 | (50m X 50m) |
| 2017-18 | CBH - 29 | 2466997 | 426542 | 833 | Core | 30.00 | Mineralized | 2.00-29.00 | (50m X 50m) |
| 2017-18 | CBH - 30 | 2466997 | 426593 | 830 | Core | 31.00 | Mineralized | 4.00-23.00 | (50m X 50m) |
| 2017-18 | CBH - 32 | 2468214 | 426118 | 604 | Core | 31.50 | Mineralized | 7.00-15.00 | (50m X 50m) |
| 2017-18 | CBH - 33 | 2468235 | 426178 | 618 | Core | 21.30 | Mineralized | 6.00-7.20 | (50m X 50m) |
| 2017-18 | CBH - 34 | 2468234 | 426316 | 627 | Core | 26.00 | Non-Mineralized | -- | (50m X 50m) |
| 2017-18 | CBH - 35 | 2467701 | 426674 | 790 | Core | 30.00 | Mineralized | 4.00-20.00 | (50m X 50m) |
| 2017-18 | CBH - 36 | 2467648 | 426674 | 788 | Core | 30.00 | Mineralized | 6.00-22.00 | (50m X 50m) |
| 2017-18 | CBH - 37 | 2467599 | 426673 | 770 | Core | 30.00 | Mineralized | 5.00-21.00 | (50m X 50m) |
| 2017-18 | CBH - 38 | 2467550 | 426673 | 790 | Core | 30.00 | Mineralized | 6.00-24.00 | (50m X 50m) |
| 2017-18 | CBH - 39 | 2466839 | 426266 | 738 | Core | 30.00 | Mineralized | 2.00-26.00 | (50m X 50m) |
| 2017-18 | CBH - 40 | 2466801 | 426298 | 738 | Core | 30.00 | Mineralized | 3.00-24.00 | (50m X 50m) |
| 2017-18 | CBH - 41 | 2467791 | 426505 | 738 | Core | 26.00 | Non-Mineralized | -- | (50m X 50m) |
| 2017-18 | CBH - 42 | 2467791 | 426605 | 738 | Core | 24.00 | Non-Mineralized | -- | (50m X 50m) |
| 2017-18 | NBH- 199 | 2468205 | 425932 | 495 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 200 | 2468105 | 425663 | 487 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 201 | 2468006 | 425734 | 630 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 202 | 2467903 | 426120 | 637 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 203 | 2469649 | 425702 | 645 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 204 | 2467706 | 425632 | 648 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 205 | 2467703 | 425532 | 650 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 207 | 2467697 | 425532 | 678 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 208 | 2467504 | 425434 | 689 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 209 | 2467505 | 425534 | 660 | DTH | 20.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 210 | 2467446 | 425348 | 687 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 211 | 2467382 | 425734 | 676 | DTH | 7.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 212 | 2467305 | 425834 | 683 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 213 | 2467145 | 425933 | 688 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 214 | 2467015 | 426044 | 689 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 216 | 2466903 | 426198 | 684 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 218 | 2469504 | 422534 | 737 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 220 | 2467455 | 426032 | 781 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 221 | 2467469 | 426232 | 770 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 223 | 2467705 | 426471 | 782 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 224 | 2467676 | 426742 | 806 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | CBH - 01 | 2469804 | 422833 | 312 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | CBH - 02 | 2469604 | 422832 | 302 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | CBH - 03 | 2469606 | 422432 | 322 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |

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| 2017-18 | CBH - 04 | 2469406 | 422433 | 307 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | CBH - 05 | 2469405 | 422634 | 298 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | CBH - 06 | 2469404 | 422834 | 317 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | CBH - 07 | 2469406 | 423034 | 310 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | CBH - 08 | 2469405 | 423232 | 312 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | CBH - 09 | 2469404 | 423432 | 311 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | CBH - 10 | 2469204 | 423634 | 313 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | CBH - 11 | 2469205 | 423434 | 319 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | CBH - 12 | 2469206 | 423234 | 318 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | CBH - 13 | 2469203 | 423033 | 320 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | CBH - 14 | 2469204 | 422833 | 324 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | CBH - 15 | 2469206 | 422432 | 325 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | CBH - 16 | 2469006 | 422632 | 320 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | CBH - 17 | 2469005 | 422832 | 316 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | CBH - 18 | 2469006 | 423233 | 317 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | CBH - 19 | 2469005 | 423433 | 314 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | CBH - 20 | 2468805 | 423432 | 315 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | CBH - 21 | 2468806 | 423234 | 307 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | CBH - 22 | 2468804 | 423034 | 319 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | CBH - 23 | 2468805 | 422834 | 316 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | CBH - 24 | 2468806 | 422634 | 302 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | CBH - 25 | 2468606 | 422633 | 310 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | CBH - 26 | 2468604 | 423033 | 307 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | CBH - 27 | 2468606 | 423233 | 309 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | CBH - 28 | 2468605 | 423434 | 318 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | CBH - 29 | 2468604 | 423634 | 318 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | CBH - 30 | 2468606 | 423834 | 320 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | CBH - 31 | 2468406 | 423833 | 320 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | CBH - 32 | 2468404 | 423633 | 319 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | CBH - 33 | 2468405 | 423433 | 318 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | CBH - 34 | 2468406 | 423232 | 316 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | CBH - 35 | 2468404 | 423032 | 320 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | CBH - 36 | 2468405 | 422832 | 321 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | CBH - 37 | 2468206 | 423234 | 319 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |



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| 2017-18 | CBH - 38 | 2468205 | 423432 | 317 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | CBH - 39 | 2468204 | 423632 | 317 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | CBH - 40 | 2468006 | 423834 | 315 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | CBH - 41 | 2468004 | 423634 | 317 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | CBH - 42 | 2468005 | 423434 | 318 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | CBH - 43 | 2468006 | 423233 | 319 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | CBH - 44 | 2468806 | 423832 | 321 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | CBH - 45 | 2469205 | 424032 | 318 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | CBH - 46 | 2469406 | 424433 | 321 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | CBH - 47 | 2469205 | 424632 | 323 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | CBH - 48 | 2469005 | 424634 | 322 | Core | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 65 | 2469805 | 422733 | 315 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 66 | 2469706 | 422833 | 312 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 67 | 2469706 | 422733 | 316 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 68 | 2469704 | 422632 | 317 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 69 | 2469704 | 422532 | 318 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 70 | 2469606 | 422532 | 318 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 71 | 2469605 | 422732 | 320 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 72 | 2469604 | 422932 | 319 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 73 | 2469606 | 423133 | 324 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 74 | 2469506 | 423332 | 322 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 75 | 2469504 | 423232 | 319 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 76 | 2469504 | 423132 | 320 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 77 | 2469505 | 423032 | 322 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 78 | 2469506 | 422832 | 321 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 79 | 2469506 | 422734 | 325 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 80 | 2469504 | 422634 | 322 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 81 | 2469504 | 422534 | 323 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 82 | 2469505 | 422434 | 321 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 83 | 2469505 | 422334 | 320 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 84 | 2469404 | 422333 | 322 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 85 | 2469406 | 422534 | 316 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 86 | 2469405 | 422734 | 317 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 87 | 2469404 | 422934 | 318 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |

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| 2017-18 | NBH- 88 | 2469406 | 423134 | 318 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 89 | 2469405 | 423332 | 319 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 90 | 2469404 | 423532 | 320 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 91 | 2469305 | 423632 | 320 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 92 | 2469306 | 423534 | 318 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 93 | 2469306 | 423434 | 318 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 94 | 2469303 | 423334 | 319 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 95 | 2469304 | 423234 | 317 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 96 | 2469306 | 422733 | 318 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 97 | 2469304 | 422633 | 321 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 98 | 2469305 | 422433 | 319 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 99 | 2469305 | 422333 | 317 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 100 | 2469206 | 422533 | 321 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 101 | 2469205 | 422733 | 320 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 102 | 2469204 | 422933 | 320 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 103 | 2469206 | 423133 | 318 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 104 | 2469205 | 423334 | 318 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 105 | 2469204 | 423534 | 319 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 106 | 2469106 | 423533 | 315 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 107 | 2469106 | 423433 | 315 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 108 | 2469104 | 423233 | 316 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 109 | 2469105 | 423133 | 316 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 110 | 2469105 | 423033 | 314 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 111 | 2469103 | 422732 | 314 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 112 | 2469104 | 422632 | 314 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 113 | 2469104 | 422532 | 316 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 114 | 2469105 | 422432 | 314 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 115 | 2469006 | 422532 | 315 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 116 | 2468083 | 422727 | 316 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 117 | 2469004 | 422932 | 316 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 118 | 2469005 | 423333 | 317 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 119 | 2468904 | 423332 | 318 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 120 | 2468905 | 423132 | 316 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 121 | 2468906 | 422932 | 315 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |



(S.C. Nayak)
Qualified Person

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|---|---|---|---|---|---|---|---|---|---|
| 2017-18 | NBH- 122 | 2468906 | 422834 | 316 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 123 | 2468904 | 422734 | 316 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 124 | 2468904 | 422634 | 316 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 125 | 2468905 | 422534 | 315 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 126 | 2468806 | 422533 | 320 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 127 | 2468805 | 422734 | 318 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 128 | 2468804 | 422934 | 320 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 129 | 2468806 | 423134 | 315 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 130 | 2468805 | 423332 | 316 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 131 | 2468706 | 423434 | 313 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 132 | 2468704 | 423334 | 314 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 133 | 2468704 | 423234 | 315 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 134 | 2468705 | 423134 | 317 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 135 | 2468705 | 423034 | 316 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 136 | 2468706 | 422934 | 316 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 137 | 2468706 | 422833 | 315 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 138 | 2468704 | 422733 | 319 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 139 | 2468606 | 423133 | 312 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 140 | 2468605 | 423334 | 318 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 141 | 2468604 | 423534 | 321 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 142 | 2468603 | 423734 | 322 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 143 | 2468505 | 423834 | 319 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 144 | 2468505 | 423734 | 318 | DTH | 5.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 145 | 2468506 | 423633 | 314 | DTH | 5.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 146 | 2468506 | 423533 | 312 | DTH | 5.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 147 | 2468503 | 423433 | 310 | DTH | 5.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 148 | 2468504 | 423333 | 313 | DTH | 6.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 149 | 2468404 | 422932 | 311 | DTH | 5.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 150 | 2468403 | 423132 | 315 | DTH | 5.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 151 | 2468406 | 423333 | 313 | DTH | 5.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 152 | 2468405 | 423533 | 314 | DTH | 5.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 153 | 2468404 | 423733 | 312 | DTH | 5.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 154 | 2468305 | 423733 | 316 | DTH | 5.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 155 | 2468306 | 423632 | 311 | DTH | 10.00 | Non-Mineralized | -- | (100m X 100m) |



(S.C. Nayak)
Qualified Person

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|---|---|---|---|---|---|---|---|---|---|
| 2017-18 | NBH- 156 | 2468306 | 423532 | 312 | DTH | 5.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 157 | 2468304 | 423432 | 315 | DTH | 5.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 158 | 2468304 | 423332 | 312 | DTH | 5.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 159 | 2468305 | 423232 | 314 | DTH | 5.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 160 | 2468305 | 423132 | 313 | DTH | 5.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 161 | 2468204 | 423134 | 316 | DTH | 5.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 162 | 2468206 | 423332 | 317 | DTH | 5.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 163 | 2468205 | 423532 | 317 | DTH | 5.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 164 | 2468105 | 423832 | 318 | DTH | 5.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 165 | 2468105 | 423732 | 320 | DTH | 5.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 166 | 2468106 | 423634 | 318 | DTH | 5.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 167 | 2468106 | 423534 | 315 | DTH | 5.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 168 | 2468104 | 423434 | 318 | DTH | 5.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 169 | 2468104 | 423334 | 316 | DTH | 5.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 170 | 2468105 | 423234 | 315 | DTH | 5.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 171 | 2468012 | 423333 | 315 | DTH | 5.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 179 | 2468704 | 423832 | 315 | DTH | 6.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | CBH- 180 | 2468904 | 423933 | 320 | DTH | 6.00 | Mineralized | 0.00-2.00 | (100m X 100m) |
| 2017-18 | CBH- 181 | 2469005 | 423933 | 315 | DTH | 10.00 | Mineralized | 0.00-2.00 | (100m X 100m) |
| 2017-18 | CBH- 182 | 2469104 | 423934 | 317 | DTH | 10.00 | Mineralized | 0.00-2.00 | (100m X 100m) |
| 2017-18 | CBH- 183 | 2469106 | 424034 | 319 | DTH | 6.00 | Mineralized | 0.00-2.00 | (100m X 100m) |
| 2017-18 | CBH- 184 | 2469204 | 424132 | 320 | DTH | 10.00 | Mineralized | 0.00-2.00 | (100m X 100m) |
| 2017-18 | CBH- 185 | 2469205 | 423932 | 316 | DTH | 10.00 | Mineralized | 0.00-2.00 | (100m X 100m) |
| 2017-18 | NBH- 186 | 2469306 | 424032 | 311 | DTH | 6.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 187 | 2469306 | 424132 | 314 | DTH | 6.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 188 | 2469404 | 424233 | 311 | DTH | 6.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 189 | 2469505 | 424233 | 312 | DTH | 6.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 190 | 2469505 | 424334 | 315 | DTH | 5.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 191 | 2469504 | 424434 | 316 | DTH | 5.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 194 | 2469304 | 424533 | 314 | DTH | 5.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 195 | 2469106 | 424632 | 317 | DTH | 5.00 | Non-Mineralized | -- | (100m X 100m) |
| 2017-18 | NBH- 198 | 2468904 | 424634 | 315 | DTH | 6.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH- 172 | 2468005 | 423534 | 313 | DTH | 30.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH- 173 | 2468004 | 423734 | 312 | DTH | 20.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH- 174 | 2467906 | 423633 | 315 | DTH | 20.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH- 175 | 2467906 | 423533 | 316 | DTH | 20.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH- 176 | 2467904 | 423433 | 317 | DTH | 20.00 | Non-Mineralized | -- | (100m X 100m) |



(S.C. Nayak)
Qualified Person

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|---|---|---|---|---|---|---|---|---|---|
| 2018-19 | NBH- 177 | 2467904 | 423333 | 317 | DTH | 20.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH- 178 | 2467806 | 423332 | 320 | DTH | 20.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH- 192 | 2469507 | 424534 | 341 | DTH | 20.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH- 193 | 2469405 | 424533 | 335 | DTH | 20.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH- 196 | 2469004 | 424735 | 336 | DTH | 20.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH- 197 | 2468906 | 424734 | 340 | DTH | 20.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH- 225 | 2469407 | 424834 | 343 | DTH | 20.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH- 226 | 2469514 | 424834 | 338 | DTH | 30.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH- 227 | 2469607 | 424835 | 342 | DTH | 20.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH- 228 | 2469807 | 424833 | 339 | DTH | 20.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH- 229 | 2470006 | 424934 | 342 | DTH | 20.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH- 230 | 2469705 | 424932 | 343 | DTH | 20.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH- 231 | 2469594 | 424935 | 341 | DTH | 20.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH- 232 | 2469105 | 424932 | 340 | DTH | 20.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH- 233 | 2469105 | 425033 | 332 | DTH | 20.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH- 234 | 2469206 | 425033 | 316 | DTH | 20.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH- 235 | 2469317 | 425034 | 317 | DTH | 20.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH- 236 | 2469006 | 425132 | 318 | DTH | 20.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH- 237 | 2469854 | 425234 | 318 | DTH | 20.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH- 238 | 2469804 | 425342 | 319 | DTH | 30.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH- 239 | 2469807 | 425434 | 320 | DTH | 20.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH- 240 | 2469705 | 425433 | 320 | DTH | 20.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH- 241 | 2469705 | 425533 | 318 | DTH | 30.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH- 242 | 2469606 | 425633 | 318 | DTH | 20.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH- 248 | 2468240 | 425858 | 496 | DTH | 15.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH- 249 | 2468433 | 425905 | 467 | DTH | 15.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH- 250 | 2468627 | 425911 | 422 | DTH | 15.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH- 251 | 2468710 | 425866 | 395 | DTH | 15.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH- 252 | 2468851 | 425924 | 409 | DTH | 15.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH- 253 | 2468984 | 425770 | 360 | DTH | 15.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH- 254 | 2468800 | 425698 | 372 | DTH | 15.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH- 255 | 2468841 | 425532 | 367 | DTH | 15.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH- 256 | 2468863 | 425403 | 354 | DTH | 15.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH- 257 | 2469053 | 425436 | 353 | DTH | 15.00 | Non-Mineralized | -- | (100m X 100m) |

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| 2018-19 | NBH- 258 | 2469244 | 425497 | 339 | DTH | 18.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH- 259 | 2469440 | 425535 | 330 | DTH | 16.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | CBH-38A | 2467549 | 426661 | 803 | Core | 60.00 | Mineralized | 9.50-39.00 | (50m X 50m) |
| 2018-19 | CBH-37A | 2467599 | 426661 | 785 | Core | 51.00 | Mineralized | 5.20-34.00 | (50m X 50m) |
| 2018-19 | CBH-60 | 2467501 | 426713 | 803 | Core | 50.00 | Mineralized | 13.00-14.00 | (50m X 50m) |
| 2018-19 | CBH-59 | 2467575 | 426743 | 779 | Core | 41.00 | Mineralized | 9.00-15.00 | (50m X 50m) |
| 2018-19 | CBH-36A | 2467649 | 426661 | 792 | Core | 41.00 | Mineralized | 6.50-33.00 | (50m X 50m) |
| 2018-19 | CBH-35A | 2467699 | 426661 | 794 | Core | 43.00 | Mineralized | 2.20-34.00 | (50m X 50m) |
| 2018-19 | CBH-123A | 2468145 | 426163 | 660 | Core | 58.00 | Mineralized | 0.00-48.00 | (50m X 50m) |
| 2018-19 | CBH-122A | 2468145 | 426213 | 660 | Core | 61.00 | Mineralized | 0.00-29.00 | (50m X 50m) |
| 2018-19 | CBH-121A | 2468145 | 426263 | 641 | Core | 61.00 | Mineralized | 0.00-50.60 | (50m X 50m) |
| 2018-19 | CBH-120A | 2468145 | 426313 | 632 | Core | 55.00 | Mineralized | 0.00-44.00 | (50m X 50m) |
| 2018-19 | CBH-119A | 2468100 | 426162 | 665 | Core | 66.00 | Mineralized | 0.00-56.00 | (50m X 50m) |
| 2018-19 | CBH-118A | 2468100 | 426212 | 663 | Core | 66.00 | Mineralized | 0.00-59.00 | (50m X 50m) |
| 2018-19 | CBH-117A | 2468100 | 426262 | 640 | Core | 66.00 | Mineralized | 0.00-45.00 | (50m X 50m) |
| 2018-19 | CBH-116A | 2468100 | 426313 | 651 | Core | 58.00 | Mineralized | 0.00-49.00 | (50m X 50m) |
| 2018-19 | CBH-115A | 2468101 | 426362 | 670 | Core | 60.00 | Mineralized | 0.00-54.00 | (50m X 50m) |
| 2018-19 | CBH-114A | 2468050 | 426133 | 655 | Core | 31.00 | Mineralized | 0.00-21.00 | (50m X 50m) |
| 2018-19 | CBH-113A | 2468051 | 426183 | 657 | Core | 34.00 | Mineralized | 0.00-34.00 | (50m X 50m) |
| 2018-19 | CBH-112A | 2468050 | 426232 | 648 | Core | 38.00 | Mineralized | 0.00-30.00 | (50m X 50m) |
| 2018-19 | CBH-111A | 2468050 | 426263 | 630 | Core | 37.00 | Mineralized | 0.00-30.00 | (50m X 50m) |
| 2018-19 | CBH-110A | 2468050 | 426313 | 662 | Core | 57.00 | Mineralized | 0.00-47.00 | (50m X 50m) |
| 2018-19 | CBH-108A | 2468000 | 426213 | 630 | Core | 26.00 | Mineralized | 0.00-14.00 | (50m X 50m) |
| 2018-19 | CBH-107A | 2468000 | 426263 | 634 | Core | 40.00 | Mineralized | 0.00-30.00 | (50m X 50m) |
| 2018-19 | CBH-106A | 2468000 | 426313 | 662 | Core | 72.00 | Mineralized | 0.00-62.00 | (50m X 50m) |
| 2018-19 | CBH-105A | 2467951 | 426363 | 711 | Core | 68.00 | Mineralized | 0.00-60.40 | (50m X 50m) |
| 2018-19 | NBH-51 | 2467604 | 425632 | 669 | DTH | 25.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH-57 | 2467457 | 426134 | 794 | DTH | 29.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH-55 | 2467248 | 426745 | 834 | DTH | 28.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH-246 | 2466684 | 426340 | 725 | DTH | 27.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH-217 | 2466804 | 426340 | 770 | DTH | 39.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | CBH-87A | 2466987 | 426342 | 840 | Core | 45.00 | Mineralized | 0.00-32.00 | (50m X 50m) |
| 2018-19 | CBH-86A | 2467004 | 426393 | 836 | Core | 40.00 | Mineralized | 5.30-25.00 | (50m X 50m) |
| 2018-19 | CBH-72A | 2466837 | 426442 | 760 | Core | 27.00 | Mineralized | 0.70-5.00 | (50m X 50m) |
| 2018-19 | CBH-67A | 2466787 | 426492 | 760 | Core | 46.00 | Mineralized | 0.00-40.00 | (50m X 50m) |
| 2018-19 | CBH-71A | 2466858 | 426492 | 770 | Core | 26.00 | Mineralized | 0.00-17.50 | (50m X 50m) |
| 2018-19 | CBH-66A | 2466787 | 426542 | 770 | Core | 101.00 | Mineralized | 4.70-43.50 | (50m X 50m) |
| 2018-19 | CBH-70A | 2466837 | 426543 | 779 | Core | 34.00 | Mineralized | 4.60-22.00 | (50m X 50m) |
| 2018-19 | CBH-65A | 2466804 | 426543 | 780 | Core | 58.00 | Mineralized | 4.60-45.00 | (50m X 50m) |
| 2018-19 | NBH-222 | 2467505 | 426334 | 773 | DTH | 29.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH-58 | 2467604 | 426432 | 766 | DTH | 30.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH-61 | 2467804 | 426432 | 749 | DTH | 36.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH-62 | 2467906 | 426432 | 745 | DTH | 31.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH-63 | 2467843 | 426246 | 691 | DTH | 29.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH-64 | 2467918 | 426167 | 672 | DTH | 29.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH-243 | 2468318 | 426232 | 534 | DTH | 25.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH-244 | 2468318 | 426132 | 537 | DTH | 25.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | CBH-245 | 2468099 | 425732 | 550 | Core | 101.00 | Non-Mineralized | -- | (50m X 50m) |
| 2018-19 | NBH-247 | 2466684 | 426540 | 735 | DTH | 27.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH-49 | 2468204 | 425832 | 509 | DTH | 33.00 | Non-Mineralized | -- | (100m X 100m) |

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| 2018-19 | NBH-270A | 2468246 | 426142 | 559 | DTH | 31.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH-50 | 2467804 | 425432 | 576 | DTH | 27.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH-206 | 2467705 | 425432 | 600 | DTH | 34.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH-52 | 2467204 | 425832 | 654 | DTH | 32.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH-215 | 2467004 | 426134 | 692 | DTH | 29.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | NBH-53 | 2466804 | 426232 | 719 | DTH | 25.00 | Non-Mineralized | -- | (100m X 100m) |
| 2018-19 | CBH-13A | 2466822 | 426478 | 745 | Core | 25.00 | Non-Mineralized | -- | (50m X 50m) |
| 2018-19 | CBH-54 | 2466906 | 426698 | 809 | Core | 29.00 | Non-Mineralized | -- | (50m X 50m) |
| 2018-19 | CBH-56 | 2467404 | 426432 | 823 | Core | 27.00 | Non-Mineralized | -- | (50m X 50m) |
| 2018-19 | CBH-219 | 2467404 | 426582 | 855 | Core | 32.00 | Non-Mineralized | -- | (50m X 50m) |

(iii) **Details of samples analysis indicating type of sample** (surface/sub surface from pits/trenches/borehole etc). Complete chemical analysis for entire strata for all radicals may be undertaken for selected samples from a NABL accredited Laboratory or Government laboratory or equivalent. Entire mineralized area may be analyzed meter wise with 10% of check samples. (At least for 10% of total samples may be analyzed in accordance to BIS and reports from NABL accredited/other government laboratory).

Core samples drawn from core drill holes and sludge collected from DTH drilled holes at suitable interval have been carefully recorded, sampled, processed and chemically analyzed mainly for Fe contents in different laboratories including NABL accredited laboratories. In most of the cases, sample interval has been taken one (1) meter.

(iv) Expenditure incurred in various prospecting operations.

| Year | Expenditure incurred (Rs.) |
|---|---|
| 2011-12 | --- |
| 2013-14 | --- |
| 2016-17 | 35,25,476.00 |
| 2017-18 | 43,62,536.00 |
| 2018-19 | 2,63,27,334.00 |
| Total | |



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f) Surface plan of the lease area may be prepared on a scale of 1: 1000 or 1: 2000 with contour interval of maximum of 10m depending upon the topography and size of the area duly marked by grid lines showing all features indicated under Rule 32(1)(a) of MCDR, 2017.

Surface Plan has been prepared on a scale of 1:4,000 with 5m contour interval and 200m x 200m grid pattern showing all features under Rule 32(1)(a) of MCDR, 2017 such as (a) location and number of boundary pillars with latitude, longitude & UTM values and (b) surface features such as road, nala etc. permission has been obtained from the Regional Controller of Mines, Indian Bureau of Mines, Bhubaneswar to prepare Surface Plan on 1:4000 scale vide Annexure-23.

g) Geological plan may be prepared on a scale of 1: 1000 or 1: 2000 scale specified for surface plan may be taken as the base plan. The details of exploration already carried out along with supporting data for existence of mineral, locations proposed exploration, various litho-units along with structural features, mineralized/ore zone with grade variation if any may be marked on the geological plan along with other features indicated under Rule 32(1)(b) of MCDR, 2017.

Geological Plan has been prepared on a scale of 1:4,000 with 5m contour interval and 200m x 200m grid pattern taking the surface plan as base plan and showing all features under Rule 32(1)(b) of MCDR, 2017 such as (a) all the geological units exposed in the virgin (un-worked) areas, (b) location of exploration boreholes and (c) level of exploration as per the United Nations Framework Classification (UNFC).

h) Geological sections may be prepared on natural scale of geological plan at suitable interval across the lease area from boundary to boundary.

Geological sections have been prepared suitably at 100m interval on a scale of 1:4000 across boreholes in the lease area from boundary to boundary showing the various litho units, iron ore etc.



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

As per Rule 22 of Mineral (Auction) Rules, 2015, the holder of a mining lease shall complete detailed exploration (G1 level exploration) and prepare a detailed feasibility study report conforming to Part IV and V of the Minerals (Evidence of Mineral Contents) Rules, 2015 over the entire area under the mining lease within a period of five years from the date of commencement of such mining lease. Accordingly, exploration proposal to explore the G2 level area in to G1 level and G1 level area till the end of mineralization considering the lateral and depth ward continuity in geological cross sections and grid spacing as per the exploration norms defined in Part-III of MEMC Rules, 2015. However, year wise exploration proposal as per the format specified by IBM appraisal of mining plan 2014 has been presented as follows:

| Year | No. of boreholes | Grid Interval (m) | Total meterage | No. of Pits, dimensions and volume | No. of Trenches, Dimensions and volume | Remarks |
|---|---|---|---|---|---|---|
| 2021 – 22 | 40 | 100 | 4000 | --- | --- | --- |
| 2022 – 23 | 30 | 100 | 3000 | --- | --- | --- |
| **Total** | **70** | **---** | **7000** | **---** | **---** | **---** |

Year-wise drilling and other details of exploration proposal have been presented as follows:

| Year | Section No. | Proposed BH No. | Core / RC/ DTH | Northing | Easting | Collar RL (m) | Borehole Inclination | Proposed Depth (100m or up to end of mineralization) | Forest area / Non-forest area / diverted forest area | Area having surface right / non-surface right area |
|---|---|---|---|---|---|---|---|---|---|---|
| 2021-22 | --- | PBH-1 | Core | 2468387 | 426211 | 574 | Vertical | 100m | Diverted forest area | Surface Right Area |
| | --- | PBH-2 | Core | 2468425 | 426023 | 564 | Vertical | 100m | -do- | -do- |
| | --- | PBH-3 | Core | 2468298 | 426143 | 578 | Vertical | 100m | -do- | -do- |



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| Year | Section No. | Proposed BH No. | Core / RC/ DTH | Northing | Easting | Collar RL (m) | Borehole Inclination | Proposed Depth (100m or up to end of mineralization) | Forest area / Non-forest area / diverted forest area | Area having surface right / non-surface right area |
|---|---|---|---|---|---|---|---|---|---|---|
| | --- | PBH-4 | Core | 2468298 | 426193 | 584 | Vertical | 100m | -do- | -do- |
| | --- | PBH-5 | Core | 2468298 | 426243 | 588 | Vertical | 100m | -do- | -do- |
| | --- | PBH-6 | Core | 2468298 | 426293 | 600 | Vertical | 100m | -do- | -do- |
| | --- | PBH-7 | Core | 2468248 | 425943 | 568 | Vertical | 100m | -do- | -do- |
| | --- | PBH-8 | Core | 2468248 | 426043 | 573 | Vertical | 100m | -do- | -do- |
| | --- | PBH-9 | Core | 2468248 | 426093 | 594 | Vertical | 100m | -do- | -do- |
| | --- | PBH-10 | Core | 2468248 | 426243 | 623 | Vertical | 100m | -do- | -do- |
| | --- | PBH-11 | Core | 2468248 | 426295 | 625 | Vertical | 100m | -do- | -do- |
| | --- | PBH-12 | Core | 2468198 | 425993 | 595 | Vertical | 100m | -do- | -do- |
| | --- | PBH-13 | Core | 2468198 | 426043 | 598 | Vertical | 100m | -do- | -do- |
| | --- | PBH-14 | Core | 2468198 | 426093 | 615 | Vertical | 100m | -do- | -do- |
| | --- | PBH-15 | Core | 2468198 | 426143 | 627 | Vertical | 100m | -do- | -do- |
| | --- | PBH-16 | Core | 2468198 | 426193 | 635 | Vertical | 100m | -do- | -do- |
| | --- | PBH-17 | Core | 2468198 | 426243 | | Vertical | 100m | -do- | -do- |
| | --- | PBH-18 | Core | 2468198 | 426293 | 655 | Vertical | 100m | -do- | -do- |
| | G18G18' | PBH-19 | Core | 2468148 | 425993 | 641 | Vertical | 100m | -do- | -do- |
| | G18G18' | PBH-20 | Core | 2468148 | 426043 | 596 | Vertical | 100m | -do- | -do- |
| | G18G18' | PBH-21 | Core | 2468148 | 426093 | 604 | Vertical | 100m | -do- | -do- |
| | G17G17' | PBH-22 | Core | 2468098 | 425993 | 612 | Vertical | 100m | -do- | -do- |
| | G17G17' | PBH-23 | Core | 2468098 | 426043 | 592 | Vertical | 100m | -do- | -do- |
| | G17G17' | PBH-24 | Core | 2468098 | 426093 | 614 | Vertical | 100m | -do- | -do- |
| | G17G17' | PBH-25 | Core | 2468098 | 426293 | 627 | Vertical | 100m | -do- | -do- |
| | G16G16' | PBH-26 | Core | 2468048 | 426993 | 609 | Vertical | 100m | -do- | -do- |
| | G16G16' | PBH-27 | Core | 2468048 | 426093 | 590 | Vertical | 100m | -do- | -do- |
| | G16G16' | PBH-28 | Core | 2468048 | 426343 | 625 | Vertical | 100m | -do- | -do- |
| | G15G15' | PBH-29 | Core | 2468000 | 426158 | 662 | Vertical | 100m | -do- | -do- |
| | G15G15' | PBH-30 | Core | 2468000 | 426343 | 641 | Vertical | 100m | -do- | -do- |
| | G14G14' | PBH-31 | Core | 2467948 | 426193 | 681 | Vertical | 100m | -do- | -do- |
| | G14G14' | PBH-32 | Core | 2467948 | 426243 | 659 | Vertical | 100m | -do- | -do- |
| | G14G14' | PBH-33 | Core | 2467948 | 426293 | 654 | Vertical | 100m | -do- | -do- |
| | --- | PBH-34 | Core | 2467898 | 426193 | 658 | Vertical | 100m | -do- | -do- |
| | --- | PBH-35 | Core | 2467898 | 426243 | 674 | Vertical | 100m | -do- | -do- |
| | --- | PBH-36 | Core | 2467898 | 426293 | 676 | Vertical | 100m | -do- | -do- |
| | --- | PBH-37 | Core | 2467898 | 426343 | 686 | Vertical | 100m | -do- | -do- |
| | --- | PBH-38 | Core | 2467849 | 426190 | 712 | Vertical | 100m | -do- | -do- |
| | --- | PBH-39 | Core | 2467849 | 426435 | 680 | Vertical | 100m | -do- | -do- |
| | --- | PBH-40 | Core | 2467849 | 426505 | 765 | Vertical | 100m | -do- | -do- |
| 2022-23 | --- | PBH-41 | Core | 2467862 | 425749 | 770 | Vertical | 100m | -do- | -do- |
| | --- | PBH-42 | Core | 2467625 | 425483 | 635 | Vertical | 100m | -do- | -do- |



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| Year | Section No. | Proposed BH No. | Core / RC/ DTH | Northing | Easting | Collar RL (m) | Borehole Inclination | Proposed Depth (100m or up to end of mineralization) | Forest area / Non-forest area / diverted forest area | Area having surface right / non-surface right area |
|---|---|---|---|---|---|---|---|---|---|---|
| | --- | PBH-43 | Core | 2467556 | 425916 | 650 | Vertical | 100m | -do- | -do- |
| | --- | PBH-44 | Core | 2467505 | 426043 | 761 | Vertical | 100m | -do- | -do- |
| | --- | PBH-45 | Core | 2467455 | 425851 | 753 | Vertical | 100m | -do- | -do- |
| | --- | PBH-46 | Core | 2467455 | 425985 | 768 | Vertical | 100m | -do- | -do- |
| | --- | PBH-47 | Core | 2467366 | 426508 | 772 | Vertical | 100m | -do- | -do- |
| | --- | PBH-48 | Core | 2467366 | 426624 | 891 | Vertical | 100m | -do- | -do- |
| | --- | PBH-49 | Core | 2467297 | 426587 | 870 | Vertical | 100m | -do- | -do- |
| | --- | PBH-50 | Core | 2467295 | 426709 | 890 | Vertical | 100m | -do- | -do- |
| | --- | PBH-51 | Core | 2467246 | 426668 | 882 | Vertical | 100m | -do- | -do- |
| | G6G6' | PBH-52 | Core | 2467048 | 426341 | 866 | Vertical | 100m | -do- | -do- |
| | --- | PBH-53 | Core | 2467048 | 426651 | 830 | Vertical | 100m | -do- | -do- |
| | G1G1' | PBH-54 | Core | 2466948 | 426593 | 798 | Vertical | 100m | -do- | -do- |
| | --- | PBH-55 | Core | 2466898 | 426643 | 776 | Vertical | 100m | -do- | -do- |
| | G1G1' | PBH-56 | Core | 2466861 | 426591 | 737 | Vertical | 100m | -do- | -do- |
| | --- | PBH-57 | Core | 2466848 | 426643 | 763 | Vertical | 100m | -do- | -do- |
| | G5G5' | PBH-58 | Core | 2466798 | 426393 | 785 | Vertical | 100m | -do- | -do- |
| | --- | PBH-59 | Core | 2466798 | 426643 | 766 | Vertical | 100m | -do- | -do- |
| | G5G5' | PBH-60 | Core | 2466748 | 426393 | 768 | Vertical | 100m | -do- | -do- |
| | G4G4' | PBH-61 | Core | 2466748 | 426443 | 770 | Vertical | 100m | -do- | -do- |
| | G3G3' | PBH-62 | Core | 2466748 | 426493 | 744 | Vertical | 100m | -do- | -do- |
| | G5G5' | PBH-63 | Core | 2466682 | 426390 | 740 | Vertical | 100m | -do- | -do- |
| | G3G3' | PBH-64 | Core | 2466682 | 426491 | 767 | Vertical | 100m | -do- | -do- |
| | G1G1' | PBH-65 | Core | 2466694 | 426591 | 758 | Vertical | 100m | -do- | -do- |
| | G4G4' | PBH-66 | Core | 2466643 | 426440 | 745 | Vertical | 100m | -do- | -do- |
| | G20G20' | PBH-67 | Core | 2467553 | 425600 | 695 | Vertical | 100m | -do- | -do- |
| | --- | PBH-68 | Core | 2467743 | 426644 | 795 | Vertical | 100m | -do- | -do- |
| | --- | PBH-69 | Core | 2467550 | 426726 | 785 | Vertical | 100m | -do- | -do- |
| | --- | PBH-70 | Core | 2467973 | 425960 | 605 | Vertical | 100m | -do- | -do- |

Entire cores will be preserved borehole-wise in permanent boxes stored serially in steel racks in permanent core sheds with suitable indexing since core samples are cylindrical section of a naturally occurring substance below ground obtained by the core drills after drilling and sole representative samples of the geology / mineral resources generated from the sub-surface and useful for assessment of mineralization and estimation of mineral of resources for economic growth of the Nation.



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As per the guidelines of "IBM Manual on appraisal of Mining Plan, 2014" at least 10% of samples will be analyzed (a) in accordance to BIS and (b) from NABL accredited / Govt. laboratory.

j) **Reserves and Resources as per UNFC with respect to the threshold value notified by IBM may be furnished in a tabular form as given below:** (Area explored under different level of exploration may be marked on the geological plan and UNFC code for area considered for different categories of reserve/resources estimation may also be marked on geological cross sections). Submit a feasibility/pre-feasibility study report along with financial analysis for economic viability of the deposit as specified under the UNFC field guidelines may be incorporated.

Geological Plan has been prepared on a scale of 1:4,000 where area explored as per UNFC has been marked and Geological Sections have been prepared matching with the Geological Plan and mineral resources have been estimated.

A summary of exploration according to the Geological Report provided by the State Govt. indicating G1, G2 etc. as per the format prescribed by IBM has been presented as follows:

| Total Lease Area: 349.50 Ha as per ROR | | | | | |
|---|---|---|---|---|---|
| Item of Information | Lease area explored as per UNFC norms (in Ha) as on 01.11.2020<br>Total lease area = A+B+C+D | | | | Remarks/ comments including reasons for not carrying out the exploration as per UNFC norms |
| | G1 Level (Ha) | G2 Level (Ha) | G3 Level (Ha) | Unexplored lease area (Ha) | |
| | A | B | C | D | E |
| Area as per level of exploration | 317.00 | 32.50 | --- | --- | --- |
| No. of BH drilled | 379 | 37 | --- | --- | |
| Meterage drilled | 9565.55 | | --- | | |
| Grid Interval | 50m to 100m | 100m to 200m | --- | --- | |
| Scale of Mapping | 1:4000 | 1:4000 | --- | --- | |
| Reserve estimated considering the above exploration as on 01.11.2020 : 6,568,416 t | | | | | |
| Remaining resource estimated considering the above exploration as on 01.11.2020 : 11,092,086 t | | | | | |
| Total reserve / resource estimated considering the above exploration as on 01.11.2020 : 17,660,502 t | | | | | |

Ref: Pre-Feasibility Study Report vide Annexure-1 along with financial analysis for economic viability of the deposit as specified under the UNFC field guidelines.

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k) **Furnish detailed calculation of reserves/resources section wise** (When the mine is fully mechanized and deposit is of complex nature with variation of size, shape of mineralized zones, grade due to intrusion within ore zone etc, an attempt may be made to estimate reserves / resources by slice plan method). In case of deposits where underground mining is proposed, reserve/resources may be estimated by level plan method, as applicable, as per the proposed mining parameters.

**METHOD OF ESTIMATION OF RESOURCES:** As per the IBM Manual on appraisal of Mining Plan, 2014, Cross sectional area measured from the sections has been multiplied with the strike length of influence, recovery factor and bulk density to arrive at the quantity of the iron ore resource in tonnes. The formula implemented to calculate the resource is as follows:

| | | |
|---|---|---|
| R | = | C x L x r x D |
| Where, R | = | Iron ore resource in tonnes. |
| C1 | = | Cross sectional area of ore zone in $m^2$ |
| L | = | Length of influence of each section i.e. 100m which is sum of half distances on either side of each section. |
| r | = | Recovery factor |
| D | = | Bulk density (t/ $m^3$) |

**Parameters considered for estimation of mineral resources:**

Ultimate pit depth has been proposed up to 270m from surface level between 864mRL to 594mRL. As per the Notification of Ministry of Mines (Indian Bureau of Mines), Nagpur vide No.C-284/3/CMG/2017 dated 25.04.2018, threshold value of iron ore is 45% Fe while cut-off grade considered by the Lessee for iron ore is 55% Fe. Therefore, mineral resources has been estimated under +45-55% Fe and +55 % Fe separately. Rock mass containing +55 % Fe has been termed as iron ore and +45%-55% Fe as sub-grade ore. Rock mass containing less than 45% Fe is considered as waste materials.

Bulk density and recovery factor of iron ore (+55% Fe) and sub-grade ore / mineral rejects (+45-55% Fe) as per the Geological Report for the purpose of estimation of iron ore resource (ref: Annexure-29) are as follows:



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| Parameters | Name of Quarry | Saleable Ore (+55% Fe) | Mineral Rejects / Sub-grade Ore (+45-55% Fe) |
|---|---|---|---|
| Bulk density | Kochar | 3.5 t/m$^3$ | 3.2 t/m$^3$ |
| | Kochar Top | 3.0 t/m$^3$ | 2.8 t/m$^3$ |
| | F-Level | 3.5 t/m$^3$ | 3.2 t/m$^3$ |
| | Kisuntanki | 3.0 t/m$^3$ | 2.8 t/m$^3$ |
| | 2550 | 2.8 t/m$^3$ | 2.7 t/m$^3$ |
| Recovery | Quarries as above | 100% | 100% |

I) **Mineral Reserves / Resources:** (Mineral resources may be estimated purely based on level of exploration, with reference to the threshold value of minerals declared by IBM):

**Mineral Resources as per UNFC level of Exploration:** Iron ore zone intersected by the closely spaced boreholes at 50m to 100m spacing laterally up to 50m distance from the borehole / quarry face and depth-wise up to end of borehole / quarry floor level has been considered under G1 level of exploration. However, iron ore resources estimated under G1 level are as follows:

| Level of Exploration | Iron ore resource (in tonnes) | Grade Group (Fe%) | Avg Grade (Fe%) |
|---|---|---|---|
| G1 - Detailed exploration | 11,702,903 | + 55% Fe | 61.06 |
| | 5,957,599 | + 45 – 55% Fe | 45.79 |
| G2 - General Exploration | --- | --- | --- |
| G3 – Prospecting | --- | --- | --- |
| G4 – Reconnaissance | --- | --- | --- |
| **Total** | **17,660,502** | --- | --- |

**Mineral Resources as per UNFC code:** Iron ore estimated under G1 level of exploration has been considered under measured resource (331) category because tonnage and grade of this category has been estimated w.r.t thickness, shape, physical characteristics, grade / mineral content and bulk density with a higher level of confidence based on detailed and reliable exploration (drilling, sampling and analysis information gathered from the drill holes).

Keeping in view the geological axis and before considering the feasibility and economic viability, total iron ore resources have been kept under measured mineral resource (331) category as follows:

| UNFC Code | Iron ore resource (in Million tonnes) | Grade Group (Fe%) | Avg Grade (Fe%) |
|---|---|---|---|
| Measured resource (331) | 11,702,903 | + 55% Fe | 61.06 |
| | 5,957,599 | + 45 – 55% Fe | 45.79 |
| Indicated resource (332) | --- | --- | --- |
| Inferred resource (333) | --- | --- | --- |
| Reconnaissance (334) | --- | --- | --- |
| **Total** | **17,660,502** | --- | --- |

*Resources and Reserves within the lease may be arrived after applying results feasibility / prefeasibility study and economic evaluation of deposit based on various factors such as:*

a) Mining method, Recovery factor, mining losses, processing loss etc.

On account of exposures of mineral resources and its limited depth of occurrence, open cast method of mining will be adopted. As per MCDR, 2017, the proposed mine belongs to Category-A (Fully Mechanized / FM) Mine. Excavators of 0.9$m^3$ to 4.2$m^3$ bucket capacity will be utilized for excavation & loading of the materials in to 30t capacity truck / dumpers which will unload it (a) directly into the hopper of the crushing plant for sizing of minerals or (b) ore stacking or processing site. Sized materials obtained from the mine will be dispatched directly to the consuming industries through contractual trucks loaded by the frontend / pay loaders.

Height and width of the benches will be kept at 6m and 9m respectively. The individual bench faces will be kept nearly vertical ($80^0$) whereas the overall quarry slope angle (the angle between the line joining the toe of bottom bench and the crest of the top bench with the horizontal) is proposed to be maintained at around $30^0$ with the horizontal.

The mine will be operated on 8 hourly two shifts basis in 300 working days in a year. Weekly one day will be declared as holiday excluding National holidays.

A simple and standard formula has been utilized for estimation of reserves as follows:

| | | |
|---|---|---|
| R2 | = | C2 x L x D |
| Where, R2 | = | Iron ore reserves in metric tonnes. |
| C2 | = | Cross sectional area of mineable mineralized area of iron ore in $m^2$ |
| L | = | Length of influence of each section i.e. 100m which is sum of half distances on either side of each section. |
| D | = | Bulk density (t/ $m^3$) |

Mineability / Economic viability is demonstrated in consecutive feasibility assessment stages in the order of increasing sense of feasibility such as Pre-feasibility Study and Feasibility Study.

**Probable Reserve (121):** This category of reserve of minerals is a part of measured resource (331) which is derived from the mining report / mining plan.

**Remaining resource (221):** This category of resource of minerals is a part of measured resource (331) which is blocked and lies within safety zone and below / beyond the ultimate pit limit.

**b) Cut off grade, Ultimate pit depth proposed.**

**Cut off grade:** The cutoff grade is taken as 55% Fe and threshold value is taken as 45% Fe. As per the Notification of Ministry of Mines (Indian Bureau of Mines), Nagpur vide No.C-284/3/CMG/2017 dated 25.04.2018, threshold value of iron ore is 45% Fe while cut-off grade considered by the Lessee for iron ore is 55% Fe. Therefore, iron ore has been estimated under +45-55%Fe and +55% Fe separately. Rock mass / overburden containing +55% Fe has been termed as iron ore and +45%-55% Fe as sub-grade ore. Rock mass containing less than 45% Fe is considered as waste materials.

**Ultimate pit depth:** Ultimate pit depth of quarries have been proposed to be 270m from surface level between 864mRL and 594mRL. Keeping in view the above considerations, iron ore reserve has been updated as follows:



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| Reserve | Type | UNFC Code | Iron Ore Reserve (in tonnes) | Grade Group (Fe%) | Avg Grade (Fe%) |
|---|---|---|---|---|---|
| Reserve | Probable Mineral Reserve | 121 | 4,212,073 | + 55% Fe | 61.06 |
| | | | 2,356,343 | + 45 – 55% Fe | 45.79 |
| **Total** | --- | --- | **6,568,416** | --- | --- |

c) Mineral / ore blocked dues to benches, barriers, pillars, road, railway, river, nala, reservoir, electric line and other statutory barriers etc, under forest, sanctuaries etc. where necessary permissions are not available.

A part of the resource will be blocked up below the safety zone and ultimate pit slopes. Therefore, iron ore reserve has been estimated in the same manner as the iron ore resource deducting non-mineable part of the resource to be blocked up below & safety zone and ultimate pit slope. Considering the ultimate pit limit, cross sectional area of mineable ore zone has been measured separately in each section. Blockable / remaining resource has been obtained by way of deducting the reserve from the resource. However, remaining iron ore resource in the M.L area has been presented as follows:

| Resource | Type | UNFC Code | Iron ore resource (in tonnes) | Grade Group (Fe%) | Avg Grade (Fe%) |
|---|---|---|---|---|---|
| Remaining resource | Pre-feasibility Mineral Resource | 221 | 7490830 | + 55% Fe | 61.06 |
| | | | 3601256 | + 45- 55% Fe | 45.79 |
| **Total** | --- | --- | **11,092,086** | --- | --- |

***Note: It may not be possible to quantify grade wise reserves, as normally there is considerable variation in size and grade distribution within the ore zone, which results variable recovery factor and bulk density. Thus tonnages arrived are tentative.***

Based on the status of economics, feasibility and exploration, UNFC code of reserve and resource have been formulated. As per the revised threshold value of iron ore as per the Notification of Ministry of Mines (Indian Bureau of Mines), Nagpur vide No.C-284/3/CMG/2017 dated 25.04.2018, in-situ iron ore reserve and resource as per UNFC (as on 01.11.2020) has been presented finally as follows:



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| Reserve/ resources | Categorization of reserves & resources | UNFC Code | Quantity (in tonnes) | Grade Group (Fe%) | Avg Grade (Fe%) |
|---|---|---|---|---|---|
| Reserves | Proved Mineral reserve | 111 | --- | --- | --- |
| | Probable Mineral Reserve | 121 | 4,212,073 | + 55% Fe | 61.06 |
| | | | 2,356,343 | + 45- 55% Fe | 45.79 |
| | | 122 | --- | --- | --- |
| **Sub-Total (A)** | --- | --- | **6,568,416** | --- | --- |
| Remaining resources | Feasibility Mineral Resource | 211 | --- | --- | --- |
| | Pre-feasibility Mineral Resource | 221 | 7,490,830 | + 55% Fe | 61.06 |
| | | | 3,601,256 | + 45- 55% Fe | 45.79 |
| | | 222 | --- | --- | --- |
| | Measured Mineral Resource | 331 | --- | --- | --- |
| | Indicated Mineral Resource | 332 | --- | --- | --- |
| | Inferred Mineral Resource | 333 | --- | --- | --- |
| | Reconnaissance Mineral Resource | 334 | --- | --- | --- |
| **Sub-Total (B)** | --- | --- | **11,092,086** | --- | --- |
| **Total Reserves (A) + Resources (B)** | --- | --- | **17,660,502** | --- | --- |

**Justification in respect of UNFC Codification:** Under UNFC, the reserves have been categorized by attributing 3-digit codes of (E) economic axis, (F) feasibility axis and (G) geological axis. The key parameter considered for mineral reserve/resource estimation under the axes of UNFC are (a) Exploration already done (drilling & analysis of ore samples), (b) Reserves updated as on date, (c) Processing technique adopted/to be adopted for saleable ore, (d) Approval of mining plan/scheme of mining with PMCP, (e) Forest Clearance, (f) Environmental Clearance and (g) Prevailing cost of mining/tonne of ore and sale value.

Degree of confidence has been defined by supporting data for the axes of UNFC and accordingly, mineable end use ore reserve considered under Probable Reserve (121) as per UNFC has been justified as follows:



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| Category (Code) | Economic Axis (E1 : Economic) | Feasibility Axis (F2 : Pre-Feasibility study) | Geological Axis (G1 : Detailed Exploration) |
|---|---|---|---|
| Probable Reserve (121) | **1.Detailed Exploration :** Exploration has been carried out by way of drilling of 416 vertical boreholes consists of 189 core drill holes (5840.55m) and 227 noncore drill holes (3725m) have been sunk in the M.L area at 50m to 100m spacing and opening of a number of quarries in iron ore zone.<br><br>**2. Mining Report:** Mining reports (plan, scheme etc.) have been prepared and approved by the Indian Bureau of Mines, Govt. of India.<br><br>**3. End use grades of reserve:** As on date, minable reserve of iron ore is 4,212,073t (61.06% Fe) and sub-grade iron ore / mineral reject is 2,356;343 t (45.79% Fe).<br><br>**4. Land use pattern:** M.L area over 349.50 hectares consists of 90.50 hectares forest land and 259.00 hectares non-forest land. | **1. Geology:** Exploration has carried out in the M.L area by way of geological mapping and exploratory drilling.<br><br>**2. Mining:** Opencast method of mining will continue. As per MCDR, 2017, the mine belongs Category-A (fully mechanized / FM) Mine. Excavators of 0.9$m^3$ to 4.2$m^3$ bucket capacity will be utilized for excavation & loading of the materials in to 30t capacity dumpers which will unload it (a) directly into the hopper the screening plant for sizing of iron ore or (b) ore stacking or processing site. Sized materials obtained from the mine will be dispatched directly to the consuming industries through contractual trucks loaded by the frontend loader.<br><br>**3. Environmental:** Environmental domains have been monitored periodically as per the CPCB norms. EIA / EMP have been presented to MoEF and Environmental Clearance has been obtained to Lessee from Ministry of Environment and Forests (MoEF) under Environment Protection Act, 1986 for production of iron ore @0.75 MTPA.<br><br>**4. Processing:** Dry processing technique such as crushing and screening will be adopted to up-grade iron ore in respect of size and grade.<br><br>**5. Infrastructure, Services and Construction Activities:** Infrastructural facilities are adequately available in the within M.L area of Lessee because the mine is operated since a long back.<br><br>**6. Costing:** Capital investment in the mine is estimated to be Rs.36 crores. Operating cost (production, processing & transporting cost within M.L area) is estimated to be Rs.1060 /tonne. Auction premium is 115% of selling price. | **1. Geological Survey :** Detailed topographical-cum-geological map has been prepared on 1:4,000 scale showing surface geological features, existing quarry, location of boreholes etc.<br><br>**2. Geochemical Survey :** Iron ore samples collected from drill holes have been analyzed for different constituents.<br><br>**3. Geophysical Survey:** This is not necessitated since ore bodies are exposed on the surface and drilling has been done at 50m to 100m interval.<br><br>**4. Technological:** (i) Exploratory boreholes have been drilled at 50m to 100m interval.<br><br>(ii) Stack samples have been analyzed in addition to the analysis of drill core samples.<br><br>(iii) Iron ore zone intersected by the closely spaced bore holes at 50m to 100m spacing laterally up to 50m distance from the borehole / quarry face and depth-wise up to end of borehole / quarry floor level has been considered under G1 level of exploration.<br><br>(iv) Environmental data are generated, collected and complied at regular interval.<br><br>**5. Petrographic :** Not necessarily required.<br><br>**6. Geostatistical analysis :** Not necessarily required. |



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| | | | |
|---|---|---|---|
| | | **7. Marketing:** Iron ore produced in the mine will be dispatched mostly to the captive integrated steel plant of the Lessee.<br><br>**8. Economic Viability:** since operating cost is Rs.1060 / tonne .Keeping in view lumps to fines ratio of iron ore (+55% Fe) is 63:37 and lumps to fines ratio of sub-grade ore / mineral reject (+45-55% Fe) is 25:75, the ASP of iron ore and mineral reject have been calculated to be Rs.2243 / tonne and Rs.1144 / tonne respectively, the mine is economically viable after value addition in captive iron ore based industries (ref: Pre-feasibility Report vide Annexure-1).<br><br>**9. Other factors:** The mine will be operated in accordance with MCR, 2016, Mines Act-1952 & MCDR-2017. | |



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## TABLE–1.1: MEASURED IRON ORE RESOURCE (331)

| Name of Quarry | Section Considered | Length of Influence (m) | Iron Ore | | | | Sub-grade Ore | | | | Total Reserve (t) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Cross Sectional Area ($m^2$) | Volume ($m^3$) | Bulk Density | Quantity (t) | Cross Sectional Area ($m^2$) | Volume ($m^3$) | Bulk Density | Quantity (t) | |
| a | b | c | d | e = c x d | f | g = e x f | h | i = c x h | j | k = i x j | l = g + k |
| Kochar | G1G1' | 75 | 4413 | 330975 | 3.5 | 1158412 | 968 | 72600 | 3.2 | 232320 | 1390732 |
| | G2G2' | 50 | 4818 | 240900 | 3.5 | 843150 | 902 | 45100 | 3.2 | 144320 | 987470 |
| | G3G3' | 50 | 4003 | 200150 | 3.5 | 700525 | 580 | 29000 | 3.2 | 92800 | 793325 |
| | G4G4' | 50 | 1985 | 99250 | 3.5 | 347375 | 128 | 6400 | 3.2 | 20480 | 367855 |
| | G5G5' | 50 | 1561 | 78050 | 3.5 | 273175 | 722 | 36100 | 3.2 | 115520 | 388695 |
| | G6G6' | 50 | 1097 | 54850 | 3.5 | 191975 | 1075 | 53750 | 3.2 | 172000 | 363975 |
| | G7G7' | 35 | 1262 | 44170 | 3.5 | 154595 | --- | --- | --- | --- | 154595 |
| | G8G8' | 63 | 1106 | 69678 | 3.5 | 243873 | --- | --- | --- | --- | 243873 |
| | **Sub-total** | --- | --- | **1118023** | --- | **3913080** | --- | **242950** | --- | **777440** | **4,690,520** |
| Kochar Top | G9G9' | 50 | 3843 | 192150 | 3.0 | 576450 | 395 | 19750 | 2.8 | 55300 | 631750 |
| | G10G10' | 50 | 4090 | 204500 | 3.0 | 613500 | 178 | 8900 | 2.8 | 24920 | 638420 |
| | G11G11' | 50 | 1342 | 67100 | 3.0 | 201300 | --- | --- | 2.8 | --- | 201300 |
| | G12G12' | 50 | 1666 | 83300 | 3.0 | 249900 | 72 | 3600 | 2.8 | 10080 | 259980 |
| | G13G13' | 53 | 1163 | 61639 | 3.0 | 184917 | --- | --- | 2.8 | --- | 184917 |
| | **Sub-total** | --- | --- | **608689** | --- | **1826067** | --- | **32250** | --- | **90300** | **1,916,367** |
| F-Level | G14G14' | 201 | 2618 | 526218 | 3.5 | 1841763 | 2130 | 428130 | 3.2 | 1370016 | 3211779 |
| | G15G15' | 50 | 3752 | 187600 | 3.5 | 656600 | 4214 | 210700 | 3.2 | 674240 | 1330840 |
| | G16G16' | 50 | 1796 | 89800 | 3.5 | 314300 | 4918 | 245900 | 3.2 | 786880 | 1101180 |
| | G17G17' | 50 | 2780 | 139000 | 3.5 | 486500 | 7625 | 381250 | 3.2 | 1220000 | 1706500 |
| | G18G18' | 56 | 4600 | 257600 | 3.5 | 901600 | 2514 | 140784 | 3.2 | 450509 | 1352109 |
| | **Sub-total** | --- | --- | **1200218** | --- | **4200763** | --- | **1406764** | --- | **4501644.8** | **8,702,408** |
| Kisuntanki | G21G21' | 56 | --- | --- | 3.0 | --- | 62 | 3472 | 2.8 | 9722 | 9722 |
| | G22G22' | 50 | 1665 | 83250 | 3.0 | 249750 | 215 | 10750 | 2.8 | 30100 | 279850 |
| | G23G23' | 60 | 1332 | 79920 | 3.0 | 239760 | 105 | 6300 | 2.8 | 17640 | 257400 |
| | **Sub-total** | --- | --- | **163170** | --- | **489510** | --- | **20522** | --- | **57462** | **546,972** |
| 2550 Quarry | G25G25' | 68 | 1086 | 73848 | 2.8 | 206775 | 760 | 51680 | 2.7 | 139536 | 346311 |
| | G26G26' | 50 | 922 | 46100 | 2.8 | 129080 | 942 | 47100 | 2.7 | 127170 | 256250 |
| | G27G27' | 50 | 940 | 47000 | 2.8 | 131600 | 834.21 | 41710.5 | 2.7 | 112618 | 244218 |
| | G28G28' | 80 | 1017 | 81360 | 2.8 | 227808 | 1053 | 84240 | 2.7 | 227448 | 455256 |
| | **Sub-total** | --- | --- | **248308** | --- | **695263** | --- | **224731** | --- | **606772** | **1,302,035** |
| WEST BLOCK QUARRY | G29-G29' | 100 | 689 | 68900 | 3 | 206700 | ---- | ---- | ---- | ---- | 206700 |
| | G30-G30' | 100 | 599 | 59900 | 3 | 179700 | ---- | ---- | ---- | ---- | 179700 |
| | G31-G31' | 100 | 265 | 26500 | 3 | 79500 | ---- | ---- | ---- | ---- | 79500 |
| | G32-G32' | 100 | 121 | 12100 | 3 | 36300 | ---- | ---- | ---- | ---- | 36300 |
| | **Sub-total** | --- | --- | **167400** | --- | **502200** | --- | --- | --- | --- | **502,200** |
| **Total** | --- | --- | --- | **3505808** | --- | **11626883** | --- | **1927217** | --- | **6033619** | **17,660,502** |



(S.C. Nayak)
Qualified Person

# CHAPTER-2

## 2.0 MINING

### A. OPEN CAST MINING

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

**Existing method for excavation:** Various mining operations such as drilling, blasting, excavation, loading and transportation had been practiced in Gorumahisani Opencast Iron Ore Block with the deployment of Heavy Earth Moving Machinery (HEMM) like blast hole drills, excavators, loaders, tippers / dumpers etc.

ROM iron ore produced from the mine is transported from the face to the processing site and fed into the crushing & screening units for sizing and sized materials are loaded by the wheel loaders and transported further by the trucks / train to the captive as well as other steel and sponge iron plants mostly located in the State.

There exist nine (9) pits / quarries indicating dimensions etc. as detailed in the table below:

| Sl. No. | Pit Name | Block Name | Length (m) | Width (m) | Area (m) |
|---|---|---|---|---|---|
| 1 | Kochar West | East Block | 156 | 125 | 19500 |
| 2 | Kochar | East Block | 444 | 339 | 150516 |
| 3 | Kochar Top | -do- | 188 | 174 | 32712 |
| 4 | 2550 | -do- | 347 | 165 | 57255 |
| 5 | Kisuntanki | -do- | 246 | 139 | 34194 |
| 6 | F-Level | -do- | 516 | 244 | 125904 |
| 7 | West Block | --- | 392 | 71 | 27832 |
| 8 | -do- | --- | 346 | 238 | 82348 |
| 9 | -do- | --- | 516 | 287 | 148092 |
| **Total** | --- | --- | --- | --- | **678,353** |

There exist seventeen (17) waste dumps in the M.L area which are detailed as below:

| Sl. No. | Name of Waste Dumps | Location | Length (m) | Width (m) | Area covered | |
|---|---|---|---|---|---|---|
| | | | | | ($m^2$) | (ha) |
| 1 | Dump-KD1 | East Block | 257 | 20 | 5140 | 0.514 |
| 2 | Dump-KD2 | -do- | 165 | 12 | 1980 | 0.198 |
| 3 | Kuilisuta Dump | -do- | 101 | 47 | 4747 | 0.475 |
| 4 | Dump-KTD1 | -do- | 160 | 109 | 17440 | 1.744 |
| 5 | Dump-KTD2 | -do- | 150 | 140 | 21000 | 2.100 |
| 6 | 2550 Dump | -do- | 110 | 69 | 7590 | 0.759 |
| 7 | Dump-FD3 | -do- | 130 | 38 | 4940 | 0.494 |
| 8 | Dump-FD5 | -do- | 171 | 59 | 10089 | 1.009 |
| 9 | Dump-FD6 | -do- | 242 | 84 | 20328 | 2.033 |
| 10 | Dump-FD7 | -do- | 141 | 27 | 3807 | 0.381 |
| 11 | Dump-FD8 | -do- | 79 | 28 | 2212 | 0.221 |
| 12 | N-Incline Dump | -do- | 410 | 53 | 21730 | 2.173 |
| 13 | Rajpal Dump | -do- | 240 | 138 | 33120 | 3.312 |
| 14 | Dump-RD3 | -do- | 232 | 90 | 20880 | 2.088 |
| 15 | Dump-WBD1 | West Block | 150 | 62 | 9300 | 0.930 |
| 16 | Dump-WBD2 | -do- | 111 | 20 | 2220 | 0.222 |
| 17 | Dump-WBD3 | -do- | 212 | 40 | 8480 | 0.848 |
| **Total** | --- | --- | --- | --- | **195,003** | **19.500** |

**Proposed method for excavation:** On account of exposures of iron ore and limited depth of occurrence, opencast method of mining will be continued. As per MCDR, 2017, the mine will be operated as a Category-A (FM) Mine. However, proposed method of excavation has been described as follows:

| Items | Description |
|---|---|
| Method of Mining | Fully mechanized method of mining (FM as per MCDR, 2017) will be adopted on two shift basis to produce iron ore @0.75 MTPA with the deployment of deep hole drilling drills, excavators, dumpers etc. |
| Justification for site selection for mining | Five (5) existing pits / quarries namely Kochar Quarry, Kochar Top Quarry, F-Level Quarry, Kisuntanki Quarry & 2550 Quarry will be developed laterally as well as depth-wise for production of iron ore @0.75 MTPA as per the vesting order since these quarries were being operated in last year before the auction. |



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| | |
|---|---|
| Bench Geometry | Height and width of the benches will be kept 6m & 9m respectively. The individual bench faces will be kept nearly vertical ($75^0$) whereas the overall quarry slope angle (the angle between the line joining the toe of bottom bench and the crest of the top bench with the horizontal) is proposed to be maintained at $30^0$ with the horizontal. |
| Blast hole drilling | Hard rock mass will be loosened through drilling and blasting for ease in excavation by the excavator. DTH drill of 100mm dia will be used for deep / blast hole drilling. |
| Loosening of the rock mass for ease in excavation | About 30% of iron ore is hard which the excavator will loosen through drilling and blasting for ease in excavation. Bigger size boulders produced after primary blasting will be further loosened / broken by the rock breaker as well as the secondary blasting. |
| Excavation | Excavators of $0.9m^3$ and $1.2m^3$ bucket capacity will be used for excavation & loading of iron ore & waste in to the dumpers. |
| Transportation of ROM Ore and waste | Dumpers of 30t capacity will be deployed for transportation of ROM ore to the stacking and waste dumping site. |
| Waste disposal | Overburden / waste generated in iron ore quarries will be dumped (a) within non-mineralized (no ore bearing) area proved by drilling and (b) outside the ultimate pit limit. |
| ROM ore processing | Dry mechanized processing technique will be adopted in the M.L area by way of screening in 800tph capacity screening plants and 470tph capacity crushing plants for upgrade of iron ore in respect of size and grade. |
| Transportation of saleable / caliberated ore (CLO) | Iron ore lumps & fines produced from the mechanized processing units like screen and crusher will be transported to the steel & sponge iron plant etc. and railway siding through contractual trucks. |
| Time schedule | The mine will be operated on two shifts basis for 300 days in a year. Time period of morning shift will be 8 hours from 6 AM to 2 PM and time period of day shift will be 8 hours from 2 PM to 10 PM. Tea break and refreshment time will be provided between 9 AM & 10 AM in $1^{st}$ shift and 5 PM & 6 PM in next shift. One day will be declared as the weekly holiday. |

Development proposal: The details of the yearwise pit development for production of iron ore are proposed to be as below:

## Development proposal for 1st year (FY 2020-21):

| Particular for the year 2020-21 | | Location (Quarry Name) | | | | |
|---|---|---|---|---|---|---|
| | | Kochar Quarry | Kochar Top Quarry | F-Level Quarry, | Kisuntanki Quarry | 2550 Quarry |
| Bench Geometry | Height | 6m | 6m | 6m | 6m | 6m |
| | Width | 9m | 9m | 9m | 9m | 9m |
| | Individual bench slope angle | $80^0$ | $80^0$ | $80^0$ | $80^0$ | $80^0$ |
| Quarry Development | Extent of Development (in UTM Coordinates) | 2466684N to 2466840N / 426422E to 426576E | 2467046N to 2467347N / 426388E to 426618E | 2467884N to 2468127N / 426163E to 426381E | 2467430N to 2467581N / 425932E to 425969E | 2467507N to 2467749N / 426635E to 426691E |
| | Sections considered for development | G2G2', G3G3' & G4G4' | G9G9', G10G10', G11G11', G12G12' & G13G13' | G14G14', G15G15', G16G16' & G17G17' | G21G21', G22G22' & G23G23' | G25G25', G26G26', G27G27' & G28G28' |
| | Number of benches | 6 | 7 | 11 | 3 | 8 |
| | Benches considered for development with RL | 724m, 730m, 736m, 744m, 750m, 756m, 762m, 768m, 777m | 858m, 864m, 870m, 876m, 882m, 888m, 894m, 900m | 618m, 624m, 630m, 636m, 642m, 648m, 654m, 700m, 706m, 712M, 718m | 750m, 756m, 762m, 768m | 762m, 768m, 774m, 780m, 786m, 792m, 798m, 804m, 810m |
| | Top RL | 779.5m | 900m | 719m | 771m | 818m |
| | Bottom RL | 724m | 858m | 618m | 750m | 762m |
| | Direction of advancement | South | West | N-S | NE-SW | N-E |
| | Dimension of the quarry at the end of the year including existing benches | 161m x 108m | 318m x 93m | 243m x 152m | 213m x 33m | 260m x 52m |
| | Area occupied ($m^2$) | 17,388$m^2$ | 29,574$m^2$ | 36,936$m^2$ | 7,029$m^2$ | 13,520$m^2$ |
| | Overall quarry slope angle | $30^0$ | $30^0$ | $30^0$ | $30^0$ | $30^0$ |
| | Production of Ore (in MT) | 213150 | 169155 | 33600 | 40458 | 51800 |
| | Generation of Mineral rejects ore from quarry (in MT) | 16000 | --- | 211680 | 14157 | --- |
| | Production of ROM (Ore + Mineral Reject) in MT | 229150 | 169155 | 245280 | 54615 | 51800 |
| | Total Generation of Waste ($m^3$) | 193850 | 95370 | 116300 | 30878 | 43450 |

## Development proposal for 2nd year (FY 2021-22):

| Particular for the year 2021-22 | | Location (Quarry Name) | | | | |
|---|---|---|---|---|---|---|
| | | Kochar Quarry | Kochar Top Quarry | F-Level Quarry, | Kisuntanki Quarry | 2550 Quarry |
| Bench Geometry | Height | 6m | 6m | 6m | 6m | 6m |
| | Width | 9m | 9m | 9m | 9m | 9m |
| | Individual bench slope angle | $80^0$ | $80^0$ | $80^0$ | $80^0$ | $80^0$ |



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| | | | | | | |
|---|---|---|---|---|---|---|
| Quarry Development | Extent of Development (in UTM Coordinates) | 2466691N to 2466812N / 426426E to 426584E | 2467048N to 2467356N / 426386E to 426640E | 2467909N to 2467817N / 426152E to 426382E | 2467428N to 2467585N / 425933E to 425986E | 2467750N to 2467500N / 426668E to 426748E |
| | Sections considered for development | G2G2', G3G3' & G4G4' | G9G9', G10G10', G11G11', G12G12' & G13G13' | G14G14', G15G15', G16G16', G17G17' & G18G18' | G21G21', G22G22' & G23G23' | G25G25', G26G26', G27G27' & G28G28' |
| | Number of benches | 6 | 7 | 9 | 3 | 4 |
| | Benches considered for development with RL | 726m, 732m, 738m, 744m, 750m, 756m, 762m, 768m, 774m | 858m, 864m, 870m, 876m, 882m, 888m, 894m, 900m | 624m, 630m, 636m, 642m, 648m, 654m, 700m, 706m, 712m | 744m, 750m, 756m, 762m, 768m | 768m, 777m, 771m, 777, 783m,789m, 795m |
| | Top RL | 774m | 900m | 712m | 771.3m | 796m |
| | Bottom RL | 726m | 858m | 624m | 744m | 768m |
| | Direction of advancement | South | West | N-S | NE-SW | N-E |
| | Dimension of the quarry at the end of the year including existing benches | 161m x 123m | 333m x 16m | 276m x 6m | 222m x 44m | 259m x 66m |
| | Area occupied ($m^2$) | 19,803$m^2$ | 5,328$m^2$ | 1,656$m^2$ | 9,768$m^2$ | 17,094$m^2$ |
| | Overall quarry slope angle | $30^0$ | $30^0$ | $30^0$ | $30^0$ | $30^0$ |
| | Production of Ore (in MT) | 232925 | 170731 | 15925 | 40296 | 51800 |
| | Generation of Mineral rejects ore from quarry (in MT) | --- | --- | 227840 | 10483 | --- |
| | Production of ROM (Ore + Mineral Reject) in MT | 232925 | 170731 | 243765 | 50779 | 51800 |
| | Total Generation of Waste ($m^3$) | 157800 | 115480 | 112500 | 37084 | 46150 |

## Development proposal for 3rd year (FY 2022-23):

| Particular for the year 2022-23 | | Location (Quarry Name) | | | | |
|---|---|---|---|---|---|---|
| | | **Kochar Quarry** | **Kochar Top Quarry** | **F-Level Quarry** | **Kisuntanki Quarry** | **2550 Quarry** |
| Bench Geometry | Height | 6m | 6m | 6m | 6m | 6m |
| | Width | 9m | 9m | 9m | 9m | 9m |
| | Individual bench slope angle | $80^0$ | $80^0$ | $80^0$ | $80^0$ | $80^0$ |
| Quarry Development | Extent of Development (in UTM Coordinates) | 2466662N to 2466902N / 426408E to 426614E | 2467049N to 2467364N / 426384E to 426633E | 2467905N to 2468181N / 426140E to 426382E | 2467424N to 2467588N / 425925E to 425987E | 2467499N to 246775N / 426624E to 426706E |
| | Sections considered for development | G1G1', G2G2', G3G3', G4G4' & G5G5' | G9G9', G10G10', G11G11', G12G12' & G13G13' | G14G14', G15G15', G16G16', G17G17' & G18G18' | G21G21', G22G22' & G23G23' | G25G25', G26G26', G27G27' & G28G28' |



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| | | | | | | |
|---|---|---|---|---|---|---|
| | Number of benches | 6 | 7 | 12 | 4 | 6 |
| | Benches considered for development with RL | 720m, 726m, 732m, 738m, 744m, 750m, 756m, 762m, 768m, 774m, 780m, 786m, 792m | 858m, 864m, 870m, 876m, 882m, 888m, 894m, 900m | 612m, 618m, 624m, 630m, 636m, 642m, 648m, 654m, 700m, 706m, 712M, 718m | 744m, 750m, 756m, 762m, 768m | 762m, 768m, 777m, 771m, 777, 783m,789m, 795m, 801m |
| | Top RL | 792m | 900m | 719m | 771.3m | 802m |
| | Bottom RL | 720m | 858m | 612m | 744m | 762m |
| | Direction of advancement | South | West | N-S | South | N-E |
| | Dimension of the quarry at the end of the year including existing benches | 170m x 161m | 335m x 13m | 280m x 17m | 230m x 55m | 259m x 80m |
| | Area occupied ($m^2$) | 27,370$m^2$ | 4,355$m^2$ | 4,760$m^2$ | 12,650$m^2$ | 20,720$m^2$ |
| | Overall quarry slope angle | $30^0$ | $30^0$ | $30^0$ | $30^0$ | $30^0$ |
| | Production of Ore (in MT) | 173250 | 168856 | 43750 | 40134 | 46480 |
| | Generation of Mineral rejects ore from quarry (in MT) | 44960 | --- | 202400 | 16940 | 13230 |
| | Production of ROM (Ore + Mineral Reject) in MT | 218210 | 168856 | 246150 | 57074 | 59710 |
| | Total Generation of Waste ($m^3$) | 140800 | 91355 | 127150 | 29878 | 47650 |

## Development proposal for 4th year (FY 2023-24):

| Particular for the year 2023-24 | | Location (Quarry Name) | | | | |
|---|---|---|---|---|---|---|
| | | **Kochar Quarry** | **Kochar Top Quarry** | **F-Level Quarry,** | **Kisuntanki Quarry** | **2550 Quarry** |
| Bench Geometry | Height | 6m | 6m | 6m | 6m | 6m |
| | Width | 9m | 9m | 9m | 9m | 9m |
| | Individual bench slope angle | $80^0$ | $80^0$ | $80^0$ | $80^0$ | $80^0$ |
| Quarry Development | Extent of Development (in UTM Coordinates) | 2466657N to 2466813N / 426382E to 426627E | 2467049N to 2467376N / 426382E to 426633E | 2467905N to 2468181N / 426143E to 426382E | 2467425N to 2467592N / 425919E to 425992E | 2467751N to 2467499N / 426614E to 426666E |
| | Sections considered for development | G1G1', G2G2', G3G3', G4G4' & G5G5' | G9G9', G10G10', G11G11', G12G12' & G13G13' | G16G16', G17G17' & G18G18' | G21G21', G22G22' & G23G23' | G25G25', G26G26', G27G27' & G28G28' |
| | Number of benches | 6 | 7 | 8 | 4 | 7 |
| | Benches considered for development with RL | 720m, 726m, 732m, 738m, 744m, 750m, 756m, 762m, 768m, 774m, 780m, 786m | 858m, 864m, 870m, 876m, 882m, 888m, 894m, 900m | 612m, 618m, 624m, 630m, 636m, 642m, 648m, 654m, | 744m, 750m, 756m, 762m, 768m, 771m | 750m, 756m, 762m, 768m, 771m, 777, 783m,789m, 795m, 801m 807m |
| | Top RL | 792m | 900m | 656m | 771.6m | 810m |
| | Bottom RL | 720m | 858m | 612m | 744m | 750m |
| | Direction of advancement | South | West | N-S | South | N-E |



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Qualified Person

| | | | | | | |
|---|---|---|---|---|---|---|
| | Dimension of the quarry at the end of the year including existing benches | 293m x 115m | 351m x 15m | 218m x 11m | 236m x 68m | 259m x 90m |
| | Area occupied ($m^2$) | 33,695$m^2$ | 5,265$m^2$ | 2,398$m^2$ | 16,048$m^2$ | 23,310$m^2$ |
| | Overall quarry slope angle | $30^0$ | $30^0$ | $30^0$ | $30^0$ | $30^0$ |
| | Production of Ore (in MT) | 193375 | 175517 | 126350 | 42348 | 39480 |
| | Generation of Mineral rejects ore from quarry (in MT) | 39520 | --- | 127200 | --- | 6210 |
| | Production of ROM (Ore + Mineral Reject) in MT | 232895 | 175517 | 253550 | 42348 | 45690 |
| | Total Generation of Waste ($m^3$) | 113200 | 121606 | 108450 | 24924 | 37250 |

## Development proposal for 5th year (FY 2024-25):

| Particular for the year 2024-25 | | Location (Quarry Name) | | | | |
|---|---|---|---|---|---|---|
| | | **Kochar Quarry** | **Kochar Top Quarry** | **F-Level Quarry,** | **Kisuntanki Quarry** | **2550 Quarry** |
| Bench Geometry | Height | 6m | 6m | 6m | 6m | 6m |
| | Width | 9m | 9m | 9m | 9m | 9m |
| | Individual bench slope angle | $80^0$ | $80^0$ | $80^0$ | $80^0$ | $80^0$ |
| Quarry Development | Extent of Development (in UTM Coordinates) | 2466653N to 2466761N / 426451E to 426605E | 2467050N to 2467385N / 426380E to 426633E | 2467903N to 2468180N / 426120E to 426280E | 2467420N to 2467595N / 425912E to 426002E | 2467751N to 2467499N / 426608E to 426662E |
| | Sections considered for development | G1G1', G2G2' & G3G3' | G9G9', G10G10', G11G11', G12G12' & G13G13' | G16G16', G17G17' & G18G18' | G21G21', G22G22' & G23G23' | G25G25', G26G26', G27G27' & G28G28' |
| | Number of benches | 6 | 7 | 8 | 4 | 8 |
| | Benches considered for development with RL | 724m, 730m, 736m, 744m, 750m, 756m, 762m, 768m, 777m | 858m, 864m, 870m, 876m, 882m, 888m, 894m, 900m | 612m, 618m, 624m, 630m, 636m, 642m, 648m, 654m, 660m | 744m, 750m, 756m, 762m, 768m | 756m, 762m, 768m, 777m, 783m, 789m, 795m, 801m, 807m, 813m 819m |
| | Top RL | 750m | 900m | 660m | 768m | 818m |
| | Bottom RL | 714m | 858m | 612m | 744m | 756m |
| | Direction of advancement | South | West | N-S | NE-SW | N-E |
| | Dimension of the quarry at the end of the year including existing benches | 293m x 122m | 357m x 14m | 218m x 12m | 245m x 81m | 259m x 99m |
| | Area occupied ($m^2$) | 35,746$m^2$ | 4,998$m^2$ | 2,616$m^2$ | 19,845$m^2$ | 25,641$m^2$ |
| | Overall quarry slope angle | $30^0$ | $30^0$ | $30^0$ | $30^0$ | $30^0$ |
| | Production of Ore (in MT) | 183400 | 174851 | 85400 | 40404 | 31220 |
| | Generation of Mineral rejects ore from quarry (in MT) | 50560 | --- | 164320 | --- | 19845 |
| | Production of ROM (Ore + Mineral Reject) in MT | 233960 | 174851 | 249720 | 40404 | 51065 |
| | Total Generation of Waste ($m^3$) | 147950 | 107439 | 112800 | 26758 | 43100 |



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

## I. Insitu Tentative Excavation

In-situ tentative excavation (in $m^3$) as per the prescribed table in the universal mining plan format will be as follows (ref: Table-2.1 to 2.10):

| Year | Quarry / Pit Name | Total Tentative excavation ($m^3$) | Top Soil ($m^3$) | OB + SB + IB ($m^3$) | ROM ($m^3$) | | ROM / Waste Ratio ($m^3$ / $m^3$) |
|---|---|---|---|---|---|---|---|
| | | | | | Iron Ore ($m^3$)* | Mineral reject ($m^3$) | |
| I (2020-21) | Kochar Quarry | 193850 | --- | 127950 | 60900 | 5000 | 1:1.9 |
| | Kochar Top Quarry | 95370 | --- | 38985 | 56385 | --- | 1:0.7 |
| | F-Level Quarry | 116300 | --- | 40550 | 9600 | 66150 | 1:0.5 |
| | Kisuntanki Quarry | 30878 | --- | 12336 | 13486 | 5056 | 1:0.7 |
| | 2550 Quarry | 43450 | --- | 24950 | 18500 | --- | 1:1.3 |
| | **Sub-total** | **479,848** | **---** | **244,771** | **158,871** | **76,206** | **1:1.0** |
| II (2021-22) | Kochar Quarry | 157800 | --- | 91250 | 66550 | --- | 1:1.4 |
| | Kochar Top Quarry | 115480 | --- | 58570 | 56910 | --- | 1:1.0 |
| | F-Level Quarry | 112500 | --- | 36750 | 4550 | 71200 | 1:0.5 |
| | Kisuntanki Quarry | 37084 | --- | 19908 | 13432 | 3744 | 1:1.2 |
| | 2550 Quarry | 46150 | --- | 27650 | 18500 | --- | 1:1.5 |
| | **Sub-total** | **469,014** | **---** | **234,128** | **159,942** | **74,944** | **1:1.0** |
| III (2022-23) | Kochar Quarry | 140800 | --- | 77250 | 49500 | 14050 | 1:1.2 |
| | Kochar Top Quarry | 91355 | --- | 35070 | 56285 | --- | 1:0.6 |
| | F-Level Quarry | 127150 | --- | 51400 | 12500 | 63250 | 1:0.7 |
| | Kisuntanki Quarry | 29878 | --- | 10450 | 13378 | 6050 | 1:0.5 |
| | 2550 Quarry | 47650 | --- | 26150 | 16600 | 4900 | 1:1.2 |
| | **Sub-total** | **436,833** | **---** | **200,320** | **148,263** | **88,250** | **1:0.8** |
| IV (2023-24) | Kochar Quarry | 113200 | --- | 45600 | 55250 | 12350 | 1:0.7 |
| | Kochar Top Quarry | 121606 | --- | 63100 | 58506 | --- | 1:1.1 |
| | F-Level Quarry | 108450 | --- | 32600 | 36100 | 39750 | 1:0.4 |
| | Kisuntanki Quarry | 24924 | --- | 10808 | 14116 | --- | 1:0.8 |
| | 2550 Quarry | 37250 | --- | 20850 | 14100 | 2300 | 1:1.3 |
| | **Sub-total** | **405,430** | **---** | **172,958** | **178,072** | **54,400** | **1:0.7** |
| V (2024-25) | Kochar Quarry | 147950 | --- | 79750 | 52400 | 15800 | 1:1.2 |
| | Kochar Top Quarry | 107439 | --- | 49155 | 58284 | --- | 1:0.8 |
| | F-Level Quarry | 112800 | --- | 37050 | 24400 | 51350 | 1:0.5 |
| | Kisuntanki Quarry | 26758 | --- | 13290 | 13468 | --- | 1:1.0 |
| | 2550 Quarry | 43100 | --- | 24600 | 11150 | 7350 | 1:1.3 |
| | **Sub-total** | **438,047** | **---** | **203,845** | **159,702** | **74,500** | **1:0.9** |
| **Total** | **---** | **2,229,172** | **---** | **1,056,022** | **804,850** | **368,300** | **1:0.9** |

अनुमोदित
APPROVED

** Tentative tonnage of the ore may be arrived by computing approximate bulk density and recovery factor as these data are variable and may be established on time series.*

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



(S.C. Nayak)
Qualified Person

Bulk density and recovery factors considered for the east block proposed quarries are as follows:

| Parameters | Name of Quarry | Saleable Ore (+55% Fe) | Mineral Rejects / Sub-grade Ore (+45-55% Fe) |
|---|---|---|---|
| Bulk density | Kochar | 3.5 t/m$^3$ | 3.2 t/m$^3$ |
| | Kochar Top | 3.0 t/m$^3$ | 2.8 t/m$^3$ |
| | F-Level | 3.5 t/m$^3$ | 3.2 t/m$^3$ |
| | Kisuntanki | 3.0 t/m$^3$ | 2.8 t/m$^3$ |
| | 2550 | 2.8 t/m$^3$ | 2.7 t/m$^3$ |
| Recovery | Quarries as above | 100% | 100% |

Keeping in view the above bulk density, the tentative quantum of waste generation (in m$^3$) and production of iron ore (in tonnes) will be as follows (ref: Table-2.1 to 2.10):

| Year | Quarry / Pit Name | OB + SB + IB (m$^3$) | ROM production (t) | | | ROM / Waste Ratio (t / m$^3$) |
|---|---|---|---|---|---|---|
| | | | Iron Ore (t) | Mineral reject (t) | Total (t) | |
| I (2020-21) | Kochar Quarry | 193850 | 213150 | 16000 | 229150 | 1:0.8 |
| | Kochar Top Quarry | 95370 | 169155 | --- | 169155 | 1:0.6 |
| | F-Level Quarry | 116300 | 33600 | 211680 | 245280 | 1:0.5 |
| | Kisuntanki Quarry | 30878 | 40458 | 14157 | 54615 | 1:0.6 |
| | 2550 Quarry | 43450 | 51800 | --- | 51800 | 1:0.8 |
| | **Sub-total** | **479,848** | **508,163** | **241,837** | **750,000** | **1:0.6** |
| II (2021-22) | Kochar Quarry | 157800 | 232925 | --- | 232925 | 1:0.7 |
| | Kochar Top Quarry | 115480 | 170731 | --- | 170731 | 1:0.7 |
| | F-Level Quarry | 112500 | 15925 | 227840 | 243765 | 1:0.5 |
| | Kisuntanki Quarry | 37084 | 40296 | 10483 | 50779 | 1:0.7 |
| | 2550 Quarry | 46150 | 51800 | --- | 51800 | 1:0.9 |
| | **Sub-total** | **469,014** | **511,677** | **238,323** | **750,000** | **1:0.6** |
| III (2022-23) | Kochar Quarry | 140800 | 173250 | 44960 | 218210 | 1:0.6 |
| | Kochar Top Quarry | 91355 | 168856 | --- | 168856 | 1:0.5 |
| | F-Level Quarry | 127150 | 43750 | 202400 | 246150 | 1:0.5 |
| | Kisuntanki Quarry | 29878 | 40134 | 16940 | 57074 | 1:0.5 |
| | 2550 Quarry | 47650 | 46480 | 13230 | 59710 | 1:0.8 |
| | **Sub-total** | **436,833** | **472,470** | **277,530** | **750,000** | **1:0.6** |
| IV (2023-24) | Kochar Quarry | 113200 | 193375 | 39520 | 232895 | 1:0.5 |
| | Kochar Top Quarry | 121606 | 175517 | --- | 175517 | 1:0.7 |
| | F-Level Quarry | 108450 | 126350 | 127200 | 253550 | 1:0.4 |
| | Kisuntanki Quarry | 24924 | 42348 | --- | 42348 | 1:0.6 |
| | 2550 Quarry | 37250 | 39480 | 6210 | 45690 | 1:0.8 |
| | **Sub-total** | **405,430** | **577,070** | **172,930** | **750,000** | **1:0.5** |
| V (2024-25) | Kochar Quarry | 147950 | 183400 | 50560 | 233960 | 1:0.6 |
| | Kochar Top Quarry | 107439 | 174851 | --- | 174851 | 1:0.6 |
| | F-Level Quarry | 112800 | 85400 | 164320 | 249720 | 1:0.5 |
| | Kisuntanki Quarry | 26758 | 40404 | --- | 40404 | 1:0.7 |
| | 2550 Quarry | 43100 | 31220 | 19845 | 51065 | 1:0.8 |
| | **Sub-total** | **438,047** | **515,275** | **234,725** | **750,000** | **1:0.6** |
| **Total** | **---** | **2,229,172** | **2,584,655** | **1,165,345** | **3,750,000** | **1:0.6** |



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Qualified Person

II. Dump re-handling (for the purpose of recovery of mineral):

There is no proposal at present for re-handling of waste dump for the purpose of recovery of minerals.

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

Individual year-wise development plans and sections showing pit layout, dump etc. has been prepared.

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

Opencast method of mining will continue on 8 hourly two shift basis with the deployment of machines like DTH drill, compressor, excavator, tipper etc. as Category-A (fully mechanized) Mine as per MCDR, 2017.

**Drilling:** Hard rock-mass will be drilled by the wagon / DTH drills. However, the details of blast hole drilling to be adopted for loosening of hard rock are as follows:

| Blast hole Parameters | Wagon Drill |
|---|---|
| Burden | 2.5m |
| Spacing | 3.0m |
| Bench height | 6.0m |
| Sub-grade drilling (10%) | 0.6m |
| Depth of the hole | 6 + 0.6 = 6.6 m |
| Output / hole | 2.5 x 3.0 x 6 = 45$m^3$ |
| Drill diameter | 100mm |
| Drilling speed | 12m /hr. |
| Working hours in a shift | 8 |
| Number of shifts per day | 2 |
| Annual working days | 300 |
| Expected utilization | 70% |
| Operating efficiency | 60% |
| Meters to be drilled/ drill / annum | 12 x 8 x 2 x 300 x 70% x 60% = 24,192m |
| Maximum volume of excavation / year (ref : 1st year) | = 479,848 $m^3$ |
| Volume to be blasted (@60% w.r.t. total excavation) | = 479,848 x 60% = 287,909$m^3$ |
| Annual requirement of holes | = 287,909 / 45= 6,398 Nos. |
| Meterage of drilling required | = 6,398 x 6.6= 42,227 m |
| No. of drills required to be in operation | = 42,227 / 24,192= 1.74, say 2 nos. |



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Though 2 DTH drills is required by calculation, 4 DTH drills have been proposed for use in 5 quarries since the quarries are located at distance from each other.

**Excavation and Loading:** Blasted / loose rocks will be excavated and loaded by the excavator and dumper combination. However, the details of excavation proposal have been presented as follows:

| Details | Kochar Quarry | Kochar Top Quarry | F-Level Quarry | Kisuntanki Quarry | 2550 Quarry |
|---|---|---|---|---|---|
| Bucket Capacity | = 2.4 $m^3$ | = 2.4 $m^3$ | = 4.2 $m^3$ | = 1.2 $m^3$ | = 1.2 $m^3$ |
| Swelling volume | = 60% | = 60% | = 60% | = 60% | = 60% |
| Swell factor | = 100/(100+60) = 0.625 | = 100/(100+60) = 0.625 | = 100/(100+60) = 0.625 | = 100/(100+60) = 0.625 | = 100/(100+60) = 0.625 |
| Bucket fill factor | = 0.8 | = 0.8 | = 0.8 | = 0.8 | = 0.8 |
| Utilization | = 60% | = 60% | = 60% | = 60% | = 60% |
| Operating efficiency | = 50% | = 50% | = 50% | = 50% | = 50% |
| Shovel cycle time | = 35 sec. | = 35 sec. | = 35 sec. | = 30 sec. | = 30 sec. |
| Swing factor | = 1 | = 1 | = 1 | = 1 | = 1 |
| No. of working hour in a shift | = 8 | = 8 | = 8 | = 8 | = 8 |
| No. of shift to be worked in a day | = 2 | = 2 | = 2 | = 2 | = 2 |
| No, of working days in a year | = 300 | = 300 | = 300 | = 300 | = 300 |
| Volume required to be handled per annum | 193850 | 95370 | 116300 | 30878 | 43450 |
| Volume to be handled / shovel | = 2.4 x 0.625 x 0.8 x 3600 x 60% x 50% x 8 x 2 x 300 / (35 x 1) = 177,737$m^3$ | = 2.4 x 0.625 x 0.8 x 3600 x 60% x 50% x 8 x 2 x 300 / (35 x 1) = 177,737$m^3$ | = 4.2 x 0.625 x 0.8 x 3600 x 60% x 50% x 8 x 2 x 300 /(35 x 1) = 311,040$m^3$ | = 1.2 x 0.625 x 0.8 x 3600 x 60% x 50% x 8 x 2 x 300 / (30 x 1) = 103,680$m^3$ | = 1.2 x 0.625 x 0.8 x 3600 x 60% x 50% x 8 x 2 x 300 / (30 x 1) = 103,680$m^3$ |
| Number of shovels required | = 193,850 / 177,737 = 1.1, say 2 nos. | = 95,370 / 177,737 = 0.54, say 1 no. | = 116,300 / 311,040 = 0.37, say 1 no. | = 30,878 / 103,680 = 0.3, say 1 no. | = 43,450 / 103,680 = 0.42, say 1 no. |

**Loading:** A total of 4 excavators of 0.9$m^3$ bucket capacity will be required for (a) feeding of ROM to the crushers and screens. In addition to this, 7 loaders of 1.7$m^3$ to 2.7$m^3$ capacity will be utilized for loading of processed ores (lumps & fines).

**HAULAGE & TRANSPORT WITHIN M.L AREA:** Overburden/ waste will be dumped. R.O.M iron ore will be transported to the crushing & screening site for sizing. Average distance / lead between the quarry and disposal / unloading sites is assumed to be 2.5 km. However, shovel - dumper matching calculation has been made as follows:

| Bucket Capacity of Excavator | $0.9m^3$ | $1.2m^3$ |
|---|---|---|
| Bucket fill factor | 0.9 | 0.9 |
| Swell factor | 0.67 | 0.67 |
| Tonnage factor | 3 $t/m^3$ | 3 $t/m^3$ |
| Tonnes per pass | 0.9 x 0.9 x 0.67 x 3<br>= 1.63 t | 1.2 x 0.9 x 0.67 x 3<br>= 2.17 t |
| Tipper / Dumper capacity | = 10 t | = 25 t |
| No. of passes | Tonnage rating of Dumper/tonnes per pass<br>= 10/1.63<br>= 7 passes | Tonnage rating of Dumper/tonnes per pass<br>= 25/2.17<br>= 11.5, say 12 passes |
| Loading time | 7 x 30 = 210 sec. | 12 x 30 = 360 sec. |
| Lead | 2.5 km | 2.5 km |
| Load travel speed | 15 kmph | 15 kmph |
| Load travel time | (3600 x 2.5)/15<br>= 600 sec. | (3600 x 2.5)/15<br>= 600 sec. |
| Dumping time | 60 sec. | 60 sec. |
| Empty travel speed | 20 kmph | 20 kmph |
| Empty travel time | (3600 x 2.5)/20<br>= 450 sec. | (3600 x 2.5)/20<br>= 450 sec. |
| Spotting time | 60sec. | 60sec. |
| Dumper cycle time | 210+600+60+450+60<br>= 1380 sec | 360+480+60+450+60<br>= 1530 sec |
| Number of dumpers required /shovel | =Dumper cycle time /(loading + spotting time)<br>= 1380/(210+60)<br>= 1380/270<br>= 5.11, say 6 nos. | =Dumper cycle time /(loading + spotting time)<br>= 1530/(360+60)<br>= 1530/420<br>= 3.6, say 4 nos. |
| Number of excavators | 4 | 3 |
| Number of dumpers attached in all total with excavators | 4 x 6 = 24 nos. | 3 x 4 = 12 nos. |

Due to the deployment of above 8 + 24 + 12 = 44 dumpers / tippers, traffic density will be 44 nos. / 2.5 km (average lead) will be 17.6, say 18 nos. / km. The impact due to the above traffic may be due to (a) dust generation, (b) traffic jam and (c) damage of the road. Therefore, road will be designed as indicated in Para-2.0Ae). For traffic management, adequate measures will be undertaken to monitor and control the traffic of communicational network. Spotters will be employed at the loading and unloading stations to avoid traffic jam.



(S.C. Nayak)
Qualified Person

**Transport from mine-head to the destination:** Saleable ore produced from the crusher / screen will be dispatched to the destination through contractual trucks / train.

**List of Machinery/Equipments:** The mine will be operated as Category-A (fully mechanized) mine as per MCDR, 2017 and the machine population is required to be arranged in the following order:

| Unit operation | Name | Dia / Capacity | Numbers |
|---|---|---|---|
| Drilling | Wagon / DTH drill | 100mm dia | 4 |
| | Compressor | 160 HP | 4 |
| Leveling | Dozer | 180 HP | 3 |
| Excavation & loading | Excavator | 4.2 $m^3$ | 1 |
| | | 2.4 $m^3$ | 3 |
| | | 1.2 $m^3$ | 2 |
| | | 0.9$m^3$ | 4 |
| | Wheel loader | 2.7 $m^3$ | 2 |
| | | 1.9$m^3$ | 3 |
| | | 1.7$m^3$ | 2 |
| Transporting | Dumper | 30 t | 30 |
| Breaking & Sizing | Mobile crushing & Screening units | 170 TPH | 1 |
| | | 100 TPH | 3 |
| | Mobile Screen | 250 TPH | 1 |
| | | 200 TPH | 2 |
| | Fixed Screen | 100 TPH | 1 |
| | Electro Magnetic Screening Plant | 50 TPH | 1 |
| Environmental Protection & industrial use | Road Grader | 135 HP | 1 |
| | DG Set | 1010 KVA | 1 |
| | | 25 KVA | 1 |
| | | 15 KVA | 1 |
| | Water Tanker | 8 KL | 4 |
| | -do- | 6 KL | 2 |
| | -do- | 4 KL | 4 |
| | Ambulance | --- | 1 |
| | Bolero / Scorpio | 50HP | 4 |



(S.C. Nayak)
Qualified Person

## BLASTING

Loosening & breaking the in-situ strata/rock by blasting is a normal practice followed in mining activity. The excavators will loosen overburden as well as iron ore zone by way of primary blasting for ease in excavation and oversized boulders will be broken by the deployment of rock breakers and secondary blasting.

**Broad Blasting Parameters:** Blast holes will be drilled by wagon drill and about 1/3$^{rd}$ of the hole in the top portion will be stemmed by the drill cuttings and rest of the hole in bottom portion will be charged with the slurry explosives like powergel, aquadine, energel etc. Drill holes will be drilled in single row as well as in multi rows on staggered pattern depending upon the strata condition & production requirement. However, the parameters chosen to achieve optimum results in terms of fragmentation, economy and least possible effect on the surrounding environment are as follows:

| Items | Quantitative aspects |
|---|---|
| Hole diameter | = 110 mm |
| Bench Height | = 6m |
| Blasting in one stroke | = 6m |
| Sub-grade drilling | = 0.6m |
| Hole depth | = 6m + 0.6m = 6.6m |
| Burden | = 2.5m |
| Spacing | = 3.0m |
| Yield/hole | = 2.5 x 3.0 x 6 |
| = bench height x burden x spacing | = 45m$^3$ or 45 x 3 =135 t |
| Charge /hole | = 22.5 kg |
| Charge / delay | Hole to hole delay system of blasting for optimum result and minimum hazards. |
| Initiation system | NONEL system of blasting / shock tube initiation system will be adopted for getting optimum blast result and minimization of hazards instead of conventional system of blasting. |
| Sequence of blasting | Bottom charging and top stemming |
| Manner of blasting | Staggered pattern |



(S.C. Nayak)
Qualified Person

**Type of Explosives to be Used:** Explosives (powergel, aquadine, energel etc.) of 83mm dia cartridges will be loaded in to 110mm dia wagon drilled holes. Explosives and accessories will be used for blasting under the direction of mines manager with competent blasting team.

Millisecond delay detonators will be used to split the vibration package in to a number of small vibration levels.

**Powder Factor:** This may vary depending upon the hardness of ore and other site conditions. However, powder factor has been calculated to be 6 tonnes ore / kg explosive as follows:

| Parameters | Quantity |
|---|---|
| Bulk density of iron ore | 3 $t/m^3$ |
| Yield / hole as indicated above | $45m^3$ or 45 x 3 = 135 t |
| Length of the hole | 6m |
| Length of the hole to be charged | 2 / 3 rd of hole = 2 / 3 x 6<br>= 3.99, say 4m |
| Diameter of explosive | 83mm or 0.083m |
| Bulk density of explosive | 1 t / $m^3$ (approx.) |
| Explosive to be charged in a hole | Circle area of catridge x length of the explosive column x bulk density<br>= ($\Pi d^2/4$) x 4 x 1<br>= 3.143 x $(0.083)^2$ / 4 x 4 x 1<br>= 0.0217 t or 21.65 kg |
| Powder factor (yield / kg of explosive) | Yield per hole / explosive charge<br>= 135 / 21.65<br>= 6.2, say 6 t / kg |

**Secondary Blasting:** Large size boulders generated after primary blasting will be broken by the rock breaker as well as secondary blasting.

**Storage and transportation of explosives:** An approved & licensed magazine has been established in the lease area to keep the explosives in safe & secure and to prevent pilferage & theft. The license is deemed to be in force for the possession & use of only for the under mentioned kinds & quantities of explosives:

| Name of the explosive | Class | Division | Quantity |
|---|---|---|---|
| Nitrate mixtures | Class-III | --- | 1800 kg |
| Safety fuse | Class- VI | 1 | 20000 m |
| Detonating fuse | -do- | 2 | |
| Detonator | -do- | 3 | 44000 Nos. |



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In addition to the blasting by the Lessee, blasting also will be carried out by the licensed vendor having his own blaster having blaster's certificate of competency.

**Environmental & Safety Measures:**

- Blasting will be preferably done in mid-day during 1.30 PM to 2.30 PM depending on seasonal variation and break hours. Blasting will not be carried out in the morning, evening, cloudy day or at the time of strong wind flow.
- Blasting will be carried out by the persons with Blaster's Certificate of Competency from DGMS, Dhanbad.
- Safety tools and implements will be kept adequately near blasting site at the time of charging.
- Portable blasting shelters will be provided near the blasting site.
- Blasting is proposed to be executed after proper signaling and warning in order to ensure that no person or animals are within the blasting danger zone.
- Since residential as well as office buildings will be established within M.L area, muffle blasting technique may be implemented to stop fly rock movements.
- Controlled blasting technique will be adopted to reduce noise, vibration and fly rock movements.
- Burden, spacing, depth of the hole, charge / hole, stemming etc. will be varied during blasting for less vibration, noise and fly rock movements.
- Loose rocks will be removed from the benches before blasting to stop fly rock movements.
- Millisecond delay detonators will be used to split a large vibration package in to a number of small vibration levels.
- Misfires, if any will be handled carefully as per stipulated procedures.
- Security services will be tightened to prevent the explosives from pilferage, theft and robbery.



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

**Layout of mine workings:** Yearwise development proposal has been detailed in Para-2.0Aa) and lay out of mine workings have been shown in yearwise development plan and sections. Existing quarries such as Kochar Quarry, Kochar Top Quarry, F-Level Quarry, Kisuntanki Quarry & 2550 Quarry will be developed further towards depth. However, status of the quarries in respect of length, width etc. will remain same at the end of plan period as follows:

| Sl. No. | Pit Name | Block Name | Length (m) | Width (m) | Area ($m^2$) |
|---|---|---|---|---|---|
| 1 | Kochar West | East Block | 156 | 125 | 19500 |
| 2 | Kochar | East Block | 444 | 339 | 150516 |
| 3 | Kochar Top | -do- | 188 | 174 | 32712 |
| 4 | 2550 | -do- | 347 | 165 | 57255 |
| 5 | Kisuntanki | -do- | 246 | 139 | 34194 |
| 6 | F-Level | -do- | 516 | 244 | 125904 |
| 7 | West Block | --- | 392 | 71 | 27832 |
| 8 | -do- | | 346 | 238 | 82348 |
| 9 | -do- | | 516 | 287 | 148092 |
| **Total** | --- | --- | --- | --- | **678,353** |

**Pit road layout :** Keeping in view the expected weather conditions (rain fall), largest vehicle on site, speed of the vehicles and construction practices in the region, haul road will be (a) designed in the M.L area to suit the load capacity of the dumpers and (b) maintained in good condition. Width of the haul road will be kept 3 times of the width of largest vehicles plying on the road plus 5m i.e 3 x 2.3m (width of proposed 25t capacity dumper) + 5m = 11.9m say 12m. The extra width of 5m will be provided to ensure the driver to negotiate the curve safely at a given speed. Definite turnouts, crossing points and waiting points will be designated where provision of this extra 5m width not practicable to maintain. Gradient will be maintained up to a maximum of 1:16 for haul road and 1:10 for ramp up to 10m length at one stretch. Haul road to be developed above the level of surrounding area will be provided with parapet wall / embankment having 1m top width and 2.5m bottom width and height equivalent to the diameter of the wheel of largest vehicle plying on the haul road. Warning notices and road signs will be posted along the haul roads at appropriate places like crossings, curves etc. for guidance of truck or tipper drivers. Haul road

will be properly maintained by way of adequate compaction and leveling. Water sprinkling will be done on the haul road for dust suppression for road safety as well as clean environment.

ROM as well as saleable ore will be dispatched from the quarries located at the hill top to the stacking site / hill toe located near the office premises. The above design of road will be implemented for connecting roads at the hill top and hill toe between the quarries and stacking site.

**Layout of faces & sites for disposal of OB / Waste:** Yearwise development plan as well as sections have been prepared showing the layout of faces. Waste disposal has been detailed in Chapter-4.0.

**Ground preparation prior to disposal of waste, reject etc.:** Topsoil will be removed from the proposed waste and reject disposal sites. Retaining wall, garland drain and settling tank will be maintained as per the proposal (ref: Para-4.0c).

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

Keeping in view the mineral conservation as well as reclamation & rehabilitation aspects, conceptual mining plan has been prepared for the lease period as per the presently available reserves as follows:

| | |
|---|---|
| Total available Reserve | 6.568 Mt |
| Production in plan period of 5 years (2020-21 to 2024-25) | 3.750 Mt |
| Balance reserve for mining beyond this plan period | 6.568 – 3.750<br>= 2.818 Mt |
| Production per annum | 0.75 Mt |
| No. of production years beyond plan period | 2.818 / 0.75<br>= 3.76, say 4 years |
| Life of Mine | 5 + 4 = 9 years (from 2020-21 to 2028-29) |



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However, life of the mine may increase depending upon the outcomes of the exploration and permission for working in safety zone along southern side M.L boundary as well as village road.

**Excavation:** There will be only five (5) quarries at the end of the mining. However, ultimate extent of the quarries will be confined to the area of 68.071 hectares and pitwise details are enumerated as follows:

| Sl. No | Name of the Quarry | Length (m) | Width (m) | Area occupied | |
|---|---|---|---|---|---|
| | | | | ($m^2$) | In hectares |
| 1 | Kochar & Kochar Top | 734 | 305 | 223870 | 22.387 |
| 2 | F-Level | 332 | 265 | 87980 | 8.798 |
| 3 | Kisuntanki | 225 | 132 | 29700 | 2.970 |
| 4 | 2550 Quarry | 330 | 107 | 35310 | 3.531 |
| 5 | WBQ-1 | 500 | 152 | 76000 | 7.600 |
| 6 | WBQ-2 | 346 | 235 | 81310 | 8.131 |
| 7 | WBQ-3 | 516 | 284 | 146544 | 14.654 |
| --- | **Total** | --- | --- | **680,714** | **68.071** |

**Recovery of ROM:** To keep the ultimate pit slope safe & stable and to mine out the optimum amount of minerals, height & width of the benches will be kept at 6m and 9m respectively at the time of abandonment. The said benching pattern will form the ultimate pit slope angle at around $30^0$ with the horizontal maintaining the individual slope at $80^0$ with the horizontal.

A total of 2.356 Mt sub-grade ore / mineral rejects is likely to be generated conceptually. As far as mineral conservation is concerned, these sub-grade ore will be blended and used in the captive plant/sold by the Lessee or dispatched to the nearby beneficiation plants for up-gradation of iron ore.

**Disposal of Waste / Topsoil and Back-filling of Voids:** There is no topsoil in the mineable area.



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Over all ore to waste ratio is 1:0.28 ($t/m^3$) and total reserve is 6,568,416 t. Therefore, (6,568,416 x 0.28 =) 1,839,156$m^3$ waste is likely to be generated conceptually. A part of the waste over 1,056,022$m^3$ generated in plan period will be dumped in the non-mineralized area (no ore bearing) and designed outside the ultimate pit limit and remaining waste (1,839,156 – 1,056,022 =) 783,134$m^3$ waste will be utilized for back-filling of mined out area. Benches at higher level and back-filled area will be planted by the local saplings.

**Reclamation and rehabilitation:** An area of 147.888 hectares land will be degraded / utilized for mining, dumping etc. conceptually as per the table given below:

| Sl. No. | Type of land use | Area utilized / degraded (ha) | At the end of plan period (ha) | At the end of life of mine (ha) |
|---|---|---|---|---|
| 1 | Area under excavation | 67.835 | 67.835 | 68.071 |
| 2 | Storage for Topsoil | --- | --- | --- |
| 3 | Overburden dump | 19.500 | 25.005 | 25.005 |
| 4 | Mineral Storage (ROM ore and mineral rejects) | 14.134 | 15.460 | 15.460 |
| 5 | Infrastructure (administrative office, quarters, canteen, store room etc.) | 22.852 | 22.852 | 22.852 |
| 6 | Roads | 13.000 | 13.000 | 13.000 |
| 7 | Railways | --- | --- | --- |
| 8 | Tailing Pond | --- | --- | --- |
| 9 | Effluent Treatment Plant | --- | --- | --- |
| 10 | Mineral Separation Plant (screening & crushing units) | 2.500 | 2.500 | 2.500 |
| 11 | Township area | --- | --- | --- |
| 12 | Others (Retaining wall, garland drain & settling tank etc.) | 0.500 | 0.750 | 1.000 |
| --- | **Sub-total** | **140.321** | **147.402** | **147.888** |
| 13 | Remaining area (including safety zone plantation) | 209.388 | 202.307 | 201.821 |
| **Total** | --- | **349.709** | **349.709** | **349.709** |



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Tree saplings will be planted in the safety zone of 7.5m width along M.L boundary. There will be no external dump in the M.L area at the end of the life of the mine. As discussed, a part of mined out area will be reclaimed by way of back-filling and plantation and remaining mined out area will be afforested. Buildings and structures will be dismantled in consultation with the concerned Govt. Departments. Ore and rejects will be dispatched to the various destination points. Road will be left as such for re-use by the local public. However, the post mining land use of the degraded area will be as follows:

| Sl. No. | Type of land use | Post mining land use pattern | Post mining land use area (ha) |
|---|---|---|---|
| 1 | Area under excavation | Reclamation & Rehabilitation (back-filling and plantation) | 68.071 |
| | | Rehabilitation (water reservoir) | 0 |
| 2 | Storage for Topsoil | Shifting for plantation | 0 |
| 3 | Overburden dump | Shifting for back-filling | 25.005 |
| 4 | Mineral Storage (ROM ore and mineral rejects) | Dispatching | 15.460 |
| 5 | Infrastructure (administrative office, quarters, canteen, store room etc.) | Dismantling & Shifting | 22.852 |
| 6 | Roads | Utilization | 13.000 |
| 7 | Railways | --- | 0 |
| 8 | Tailing Pond | --- | 0 |
| 9 | Effluent Treatment Plant | --- | 0 |
| 10 | Mineral Separation Plant (screening & crushing units) | Shifting | 2.500 |
| 11 | Township area | --- | 0 |
| 12 | Others (Retaining wall, garland drain & settling tank etc.) | Rehabilitation | 1.000 |
| 13 | Remaining area (including safety zone plantation) | --- | 201.821 |
| **Total** | **---** | **---** | **349.709** |

In pursuant to the order dated 14.01.2020 passed by the Ministry of Mines, Govt. of India consequent upon the order dated 08.01.2020 of the Hon'ble Apex Court passed on W.P @No.114/2014, Lessee shall carry out re-grassing in mining area after closure of mines.

## B. UNDERGROUND MINING

No underground mining operation is proposed in this lease area.



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## TABLE–2.1: IRON ORE PRODUCTION SCHEDULE (Kochar Quarry)

| Year | Name of Quarry | Section Considered | Length of Influence (m) | Iron Ore | | | | Sub-grade Ore | | | | Total Quantity (t) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Cross Sectional Area ($m^2$) | Volume ($m^3$) | Bulk Density | Quantity (t) | Cross Sectional Area ($m^2$) | Volume ($m^3$) | Bulk Density | Quantity (t) | |
| | a | b | c | d | e = c x d | f | g = e x f | h | i = c x h | j | k = i x j | l = g + k |
| 1st | Kochar | G2G2' | 50 | 342 | 17100 | 3.5 | 59850 | 100 | 5000 | 3.2 | 16000 | 75850 |
| | | G3G3' | 50 | 502 | 25100 | 3.5 | 87850 | 0 | 0 | 3.2 | 0 | 87850 |
| | | G4G4' | 50 | 374 | 18700 | 3.5 | 65450 | 0 | 0 | 3.2 | 0 | 65450 |
| | | **Sub-total** | --- | --- | **60900** | --- | **213150** | --- | **5000** | --- | **16000** | **229150** |
| 2nd | -do- | G2G2' | 50 | 296 | 14800 | 3.5 | 51800 | 0 | 0 | 3.2 | 0 | 51800 |
| | | G3G3' | 50 | 850 | 42500 | 3.5 | 148750 | 0 | 0 | 3.2 | 0 | 148750 |
| | | G4G4' | 50 | 185 | 9250 | 3.5 | 32375 | 0 | 0 | 3.2 | 0 | 32375 |
| | | **Sub-total** | --- | --- | **66550** | | **232925** | --- | **0** | --- | **0** | **232925** |
| 3rd | -do- | G1G1' | 50 | 118 | 5900 | 3.5 | 20650 | 165 | 8250 | 3.2 | 26400 | 47050 |
| | | G2G2' | 50 | 202 | 10100 | 3.5 | 35350 | 30 | 1500 | 3.2 | 4800 | 40150 |
| | | G3G3' | 50 | 216 | 10800 | 3.5 | 37800 | 86 | 4300 | 3.2 | 13760 | 51560 |
| | | G4G4' | 50 | 52 | 2600 | 3.5 | 9100 | 0 | 0 | 3.2 | 0 | 9100 |
| | | G5G5' | 50 | 402 | 20100 | 3.5 | 70350 | 0 | 0 | 3.2 | 0 | 70350 |
| | | **Sub-total** | --- | --- | **49500** | | **173250** | --- | **14050** | --- | **44960** | **218210** |
| 4th | -do- | G1G1' | 50 | 165 | 8250 | 3.5 | 28875 | 247 | 12350 | 3.2 | 39520 | 68395 |
| | | G2G2' | 50 | 168 | 8400 | 3.5 | 29400 | 0 | 0 | 3.2 | 0 | 29400 |
| | | G3G3' | 50 | 166 | 8300 | 3.5 | 29050 | 0 | 0 | 3.2 | 0 | 29050 |
| | | G4G4' | 50 | 306 | 15300 | 3.5 | 53550 | 0 | 0 | 3.2 | 0 | 53550 |
| | | G5G5' | 50 | 300 | 15000 | 3.5 | 52500 | 0 | 0 | 3.2 | 0 | 52500 |
| | | **Sub-total** | --- | --- | **55250** | | **193375** | --- | **12350** | --- | **39520** | **232895** |
| 5th | -do- | G1G1' | 50 | 812 | 40600 | 3.5 | 142100 | 316 | 15800 | 3.2 | 50560 | 192660 |
| | | G2G2' | 50 | 44 | 2200 | 3.5 | 7700 | 0 | 0 | 3.2 | 0 | 7700 |
| | | G3G3' | 50 | 192 | 9600 | 3.5 | 33600 | 0 | 0 | 3.2 | 0 | 33600 |
| | | **Sub-total** | --- | --- | 52400 | --- | **183400** | --- | **15800** | --- | **50560** | **233960** |
| **Total** | --- | --- | --- | --- | **284600** | --- | **996100** | --- | **47200** | --- | **151040** | **1147140** |



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## TABLE–2.2: IRON ORE PRODUCTION SCHEDULE (Kochar Top Quarry)

| Year | Name of Quarry | Section Considered | Length of Influence (m) | Iron Ore | | | | Sub-grade Ore | | | | Total Quantity (t) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Cross Sectional Area ($m^2$) | Volume ($m^3$) | Bulk Density | Quantity (t) | Cross Sectional Area ($m^2$) | Volume ($m^3$) | Bulk Density | Quantity (t) | |
| | a | b | c | d | e = c x d | f | g = e x f | h | i = c x h | j | k = i x j | l = g + k |
| 1st | Kochar Top | G9G9' | 45 | 73 | 3285 | 3.0 | 9855 | --- | --- | --- | --- | 9855 |
| | | G10G10' | 50 | 380 | 19000 | 3.0 | 57000 | --- | --- | --- | --- | 57000 |
| | | G11G11' | 50 | 442 | 22100 | 3.0 | 66300 | --- | --- | --- | --- | 66300 |
| | | G12G12' | 50 | 77 | 3850 | 3.0 | 11550 | --- | --- | --- | --- | 11550 |
| | | G13G13' | 50 | 163 | 8150 | 3.0 | 24450 | --- | --- | --- | --- | 24450 |
| | | **Sub-total** | --- | --- | **56385** | --- | **169155** | --- | --- | --- | --- | **169155** |
| 2nd | -do- | G9G9' | 45 | 72 | 3240 | 3 | 9720 | --- | --- | --- | --- | 9720 |
| | | G10G10' | 50 | 104.409 | 5220 | 3 | 15661 | --- | --- | --- | --- | 15661 |
| | | G11G11' | 50 | 366 | 18300 | 3 | 54900 | --- | --- | --- | --- | 54900 |
| | | G12G12' | 50 | 148 | 7400 | 3 | 22200 | --- | --- | --- | --- | 22200 |
| | | G13G13' | 50 | 455 | 22750 | 3 | 68250 | --- | --- | --- | --- | 68250 |
| | | **Sub-total** | --- | --- | **56910** | --- | **170731** | --- | --- | --- | --- | **170731** |
| 3rd | -do- | G9G9' | 45 | 76.34 | 3435 | 3 | 10306 | --- | --- | --- | --- | 10396 |
| | | G10G10' | 50 | 128 | 6400 | 3 | 19200 | --- | --- | --- | --- | 19200 |
| | | G11G11' | 50 | 38 | 1900 | 3 | 5700 | --- | --- | --- | --- | 5700 |
| | | G12G12' | 50 | 494 | 24700 | 3 | 74100 | --- | --- | --- | --- | 74100 |
| | | G13G13' | 50 | 397 | 19850 | 3 | 59550 | --- | --- | --- | --- | 59550 |
| | | **Sub-total** | --- | --- | **56285** | --- | **168856** | --- | --- | --- | --- | **168856** |
| 4th | -do- | G9G9' | 45 | 106 | 4770 | 3 | 14310 | --- | --- | --- | --- | 14310 |
| | | G10G10' | 50 | 145 | 7250 | 3 | 21750 | --- | --- | --- | --- | 21750 |
| | | G11G11' | 50 | 51.71 | 2586 | 3 | 7757 | --- | --- | --- | --- | 7757 |
| | | G12G12' | 50 | 548 | 27400 | 3 | 82200 | --- | --- | --- | --- | 82200 |
| | | G13G13' | 50 | 330 | 16500 | 3 | 49500 | --- | --- | --- | --- | 49500 |
| | | **Sub-total** | --- | --- | **58506** | --- | **175517** | --- | --- | --- | --- | **175517** |
| 5th | -do- | G9G9' | 45 | 122 | 5490 | 3 | 16470 | --- | --- | --- | --- | 16470 |
| | | G10G10' | 50 | 158 | 7900 | 3 | 23700 | --- | --- | --- | --- | 23700 |
| | | G11G11' | 50 | 83.87 | 4194 | 3 | 12581 | --- | --- | --- | --- | 12581 |
| | | G12G12' | 50 | 286 | 14300 | 3 | 42900 | --- | --- | --- | --- | 42900 |
| | | G13G13' | 50 | 528 | 26400 | 3 | 79200 | --- | --- | --- | --- | 79200 |
| | | **Sub-total** | --- | --- | **58284** | --- | **174851** | --- | --- | --- | --- | **174851** |
| **Total** | --- | --- | --- | --- | **286,370** | --- | **859110** | --- | --- | --- | --- | **859110** |



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## TABLE–2.3: IRON ORE PRODUCTION SCHEDULE (F-Level Quarry)

| Year | Name of Quarry | Section Considered | Length of Influence (m) | Iron Ore | | | | Sub-grade Ore | | | | Total Quantity (t) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Cross Sectional Area ($m^2$) | Volume ($m^3$) | Bulk Density | Quantity (t) | Cross Sectional Area ($m^2$) | Volume ($m^3$) | Bulk Density | Quantity (t) | |
| | a | b | c | d | e = c x d | f | g = e x f | h | i = c x h | j | k = i x j | l = g + k |
| 1st | F-Level | G14G14' | 50 | 0 | 0 | 3.5 | 0 | 190 | 9500 | 3.2 | 30400 | 30400 |
| | | G15G15' | 50 | 12 | 600 | 3.5 | 2100 | 418 | 20900 | 3.2 | 66880 | 68980 |
| | | G16G16' | 50 | 180 | 9000 | 3.5 | 31500 | 422 | 21100 | 3.2 | 67520 | 99020 |
| | | G17G17' | 50 | 0 | 0 | 3.5 | 0 | 293 | 14650 | 3.2 | 46880 | 46880 |
| | | **Sub-total** | --- | --- | **9600** | --- | **33600** | --- | **66150** | ---- | **211680** | **245280** |
| 2nd | -do- | G14G14' | 50 | 0 | 0 | 3.5 | 0 | 196 | 9800 | 3.2 | 31360 | 31360 |
| | | G15G15' | 50 | 13 | 650 | 3.5 | 2275 | 411 | 20550 | 3.2 | 65760 | 68035 |
| | | G16G16' | 50 | 58 | 2900 | 3.5 | 10150 | 120 | 6000 | 3.2 | 19200 | 29350 |
| | | G17G17' | 50 | 0 | 0 | 3.5 | 0 | 367 | 18350 | 3.2 | 58720 | 58720 |
| | | G18G18' | 50 | 20 | 1000 | 3.5 | 3500 | 330 | 16500 | 3.2 | 52800 | 56300 |
| | | **Sub-total** | --- | --- | **4550** | --- | **15925** | --- | **71200** | --- | **227840** | **243765** |
| 3rd | -do- | G14G14' | 50 | 163 | 8150 | 3.5 | 28525 | 238 | 11900 | 3.2 | 38080 | 66605 |
| | | G15G15' | 50 | 15 | 750 | 3.5 | 2625 | 280 | 14000 | 3.2 | 44800 | 47425 |
| | | G16G16' | 50 | 52 | 2600 | 3.5 | 9100 | 211 | 10550 | 3.2 | 33760 | 42860 |
| | | G17G17' | 50 | 0 | 0 | 3.5 | 0 | 251 | 12550 | 3.2 | 40160 | 40160 |
| | | G18G18' | 50 | 20 | 1000 | 3.5 | 3500 | 285 | 14250 | 3.2 | 45600 | 49100 |
| | | **Sub-total** | --- | --- | **12500** | --- | **43750** | --- | **63250** | --- | **202400** | **246150** |
| 4th | -do- | G16G16' | 50 | 34 | 1700 | 3.5 | 5950 | 300 | 15000 | 3.2 | 48000 | 53950 |
| | | G17G17' | 50 | 373 | 18650 | 3.5 | 65275 | 372 | 18600 | 3.2 | 59520 | 124795 |
| | | G18G18' | 50 | 315 | 15750 | 3.5 | 55125 | 123 | 6150 | 3.2 | 19680 | 74805 |
| | | **Sub-total** | --- | --- | **36100** | --- | **126350** | | **39750** | --- | **127200** | **253550** |
| 5th | -do- | G16G16' | 50 | 0 | 0 | 3.5 | 0 | 555 | 27750 | 3.2 | 88800 | 88800 |
| | | G17G17' | 50 | 235 | 11750 | 3.5 | 41125 | 297 | 14850 | 3.2 | 47520 | 88645 |
| | | G18G18' | 50 | 253 | 12650 | 3.5 | 44275 | 175 | 8750 | 3.2 | 28000 | 72275 |
| | | **Sub-total** | --- | --- | **24400** | --- | **85400** | --- | **51350** | --- | **164320** | **249720** |
| **Total** | --- | --- | --- | --- | **87150** | --- | **305025** | --- | **291700** | --- | **933440** | **1238465** |



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## TABLE–2.5: IRON ORE PRODUCTION SCHEDULE (2550 Quarry)

| Year | Name of Quarry | Section Considered | Length of Influence (m) | Iron Ore | | | | Sub-grade Ore | | | | Total Quantity (t) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Cross Sectional Area ($m^2$) | Volume ($m^3$) | Bulk Density | Quantity (t) | Cross Sectional Area ($m^2$) | Volume ($m^3$) | Bulk Density | Quantity (t) | |
| | a | b | c | d | e = c x d | f | g = e x f | h | i = c x h | j | k = i x j | l = g + k |
| 1st | 2550 | G25G25' | 50 | 185 | 9250 | 2.8 | 25900 | | 0 | 2.7 | 0 | 25900 |
| | | G26G26' | 50 | 65 | 3250 | 2.8 | 9100 | | 0 | 2.7 | 0 | 9100 |
| | | G27G27' | 50 | 100 | 5000 | 2.8 | 14000 | | 0 | 2.7 | 0 | 14000 |
| | | G28G28' | 50 | 20 | 1000 | 2.8 | 2800 | | 0 | 2.7 | 0 | 2800 |
| | | **Sub-total** | --- | --- | **18500** | --- | **51800** | --- | **0** | ---- | **0** | **51800** |
| 2nd | -do- | G25G25' | 50 | 70 | 3500 | 2.8 | 9800 | | 0 | 2.7 | 0 | 9800 |
| | | G26G26' | 50 | 140 | 7000 | 2.8 | 19600 | | 0 | 2.7 | 0 | 19600 |
| | | G27G27' | 50 | 57 | 2850 | 2.8 | 7980 | | 0 | 2.7 | 0 | 7980 |
| | | G28G28' | 50 | 103 | 5150 | 2.8 | 14420 | | 0 | 2.7 | 0 | 14420 |
| | | **Sub-total** | --- | --- | **18500** | --- | **51800** | --- | **0** | --- | **0** | **51800** |
| 3rd | -do- | G25G25' | 50 | 60 | 3000 | 2.8 | 8400 | 79 | 3950 | 2.7 | 10665 | 19065 |
| | | G26G26' | 50 | 61 | 3050 | 2.8 | 8540 | | 0 | 2.7 | 0 | 8540 |
| | | G27G27' | 50 | 143 | 7150 | 2.8 | 20020 | | 0 | 2.7 | 0 | 20020 |
| | | G28G28' | 50 | 68 | 3400 | 2.8 | 9520 | 19 | 950 | 2.7 | 2565 | 12085 |
| | | **Sub-total** | --- | --- | **16600** | --- | **46480** | --- | **4900** | --- | **13230** | **59710** |
| 4th | -do- | G25G25' | 50 | 42 | 2100 | 2.8 | 5880 | 37 | 1850 | 2.7 | 4995 | 10875 |
| | | G26G26' | 50 | 25 | 1250 | 2.8 | 3500 | | 0 | 2.7 | 0 | 3500 |
| | | G27G27' | 50 | 155 | 7750 | 2.8 | 21700 | | 0 | 2.7 | 0 | 21700 |
| | | G28G28' | 50 | 60 | 3000 | 2.8 | 8400 | 9 | 450 | 2.7 | 1215 | 9615 |
| | | **Sub-total** | --- | --- | **14100** | --- | **39480** | | **2300** | --- | **6210** | **45690** |
| 5th | -do- | G25G25' | 50 | 44 | 2200 | 2.8 | 6160 | 96 | 4800 | 2.7 | 12960 | 19120 |
| | | G26G26' | 50 | 73 | 3650 | 2.8 | 10220 | | 0 | 2.7 | 0 | 10220 |
| | | G27G27' | 50 | 75 | 3750 | 2.8 | 10500 | 46 | 2300 | 2.7 | 6210 | 16710 |
| | | G28G28' | 50 | 31 | 1550 | 2.8 | 4340 | 5 | 250 | 2.7 | 675 | 5015 |
| | | **Sub-total** | --- | --- | **11150** | --- | **31220** | --- | **7350** | --- | **19845** | **51065** |
| **Total** | --- | --- | --- | --- | **78850** | --- | **220780** | --- | **14550** | --- | **39285** | **260065** |



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## TABLE–2.6: OVERBURDEN REMOVAL SCHEDULE (Kochar Quarry)

| Year | Name of Quarry | Section Considered | Length of Influence (m) | Cross Sectional Area ($m^2$) | Volume ($m^3$) | Bulk Density | Quantity (t) |
|---|---|---|---|---|---|---|---|
| | a | b | c | d | e = c x d | f | g = e x f |
| 1st | Kochar | G2G2' | 50 | 232 | 11600 | 2.2 | 25520 |
| | | G3G3' | 50 | 815 | 40750 | 2.2 | 89650 |
| | | G4G4' | 50 | 1512 | 75600 | 2.2 | 166320 |
| | | **Sub-total** | --- | --- | **127950** | --- | **281490** |
| 2nd | -do- | G2G2' | 50 | 147 | 7350 | 2.2 | 16170 |
| | | G3G3' | 50 | 1086 | 54300 | 2.2 | 119460 |
| | | G4G4' | 50 | 592 | 29600 | 2.2 | 65120 |
| | | **Sub-total** | --- | --- | **91250** | --- | **200750** |
| 3rd | -do- | G1G1' | 50 | 29 | 1450 | 2.2 | 3190 |
| | | G2G2' | 50 | 144 | 7200 | 2.2 | 15840 |
| | | G3G3' | 50 | 349 | 17450 | 2.2 | 38390 |
| | | G4G4' | 50 | 731 | 36550 | 2.2 | 80410 |
| | | G5G5' | 50 | 292 | 14600 | 2.2 | 32120 |
| | | **Sub-total** | --- | --- | **77250** | --- | **169950** |
| 4th | -do- | G1G1' | 50 | 52 | 2600 | 2.2 | 5720 |
| | | G2G2' | 50 | 23 | 1150 | 2.2 | 2530 |
| | | G3G3' | 50 | 181 | 9050 | 2.2 | 19910 |
| | | G4G4' | 50 | 458 | 22900 | 2.2 | 50380 |
| | | G5G5' | 50 | 198 | 9900 | 2.2 | 21780 |
| | | **Sub-total** | --- | --- | **45600** | --- | **100320** |
| 5th | -do- | G1G1' | 50 | 933 | 46650 | 2.2 | 102630 |
| | | G2G2' | 50 | 82 | 4100 | 2.2 | 9020 |
| | | G3G3' | 50 | 580 | 29000 | 2.2 | 63800 |
| | | **Sub-total** | --- | --- | **79750** | --- | **175450** |
| **Total** | --- | --- | --- | --- | **421800** | --- | **927960** |



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## TABLE–2.7: OVERBURDEN REMOVAL SCHEDULE (Kochar Top Quarry)

| Year | Name of Quarry | Section Considered | Length of Influence (m) | Cross Sectional Area ($m^2$) | Volume ($m^3$) | Bulk Density | Quantity (t) |
|---|---|---|---|---|---|---|---|
| | a | b | c | d | e = c x d | f | g = e x f |
| 1st | Kochar Top | G9G9' | 45 | 253 | 11385 | 2.2 | 25047 |
| | | G10G10' | 50 | 135 | 6750 | 2.2 | 14850 |
| | | G11G11' | 50 | 242 | 12100 | 2.2 | 26620 |
| | | G12G12' | 50 | 157 | 7850 | 2.2 | 17270 |
| | | G13G13' | 50 | 18 | 900 | 2.2 | 1980 |
| | | **Sub-total** | --- | --- | **38985** | --- | **85767** |
| 2nd | -do- | G9G9' | 45 | 136 | 6120 | 2.2 | 13464 |
| | | G10G10' | 50 | 116 | 5800 | 2.2 | 12760 |
| | | G11G11' | 50 | 626 | 31300 | 2.2 | 68860 |
| | | G12G12' | 50 | 256 | 12800 | 2.2 | 28160 |
| | | G13G13' | 50 | 51 | 2550 | 2.2 | 5610 |
| | | **Sub-total** | --- | --- | **58570** | --- | **128854** |
| 3rd | -do- | G9G9' | 45 | 96 | 4320 | 2.2 | 9504 |
| | | G10G10' | 50 | 104 | 5200 | 2.2 | 11440 |
| | | G11G11' | 50 | 58 | 2900 | 2.2 | 6380 |
| | | G12G12' | 50 | 268 | 13400 | 2.2 | 29480 |
| | | G13G13' | 50 | 185 | 9250 | 2.2 | 20350 |
| | | **Sub-total** | --- | --- | **35070** | --- | **77154** |
| 4th | -do- | G9G9' | 45 | 80 | 3600 | 2.2 | 7920 |
| | | G10G10' | 50 | 102 | 5100 | 2.2 | 11220 |
| | | G11G11' | 50 | 74 | 3700 | 2.2 | 8140 |
| | | G12G12' | 50 | 557 | 27850 | 2.2 | 61270 |
| | | G13G13' | 50 | 457 | 22850 | 2.2 | 50270 |
| | | **Sub-total** | --- | --- | **63100** | --- | **138820** |
| 5th | -do- | G9G9' | 45 | 149 | 6705 | 2.2 | 14751 |
| | | G10G10' | 50 | 110 | 5500 | 2.2 | 12100 |
| | | G11G11' | 50 | 101 | 5050 | 2.2 | 11110 |
| | | G12G12' | 50 | 317 | 15850 | 2.2 | 34870 |
| | | G13G13' | 50 | 321 | 16050 | 2.2 | 35310 |
| | | **Sub-total** | --- | --- | **49155** | --- | **108141** |
| **Total** | --- | --- | --- | --- | **244880** | --- | **538736** |



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## TABLE–2.8: OVERBURDEN REMOVAL SCHEDULE (F-Level Quarry)

| Year | Name of Quarry | Section Considered | Length of Influence (m) | Cross Sectional Area ($m^2$) | Volume ($m^3$) | Bulk Density | Quantity (t) |
|---|---|---|---|---|---|---|---|
| | a | b | c | d | e = c x d | f | g = e x f |
| 1st | F-Level | G14G14' | 50 | 251 | 12550 | 2.2 | 27610 |
| | | G15G15' | 50 | 60 | 3000 | 2.2 | 6600 |
| | | G16G16' | 50 | 500 | 25000 | 2.2 | 55000 |
| | | G17G17' | 50 | 0 | 0 | 2.2 | 0 |
| | | **Sub-total** | --- | --- | **40,550** | --- | **89,210** |
| 2nd | -do- | G14G14' | 50 | 293 | 14650 | 2.2 | 32230 |
| | | G15G15' | 50 | 90 | 4500 | 2.2 | 9900 |
| | | G16G16' | 50 | 194 | 9700 | 2.2 | 21340 |
| | | G17G17' | 50 | 117 | 5850 | 2.2 | 12870 |
| | | G18G18' | 50 | 41 | 2050 | 2.2 | 4510 |
| | | **Sub-total** | --- | --- | **36,750** | --- | **80,850** |
| 3rd | -do- | G14G14' | 50 | 314 | 15700 | 2.2 | 34540 |
| | | G15G15' | 50 | 315 | 15750 | 2.2 | 34650 |
| | | G16G16' | 50 | 152 | 7600 | 2.2 | 16720 |
| | | G17G17' | 50 | 217 | 10850 | 2.2 | 23870 |
| | | G18G18' | 50 | 30 | 1500 | 2.2 | 3300 |
| | | **Sub-total** | --- | --- | **51,400** | --- | **113,080** |
| 4th | -do- | G16G16' | 50 | 189 | 9450 | 2.2 | 20790 |
| | | G17G17' | 50 | 341 | 17050 | 2.2 | 37510 |
| | | G18G18' | 50 | 122 | 6100 | 2.2 | 13420 |
| | | **Sub-total** | --- | --- | **32,600** | --- | **71,720** |
| 5th | -do- | G16G16' | 50 | 286 | 14300 | 2.2 | 31460 |
| | | G17G17' | 50 | 244 | 12200 | 2.2 | 26840 |
| | | G18G18' | 50 | 211 | 10550 | 2.2 | 23210 |
| | | **Sub-total** | --- | --- | **37,050** | --- | **81,510** |
| **Total** | --- | --- | --- | --- | **198,350** | | **436,370** |



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## TABLE–2.9: OVERBURDEN REMOVAL SCHEDULE (Kisuntanki Quarry)

| Year | Name of Quarry | Section Considered | Length of Influence (m) | Cross Sectional Area ($m^2$) | Volume ($m^3$) | Bulk Density | Quantity (t) |
|---|---|---|---|---|---|---|---|
| | a | b | c | d | e = c x d | f | g = e x f |
| 1st | Kisuntanki | G21G21' | 32 | 125 | 4000 | 2.2 | 8800 |
| | | G22G22' | 50 | 120 | 6000 | 2.2 | 13200 |
| | | G23G23' | 32 | 73 | 2336 | 2.2 | 5139 |
| | | **Sub-total** | **---** | **---** | **12,336** | **---** | **27,139** |
| 2nd | -do- | G21G21' | 32 | 319 | 10208 | 2.2 | 22458 |
| | | G22G22' | 50 | 162 | 8100 | 2.2 | 17820 |
| | | G23G23' | 32 | 50 | 1600 | 2.2 | 3520 |
| | | **Sub-total** | **---** | **---** | **19,908** | **---** | **43,798** |
| 3rd | -do- | G21G21' | 32 | 154 | 4928 | 2.2 | 10842 |
| | | G22G22' | 50 | 65 | 3250 | 2.2 | 7150 |
| | | G23G23' | 32 | 71 | 2272 | 2.2 | 4998 |
| | | **Sub-total** | **---** | **---** | **10,450** | **---** | **22,990** |
| 4th | -do- | G21G21' | 32 | 134 | 4288 | 2.2 | 9434 |
| | | G22G22' | 50 | 60 | 3000 | 2.2 | 6600 |
| | | G23G23' | 32 | 110 | 3520 | 2.2 | 7744 |
| | | **Sub-total** | **---** | **---** | **10,808** | **---** | **23,778** |
| 5th | -do- | G21G21' | 32 | 129 | 4128 | 2.2 | 9082 |
| | | G22G22' | 50 | 109 | 5450 | 2.2 | 11990 |
| | | G23G23' | 32 | 116 | 3712 | 2.2 | 8166 |
| | | **Sub-total** | **---** | **---** | **13,290** | **---** | **29,238** |
| **Total** | **---** | **---** | **---** | **---** | **66,792** | **---** | **146,943** |



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## TABLE–2.10: OVERBURDEN REMOVAL SCHEDULE (2550 Quarry)

| Year | Name of Quarry | Section Considered | Length of Influence (m) | Cross Sectional Area ($m^2$) | Volume ($m^3$) | Bulk Density | Quantity (t) |
|---|---|---|---|---|---|---|---|
| | a | b | c | d | e = c x d | f | g = e x f |
| 1st | 2550 | G25G25' | 50 | 111 | 5550 | 2.2 | 12210 |
| | | G26G26' | 50 | 42 | 2100 | 2.2 | 4620 |
| | | G27G27' | 50 | 73 | 3650 | 2.2 | 8030 |
| | | G28G28' | 50 | 273 | 13650 | 2.2 | 30030 |
| | | **Sub-total** | --- | --- | **24,950** | --- | **54,890** |
| 2nd | -do- | G25G25' | 50 | 306 | 15300 | 2.2 | 33660 |
| | | G26G26' | 50 | 66 | 3300 | 2.2 | 7260 |
| | | G27G27' | 50 | 66 | 3300 | 2.2 | 7260 |
| | | G28G28' | 50 | 115 | 5750 | 2.2 | 12650 |
| | | **Sub-total** | --- | --- | **27,650** | --- | **60,830** |
| 3rd | -do- | G25G25' | 50 | 77 | 3850 | 2.2 | 8470 |
| | | G26G26' | 50 | 40 | 2000 | 2.2 | 4400 |
| | | G27G27' | 50 | 247 | 12350 | 2.2 | 27170 |
| | | G28G28' | 50 | 159 | 7950 | 2.2 | 17490 |
| | | **Sub-total** | --- | --- | **26,150** | --- | **57,530** |
| 4th | -do- | G25G25' | 50 | 46 | 2300 | 2.2 | 5060 |
| | | G26G26' | 50 | 100 | 5000 | 2.2 | 11000 |
| | | G27G27' | 50 | 123 | 6150 | 2.2 | 13530 |
| | | G28G28' | 50 | 148 | 7400 | 2.2 | 16280 |
| | | **Sub-total** | --- | --- | **20,850** | --- | **45,870** |
| 5th | -do- | G25G25' | 50 | 111 | 5550 | 2.2 | 12210 |
| | | G26G26' | 50 | 85 | 4250 | 2.2 | 9350 |
| | | G27G27' | 50 | 168 | 8400 | 2.2 | 18480 |
| | | G28G28' | 50 | 128 | 6400 | 2.2 | 14080 |
| | | **Sub-total** | --- | --- | **24,600** | --- | **54,120** |
| **Total** | --- | --- | --- | --- | **124,200** | --- | **273,240** |



(S.C. Nayak)
Qualified Person

# CHAPTER-3

## 3.0 MINE DRAINAGE

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

General surface / ground level is at 395mRL. Minimum and maximum depth of water table based on observations from nearby wells and water bodies are as follows:

| | |
|---|---|
| Minimum depth of water table (in rainy season) | 45m depth at 350mRL |
| Maximum depth of water table (in summer season) | 90m depth at 305mRL |

b) Indicate maximum and minimum depth of Workings.

Quarrywise existing and proposed depth of workings have been presented as follows:

| Depth of Working | Kochar | Kochar Top | F-Level | Kisuntanki | 2550 |
|---|---|---|---|---|---|
| Existing quarry bottom level | 735 | 855 | 611 | 745 | 771 |
| Proposed quarry bottom level | 714 | 855 | 611 | 742 | 760 |

c) Quantity and quality of water likely to be encountered, the pumping arrangements and places where the mine water is finally proposed to be discharged

Quantity and quality of water likely to be encountered: As per the existence of water table and proposed depth of working as indicated in Para-3.0a) & b), there is no possibility of seepage / accumulation of ground water on the quarry floor. Source of water in the mine are (a) rainfall / direct precipitated water and (b) surface run-off water from the adjacent pit top area at higher levels around the pit / quarry. However, quantity of water will flow in the pit as estimated below:

| Description | Quantity |
|---|---|
| Pit area at the end of plan period | 678,353$m^2$ |
| Adjacent pit top area (assuming 10% of pit area) | 67,835$m^2$ |
| Total catchment area | 678,353 + 67,835<br>= 746,188$m^2$ |



(S.C. Nayak)
Qualified Person

| | |
|---|---|
| Annual rainfall | 1250mm or 1.25m |
| Quantity of rainfall | 746,188 x 1.25 = 932,735$m^3$ |
| Rain water likely to be evapo-transpired (assuming 50% of total rainfall) | 932,735 x 50% = 466,368$m^3$ |
| Rain water likely to be seeped in to sub-surface (assuming 20% of total rainfall) | 932,735 x 20% = 186,547$m^3$ |
| Rain water likely to be flown / accumulated in the quarry / pit (remaining 30% of total rainfall) | 932,735 x 30% = 279,820$m^3$ |

**Pumping arrangements and places where the mine water is finally proposed to be discharged:** Sub surface strata in the pits are porous in nature. About 50% of rain as well as run-off water is likely to be evapo-transpired and 20% of water will be seeped in to sub-surface due to porous nature of sub-surface strata and remaining 30% of the water accumulates on the quarry floor only in rainy season which evaporates over the period. In rainy season, machines will work at higher levels / upper benches. Hence, neither pumping arrangement nor the place is required for final discharge.

d) Describe regional and local drainage pattern. Also indicate annual rain fall, catchments area, and likely quantity of rain water to flow through the lease area, arrangement for arresting solid wash off etc.

**Regional and local drainage pattern:** The drainage pattern of the area is of dendritic type. There is no perennial nala in the lease area. The seasonal water ways like gullies, streamlets and streams (nalas) drain the surface run-off water during rainy season.

**Annual rain fall, catchments area and likely quantity of rain water to flow through the lease area:** Average annual rainfall is 1250mm. The south-west monsoon lasts from mid June to mid September and the area receives more than 70% to 80% of the annual rainfall during the period. Likely quantity of rainwater to flow through the lease area has been calculated as follows:

| Description | Quantitative Aspects |
|---|---|
| M.L area (as per DGPS Survey) | 349.709 ha or 3,497,090$m^2$ |
| Quarry as well as surrounding area (ref : Para-3c) | 746,188$m^2$ |
| Remaining area in the M.L area | 3,497,090 – 746,188 = 2,750,902$m^2$ |



(S.C. Nayak)
Qualified Person

| | |
|---|---|
| Annual rainfall | 1250mm or 1.25m |
| Quantity of rainfall | 2,750,902$m^2$ x 1.25m<br>= 3,438,628$m^3$ |
| Rain water likely to be evapo-transpired (assuming 50% of total rainfall) | 3,438,628 x 50% = 1,719,314$m^3$ |
| Rain water likely to be seeped in to sub-surface (assuming 20% total rainfall) | 3,438,628 x 20% = 687,726$m^3$ |
| Rain water likely to flow in the lease area (remaining 30% total rainfall) | 3,438,628 x 30% = 1,031,588$m^3$ |

A part of water flowing through the lease area will be harvested in the rain Water Harvesting Pond (WHP) for industrial use (water sprinkling for dust suppression, wet drilling etc.) and plantation. Remaining water will be allowed to flow in to the peripheral seasonal nalas through the net work of garland drains (or pipe arrangements) and settling ponds.

**Arrangement for arresting solid wash off etc.:** Protective measures like retaining wall, garland drain and settling tank have already been built up at the lower levels around the waste dumps. Retaining wall is made up of OB boulders which retain the wash-off materials dumping the rain. Garland drain has been developed beyond the retaining wall and receives waste water coming out of the retaining wall. Settling tanks developed and connected with the garland drain receives the waste water, settles the sediments and releases clean water. However, the dimensions of said protective measures have been presented in the table as follows:

| Location | Retaining Wall | | | Garland Drain | | | Settling Tank | | |
|---|---|---|---|---|---|---|---|---|---|
| | Length (m) | Width (m) | Height (m) | Length (m) | Width (m) | Depth (m) | Length (m) | Width (m) | Depth (m) |
| Dump-KD1 (near Kochar Quarry) | 343 | 2 | 2 | 311 | 1 | 2 | 42 | 22 | 5 |
| Dump-KD2 (near Kochar Quarry) | 130 | 2 | 2 | 90 | 1 | 2 | 7 | 5 | 2 |
| Dump-KTD1 & KTD2 (near Kochar Top Quarry) | 413 | 2 | 2 | 371 | 1 | 2 | 27 | 10 | 5 |
| N-Incline Dump (near N-Incline Quarry) | 295 | 2 | 2 | 295 | 1 | 2 | 14 | 5 | 4 |
| Rajpal Dump (near Rajpal Quarry) | 318 | 2 | 2 | 314 | 1 | 2 | 16 | 5 | 5 |
| **Total** | **1499** | **---** | **---** | **1381** | **---** | **---** | **106** | **---** | **---** |

In addition to the above, the protective measures to be constructed in plan period around the waste dumps and mineral reject stacks are as follows:

| Year | Location | Retaining Wall | | | Garland Drain | | | Settling Tank | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Length (m) | Width (m) | Height (m) | Length (m) | Width (m) | Depth (m) | Length (m) | Width (m) | Depth (m) |
| 2020-21 | Dump-KD1 (near Kochar Quarry) | 50 | 2 | 2 | 50 | 1 | 2 | --- | --- | --- |
| | Dump-KD2 (near Kochar Quarry) | 50 | 2 | 2 | 50 | 1 | 2 | --- | --- | --- |
| | Rajpal Dump (near Rajpal Quarry) | 50 | 2 | 2 | 50 | 1 | 2 | --- | --- | --- |
| | 2550 Dump (near 2550 Quarry) | 50 | 2 | 2 | 50 | 1 | 2 | --- | --- | --- |
| | Dump-WBD1 (West Block) | 50 | 2 | 2 | --- | --- | --- | --- | --- | --- |
| | Mineral reject-1 | 50 | 2 | 2 | 50 | 2 | 2 | --- | --- | --- |
| | Mineral reject-2 | 50 | 2 | 2 | 50 | --- | --- | --- | --- | --- |
| | | | | | | | | | | |
| 2021-22 | Dump-KD1 (near Kochar Quarry) | 215 | 2 | 2 | 215 | 1 | 2 | 10 | 5 | 5 |
| | Dump-KD2 (near Kochar Quarry) | 285 | 2 | 2 | 285 | 1 | 2 | 10 | 5 | 5 |
| | Rajpal Dump (near Rajpal Quarry) | 485 | 2 | 2 | 485 | 1 | 2 | 10 | 5 | 5 |
| | 2550 Dump (near 2550 Quarry) | 160 | 2 | 2 | 160 | 1 | 2 | 10 | 5 | 5 |
| | Dump-WBD1 (West Block) | 400 | 2 | 2 | --- | --- | --- | --- | --- | --- |
| | Mineral reject-1 | 360 | 2 | 2 | 360 | 2 | 2 | 10 | 5 | 5 |
| | Mineral reject-2 | 190 | 2 | 2 | 190 | --- | --- | --- | --- | --- |
| **Total** | --- | **2445** | --- | --- | **1995** | --- | --- | --- | --- | --- |

Retaining wall will be repaired / maintained and garland drain as well as settling tank will be cleaned throughout the plan period as and when necessitated preferable just after the monsoon season.



**(S.C. Nayak)**
Qualified Person

# CHAPTER-4

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

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

There exist seventeen (17) waste dumps in the M.L area which are detailed as below:

| Sl. No. | Name of Waste Dumps | Location | Length (m) | Width (m) | Area covered | |
|---|---|---|---|---|---|---|
| | | | | | ($m^2$) | (ha) |
| 1 | Dump-KD1 | East Block | 257 | 20 | 5140 | 0.514 |
| 2 | Dump-KD2 | -do- | 165 | 12 | 1980 | 0.198 |
| 3 | Kuilisuta Dump | -do- | 101 | 47 | 4747 | 0.475 |
| 4 | Dump-KTD1 | -do- | 160 | 109 | 17440 | 1.744 |
| 5 | Dump-KTD2 | -do- | 150 | 140 | 21000 | 2.100 |
| 6 | 2550 Dump | -do- | 110 | 69 | 7590 | 0.759 |
| 7 | Dump-FD3 | -do- | 130 | 38 | 4940 | 0.494 |
| 8 | Dump-FD5 | -do- | 171 | 59 | 10089 | 1.009 |
| 9 | Dump-FD6 | -do- | 242 | 84 | 20328 | 2.033 |
| 10 | Dump-FD7 | -do- | 141 | 27 | 3807 | 0.381 |
| 11 | Dump-FD8 | -do- | 79 | 28 | 2212 | 0.221 |
| 12 | N-Incline Dump | -do- | 410 | 53 | 21730 | 2.173 |
| 13 | Rajpal Dump | -do- | 240 | 138 | 33120 | 3.312 |
| 14 | Dump-RD3 | -do- | 232 | 90 | 20880 | 2.088 |
| 15 | Dump-WBD1 | West Block | 150 | 62 | 9300 | 0.930 |
| 16 | Dump-WBD2 | -do- | 111 | 20 | 2220 | 0.222 |
| 17 | Dump-WBD3 | -do- | 212 | 40 | 8480 | 0.848 |
| **Total** | --- | --- | --- | --- | **195,003** | **19.500** |

Nature of top soil, overburden / waste and Mineral Reject: There will be no generation of topsoil since the pit / quarry will be developed mostly towards depth. Overburden (OB) / waste generated from the mine are laterite, shale etc. Iron ore of +45-55% $Fe_2O_3$ is considered as mineral rejects / sub-grade ore.

Quantity of top soil, overburden / waste and Mineral Reject to be disposed off: Yearwise and quarrywise quantities of overburden / waste to be generated is as follows:

| Name of Quarry | Volume of OB / Waste Generation (m³) | | | | | |
|---|---|---|---|---|---|---|
| | I (2020-21) | II (2021-22) | III (2022-23) | IV (2023-24) | V (2024-25) | Total |
| Kochar | 127950 | 91250 | 77250 | 45600 | 79750 | 421800 |
| Kochar Top | 38985 | 58570 | 35070 | 63100 | 49155 | 244880 |
| F-Level | 40550 | 36750 | 51400 | 32600 | 37050 | 198350 |
| Kisuntanki | 12336 | 19908 | 10450 | 10808 | 13290 | 66792 |
| 2550 | 24950 | 27650 | 26150 | 20850 | 24600 | 124200 |
| **Total** | **244,771** | **234,128** | **200,320** | **172,958** | **203,845** | **1,056,022** |

Yearwise and quarrywise quantities of mineral reject generation will be as follows:

| Name of Quarry | Volume of Sub-grade ore / Mineral Reject Generation (m³) | | | | | |
|---|---|---|---|---|---|---|
| | I (2020-21) | II (2021-22) | III (2022-23) | IV (2023-24) | V (2024-25) | Total |
| Kochar | 5000 | --- | 14050 | 12350 | 15800 | 47200 |
| F-Level | 66150 | 71200 | 63250 | 39750 | 51350 | 291700 |
| Kisuntanki | 5056 | 3744 | 6050 | --- | --- | 14850 |
| 2550 | --- | --- | 4900 | 2300 | 7350 | 14550 |
| **Total** | **76,206** | **74,944** | **88,250** | **54,400** | **74,500** | **368,300** |

Overburden will be dumped in the non-mineralized area located outside the ultimate pit limit. Iron Ore containing +55% Fe will be directly dispatched / sold to the consuming industries / buyers and sub-grade ore / mineral reject of +45-55% Fe will be stacked initially and dispatched / sold after blending with iron ore of +55% Fe before use. However, the facts and figures have been presented finally in the prescribed format is as follows:

| Year | Top Soil (m³) | | OB + SB + IB / waste (m³) | | | | Mineral Rejects (m³) | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Reuse/ spreading | Storage | Total Generation | Backfilling | Storage | Utilization | Total Generation | Blending | Storage | Beneficiation |
| I (2020-21) | --- | --- | 244,771 | --- | 244,771 | --- | 76206 | 38103 | 38103 | --- |
| II (2021-22) | --- | --- | 234,128 | --- | 234,128 | --- | 74944 | 37472 | 37472 | --- |
| III (2022-23) | --- | --- | 200,320 | --- | 200,320 | --- | 88250 | 44125 | 44125 | --- |
| IV (2023-24) | --- | --- | 172,958 | --- | 172,958 | --- | 54400 | 27200 | 27200 | --- |
| V (2024-25) | --- | --- | 203,845 | --- | 203,845 | --- | 74500 | 37250 | 37250 | --- |
| **Total** | **---** | **---** | **1,056,022** | **---** | **1,056,022** | **---** | **368,300** | **184,150** | **184,150** | **---** |



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

Selection of dumping site mostly depends upon the factors like topography, drainage, land use, mineral inventory, pit configuration, mine waste characteristics, its volume of generation and economy in transportation. Keeping in view the above physical as well as techno-economic factors, existing dumps namely Rajpal dump, Dump-KTD2 and 2550 dump will be utilized for dumping of waste materials which are located (a) in the non-mineralized (no ore bearing) areas and (b) outside the ultimate pit limit. In addition to this, Dump-WBD1 located in west block will be expanded with the additional area of 2.360 hectares to accommodate 118,000$m^3$ waste of F-Level and Kochar Quarry in one terrace of 7.5m maximum height and 5m average height.

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

**Manner of disposal of waste:** Waste materials generated in plan period will be disposed off over the existing dumps in forwarding as well as retreating method in form of terraces. Individual terrace slope will be maintained at $37^0$ 30' with the horizontal while overall dump slope angle will be maintained at $28^0$ with the horizontal.

**Build up of dumps:** Year wise build-up of the OB / waste dumps have been proposed as follows:

| Year | Waste Generation ($m^3$) | Waste to be Dumped ($m^3$) | Dump Name | Location of Dump (Coordinates) | Existing or New Dump | Top RL of the Dump | No. of terrace proposed | Individual Terrace Height (m) | Slope of the terrace | Overall slope angle of dump |
|---|---|---|---|---|---|---|---|---|---|---|
| 2020-21 | 144900 | 144900 | Rajpal | 2467774N to 2467811N/ 425400E to 425531E | Existing | 640 | 3 | 15 | 37°30' | $28^0$ |
| | 38985 | 38985 | KTD1 | 2467243N to 2467381N/ 426626E to 426789E | Existing | 860 | 2 | 15 | 37°30' | $28^0$ |
| | 37286 | 37286 | 2550 | 2467748N to 2467803N / 426451E to 426457E | Existing | 665 | 2 | 10 | 37°30' | $28^0$ |
| | 23600 | 23600 | WBD1 | 2468733N to 2469156N / 423763E to 423991E | Existing | 326 | 1 | 7.5 | 37°30' | $28^0$ |
| Sub-total | **244771** | **244771** | --- | --- | --- | --- | --- | --- | --- | --- |



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| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 2021-22 | 104400 | 104400 | Rajpal | 2467689N to 2467803N / 425349E to 425462E | Existing | 640 | 3 | 15 | 37°30' | 28° |
| | 58570 | 58570 | KTD2 | 2467309N to 2467441N / 426438E to 426567E | Existing | 880 | 2 | 15 | 37°30' | 28° |
| | 47558 | 47558 | 2550 | 2467708N to 2467748N / 426451E to 426495E | Existing | 665 | 2 | 10 | 37°30' | 28° |
| | 23600 | 23600 | WBD1 | 2468733N to 2469156N / 423763E to 423991E | Existing | 326 | 1 | 7.5 | 37°30' | 28° |
| **Sub-total** | **234128** | **234128** | --- | --- | --- | --- | --- | --- | --- | --- |
| 2022-23 | 105050 | 105050 | Rajpal | 2467329N to 2467778N / 425513E to 425605E | Existing | 640 | 3 | 15 | 37°30' | 28° |
| | 35070 | 35070 | KTD2 | 2467329N to 2467442N / 426420E to 426554E | Existing | 880 | 2 | 15 | 37°30' | 28° |
| | 36600 | 36600 | 2550 | 2467674N to 2467708N / 426437E to 426496E | Existing | 665 | 2 | 10 | 37°30' | 28° |
| | 23600 | 23600 | WBD1 | 2468733N to 2469156N / 423763E to 423991E | Existing | 326 | 1 | 7.5 | 37°30' | 28° |
| **Sub-total** | **200320** | **200320** | --- | --- | --- | --- | --- | --- | --- | --- |
| 2023-24 | 54600 | 54600 | Rajpal | 2467605N to 2467778N / 425466E to 425497E | Existing | 640 | 3 | 15 | 37°30' | 28° |
| | 63100 | 63100 | KTD2 | 2467352N to 2467452N / 426404E to 426524E | Existing | 880 | 2 | 15 | 37°30' | 28° |
| | 31658 | 31658 | 2550 | 2467634N to 2467677N / 426415E to 426471E | Existing | 665 | 2 | 10 | 37°30' | 28° |
| | 23600 | 23600 | WBD1 | 2468733N to 2469156N / 423763E to 423991E | Existing | 326 | 1 | 7.5 | 37°30' | 28° |
| **Sub-total** | **172958** | **172958** | --- | --- | --- | --- | --- | --- | --- | --- |
| 2024-25 | 93200 | 93200 | Rajpal | 2467556N to 2467774N / 425397E to 425446E | Existing | 640 | 3 | 15 | 37°30' | 28° |
| | 49155 | 49155 | KTD2 | 2467375N to 2467463N / 426390E to 426491E | Existing | 880 | 2 | 15 | 37°30' | 28° |
| | 37890 | 37890 | 2550 | 2467593N to 2467636N / 426393E to 426447E | Existing | 665 | 2 | 10 | 37°30' | 28° |
| | 23600 | 23600 | WBD1 | 2468733N to 2469156N / 423763E to 423991E | Existing | 326 | 1 | 7.5 | 37°30' | 28° |
| **Sub-total** | **203845** | **203845** | --- | --- | --- | --- | --- | --- | --- | --- |
| **Total** | **1056022** | **1056022** | --- | --- | --- | --- | --- | --- | --- | --- |

Build up of Mineral Rejects: Year wise build-up of the Mineral Rejects have been proposed as follows:

| Year | Mineral Reject Generation ($m^3$) | Mineral Reject to be Stacked ($m^3$) | Mineral Reject Name | Location of Mineral Reject (Coordinates) | Existing or New Mineral Reject Stack | Top RL of the Mineral Reject | No. of terrace proposed | Individual Terrace Height (m) | Slope of the terrace | Overall slope angle of Mineral Reject |
|---|---|---|---|---|---|---|---|---|---|---|
| 2020-21 | 56150 | 56150 | Mineral Reject-1 | 2468228N to 2468306N / 426077E to 426200E | New | 596 | 1 | 15 | 37°30' | 28° |
| | 5056 | 5056 | Mineral Reject-2 | 2467752N to 2467812N / 426539E to 426613E | New | 780 | 1 | 7.5 | 37°30' | 28° |
| | 15000 | 15000 | Mineral Reject-3 | 2469525N to 2469648N / 425586E to 425748E | New | 338 | 1 | 7.5 | 37°30' | 28° |
| **Sub-total** | **76206** | **76206** | --- | --- | --- | --- | --- | --- | --- | --- |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 2021-22 | 56200 | 56200 | Mineral Reject-1 | 2468279N to 2468325N / 426133E to 426309E | New | 596 | 1 | 15 | 37°30' | 28° |
| | 3744 | 3744 | Mineral Reject-2 | 2467750N to 2467825N / 426523E to 426593E | New | 780 | 1 | 7.5 | 37°30' | 28° |
| | 15000 | 15000 | Mineral Reject-3 | 2469525N to 2469648N / 425586E to 425748E | New | 338 | 1 | 7.5 | 37°30' | 28° |
| **Sub-total** | **74944** | **74944** | --- | --- | --- | --- | --- | --- | --- | --- |
| 2022-23 | 62300 | 62300 | Mineral Reject-1 | 2468211N to 2468308N / 425982E to 426163E | New | 596 | 1 | 15 | 37°30' | 28° |
| | 10950 | 10950 | Mineral Reject-2 | 2467750N to 2467832N / 426512E to 426559E | New | 780 | 1 | 7.5 | 37°30' | 28° |
| | 15000 | 15000 | Mineral Reject-3 | 2469525N to 2469648N / 425586E to 425748E | New | 338 | 1 | 7.5 | 37°30' | 28° |
| **Sub-total** | **88250** | **88250** | --- | --- | --- | --- | --- | --- | --- | --- |
| 2023-24 | 37100 | 37100 | Mineral Reject-1 | 2468308N to 2468358N / 426162E to 426308E | New | 596 | 1 | 15 | 37°30' | 28° |
| | 2300 | 2300 | Mineral Reject-2 | 2467759N to 2467838N / 426506E to 426559E | New | 780 | 1 | 7.5 | 37°30' | 28° |
| | 15000 | 15000 | Mineral Reject-3 | 2469525N to 2469648N / 425586E to 425748E | New | 338 | 1 | 7.5 | 37°30' | 28° |
| **Sub-total** | **54400** | **54400** | --- | --- | --- | --- | --- | --- | --- | --- |
| 2024-25 | 52150 | 52150 | Mineral Reject-1 | 2468234N to 2468342N / 425983E to 426203E | New | 596 | | | 37°30' | 28° |
| | 7350 | 7350 | Mineral Reject-2 | 2467766N to 2467843N / 426502E to 426548E | New | 780 | | | 37°30' | 28° |
| | 15000 | 15000 | Mineral Reject-3 | 2469525N to 2469648N / 425586E to 425748E | New | 338 | | | 37°30' | 28° |
| **Sub-total** | **74500** | **74500** | --- | --- | --- | --- | --- | --- | --- | --- |
| **Total** | **368,300** | **368,300** | --- | --- | --- | --- | --- | --- | --- | --- |

**Protective measures / Precautions envisaged:** Dumping of various sizes of waste materials will be dumped in a mixture form for binding of the materials. Terraces will be sloped inward to prevent the erosion and slope failure during rain. Berms will be provided at the periphery of each terrace to stop gully formation due to erosion of loose materials during rain and wind. Catch drains will be developed at the inner side of terrace and connected with garland drain to be developed around the toe of the dump. Dump slopes with cracks / fissures or loose soil at places mostly near the haul road will be protected by way of coir matting. Grass seeds will be shown over the dead terraces / slopes for binding soil and erosion control. OB dump will be rehabilitated and stabilized by way of plantation of local tree saplings for stabilization of dump slopes and aesthetic beauty.

Protective measures like retaining wall, garland drain and settling tank have already been built up at the lower levels around the waste dumps. Retaining wall is made up of OB boulders which retain the wash-off materials dumping the rain. Garland drain has been developed beyond the retaining wall and receives waste water coming out of the retaining wall. Settling tanks developed and connected with the garland drain receives the waste water, settles the sediments and releases clean water. However, the dimensions of said protective measures have been presented in the table as follows:



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| Location | Retaining Wall | | | Garland Drain | | | Settling Tank | | |
|---|---|---|---|---|---|---|---|---|---|
| | Length (m) | Width (m) | Height (m) | Length (m) | Width (m) | Depth (m) | Length (m) | Width (m) | Depth (m) |
| Dump-KD1 (near Kochar Quarry) | 343 | 2 | 2 | 311 | 1 | 2 | 42 | 22 | 5 |
| Dump-KD2 (near Kochar Quarry) | 130 | 2 | 2 | 90 | 1 | 2 | 7 | 5 | 2 |
| Dump-KTD1 & KTD2 (near Kochar Top Quarry) | 413 | 2 | 2 | 371 | 1 | 2 | 27 | 10 | 5 |
| N-Incline Dump (near N-Incline Quarry) | 295 | 2 | 2 | 295 | 1 | 2 | 14 | 5 | 4 |
| Rajpal Dump (near Rajpal Quarry) | 318 | 2 | 2 | 314 | 1 | 2 | 16 | 5 | 5 |
| **Total** | **1499** | **---** | **---** | **1381** | **---** | **---** | **106** | **---** | **---** |

In addition to the above, the protective measures to be constructed in plan period around the waste dumps and mineral reject stacks are as follows:

| Year | Location | Retaining Wall | | | Garland Drain | | | Settling Tank | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Length (m) | Width (m) | Height (m) | Length (m) | Width (m) | Depth (m) | Length (m) | Width (m) | Depth (m) |
| 2020-21 | Dump-KD1 (near Kochar Quarry) | 50 | 2 | 2 | 50 | 1 | 2 | --- | --- | --- |
| | Dump-KD2 (near Kochar Quarry) | 50 | 2 | 2 | 50 | 1 | 2 | --- | --- | --- |
| | Rajpal Dump (near Rajpal Quarry) | 50 | 2 | 2 | 50 | 1 | 2 | --- | --- | --- |
| | 2550 Dump (near 2550 Quarry) | 50 | 2 | 2 | 50 | 1 | 2 | --- | --- | --- |
| | Dump-WBD1 (West Block) | 50 | 2 | 2 | --- | --- | --- | --- | --- | --- |
| | Mineral reject-1 | 50 | 2 | 2 | 50 | 2 | 2 | --- | --- | --- |
| | Mineral reject-2 | 50 | 2 | 2 | 50 | --- | --- | --- | --- | --- |
| | | | | | | | | | | |
| 2021-22 | Dump-KD1 (near Kochar Quarry) | 215 | 2 | 2 | 215 | 1 | 2 | 10 | 5 | 5 |
| | Dump-KD2 (near Kochar Quarry) | 285 | 2 | 2 | 285 | 1 | 2 | 10 | 5 | 5 |
| | Rajpal Dump (near Rajpal Quarry) | 485 | 2 | 2 | 485 | 1 | 2 | 10 | 5 | 5 |
| | 2550 Dump (near 2550 Quarry) | 160 | 2 | 2 | 160 | 1 | 2 | 10 | 5 | 5 |
| | Dump-WBD1 (West Block) | 400 | 2 | 2 | --- | --- | --- | --- | --- | --- |
| | Mineral reject-1 | 360 | 2 | 2 | 360 | 2 | 2 | 10 | 5 | 5 |
| | Mineral reject-2 | 190 | 2 | 2 | 190 | --- | --- | --- | --- | --- |
| **Total** | --- | **2445** | --- | --- | **1995** | --- | --- | --- | --- | --- |

Retaining wall will be repaired / maintained and garland drain as well as settling tank will be cleaned throughout the plan period as and when necessitated preferable just after the monsoon season.



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# CHAPTER-5

## 5.0 USE OF MINERAL AND MINERAL REJECTS

a) Describe briefly the requirement of end-use industry specifically in terms of physical and chemical composition.

Iron ore recovered from the mine will be dispatched to the captive industries (steel & sponge iron plants) of Lessee as below:

| Sl. No. | Name of the plant | Name of Units | Production capacity | |
|---|---|---|---|---|
| | | | Present | Expansion proposed |
| 1 | Bhagabati Power and Steel Ltd, Raipur, Chhattisgarh | Sponge Iron Unit | 66,000TPA | 66,000TPA |
| | | Steel Melting Shop | 66,000TPA | 66,000TPA |
| | | Steel Rolling Mill | 30,000TPA | 1,00,000TPA |
| | | Captive Power Plant | 10 MW | 10 MW |
| 2 | Amalgam Steel Pvt. Ltd, Kandra, Jamshedpur, Jharkhand. | Pellets Plant | 1.2 MTPA | 1.2 MTPA |
| 3 | Mayur Electro Ceramics Pvt. Ltd | Sponge Iron (tunnel kiln) | 7056 TPA | |
| | | High Grade Pure Nugget | 25000 TPA | |

In addition to this, surplus iron ore recovered from the mine will be dispatched / sold to the other steel & sponge iron plants and coal handling plants (CHP) for coal washing / cleaning through heavy media separation process since the State Govt. has not specified the end use of the mineral in the block.

b) Give brief requirement of intermediate industries involved in up-gradation of mineral before its end-use.

Intermediate industries such as crushing and screening plants will be involved within M.L area in up-gradation of iron ore before its end-use to cater the need of captive plants of the Lessee and buyers in respect of size and grade.



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c) Give detail requirements for other industries, captive consumption, export, associated industrial use etc.

As discussed, a part of iron ore recovered from the mine will be supplied for captive use and remaining / surplus iron ore will be sold to the other steel & sponge iron plants, coal handling plants etc. as per demand.

d) Indicate precise physical and chemical specification stipulated by buyers

| Sl. No. | Constituents | Blast Furnace Grade | | Sponge Iron Grade | Coal handling plants |
|---|---|---|---|---|---|
| | | Lumps | Fines | Lumps | |
| 1 | Size | 10-40mm | -10mm | 5-18mm | -75mm |
| 2 | Iron (Fe) | +60% Fe | +55% Fe | +62% Fe | +50% Fe |

e) Give details of processes adopted to upgrade the ROM to suit the user requirements. The useable mineral recovered from ROM may not be directly used in any industry and may need intermediate process to suit the user industry in terms of physical and chemical compositions.

Dry processing such as crushing & screening will be adopted to upgrade the mined out ROM iron ore (+55% Fe) to suit the user requirements as per the flow sheet given in Para-6.0b). Mineral rejects / sub-grade iron ore (+45%-55% Fe) mined out from the quarries will be stacked for sale / beneficiation in future depending upon the market demand. Similarly, fines generated during crushing & screening will be stacked separately and dispatched on market demand leaving no stack in the mine.



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Qualified Person

# CHAPTER-6

## 6.0 PROCESSING OF ROM ORE AND MINERAL REJECTS

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

In general, the chief impurities in Iron Ore are silica, alumina, sulphur and phosphorus which are in the form of $Al_2O_3$, $SiO_2$, $FeS_2$ or $CaSO_4$ and $Ca_3$ $(PO_4)_2$ respectively. The $Al_2O_3$ /$SiO_2$ ratio in the ore has an important bearing on the economics of smelting the iron ores.

As far as mineral conservation is concerned, up-gradation of ore by way of dry processing such as crushing & screening will be essentially adopted in the M.L area for up gradation of iron ore in respect of size and grade. Mineral reject / sub-grade iron ore (+45-55% Fe) of plan period will be stacked initially and dispatched subsequently after blending with upper grade ores or as such depending upon the market demand. The machines to be deployed for dry processing are as follows:

| Unit operation | Name | Dia / Capacity | Numbers |
|---|---|---|---|
| Breaking & Sizing | Mobile crushing & Screening units | 170 TPH | 1 |
| | | 100 TPH | 3 |
| | Mobile Screen | 250 TPH | 1 |
| | | 200 TPH | 2 |
| | Fixed Screen | 100 TPH | 1 |
| | Electro Magnetic Screening Plant | 50 TPH | 1 |

Adequacy of the proposed crushing & screening plants has been justified as follows:

| Description | Crushing & Screening Plants |
|---|---|
| Working hours/shift | 8 hours |
| No. of shifts to be operated | 2 shifts |
| Annual working days | 300 days |
| Availability of screen / crusher | 60% |



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| | |
|---|---|
| Utilization of screen / crusher | 75% |
| Overall operating efficiency | 60% x 75% =45% |
| Mine capacity | 7,50,000 TPA ROM Iron Ore |
| Capacity of the screening plants available / hour | = 800 TPH |
| Capacity of the screening plants available / annum | = 800 x 8 x 2 x 300 x 45%<br>= 1,728,000 TPA (adequate for screening to meet the production capacity of 750,000 TPA) |
| Screened oversize lumps and manually processed lumps (+40mm) to be produced assuming 60% of total ROM Ore | = 750,000 x 60%<br>= 450,000 TPA |
| Capacity of the crushing plants available / hour | = 470 TPH |
| Capacity of the crushing plants available / annum | = 470 x 8 x 2 x 300 x 45%<br>= 1,015,200 TPA (adequate for crushing of 450,000 TPA over size lumps) |

ROM (run-off mine) iron ore of +45% Fe raised from the mine will be transported to the stacking and processing site located at West Block non forest land where ROM is sized / broken by way of crushing and screening to produce lumps and fines.

b) Give a material balance chart with a flow sheet or schematic diagram of the processing procedure indicating feed, product, recovery, and its grade at each stage of processing.

Run-off mine iron ore raised from the mine will be sorted / sized manually and crushed / screened mechanically for separation of iron ores in to various sizes. However, flow sheet of the processing procedure has been presented as follows:



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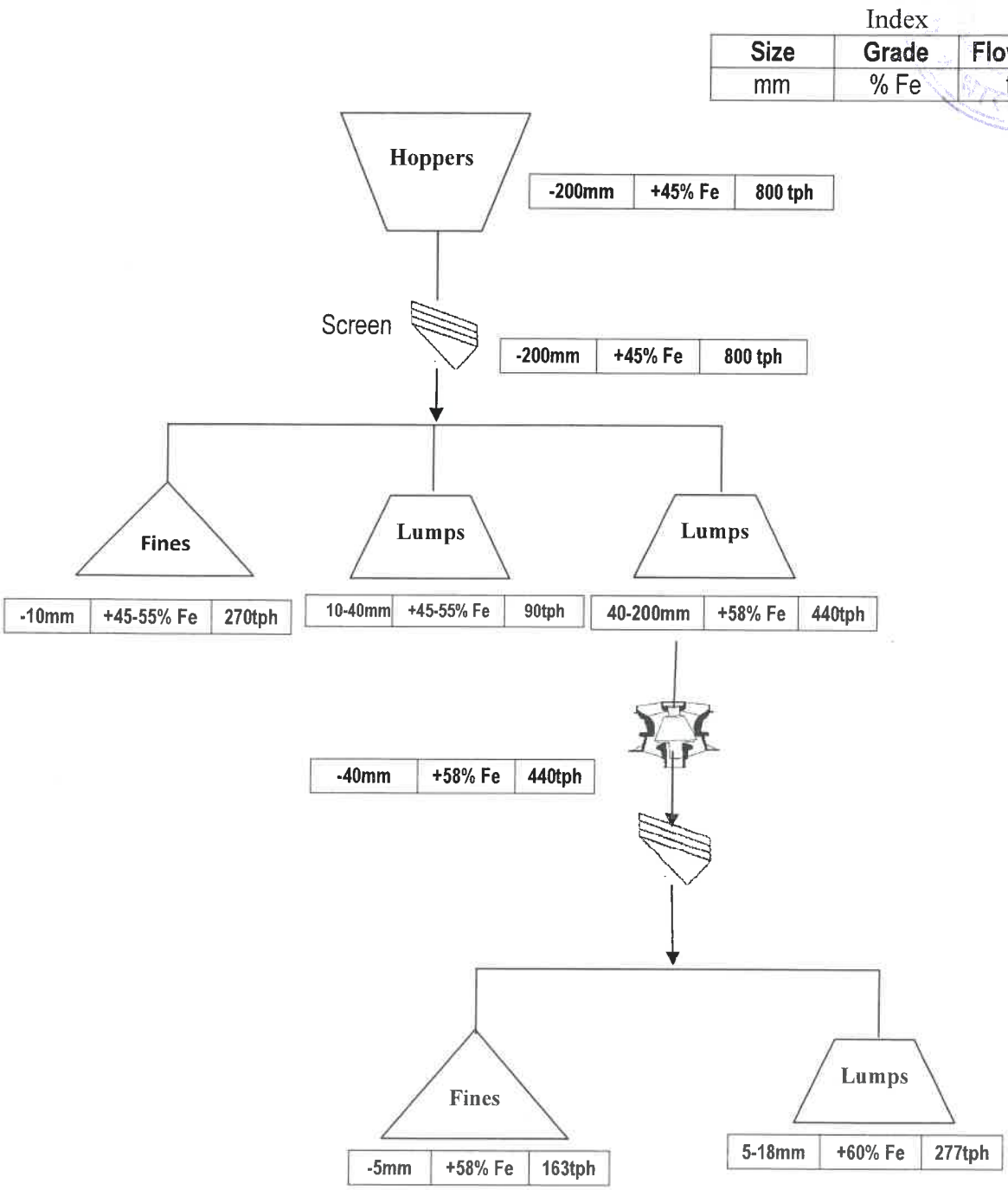


c) Explain the disposal method for tailings or reject from the processing plant.

Due to dry processing there will be no generation of tailings. However, fines generated during dry processing (crushing & screening) will be sold as per the demand.



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d) Quantity and quality of tailings /reject proposed to be disposed, size and capacity of tailing pond, toxic effect of such tailings, if any, with process adopted to neutralize any such effect before their disposal and dealing of excess water from the tailings dam.

Not applicable due to dry processing.

e) Specify quantity and type of chemicals if any to be used in the processing plant.

There will be no use of any chemicals due to dry processing i.e., crushing & screening. Only water will be sprinkled for dust suppression.

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

Not applicable

g) Indicate quantity ($m^3$ / day) of water required for mining and processing and sources of supply of water, disposal of water and extent of recycling. Water balance chart may be given.

About 19.13, say $20m^3$ of potable water will be provided to the employees / Quarry staff daily for drinking purpose assuming 12 liters of clean and wholesome drinking water per head per day, 16.25, say $17m^3$ will be required at the mine site for bathing, washing & cooking. In addition to these, $60m^3$ of water will be utilized for non-domestic purpose which includes $40m^3$ for water spraying for dust suppression / prevention, $10m^3$ for watering the plantation site for live and growth of the saplings and $10m^3$ for dry fog system and wet drilling. Hence, the peak demand of intake water may be tabulated as follows:

| Class of Use | Purpose | Peak demand ($m^3$ / day) | Source of water |
|---|---|---|---|
| Domestic | Drinking (for 240 persons @12 liters / man / day) | 2.88 | Ground water |
| | Bathing, washing, cooking etc. (for 65 persons @250 liters / man / day) | 16.25 | -do- |
| Non-Domestic | Water sprinkling for dust suppression | 40.00 | Surface water |
| | Watering the plantation site | 10.00 | -do- |
| | Dry fog system and wet drilling | 10.00 | |
| **Total** | --- | **79.13, say $80m^3$** | --- |

As for as the use of water is concerned, water will be consumed / evaporated / evapo-transportation and cannot be re-cycled.



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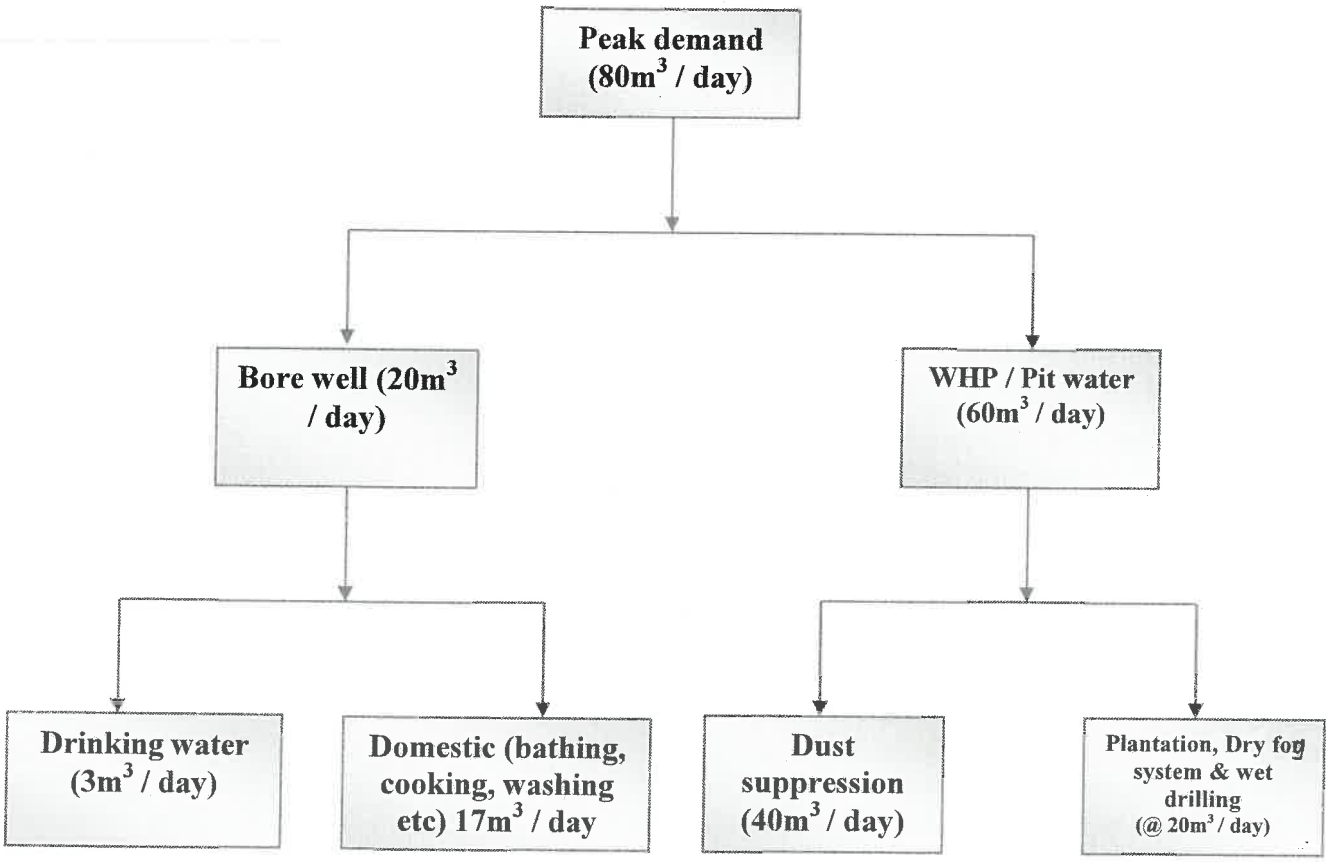
Since there will be no wet beneficiation of iron ore, recycling of water is not possible. The entire water carried in to the lease area will be either consumed by the workers or plants or wetting of haul roads or evaporation. However, water balance chart of the mine has been presented as follows:



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# CHAPTER-7

## 7.0 OTHERS (Describe briefly the following)

### a) SITE SERVICES

| | | |
|---|---|---|
| **Existing site services:** | Administrative & Technical Buildings | It houses various departments of general administration, electronic data processing, financial & accounts, personnel & welfare, security etc.<br><br>Mines Manager, Mining Engineer, Geologist and Surveyor sits therein for geological mapping and grade control, short term & long term mine planning, environmental management, statutory compliances and preparation of annual returns for submission to the IBM, DGMS, Directorate of Mines etc. |
| | Residential Complex | Well furnished temporary quarters have been provided for the accommodation of some officials / employees for the emergence work at the mines from time to time and security barrack for security officer, supervisor, gun man and security guards for safe & secured existence of the infrastructure, machinery, explosives and plantation. |
| | Vocational Training Centre (VTC) | Vocational training centre has been built up for conducting training classes and exhibition of models. |
| | Creche, Canteen and Rest Shelter | Rest shelter has been built up for food, tiffin tea etc. near the quarry site to provide space to the workers for fooding, rest etc. A canteen with dining, hall, kitchen room, store etc. has been built up for food, tiffin, tea etc. A crèche has been provided to take care of the children of the employed female workers. |
| | Human Laboratories | Toilets equipped with STP (Sewerage Treatment Plant) has been provided in the M.L. area for disposal of human excreta in a hygienic manner. |
| | Health Centre | First-aid facilities equipped with sterilized dressing materials such as cotton wool, bandages, iodine and antiseptic solution etc are provided for treatment of the workers before hospitalization, if any accident occurs in the mine. Medical examinations of workers are carried out periodically, records are maintained properly and treatment is done accordingly by the specialized Doctors. Ambulance is provided to carry the patients to the nearby hospitals. Occupational health surveillance program of the workers are undertaken periodically to observe any contractions due to exposure of dust and take corrective measures accordingly. |
| | Weight Bridge | Weigh bridges have been set up in the M.L area mainly for weighing of saleable iron ore before dispatch to the respective consuming industries. |
| | Blasting Shelter | Portable steel blasting shelters (one end open type) have been kept at the mine site to provide shelter to the blasters during blasting. These blasting shelters are shifted time to time in accordance with the shifting of blast hole locations. |

| | | |
|---|---|---|
| | Magazine | Well designed and licensed building called magazine has been constructed in the M.L. area as per the Indian Explosives Act for safe and secure storage of explosive. However the blasting is done by procuring explosive from outside agency having valid explosive license. |
| | Chemical Laboratory | A chemical laboratory has been established in the M.L area for day to day chemical analysis and quality monitoring of iron ore. |
| | Stores & Workshops | Store buildings has been constructed to store spare parts, safety equipments etc. |
| | Fuel Filling Station and Lubricant Store | Fuel filling station houses an underground store (for diesel storage) with fuel pumps and meter. Fuel pumps fills diesel directly in to the HEMM's like DTH drills, compressors, excavators, loaders, dumpers etc., four wheelers, water sprinklers etc. Lubricant store houses various lubricants to top up the equipments along with fuel. |
| | Power Supply | Grid Corporation of Odisha Limited (erstwhile Orissa State Electricity Board) power line passes through the M.L area. Mines office, residential complex, guest house etc. are electrified. Electric sub-stations have been established as per need. |
| | Solar System | Solar system has been established in the M.L area for lighting, weigh bridge operation etc. |
| | Illumination | In addition to the front and rear illumination of the HEMM's, adequate light arrangements are provided for safe operation of the mine during night. Street Light lamp posts of 11m height will be provided along the roadside at 40m spacing. Each lamp post will have a number of 90W LED lamps Light Fixture for lighting of trunk haul road. Mobile lamp posts of 6Mtr. height are/will be provided along the roadside at 25m to 40m interval for lighting of branch haul roads. Mobile/portable lamp posts of 9m height with 200W LED lamp Light Fixture will be provided on the working face for enough illumination / lighting of mine faces. |
| | Water Supply | Wholesome drinking water has been supplied through pipelines to the office & canteen for drinking and domestic purpose. Quarry / surface water carried through water tanker is used for non-domestic purpose such as (a) water spraying on dust prone areas like haul road, loading & unloading sites etc. and (b) plantation. |
| | Transport & communication | Several Boleros and Scorpios will be deployed for transportation between the office of the employees, executives / shift-in-charges and working spots. Mobile phone sets have been provided for communication amongst the Supervisory personal and the Operators and Lessee has already set up of his own mobile tower for communication facilities. |
| Proposed site services | | The statutory buildings such as rest shed, first-aid centre, crèche, canteen etc will be well maintained. Cool and wholesome drinking water, safety equipment and blasting shelters will be provided at the mine site as per need. |



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## 10.2 Employment potential:

Shovel-dumper combination will be deployed in the mine for excavation & loading and transportation of ore and waste to the respective. Manual breaking as well as mechanical processing sites. Mobile crushers & screens will be deployed for breaking & sizing and sized ore will be loaded in to the hired trucks by the pay loaders. Keeping in view the above type of mechanization, the employment distribution pattern has been proposed to be as follows:

| Category | Post | Qualification | Numbers |
|---|---|---|---|
| Management | Mines Manager | 1st Class Mines Manager's Certificate of Competency | 1 |
| | Asst. Mines Manager | 2nd Class Mines Manager's Certificate of Competency | 1 |
| | Mining Engineer | Degree in Mining Engineering | 1 |
| | Geologist | M. Sc. in Geology / Applied Geology | 3 |
| | Chemist | M.Sc. / B.sc. in Analytical Chemistry | 2 |
| | Head Accountant | Bachelor's degree in accounting / finance | 1 |
| | Accountant & Cashier | Graduate in Arts / Science / Commerce | 1 |
| | Commercial Manager | Degree in accounting / MBA in costing | 1 |
| | Quality Controller | B. Sc in Geology | 1 |
| | | | |
| Supervisory | Mining Foreman | Foreman's Certificate of Competency | 2 |
| | Mining Mate | Mate's Certificate of Competency | 7 |
| | Surveyor | Surveyor's Certificate of Competency | 1 |
| | Mechanical Engineer | Diploma in Mechanical Engineering | 1 |
| | Electrical Engineer | Diploma in Electrical Engineering | 1 |
| | Electrical Forman | ITI in Electrical Engineering | 1 |
| | | | |
| Highly Skilled | Computer Operator | Graduate and experienced | 3 |
| | WB Clerk | Graduate and experienced | 3 |
| | FA-in-charge | Experienced | 1 |
| | DTH drill operator | Experienced with valid license | 4 |
| | Blaster | Blaster's Certificate of Competency | 1 |
| | Excavator operator | Experienced with valid license | 10 |
| | HMV / dumper Driver | Experienced with valid license | 30 |
| | Crusher Operators | Experienced | 4 |
| | Screen Operators | Experienced | 7 |
| | | | |
| Skilled | Dozer operator | Experienced with valid license | 3 |
| | LMV (Jeep / Bolero) Driver | Experienced with valid license | 4 |
| | Water Tanker Driver | Experienced with valid license | 10 |
| | Pay loader operator | Experienced with valid license | 7 |
| | JCB Operator | Experienced with valid license | 1 |
| | Road grader | Experienced with valid license | 1 |



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| | | | |
|---|---|---|---|
| | DG Set Operator | | 1 |
| | Mechanic | ITI in Mechanical Engineering | 6 |
| | Electrician | ITI in Electrical Engineering | 2 |
| | Crushing Asst. Operators | Experienced | 4 |
| | Screening Asst. Operators | Experienced | 7 |
| | Ambulance Driver | Experienced with valid license | 1 |
| | Clerk | Graduate and experienced | 4 |
| | | | |
| Semi-Skilled | Office Assistant | Experienced | 2 |
| | Security Guards | Experienced with valid gun license | 22 |
| | | | |
| Un-Skilled | Cleaner, Flag Man | --- | 25 |
| | Mazdoor (tree felling, drinking water carrier, road making, plantation and nursery work) | --- | 22 |
| | Mazdoor (sorting, quality and environment protection work) | --- | 28 |
| | Peon | --- | 1 |
| | Messenger | --- | 1 |
| | | | |
| **Total** | **---** | **---** | **240** |

Category-wise employment pattern has been summarized as follows:

| **Category of Employment** | **Numbers** | **Percentage** |
|---|---|---|
| Management & Supervisory | 25 | 10% |
| Highly Skilled | 63 | 26% |
| Skilled | 51 | 22% |
| Semi-Skilled | 24 | 10% |
| Un-skilled | 77 | 32% |
| **Total** | **240** | **100%** |

Keeping in view the mechanized method of mining (A-FM as per MCDR, 2017), OMS has been calculated to be 11.5 t for iron ore as follows:

| | |
|---|---|
| Yearly production of iron ore | 750,000 t |
| Number of working days in the Year excluding rainy days, holiday's etc. | 300 |
| Daily production | 750,000 / 300 = 2500 t |
| OMS | 11.5 t |
| Number of workers required in work | 2500 / 11.5 = 217.4, say 218 nos. |
| Absenteeism (assuming 10%) | 218 + 218 (10%) |
| Total requirement of workers | 218 + 21.8 = 239.8, say 240 nos. |



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# CHAPTER-8

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

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

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

An area of 140.321 hectares land is already degraded / utilized for mining, dumping, road etc. as given below:

| Sl. No. | Type of land use | Area utilized / degraded (ha) |
|---|---|---|
| 1 | Area under excavation | 67.835 |
| 2 | Storage for Topsoil | --- |
| 3 | Overburden dump | 19.500 |
| 4 | Mineral Storage (ROM ore and mineral rejects) | 14.134 |
| 5 | Infrastructure (administrative office, quarters, canteen, store room etc.) | 22.852 |
| 6 | Roads | 13.000 |
| 7 | Railways | --- |
| 8 | Tailing Pond | --- |
| 9 | Effluent Treatment Plant | --- |
| 10 | Mineral Separation Plant (screening & crushing units) | 2.500 |
| 11 | Township area | --- |
| 12 | Others (Retaining wall, garland drain & settling tank etc.) | 0.500 |
| **Total** | --- | **140.321** |

Water regime, quality of air, ambient noise level, flora, climatic conditions:

Water regime: M.L. area is primarily a hilly area and devoid of any perennial surface water resource. Natural streams like Vesrakocha nala, Am nala and Rajpal nala are seasonal in nature, which starts radially from the periphery of the M.L area and flows towards the downhill area. Surface water samples from the above surface water sources have been collected and analyzed. However, all the measured values are found well within the permissible limit.

Tube wells and dug wells are the main source of water for domestic use. The depth of these tube wells varies from 150ft to 300ft (45m to 90m). Minimum and maximum depth of water tables in the M.L area based on the observation from these tube wells are interpreted to be as follows:

| | |
|---|---|
| General surface / ground level | 395mRL |
| Minimum depth of water table in rainy season | 45m depth at 350mRL |
| Maximum depth of water table in summer season | 90m depth at 305mRL |

Ground water samples from the above ground water sources (tube wells) have been collected and analyzed. The results of water samples indicated that ground water is potable and safe.

**Quality of Air:** The source of the air pollution in the M.L area are drilling, blasting, excavation, loading, unloading & movement of loaded & unloaded vehicles and source of air pollutants are point source (drilling & use of compressors), line source (moving truck & other vehicles and movement of excavator), area (quarry area while working) and instantaneous source (blasting). The machinery, in use, include drills, compressors, excavators and vehicles. The parameters like Particulate Matter (size less than 10 km) or $PM_{10}$ (SPM), Particulate Matter (size less than 2.5 km) or $PM_{10}$, Sulphur Dioxide ($SO_2$), Nitrogen Dioxides ($NO_x$) and Carbon Monoxide (CO) have been monitored. The ambient air quality (AAQ) parameters monitored at different locations inside the M.L area (core zone) and outside the M.L area (buffer zone) is well within statutory limit.

**Ambient Noise Level:** The source of the noise in the core zone (M.L. area) and buffer zone (5km radius) are blast hole drill, compressor, trucks / tippers etc. Ambient noise level monitored quarterly in core as well as buffer zone is found within permissible limit.

**Flora:** M.L. area over 349.50 hectares consists of 90.50 hectares forest land and 259 hectares non-forest land. Out of 349.50 hectares, an area of 140.333 hectares has been degraded / utilized due to mining, dumping, road development etc. General character of the vegetation in the forest in & around the M.L area is dry deciduous type. The existing forested part of the lease area (mainly 7.5m wide safety zone along M.L. boundary) and buffer zone (5 km radius of M.L area) are mixed with Kusum, Kadamba, Palas etc.

**Climatic Condition:** The region undergo three climatic cycles throughout the year. The climate in the area is generally cold in water between November and February and hot is summer between March and June. The monsoon sets in late June and continues upto the end of August.



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Temperature shows the variation between $9^0$ C to $45^0$ C. Average annual rainfalls is 1250mm. The south-west monsoon remains from mid June to mid September and the area receives more than 70% of the annual rainfall during the period. Relative humidity varies from 20% to 96%.

Predominant wind direction is South-West. Area remains calm for nearly 50% of the year.

**Human settlements:** People of the buffer zone are mostly engaged in mining & allied activities. To assess the socio-economic condition of the region, twenty (20) villages were selected within 5 km radius of the M.L area. From the data, following details have been summarized:

**TABLE-8.1: POPULATION DISTRIBUTION PATTERN** (Source: Census of India, 2011)

| Sl. No. | Name of the Village | Population | | | SC | ST |
|---|---|---|---|---|---|---|
| | | Male | Female | Total | | |
| 1 | **Badmauda** | 653 | 642 | 1295 | 123 | 489 |
| 2 | Bhatgoda | 246 | 326 | 572 | 0 | 479 |
| 3 | Chapal | 210 | 208 | 418 | 0 | 418 |
| 4 | Dhatikidihi | 227 | 315 | 542 | 24 | 504 |
| 5 | **Gorumahisani** | 1043 | 894 | 1937 | 185 | 712 |
| 6 | Hatia | 484 | 462 | 946 | 136 | 501 |
| 7 | Kalimati | 304 | 319 | 623 | 0 | 623 |
| 8 | Khejuri | 368 | 401 | 769 | 18 | 732 |
| 9 | Kolidiha | 357 | 359 | 716 | 41 | 489 |
| 10 | Kukudimundi | 567 | 551 | 1118 | 20 | 876 |
| 11 | **Kuleisila** | 853 | 861 | 1714 | 191 | 401 |
| 12 | Naupada | 60 | 85 | 145 | 30 | 91 |
| 13 | Rengalbeda | 82 | 116 | 198 | 0 | 198 |
| 14 | Sanjari | 47 | 44 | 91 | 0 | 77 |
| 15 | **Sanmauda** | 277 | 357 | 634 | 55 | 462 |
| 16 | Sudarsanpur | 468 | 507 | 975 | 35 | 265 |
| 17 | Sundhal | 1222 | 1265 | 2487 | 152 | 949 |
| 18 | Tolak | 426 | 462 | 888 | 66 | 221 |
| 19 | Tulasibani | 86 | 110 | 196 | 0 | 194 |
| 20 | Udayapur | 280 | 300 | 580 | 46 | 506 |
| --- | **Total** | **8,260** | **8,584** | **16,844** | **1,122** | **9,187** |

Area around the mine is ST dominated. Male to Female ratio is 1000:1039 which may be due to immigrants of the male people to the mining zone. However, the details are as follows:

- No. of villages studied = 20
- Total population (as per Census of India, 2011) = 16,844
- Male = 8,260 (49%)
- Female = 8,584 (51%)
- SC (Male + Female) = 1,122 (7%)
- ST (Male + Female) = 9,187 (54%)

**TABLE-8.2: LITERACY LEVEL** (Source: Census of India, 2011)

| Sl. No | Name of the Village | Total Population | Literacy | | | |
|---|---|---|---|---|---|---|
| | | | Male | Female | Total | % |
| 1 | **Badmauda** | 1295 | 459 | 298 | 757 | 58 |
| 2 | Bhatgoda | 572 | 107 | 93 | 200 | 35 |
| 3 | Chapal | 418 | 120 | 69 | 189 | 45 |
| 4 | Dhatikidihi | 542 | 144 | 156 | 300 | 55 |
| 5 | **Gorumahisani** | 1937 | 697 | 412 | 1109 | 57 |
| 6 | Hatia | 946 | 323 | 195 | 518 | 55 |
| 7 | Kalimati | 623 | 161 | 124 | 285 | 46 |
| 8 | Khejuri | 769 | 208 | 95 | 303 | 39 |
| 9 | Kolidiha | 716 | 230 | 178 | 408 | 57 |
| 10 | Kukudimundi | 1118 | 406 | 299 | 705 | 63 |
| 11 | **Kuleisila** | 1714 | 640 | 495 | 1135 | 66 |
| 12 | Naupada | 145 | 39 | 33 | 72 | 50 |
| 13 | Rengalbeda | 198 | 38 | 22 | 60 | 30 |
| 14 | Sanjari | 91 | 27 | 12 | 39 | 43 |
| 15 | **Sanmauda** | 634 | 189 | 169 | 358 | 56 |
| 16 | Sudarsanpur | 975 | 314 | 238 | 552 | 57 |
| 17 | Sundhal | 2487 | 692 | 498 | 1190 | 48 |
| 18 | Tolak | 888 | 287 | 249 | 536 | 60 |
| 19 | Tulasibani | 196 | 35 | 16 | 51 | 26 |
| 20 | Udayapur | 580 | 126 | 79 | 205 | 35 |
| --- | **Total** | **16,844** | **5,242** | **3,730** | **8,972** | **53** |

It can be observed from the Table-8.2 that, the overall literacy level is 53%. Highest & lowest level of literacy is observed at village Kuleisila (66%) and village Tulasibani (26%) respectively.



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**TABLE-8.3: OCCUPATIONAL STRUCTURE** (Source: Census of India, 2011)

| Sl. No. | Name of the Village | Total Population | Working Population | | | |
|---|---|---|---|---|---|---|
| | | | Main workers | Marginal workers | Total workers | Non workers |
| 1 | **Badmauda** | 1295 | 110 | 370 | 480 | 815 |
| 2 | Bhatgoda | 572 | 145 | 129 | 274 | 298 |
| 3 | Chapal | 418 | 122 | 134 | 256 | 162 |
| 4 | Dhatikidihi | 542 | 126 | 101 | 227 | 315 |
| 5 | **Gorumahisani** | 1937 | 827 | 40 | 867 | 1070 |
| 6 | Hatia | 946 | 273 | 154 | 427 | 519 |
| 7 | Kalimati | 623 | 163 | 169 | 332 | 291 |
| 8 | Khejuri | 769 | 183 | 296 | 479 | 290 |
| 9 | Kolidiha | 716 | 257 | 151 | 408 | 308 |
| 10 | Kukudimundi | 1118 | 310 | 88 | 398 | 720 |
| 11 | **Kuleisila** | 1714 | 536 | 103 | 639 | 1075 |
| 12 | Naupada | 145 | 73 | 0 | 73 | 72 |
| 13 | Rengalbeda | 198 | 111 | 30 | 141 | 57 |
| 14 | Sanjari | 91 | 23 | 36 | 59 | 32 |
| 15 | **Sanmauda** | 634 | 203 | 23 | 226 | 408 |
| 16 | Sudarsanpur | 975 | 130 | 423 | 553 | 422 |
| 17 | Sundhal | 2487 | 771 | 153 | 1224 | 1263 |
| 18 | Tolak | 888 | 297 | 5 | 302 | 586 |
| 19 | Tulasibani | 196 | 54 | 94 | 148 | 48 |
| 20 | Udayapur | 580 | 215 | 12 | 227 | 353 |
| --- | **Total** | **16,844** | **4,929** | **2,511** | **7,740** | **9,104** |

People of area are mostly engaged in the mines for their livelihood. The details of status of employment are as follows:

- Main workers = 4,929 (25%)
- Marginal workers = 2,511 (15%)
- Total workers = 7,740 (46%)
- Non workers = 9,104 (54%)

Public buildings, places of worship and monuments:

The lease area (Core Zone) and the area within 5km radius of the M.L area (Buffer Zone) do not have the notable public buildings as well as places of worship and monuments of archeological, historical, cultural and aesthetic importance.



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Indicate any sanctuary is located in the vicinity of leasehold:

There is no national park/wild life sanctuary/biosphere reserve/ tiger reserve/ elephant reserve in the core (M.L area) and buffer zone (5 km radius of the M.L area).

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

i) **Land area indicating the area likely to be degraded due to quarrying, dumping, roads, workshop, processing plant, tailing pond/dam, township etc.**

An area of 147.402 hectares in the M.L area will be degraded / utilized for mining, dumping, infrastructure, road etc. at the end of plan period as follows:

| Sl. No. | Type of land use | Area utilized / degraded (ha) | At the end of plan period (ha) |
|---|---|---|---|
| 1 | Area under excavation | 67.835 | 67.835 |
| 2 | Storage for Topsoil | --- | --- |
| 3 | Overburden dump | 19.500 | 25.005 |
| 4 | Mineral Storage (ROM ore and mineral rejects) | 14.134 | 15.460 |
| 5 | Infrastructure (administrative office, quarters, canteen, store room etc.) | 22.852 | 22.852 |
| 6 | Roads | 13.000 | 13.000 |
| 7 | Railways | --- | --- |
| 8 | Tailing Pond | --- | --- |
| 9 | Effluent Treatment Plant | --- | --- |
| 10 | Mineral Separation Plant (screening & crushing units) | 2.500 | 2.500 |
| 11 | Township area | --- | --- |
| 12 | Others (Retaining wall, garland drain & settling tank etc.) | 0.500 | 0.750 |
| **Total** | **---** | **140.321** | **147.402** |

**Mitigation measures:** Natural growth of the trees / plants in the M.L area in the virgin area will be protected and plantation will be undertaken in 7.5m wide no working zone / safety zone along the M.L boundary inside the lease area to maintain aesthetic beauty and arrest the dust particles. Reclamation and rehabilitation work will be undertaken as per the progressive mine closure plan.



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Sapling of local species like Karanja (Pongamia Glabra), Simaria (Bursera simaruba), Sisu (Dalbergia Latifolia), Mango (Mangifera indica), Kadamba (Neolamarckia cadamba) etc. other locally growing trees etc. will be planted at 2m spacing. Watering and manuring will be done periodically. Post plantation care such as soil working, pruning etc will be conducted. Insecticides will be spread for pest control. Plantation area will be kept under proper watch and ward to save the trees from fire & grazing. Monitoring & Maintenance of the plantation site will be undertaken in such way that there will be at least 80% survival rate through casualty replacement. However, the plantation to be carried out has been shown in the Table-8.4 as follows:

**TABLE-8.4: PLANTATION SCHEDULE (Safety Zone)**

| Year | Location | Area proposed ($m^2$) | No. of saplings | Name of the species |
|---|---|---|---|---|
| 1st (2020-21) | Safety zone | 5000 | 1250 | Karanja (Pongamia Glabra), Simaria (Bursera simaruba), Sisu (Dalbergia Latifolia), Mango (Mangifera indica), Kadamba (Neolamarckia cadamba) etc. |
| 2nd (2021-22) | -do- | 5000 | 1250 | -do- |
| 3rd (2022-23) | -do- | 5000 | 1250 | -do- |
| 4th (2023-24) | -do- | 5000 | 1250 | -do- |
| 5th (2024-25) | -do- | 5000 | 1250 | -do- |
| **Total** | **---** | **25,000** | **6,250** | **---** |

ii) Air quality

As far as air pollution is concerned, fugitive dust (SPM) pollution is predominant than the gaseous pollutants. Mining unit operation such as excavation, loading & unloading, movement of tippers and haul roads, no doubt, normally generates the fugitive dusts and noxious gases like NOx, $SO_2$, CO etc. Fugitive dusts are localized because there is no chance of transport of this pollutant in to the nearby villages due to existence surrounding hills, forest and calm condition of the wind flow.

Dust as well as gases emission from the vehicles / machines will be dispersed over a wide R.F. area and dilulated without flowing in to the nearby villages.

**Mitigation measures:** Mitigation measures to protect air from adverse effect have been proposed as follows:

- Air & noise level will be monitored quarterly 8 hours per day per season (two days per week for one month) as per CPCB norms throughout the life of the mine to check the effectiveness of environmental management (pollution control measures) vs mining activities. The parameters like $PM_{10}$, $PM_{2.5}$, $SO_2$, $NO_x$ and CO are proposed to be quantified in the air samples taken from core zone as well as buffer zone.
- Water sprinkling will be done at regular intervals on the dust prone areas such as haul roads and other possible dust generation areas to suppress emission and distribution of dust particles.
- Plantation will be undertaken in the safety zone and waste dump to arrest the air borne dust and prevent further spreading.
- Diesel machines will be subjected to proper maintenance to decrease the emission level of $NO_x$ and $SO_x$.
- Sharp drill bits will be used during drilling for less generation of dust particles.
- Wet-drilling techniques / dust-collectors will be deployed to prevent generation of dust during drilling operations.
- Overloading of truck / tippers will be prohibited to stop spillage of the waste / ore on the way.
- Trucks / tipper drivers will be instructed strictly to run the loaded vehicles at a speed less than 20 to 30 km / hour in the mines depending upon the climate to generate dust on the haul road as minimum as possible.
- Suitable blast design & delay detonators will be used to avoid excess generation of dust during blasting operations.
- Sits will be provided to the operators in the closed cabin of the machines to have the dust free environment.
- Personnel working in dusty areas will wear protective respiratory devices and undertake adequate training and information on safety & health aspects.



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- Dust masks will be provided to protect the workers who are exposed to prolonged dust.

iii) Water quality

Impact on Surface Water Quality & Mitigation Measures: Wash-off materials from the waste dumps, sub-grade stacks and quarry floors normally flow towards low lying areas and natural water ways. Thus, water pollution is expected marginally due to the flow of sediments along with surface run-off water. Therefore, preventive measures to be taken for mitigation of the impact on water quality will be as follows:

- Surface water samples drawn from the upstream and downstream of nearby nalas will be monitored and analyzed to check the pollutants and take remedial measures accordingly.
- Retaining wall will be constructed / maintained around the waste dump and sub-grade stack to arrest the wash-offs / sediments and to release clean water outside. Hence, there will be no chance of flow of sediments to the nearby natural water courses.
- Water flowing from the dumps will be routed through garland drain and settling tank to settle the wash-off materials and release clean water.
- Waste water from toilet will be canalized / piped into the soak pit and human excreta from the toilet will be canalized to the septic tank.

Impact on Ground Water Quality & Mitigation Measures: The downward movement of the toxic substances from the stack, dump and exposed quarry faces during seepage and percolation of ground water normally affects the ground water quality adversely in mining area. Mining will be carried out at the top of hill range and the water table in the M.L area is comparatively at a greater depth which will not be touched / punctured during the plan period. Hence, there will be neither discharge nor pollution of ground water in the mine. Toxic materials do not exist in the mine, which can pollute and jeopardize human health.

Measures proposed to provide clean and wholesome water to the mine employees and local people are as follows:

- Water samples drawn from the nearby bore wells will be monitored and analyzed to check the pollutants and take remedial measures accordingly.
- There will be no impact on ground water quantity due to mining since surface water will be utilized for non-domestic / industrial purposes.

iv) Noise levels

**Impact on human health due to noise:** The sources of noise in the mine are point sources like drill, compressor, excavators, loader, line sources like transport vehicles / trucks / dumpers and instantaneous source like blasting. So far, health hazard (hearing impaired) due to noise has not been observed in the area. Noise level of work zone (which is away from the human habitation) does not impact on the noise level of any village.

**Mitigation measures :** The maximum noise level prescribed by Director General of Mine Safety (DGMS) for an 8 hours exposure is 90dB(A). Three basic noise control techniques such as (a) reduction of noise generation at source, (b) isolating the source and (c) increasing the attenuation as well as absorption between the source & listener may be kept on mind & implemented in the work zone to control the noise levels. Therefore, control measures suggested to keep the noise level within permissible limit are as follows:

- Noise level will be maintained quarterly in both core (M.L area) as well as buffer zone (5 km adjoining area) as per CPCB norms.
- Machines will be maintained and lubricated properly to reduce the noise level.
- Operators cabins of the various machines and vehicles will be built sound proof.
- Instantaneous noise of blasting will be minimized by the implementation of suitable blast design and use of proper delay interval.
- Men & animals will be evacuated to a safe distance (beyond the blasting danger zone) for safety from noise and fly rocks.
- Workers will not be allowed to work in the work zone where noise level exceeds 90dB(A).



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- Measures will be taken to control the noise levels below 90dB(A) in work environment.
- Existing trees in non-mineable area around the quarries will be protected and new tree saplings will be planted in vacant areas to stop the propagation of noise outside.
- Personnel working in dusty areas will wear protective respiratory devices and undertake adequate training and information on safety & health aspects.

v) Vibration levels (due to blasting)

Impact: Pneumatic DTH drills of 100mm dia will be used for blast hole drilling and blasting. Impact of vibration due to blasting is negligible. As far as vibration is concerned, blasting has not been objectionable in the region.

Mitigation measures: Delay detonators will be used to split a large vibration package in to a number of small vibration levels. Vibration will also be minimized by changing the broad blasting parameters on trial & error basis depending upon the strata condition.

vi) Water regime

Impact: About 19.13, say 20$m^3$ of potable water will be provided to the employees / Quarry staff daily for drinking purpose assuming 12 liters of clean and wholesome drinking water per head per day, 16.25, say 17$m^3$ will be required at the mine site for bathing, washing & cooking. In addition to these, 60$m^3$ of water will be utilized for non-domestic purpose which includes 40$m^3$ for water spraying for dust suppression / prevention, 10$m^3$ for watering the plantation site for live and growth of the saplings and 10$m^3$ for dry fog system and wet drilling. Hence, the peak demand of intake water may be tabulated as follows:

| Class of Use | Purpose | Peak demand ($m^3$ / day) | Source of water |
|---|---|---|---|
| Domestic | Drinking (for 240 persons @12 liters / man / day) | 2.88 | Ground water |
| | Bathing, washing, cooking etc. (for 65 persons @250 liters / man / day) | 16.25 | -do- |
| Non-Domestic | Water sprinkling for dust suppression | 40.00 | Surface water |
| | Watering the plantation site | 10.00 | -do- |
| | Dry fog system and wet drilling | 10.00 | |
| **Total** | --- | **79.13, say 80$m^3$** | --- |



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As for as the use of water is concerned, water will be consumed / evaporated / evapo-transportation and cannot be re-cycled.

**Mitigation measures:** Due to such less consumption of water, the impact on water regime will be negligible. Since water table is far below the proposed ultimate pit limit and there is no possibility of ground water puncture during the plan period, ground water quality will not be deteriorated.

vii) Acid mine drainage

Acid mine drainage is not expected in this iron ore mine due to absence of acid forming minerals.

viii) Surface subsidence

Opencast mining continues in the M.L area. Hence, question regarding surface subsidence does not arise.

ix) Socio-economics

Socio-economic profile of the study area (5km radius of M.L area) has been presented in Para-8.1 under heading Human settlements. This Gorumahisani Iron Ore Block of Ghanashyam Misra & Sons Pvt. Ltd. is located in backward region surrounded by the hills and forests. Agriculture is not suitable because of infertile soil, hilly topography and lack of irrigation. Local people mostly depend upon the mining and allied activities. The mine has been operated since a long back. Lessee has been providing social amenities for local villagers, most of whom are poor people. Therefore, mining operation in this area has provided positive impact / benefits on the living condition of the local inhabitants in the following manner:

As proposed in Para-7b), there will be direct engagement of 550 persons for mining activity. Indirect engagement may be three to five times. The project will provide increased requirement of iron ore for the steel and sponge iron plants which will provide direct as well as indirect employment of a large number of workers in the region and technical as well as management personnel on merit basis in the Nation. The project will add adequate amount of revenue to the State's exchequer.



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x) Historical monuments etc.

There are no historical monuments within 5 Km radius of the M.L. area. Measures, therefore, in this respect is not necessitated.

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

Environmental monitoring of environmental domains like air and water will be continued during the life of the mine. The monitoring proposal has been proposed to be as follows:

| Environmental Domains | Pollutants | Parameters | Location | Yearwise Frequency of Monitoring |
|---|---|---|---|---|
| Air | Dust/ Particulate Matter | $PM_{10}$, $PM_{2.5}$ in $\mu g/m^3$ | Two (2) stations in core zone (M.L area) and 2 locations at nearest village sites. | 8 hourly, twice in a week and 4 weeks in a season and 4 seasons in a year in day time. |
| | Fumes | $SO_2$, $NO_x$ and CO in $\mu g/m^3$ | | |
| | Fugitive Emissions | SPM in $\mu g/m^3$ | | |
| | Heavy Metals | As per EC/ CTO order | | |
| Water | Surface water | As per IS:2296 | Two (2) locations at upstream as well as downstream of nearby nalas. | -do- |
| | Ground water | As per IS:10500, 2012 | Two (2) locations at bore well in the M.L area and tube well of nearest village. | -do- |
| Noise | --- | Noise level in dB(A) | Two (2) stations in core zone (M.L area) and 2 locations at nearest village sites. | 8 hourly, twice in a week and 4 weeks in a season and 4 seasons in a year in day time from 6 AM to 10 PM and in night time from 10 PM to 6 AM. |

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

Since there is no possibility of exhaust of iron ore in this opencast mine during plan period, reclamation cannot be carried out. The land to be degraded by way of mining / excavation and reclamation to be done against the land degradation at the end of lease period are as follows:

| Land Degradation/ Rehabilitation | As at present (ha) | As at the end of plan period (ha) | As at the end of lease period (ha) |
|---|---|---|---|
| Land under mining / excavation | 67.835 | 67.835 | 68.071 |
| Reclamation & Rehabilitation | --- | --- | 68.071 |

8.3.2 Topsoil Management: The topsoil available at the site and its utilization may be described.

There will be no generation of topsoil since opencast mine will be developed mostly towards depth.

8.3.3 Tailings Dam Management: The steps to be taken for protection and stability of tailing dam, stabilization of tailing material and its utilization, periodic de-silting measures to prevent water pollution from tailings etc, arrangement for surplus water overflow along with detail design, structural stability studies, the embankment seepage loss into the receiving environment and ground water contaminant if any may be described.

There is no proposal for commissioning of beneficiation / washing plant in the lease area. Tailings slimes/tailings will be not generated due to absence of wet processing in the M.L area. Hence, tailing dam construction and management are not necessarily required. Due to dry processing (crushing and screening), there will be generation of iron fines which will be sold as per the demand.

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

Acid mine drainage is not expected (ref: Para-8.2 vii) and mitigating measures is not necessitated.

8.3.5 Surface subsidence mitigation measures through backfilling of mine voids or by any other means and its monitoring mechanism.
*The information on protective measures for reclamation and rehabilitation works year wise may be provided as per the following table.*

Surface subsidence is not expected due to opencast mining.

8.3.6 Summary of year wise proposal

The information on protective measures for reclamation and rehabilitation works year wise has been provided as follows:

| Items | Details | 2020-21 | 2021-22 | 2022-23 | 2023-24 | 2024-25 |
|---|---|---|---|---|---|---|
| Dump management | Area to be afforested (ha) | | | 0.500 | 0.500 | 0.500 |
| | No of saplings to be planted | | | 1250 | 1250 | 1250 |
| | Cumulative no of plants | | | 1250 | 2500 | 3750 |
| | Cost including watch and care during the year (Rs.) | | | --- | --- | --- |
| Management of worked out benches | Area available for rehabilitation (ha) | --- | --- | --- | --- | --- |
| | Afforestation done (ha) | --- | --- | --- | --- | --- |
| | No of saplings to be planted in the year | --- | --- | --- | --- | --- |
| | Cumulative no of plants | --- | --- | --- | --- | --- |
| | Any other method of rehabilitation (specify) | --- | --- | --- | --- | --- |
| | Cost including watch and care during the year | --- | --- | --- | --- | --- |
| Reclamation and rehabilitation by backfilling | Void available for Backfilling (L x B x D) pit wise /stope wise (ha) | | | --- | --- | --- |
| | Void filled by waste / tailings (ha) | | | --- | --- | --- |
| | backfilled area to be afforested | | | --- | --- | --- |
| | Rehabilitation by making water reservoir | --- | --- | --- | --- | --- |
| | Any other means (specify) | --- | --- | --- | --- | --- |
| Rehabilitation of waste land within lease | Area available (ha) | --- | --- | --- | --- | --- |
| | Area to be rehabilitated | 0.5 ha | 0.5 ha | --- | --- | --- |
| | Method of rehabilitation | Plantation | Plantation | Plantation | Plantation | Plantation |
| Others (protective works around waste dump) | Retaining wall | 350m x 2m x 2m | 2095m x 2m x 2m | Maintenance | Maintenance | Maintenance |
| | Garland drain | 300m x 1m x 2m | 1695m x 1m x 2m | -do- | -do- | -do- |
| | Settling tank (5 nos.) | --- | 10m x 5m x 5m | -do- | -do- | -do- |

**8.4 Disaster Management and Risk Assessment:** This may deal with action plan for high risk accidents like landslides, subsidence, flood, inundation in underground mines, fire, seismic activities, tailing dam failure etc. and emergency plan proposed for quick evacuation, ameliorative measures to be taken etc. The capability of lessee to meet such eventualities and the assistance to be required from the local authority may also be described.

Disaster management and risk assessment will be undertaken in respect of an accident causing loss of life or serious bodily injury or a permanent collapse of any part of the working or dump as applicable to opencast mine as per Mines Act, 1952. Various types of likely disasters in opencast mine, risk assessment and disaster management before, during and after disaster have been presented as follows:

| Disaster | Risk Assessment | Disaster Management | | |
|---|---|---|---|---|
| | | Action plan / preventive measures (before disaster) | Emergency plan for evacuation (during disaster) | Ameliorative measures (after disaster) |
| Landslides / slope failure | No slope failure is observed in the mine or dump till date. | **Quarry / Pit:** Mining will be carried out in a top downward manner without creating any overhang or undercut in the benches. Width of the bench will be always maintained more than the height. Overall quarry slope angle will be maintained less than $45^0$ with the horizontal.<br><br>Waste will not be allowed to accumulate on the bench floors or quarry top.<br><br>Slope failure warnings signs like cracks, fissures etc. developed in quarry benches will be identified.<br><br>Cracks and openings, if developed, at the bench face / slopes will be dressed to maintain safe condition of the faces.<br><br>**Waste Dump:** Waste dump terraces slopes will be maintained at the angle of repose / natural angle of the waste materials.<br><br>Dump terraces slopes will be kept under regular supervision for identification of cracks, proper terracing etc.<br><br>Proper drainage system will be developed to channel rain water away from the slope without affecting slope ability or causing soil erosion from the waste dump. | Emergency procedures and diagrams will be located within office building showing the location of emergency exits and emergency equipments (fire extinguisher etc.) as well as maps showing evacuation routes from pit bottom to pit top.<br>Employee designated to assist quick evacuation will be trained in the complete work place lay out and various alternative escape routes. There will be alarm on emergency. On hearing an evacuation alarm, all activities will be ceased and personnel as well as valuables will be secured.<br><br>All will be warned to run away as quick as possible from the path of landslide / slope failure or flow of waste materials. | Men and materials will be recovered if buried under the debris / earth.<br><br>Hospital will be informed to handle the victims or causalities, if any.<br><br>Safety aspects will be audited by the Mines Manager regularly. |

| | | | | |
|---|---|---|---|---|
| | There is risk of fire at the oil depot, electrical substation / transformer, power line, electrical apparatus, machinery, belt conveyor etc. | and materials from fire hazard at any time if small scale fire occurs in the office, residential buildings etc.<br><br>Explosion proof / intrinsically safe electrical equipments such as transformers, motors etc will be fitted with screening / conveying system.<br><br>In case of electrical fire, the personnel on duty shall shut down the electrical fire and inform the shift-in-charge.<br><br>Diesel will be stored in a licensed underground storage tank and filled in the machines by educated and trained workers. | materials from fire hazard.<br><br>In case of any fire, whosoever notices will sound the alarm and informed the shift-in-charge and security personnel who will take steps to evacuate all men and materials except trained personnel of fire fighting.<br><br>The fire brigade will be summoned to deal with the emergency. Concerned district officials will also be informed regarding the situation.<br><br>The fire area will be condoned off till the fire is fully extinguished and remain so until all wreckage and debris is cleared away. | restored.<br><br>The clearance for restoration of power will be given only by the shift-in-charge.<br><br>Personnel trained in dealing with fire will be summoned.<br><br>In case of serious fire and depending upon the gravity of the situation, the mine manager may be summoned to assume charge. |
| Explosion / blasting | Magazine has been constructed as per the plan approved by the explosive department. | Explosive will be kept well away from the work zone in the well designed licensed buildings called magazines as per as the Indian Explosive Act.<br><br>Adequate safety zone will be provided around the magazine as per the explosive rule depending upon the capacity of magazine.<br><br>All dry vegetation within 15m radius will be cleared. Temperature inside the magazine will be monitored mainly in summer season to guard against the spontaneous fire. | No one will be allowed to trespass in to the spot during explosion / blasting. | Victims will be rescued.<br><br>Hospital will be informed to handle the victims or causalities, if any. |



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| | | Lightening arrester will be installed on the magazine roof.<br><br>Magazine will be kept under proper watch & ward and tight security to prevent explosives from pilferage or theft and keep the explosives in safe & secure. | | |
| Seismic activities | Map of seismic zone in India indicates that Odisha falls under seismic zone-I, II & III. In Odisha, minor earth quakes have been felt many often but none is severe. | Earthquake is a natural phenomenon which cannot be prevented. | The people will be kept alert against the consequences and subsequent earthquakes. | Victims will be rescued<br><br>Hospital will be informed to handle the victims or causalities, if any. |
| Tailing dam failure | There is neither existence of beneficiation plant nor proposal for commissioning of beneficiation plant in the M.L area in plan period which generates tailings. Therefore, tailing dam is not necessarily required and the question of failure of tailing dam does not arise. | Not necessarily required. | Not necessarily required. | Not necessarily required. |
| Vehicular accidents | Accident may happen during the operation as well as movement of the machines or vehicles. | Excavator, trucks / tippers and four wheelers will be driven by the licensed drivers / operators.<br>No one will be allowed to drive or operate the vehicles / machinery in an alcoholic / intoxicated stage.<br>No one will be allowed to ride in to the moving vehicles.<br><br>Overloading of ore or waste will be not allowed at all. | First-aid treatment will be provided to the victim immediately after accidents and before hospitalization by the trained first-aid certificate holder.<br><br>Ambulance will be provided and the victims will be carried to the nearest hospital immediately. | Hospital will be informed to handle the causalities, if any.<br><br>Information will be given to the concerned officer of the DGMS and District Officials in case of fatal accidents. |



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|---|---|---|---|---|
| | | Vehicles / machines will be maintained and examined regularly by the trained personnel.<br>Vocational training will be provided as per the DGMS guidelines.<br><br>Skilled and trained spotters will be appointed at the loading and unloading points to prevent the collision of vehicles.<br><br>Haul road will be properly maintained with the provision of parapet wall, guard wall, road signs at strategic points etc. | | |

**The capability to meet such eventualities and assistance to be required from the local authorities:** Lessee is capable to meet such eventualities. Employment potential for the area will be only 240 numbers. In case of emergency, Lessee will need the help of nearest state fire department located at Gorumahisani for rescue if any high risk accident occurs in the area which will be adequate for the above employment potential. Designation and address of the person with respective responsibility in respect of disaster management and risk assessment has been stated as follows:

| Name | Designation | Address | Contact No. | Responsibility |
|---|---|---|---|---|
| Sri B.K Nayak | Mines Manager (as incident controller) | AT/PO: Gorumahisani, Via: Tatanagar (S.E.Rly)<br>Dist: Mayurbhanj, State: Odisha<br>E-mail: gmspl2011@gmail.com<br>Phone: 06794-274219 / 274204,<br>Fax: 06794-274380<br>Fax: 06794-274380 | 7682821901 | Overall administrative & supervision of the rescue work. Information to the fire brigade to deal with emergency and concerned district officials. |
| Sri Anup Samanta | Mining Engineer-in-charge (as site controller) | -do- | 7682821902 | Disaster control and reporting to the seniors regarding the situation. Mob control and information to the security personnel as well as own foremen, workers to evacuate all the persons from the area in case of any disaster except the fire brigade personnel. |
| Sri Minaketan Naik | Geologist -in-charge (as emergency controller) | -do- | 9437597145 | Providing facility for rescue, fire fighting, medical, transport and communication. Mobilization of Security Personnel for controlling fire at ground level. |



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**SAFETY MEASURES FOR MINER'S HEALTH:** As per recommendation of 10th National Conference in the year 2007 on safety in mines, all the workers are / will be medically examined as per the prescribed standard of DGMS by the ILO (International Labour Organization) through the trained Doctors. Periodical medical examination of 1/5th of total strength of workers will be done every year. Besides above, health camps will be organized for health check up of the workers.

Protective wears such as helmet, shoes, gloves, goggles etc. will be provided to the workers adequately.

Air borne dust will be suppressed at the source by wetting of haul road, ore stack yard etc.

**8.5 Care and maintenance during temporary discontinuance:** An emergency plan for the situation of temporary discontinuance due to court order or due to statutory requirements or any other unforeseen circumstances may indicate measures of care, maintenance and monitoring of status of discontinued mining operations expected to re-open in near future.

Life of the mine is 9 years as on date (ref: para-2.0A.f). However, temporary discontinuance during the course of mining may not be ruled out due to unforeseen causes such as:

- Court order
- Accidents in the Mine
- Local issues
- Statutory Requirements
- Natural Calamities
- Any other unforeseen circumstances

An emergence plan is necessary to re-open, if the mine is temporarily discontinued. The measures proposed for care & maintenance during temporary discontinuance are as follows:

- Intimation to local mine and legal administrative authorities concerned (IBM, DGMS, Directorate of Mines, Circle Mining Office etc.) regarding temporary discontinuance.
- Explanation to the local community regarding the cause of temporary discontinuance and possibility of reopening of mine in future.
- Listing and proper storing of the Machines, Materials, Assets and Documents.
- Care and maintenance of machinery as per the machine operating manuals.
- Employment and tightening of the security for proper watch and ward to keep the machine and materials in safe and secure.
- Repair and maintenance of haul road.
- Regular monitoring of Air, Water, Noise etc. in the permitted area.



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- Monitoring of status of mining operation in respect of bench height, width, individual bench slope angle, overhang, undercut or any other parameters whose levels either in form of higher side or lower side is dangerous for further mine working.
- Preparation of plan and sections of discontinued mining operation.
- Projection of benches in plan and sections which is safe for further working.
- Formation of safe benches as per plan and sections.
- Intimation to the concerned authorities for reopening once the mine is risk free.

## 8.6 Financial Assurance:

*The financial assurance is required to be submitted in form of a Bank Guarantee as stated in Rule 27(2) of Mineral Conservation and Development Rules, 2017* ***for the period expiring at the end of validity of the document.*** *The amount calculated for the purpose of Financial Assurance is based on the CCOM's Circular no. 4 dated 2006 as below.*

*Table indicating the break-up of areas in the Mining Lease for calculation of Financial Assurance:*

| Sl. No. | Type of land use | Area put on use at start of plan (in ha) | Additional requirement during plan period (in ha) | Total (in ha) | Area considered as fully reclaimed & rehabilitated (in ha) | Net area considered for calculation (in ha) |
|---|---|---|---|---|---|---|
| 1 | Area under excavation | 67.835 | --- | 67.835 | --- | 67.835 |
| 2 | Storage for Topsoil | --- | --- | --- | --- | --- |
| 3 | Overburden dump | 19.500 | 5.505 | 25.005 | --- | 25.005 |
| 4 | Mineral Storage (ROM ore and mineral rejects) | 14.134 | 1.326 | 15.460 | --- | 15.460 |
| 5 | Infrastructure (administrative office, quarters, canteen, store room etc.) | 22.852 | --- | 22.852 | --- | 22.852 |
| 6 | Roads | 13.000 | --- | 13.000 | --- | 13.000 |
| 7 | Railways | --- | --- | --- | --- | --- |
| 8 | Tailing Pond | --- | --- | --- | --- | --- |
| 9 | Effluent Treatment Plant | --- | --- | --- | --- | --- |
| 10 | Mineral Separation Plant (screening & crushing units) | 2.500 | --- | 2.500 | --- | 2.500 |
| 11 | Township area | --- | --- | --- | --- | --- |
| 12 | Others (Retaining wall, garland drain & settling tank etc.) | 0.500 | 0.250 | 0.750 | --- | 0.750 |
| --- | **Total** | **140.321 (A)** | **7.081 (B)** | **147.402 [C = (A+B)]** | **--- (D)** | **147.402 [E = (C-D)]** |

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

"---" is mentioned where the land is not used in the above categories.



(S.C. Nayak)
Qualified Person

Though land use table for financial assurance as well as the present status of reclamation and rehabilitation has been prepared as above as per IBM manual on appraisal of Mining Plan 2014, financial assurance is not applicable as per 27(1) of MCDR, 2017 since this Gorumahisani mining lease area has been granted through auction wherein Mine Development and Production Agreement (MDPA) has been signed between the Lessee and the Govt. of Odisha (ref: Annexure-19).

*The above mentioned actions have been taken to be stated clearly in the mine closure plan. A certificate duly signed by the lessee to the effect that said closure plan complies all statutory rules, regulations, orders made by the Central or State Government, statutory organizations, court etc. have been taken into consideration and wherever any specific permission is required, the lessee will approach the concerned authorities. The lessee may also give an undertaking to the effect that all the measures proposed in this closure plan will be implemented in a time bound manner as proposed.*



**(S.C. Nayak)**
Qualified Person

GHANASHYAM MISRA & SONS PVT. LTD.

Mines off. : P.O. Gorumahisani, Dist Mayurbhanj, Odisha. Via-Tatanagar (S.E.Rly)
Gram : Ghanashyam Misra, Gorumahisani-757042
Phone : +91 6794 274219 / 274204, Fax : +91 6794 274380
E-mail : gmspl@mail.com, CIN : U10200WB1979PTC032365

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## CONSENT LETTER / UNDERTAKING / CERTIFICATE FROM THE LESSEE

01. The Mining Plan in respect of **Gorumahisani Iron Ore Block** of **M/s Ghanashyam Misra & Sons Pvt. Ltd,** 7, Waterloo Street, 2nd Floor, Kolkata-700069, West Bengal over an area of 349.709 hectares (as per DGPS) / 349.50 hectares (as per ROR) in villages Kuleisila, Badamouda, Sanamouda, Sundhal, Balitangiri, Nodhabani and Gorumahisani R.F, Tahasil Rairangpur, District Mayurbhanj, Odisha submitted under Rule 16(1) of MCR, 2016 has been prepared by the Qualified Person, Sri S.C. Nayak under Rule 15 of MCR, 2016.

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

**Subash Chandra Nayak,**
MINESKETCH Consultants (P) Ltd.,
Flat No.205, Bhagwan Tower, Cuttack Road, Bhubaneswar-751006
Telephone: 0674-2573607 / 2950508, Mobile: 7978439350 / 9438471176
E-mail: mcpl762005@gmail.com / minesketch2005@gmail.com

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

**02.** It is certified that the **CCOM's Circular No.2/2010** will be implemented and complied with when an authorized agency is approved by the State Government.

**03.** It is certified that the **Progressive Mine Closure Plan** submitted under Rule 23 of MCDR, 2017 of **Gorumahisani Iron Ore Block** of M/s Ghanashyam Misra & Sons Pvt. Ltd, over an area of 349.709 hectares (as per DGPS) / 349.50 hectares (as per ROR) in villages Kuleisila, Badamouda, Sanamouda, Sundhal, Balitangiri, Nodhabani and Gorumahisani R.F, Tahasil Rairangpur, District Mayurbhanj, Odisha complies with all statutory Rules, Regulations, Orders made by the Central or State Government, Statutory Organization, Court etc. which have been taken into consideration and wherever any specific permission is required, the **Lessee** will approach the concerned authorities.

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

**04.** The provisions of Mines Act, Rules and Regulations made there under have been observed in the **Mining Plan** over an area of 349.709 hectares (as per DGPS) / 349.50 hectares (as per ROR) in **Mayurbhanj** district in Odisha State belonging to **Gorumahisani Iron Ore Block** and where specific permissions are required, the **Lessee** will approach the DGMS. Further, standards prescribed by DGMS in respect of miners' health will be strictly implemented.

**Signature of Lessee**

Place : Gorumahisani
Date : 15/01/2021

**(Sourav Misra),**
Nominated Owner

**S.C. Nayak,** M. Tech, ISM
Mining and Environmental Consultant
IBM REGN.NO.RQP/CAL/211/95/A
DM REGN.NO.RQP/OD/029/2015

**MINESKETCH Consultants (P) Ltd**
Flat No.205, Bhagwan Tower, Cuttack Road, Bhubaneswar-751006
Phone: (0674) 2573607 / 2950508, Mob: 7978439350 / 9438471176
E-mail: mcpl762005@gmail.com / minesketch2005@gmail.com

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Letter No.:.....

Date :18.01.2021

## CERTIFICATE FROM THE QUALIFIED PERSON

Certified that the provisions of the Mineral Conservation & Development Rules, 2017 have been observed in the **Mining Plan** (Submitted Under Rule 16(1) of MCR, 2016) along with **Progressive Mine Closure Plan** (Submitted Under Rule 23 of MCDR, 2017) in respect of **Gorumahasani Iron Ore Mine** over an area of **349.709 hectares** (as per DGPS) / **349.50 hectares** (as per ROR) in villages Kuleisila, Badamouda, Sanamouda, Sundhal, Balitangiri, Nodhabani and Gorumahisani R.F, Tahasil Rairangpur, District Mayurbhanj, Odisha of **M/s Ghanashyam Misra & Sons Pvt. Ltd**, 7, Waterloo Street, 2nd Floor, Kolkata-700069, West Bengal and wherever specific permissions are required the Lessee will approach the concerned authorities of Indian Bureau of Mines.

Certified that the information furnished in the **Mining Plan** and **Progressive Mine Closure Plan** is correct to the best of my knowledge.

**Signature**

Place : Bhubaneswar
Date : 18.01.2021

**(S.C. Nayak)**
**Qualified Person**